Stratigraphy and Sedimentology of the Late Carboniferous Parrsboro Formation

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Introduction

A thick (approximately 10 km) succession of Late Carboniferous strata outcrops immediately south of the Cobequid Fault Zone in a narrow (7-15 km) belt that stretches approximately 180 km from Advocate Bay to Stellarton (Fig. 1). The Nova Scotia Department of Natural Resources and the Geological Survey of Canada are remapping much of this area on NTS map sheets 11E/05, 06, 07 and 10, at a scale of 1:10 000, to provide a better stratigraphic and structural framework for energy and mineral exploration.

The oldest Late Carboniferous strata in the mapped area belong to the Mabou Group which includes rocks of the West Bay and Londonderry formations. Lying disconformably on the Mabou Group are the coal-bearing strata of the Cumberland Group. The focus of this report is the Parrsboro Formation, the lowest stratigraphic unit of the Cumberland Group. The information presented is based on mapping north of Truro (North River area; Fig. 1) and examination of coastal exposures in the Parrsboro area. The report reviews previous work on the Parrsboro Formation and provides new stratigraphic and sedimentological information.

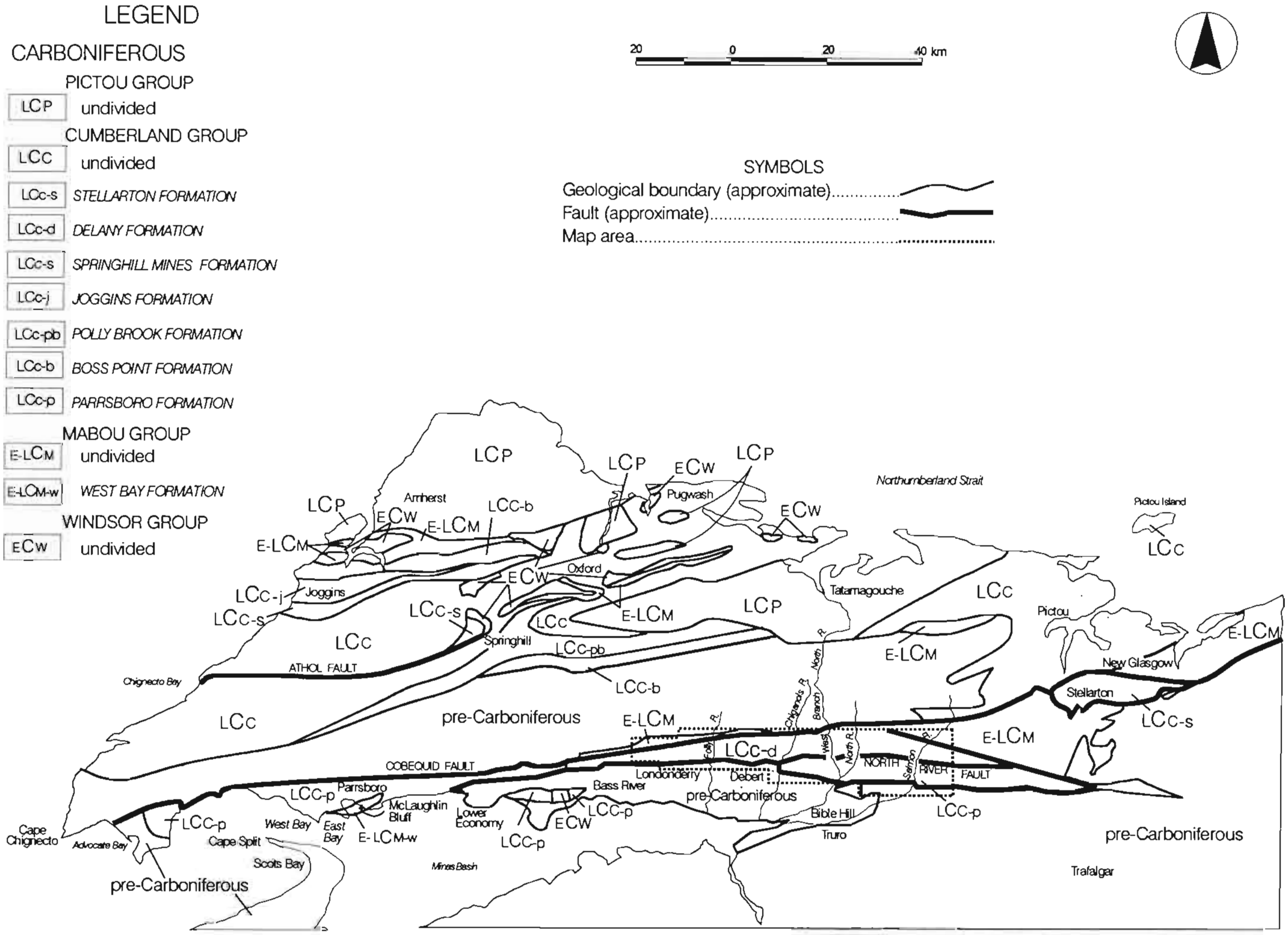

Figure 1. Distribution of Late Carboniferous strata south of the Cobequid Fault and location of study areas discussed in text.

Previous Work

The earliest regional mapping of Carboniferous strata south of the Cobequid Fault was undertaken by Fletcher (1902, 1904, 1905). He did not distinguish the Parrsboro Formation as a regionally mappable unit and variously included it as part of either his 'Devonian' Riversdale-Union Formation or his 'Early Carboniferous' Limestone Formation. Ami (1903) recognized that much of the strata in the Parrsboro area described by Fletcher (1902) as Early Carboniferous was in fact Late Carboniferous in age. Hyde (1915) agreed with Ami (1903) and introduced the name Parrsboro Formation to be used to describe these rocks. In addition Hyde (1915) recognized that the Parrsboro Formation unconformably overlies what is now recognized as the West Bay Formation of the Mabou Group.

