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**BIBLIOGRAPHY AND GUIDE TO  
TRIASSIC PETROLEUM GEOLOGY,  
WESTERN CANADA BASIN - ON DISKETTE**

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(with contributions from D.W. Gibson)**

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**Bibliography and guide to Triassic petroleum geology,  
Western Canada Basin - on diskette**

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**ABSTRACT**

This open file provides a bibliography and guide that introduces the petroleum geology and literature of the Western Canada Basin Triassic System. The open file consists of a 3 1/2" diskette with the same information presented in three file formats: ASCII, Wordperfect 5.1 and Microsoft Word5 as well as a paper copy of the text with figures. The diskette files contain a bibliography of over 300 references, categorized by region and topic, along with a short explanatory text and three figures. The principal petroleum references are highlighted.

**INTRODUCTION**

This open file covers the Triassic of the cratonic platform in the Interior Plains and adjacent platformal and miogeoclinal deposits in Foothills and Front Ranges outcrop. The note does not cover the Cordilleran Triassic, most of which belongs to accreted terranes that were not part of Triassic North America.

**TRIASSIC GEOLOGIC SETTING**

Triassic strata in the Western Canada Sedimentary Basin occur in three main regions (Fig. 1, see Barss et al., 1964; Carlson, 1968; Christopher, 1984; Gibson and Barclay, 1989). In northwestern Alberta and northeastern British Columbia, the basin called the Peace River Embayment occurs in the subsurface of the Interior Plains and in outcrop of the adjacent Rocky Mountain Foothills and Front Ranges. In southern Saskatchewan and southwestern Manitoba, the

Williston Basin occurs in the subsurface of the Interior Plains and contains possible Triassic strata.

The Peace River Embayment contains the thickest Triassic deposits and hosts the bulk of Triassic hydrocarbon resources (Fig. 2). Triassic Alberta Basin recoverable oil reserves are  $118.8 \times 10^6 \text{ m}^3$  (747 million barrels) in 105 oil fields and marketable gas reserves are  $263.6 \times 10^9 \text{ m}^3$  (9.4 TCF) in 217 gas fields representing about 4% and 8% of Western Canada oil and gas reserves, respectively (Podruski et al., 1988; Energy Resources Conservation Board 1990; Energy Resources Division 1990). The Triassic remains an active exploration target with significant potential as shown by drilling activity and discoveries at Spirit River (1983), Brassey (1987), Ring-Border (1988) and Sukunka (1989) fields. Petroleum plays consist of stratigraphic and structural traps within sandstone and coquina reservoirs of shoreline, tidal channel, shallow marine and aeolian origin and carbonate reservoirs of tidal flat and marine shelf origin.

Deposits here represent mainly clastic-evaporite sediments deposited in a shelf-shoreline-sabkha system within an arid mid-temperate to sub-tropical climatic setting. These strata were deposited as three major transgressive-regressive cycles (Fig. 3). The cycles are 100 to 100s of metres in thickness usually comprising one to three formations and represent third or fourth order "Depositional Sequences" and are composed of many, smaller shallowing-upward transgressive-regressive sequences.

Red bed strata of the Lower Watrous and Lower Amaranth formations occur in the Williston Basin and have been suggested to be either of Jurassic or Triassic age (Fig. 1). Oil occurs only in basal Amaranth sandstones at the Waskada, South Pierson and Coulter fields of southwestern Manitoba. These fields contain  $2.9 \times 10^6 \text{ m}^3$  recoverable oil reserves and represent 10% of Manitoba's oil reserves (18 million barrels; Manitoba Energy and Mines - Petroleum Branch, pers. comm., 1990).

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The bibliography contains over 300 references pertinent to stratigraphy and petroleum geology of the Western Canada Basin Triassic. This information will be released also on computer disks as a Geological Survey of Canada Open File.

The references are categorized by region of study, such as northern Alberta and B.C., southern Alberta and southeast B.C., Saskatchewan and Manitoba, and by topic, such as geochemistry, paleontology or bedrock geology. Papers in **bold type** are those considered essential reading for people

interested in petroleum geology of the Western Canada Basin Triassic. Reading of these selected papers should provide a balanced understanding of the Western Canada Triassic - papers excluded from this designation are not lesser papers - they would supplement such a reading or serve other purposes.

For additional references that cover a wider range of topics related to the Triassic, consult Barss et al., (1964), Gibson and Barclay (1989) and the lexicons of Hargreaves et al., (1960) and Glass (1990). The 1964 Geological Atlas of Western Canada Triassic and other chapters contain a thorough list of pre-1964 publications and bedrock geological maps of the Western Canadian Sedimentary Basin and the Canadian Cordillera (Barss et al., 1964; McCrossan and Glaister, 1964).

