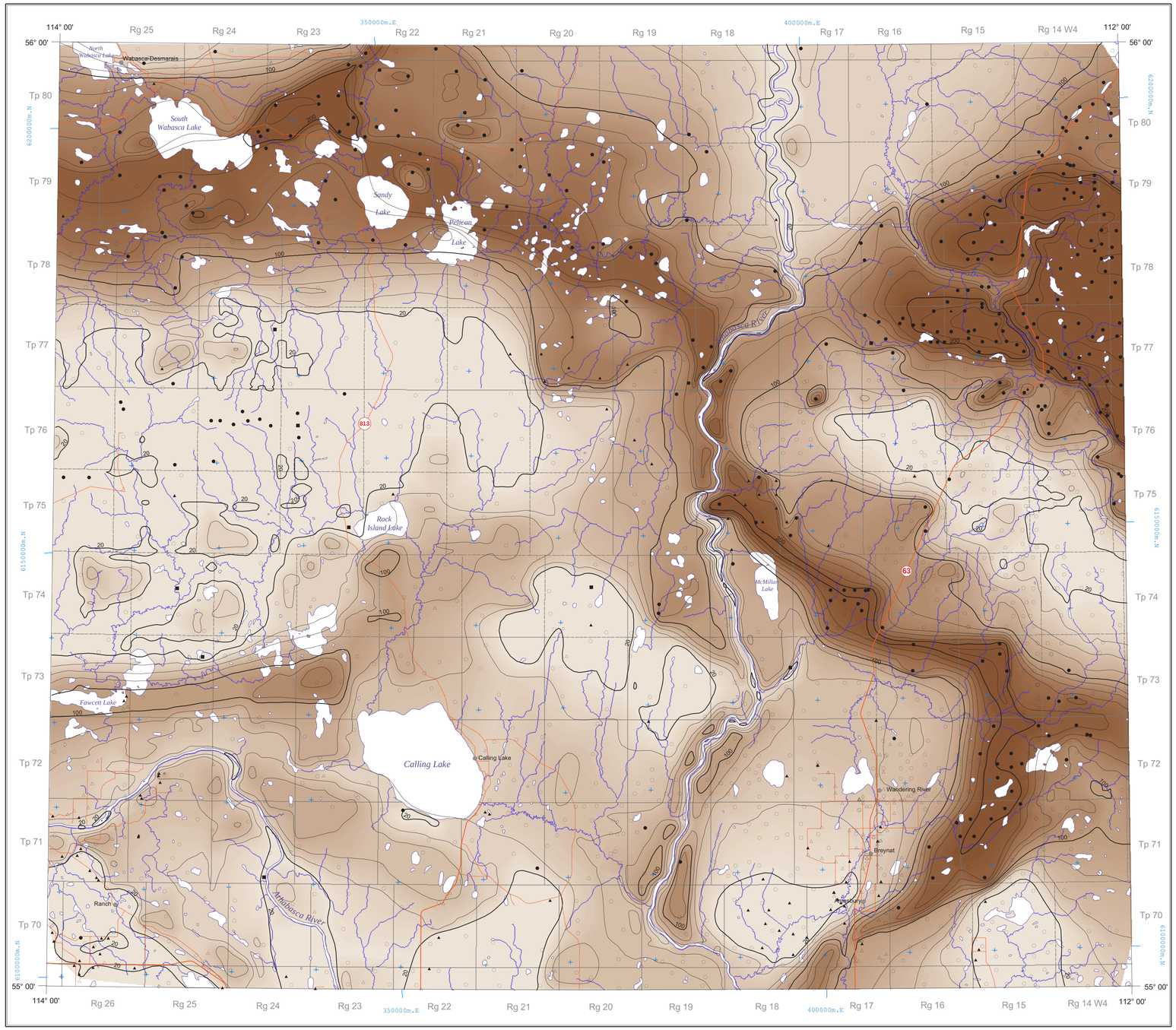
NTS 83P
Drift Thickness



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Map 255

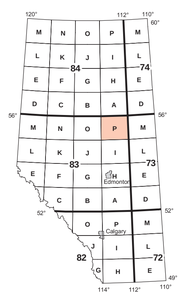
Drift Thickness of Pelican River Area, Alberta (NTS 83P)

Geology by: J.G. Pawlowicz and M.M. Fenton

Scale 1:250 000

0 5 10 20 30 40 Kilometres
0 3 6 12 18 24 30 Miles

Projection: Universal Transverse Mercator, Zone 12
Datum: North American Datum, 1983



Data

Petrophysical logs were the primary source of information used for constructing the bedrock topography. A suite of the common well logs (gamma, resistivity, spontaneous potential, density, neutron, sonic and calliper) were useful in making the pick for top of bedrock; however, the gamma and resistivity logs proved to be the most useful. The drift typically displays a lower gamma response and higher resistivity response than the underlying bedrock. Other sources of data were water well lithologs, mineral exploration testholes and information on outcrop locations.

Picking the bedrock surface was difficult in some areas where data were sparse. Many of the log traces were absent from the upper part of the hole because of surface casing. The depth of surface casing set in bedrock was used for an estimate of maximum drift thickness in places with few data. Conversely, many water wells did not penetrate deep enough to intersect the bedrock, so only a minimum drift thickness value could be used.