There are many bedrock maps that cover areas containing Triassic outcrop - this bibliography however cites only maps covering the main areas where Triassic strata are common and in particular focuses on outcrop in the Peace River region adjacent to the Triassic oil and gas fields. I have therefore ignored many bedrock maps that include, but do not focus on, Triassic strata.

**Note:** To assist in preparing future versions of this bibliography, I would appreciate hearing of any mistakes, omissions or more recent publications or any other comments (phone 403-292-7019 or 403-292-7000, fax 403-292-7034).

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## **II. FOOTHILLS BEDROCK GEOLOGY PAPERS COVERING THE PEACE RIVER EMBAYMENT REGION (NORTHWEST ALBERTA, NORTHEAST BRITISH COLUMBIA).**

Note: This list is intended to introduce the reader to the principal maps covering Triassic outcrop but is not exhaustive. Please consult Geological Survey of Canada libraries and publications offices for further information.

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#### FIGURE CAPTIONS

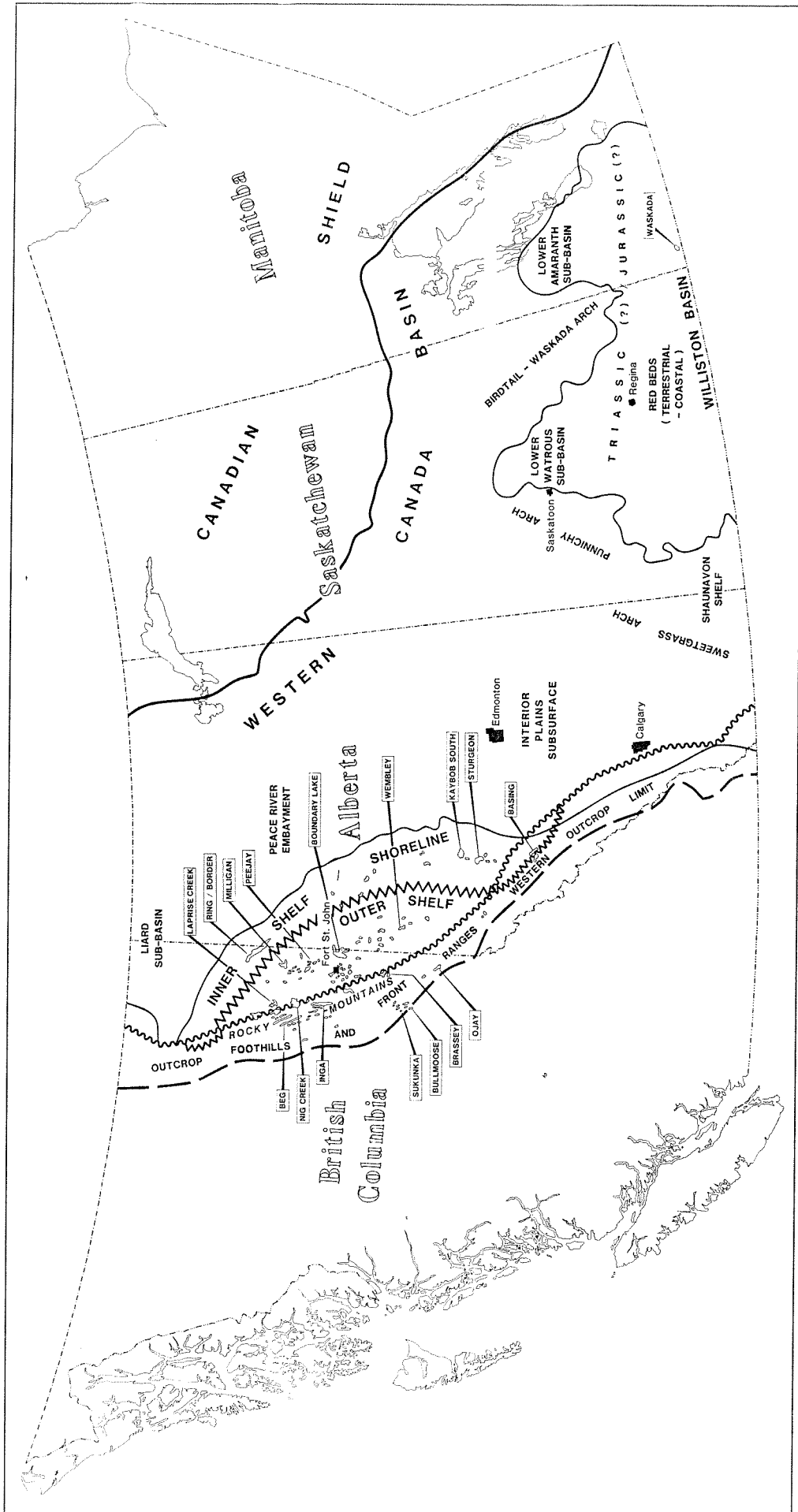
**Figure 1.** Western Canada Basin Triassic distribution and geologic setting. Inner shelf-outer shelf boundary sketched in Peace River Embayment - note that the boundary was here in Early Triassic, regressed westward in Middle and late Triassic and retreated eastward in latest Triassic (see T-R assemblages of Figs. 2, 3). Triassic oil and gas fields in black with principal fields labelled.

**Figure 2.** Stratigraphic model for Triassic strata in the Peace River Embayment (modified from Gibson and Barclay, 1989). The model displays the relations between Peace River Plains subsurface and Foothills outcrop nomenclature, displays the main depositional environments and also relates

the correlations and environments to three transgressive-regressive cycles.

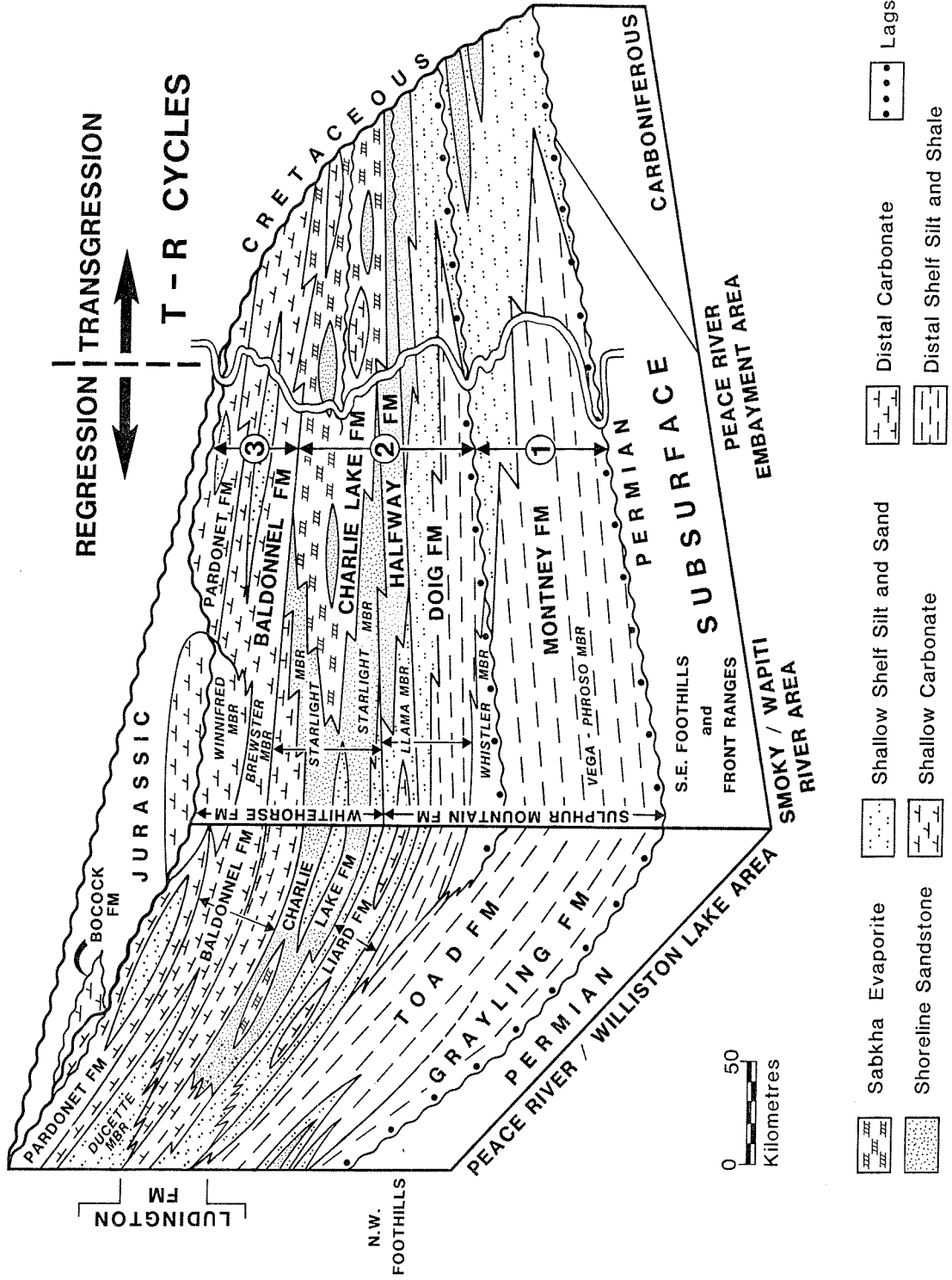
**Figure 3.** Nomenclature and correlation chart for Triassic strata in the subsurface and outcrop of the Peace River Embayment (modified from Gibson and Barclay, 1989).