Interpretation

The physiography of the Pelican map area has been defined by Pettapiece (1986) and a modified version of these subdivisions is shown on the accompanying digital elevation model (Figure 1). The east-west trending uplands of the Pelican Mountains, the Amadou Hills and May Hills extend across the central portion of the area. The Wabasca Plain is located to the north. The Wandering River Plain is situated in the southeast and to the southwest are three plains: the Fawcett Plain, the Thorhild Plain and the Cross Lake Plain. The Athabasca River Valley forms a major north-trending feature in the eastern half of the area and a small segment of the river is also present in the southwest, forming the northern boundary of the Cross Lake Plain. The subcropping bedrock in this region consists of the Cretaceous Wapiti and Labiche formations (Hamilton et al., 1999; Campbell et al., 2002). Figure 2 shows the bedrock topography of the Pelican area, from Alberta Geological Survey Map 254 (Pawlowicz and Fenton, 2004).

The drift thickness interpretation was made after completion of the bedrock topography contouring. The bedrock topography contours were initially generated from bedrock surface picks using a computer-contouring program with some subsequent modifications by hand. The bedrock topography surface, in a digital grid format, was subtracted from the digital elevation model of the present-day surface. The resulting grid was then contoured to form an isopach map of the drift. Preliminary versions of this map were released as Alberta Geological Survey (AGS) publications by Pawlowicz and Fenton (2001) and Andriashek et al. (2001).

The drift thickness map shows the variation in thickness of unconsolidated sediment lying between the bedrock surface and the present-day land surface, and complements the regional drift thickness map of Alberta (Pawlowicz and Fenton, 1995). The thickness of the drift varies from less than 20 metres in uplands, such as the Pelican Mountains, to a little over 260 metres in the Wiau Valley in the northeast part of the map area. The thickest drift occurs within the major bedrock valleys: the Wiau Valley and the Leismer Valley in the northeast, and the north-trending Amesbury Valley in the central portion of the area. The Fawcett Valley in the southwest is filled with only a moderate thickness of drift.

The stratigraphy within the drift is poorly known. Preglacial gravels discontinuously cap the bedrock on the Pelican Mountains and are generally mantled by till less than five metres thick (Campbell et al., 2002). Reworked preglacial gravels beneath glacial sediments were also found, to a lesser extent, in the Fawcett Plain. Coreholes drilled within map area 83P by the Alberta Geological Survey indicate that in at least some places a multi-layer sequence of till and non-till sediments have been preserved, but there are insufficient data for correlation of individual till sheets (Pawlowicz et al., 2001). In corehole P00-1, located north of Calling Lake, the upper portion of both the upper and lower till sheets include a weathered, oxidized horizon. The preservation of this weathering horizon on the lower till indicates a major, nonglacial weathering interval prior to the glaciation that deposited the upper till. A 145-metre thick valley-fill sequence of drift was penetrated in AGS corehole P00-7 before intersecting the shale bedrock in the Amesbury Valley near Wabasca. The upper 50 metres of the hole is till, underlain by a thick sequence of glaciolacustrine silt and clay from 50 to 136 metres. Glaciolacustrine rhythmites (probably varves) were intersected in this unit. The vertical variation in thickness of the layers within each couplet indicates changes in the depositional conditions in the lake, because of either changes in water depth and/or changes in the position of the ice margin. Glacial gravel about seven metres thick forms the lowermost unit of the drift in hole P00-7, which directly overlies the bedrock. Previous stratigraphic work from more detailed investigations to the east (Andriashek and Fenton, 1989; Andriashek, 2003) shows several glacial and preglacial units comprising the drift.

FEATURES LEGEND

Data sources

- Petroleum well, bedrock surface picked
- Petroleum well, bedrock surface above logged interval
- Water well, bedock surface picked
- Water well, bedrock surface below bottom of well
- Section, bedrock exposed
- Section, bedrock not exposed
- Elevation contour (masl) contour interval - 20m

Drift thickness

260 m
200
140
80
20 m

BASEMAP LEGEND

- City/Town
- Road - gravel
- Road - paved
- Township/range - surveyed
- Township/range - unsurveyed
- UTM, Zone 12 Grid (450000m.E)
- River
- Lake

Figure 1. Present day surface topography and physiography

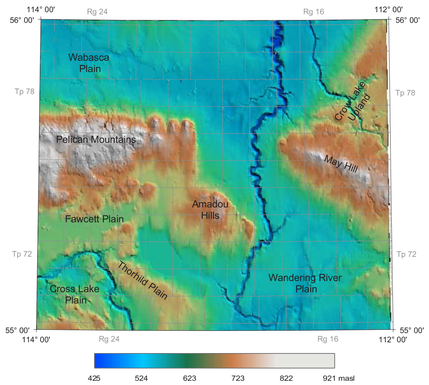
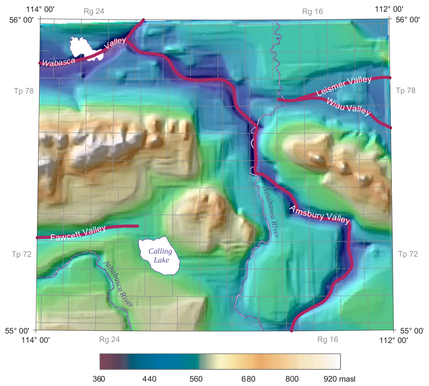


Figure 2. Bedrock topography



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EUB Alberta Energy and Utilities Board | AGS Alberta Geological Survey