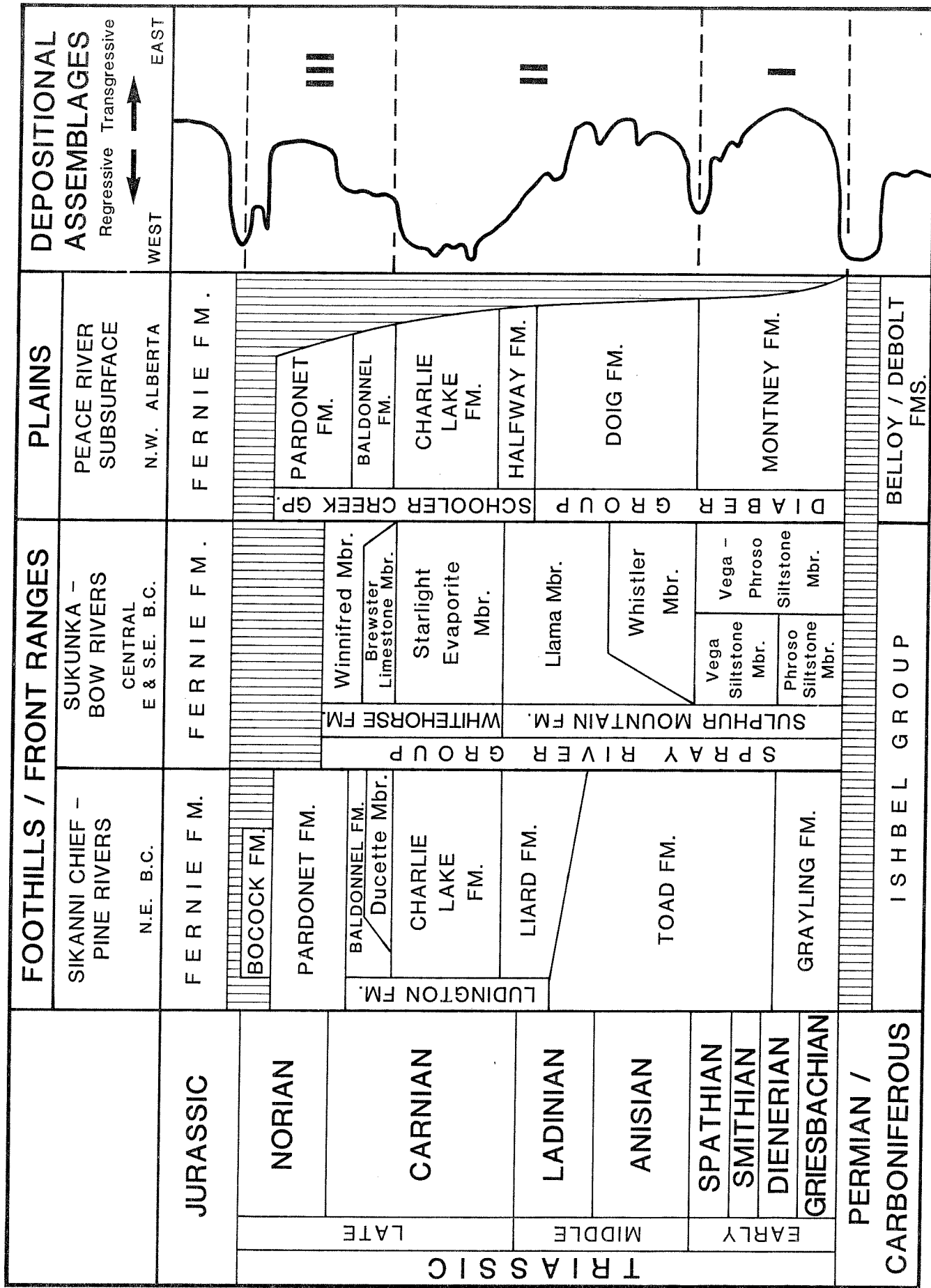




Barclay Fig. 1

# TRIASSIC STRATIGRAPHIC MODEL





Nomenclature and correlation chart of Triassic formations, members and depositional assemblages, Alberta Basin (modified from Gibson and Barclay, 1989).