Bell (1927) described the Parrsboro Formation as forming the upper part of the Riversdale Series. He also included strata equivalent to the underlying West Bay Formation (ie. Harrington River Formation) in the Riversdale Series, but later reassigned it to the underlying Canso Group. Bell (1944) discontinued the use of Riversdale Series in favour of the Riversdale Group. The Riversdale Group was defined as including all strata (generally of Westphalian A age) above the Canso Group and below the Cumberland Group. In the Parrsboro area this left the Parrsboro Formation as the only stratigraphic unit within the Riversdale Group. Bell (1944) used fossil plants and bivalves to assign a Westphalian A age to the Parrsboro Formation and suggested that the Riversdale 'Formation' as used by Fletcher (1902, 1904, 1905) was no longer a valid stratigraphic unit.

Weeks (1948) mapped Carboniferous strata south of the Cobequid Fault Zone from Folly River to Lower Economy. He recognized fault bounded blocks of Riversdale Group, but did not assign any of the strata to the Parrsboro Formation. Stevenson (1958), following on the work of Weeks (1948), extended mapping of the Carboniferous adjacent to the Cobequid Fault as far west as the Lower Economy area. Stevenson (1958), like Weeks (1948), recognized the Riversdale Group as a distinct stratigraphic unit, but did not attempt any further stratigraphic subdivision.

Belt (1962, 1965) included the Parrsboro Formation in his Mabou Group and informally subdivided it into a lower red facies and an upper grey facies. The inclusion of the Parrsboro Formation in the Mabou Group did not gain widespread acceptance, however, the red and grey facies subdivisions proposed by Belt (1962, 1965) have proven very useful. Belt (1962, 1965) also isolated microspores from the Parrsboro Formation that were identified by M. S. Barss indicating a Westphalian A age.

Carroll *et al.* (1972) provided some useful descriptions of the sedimentology and fossil fauna from coastal exposures of the Parrsboro Formation near the Town of Parrsboro.

During 1976, Gulf Minerals undertook a mineral exploration project that included mapping Carboniferous strata immediately south of the Cobequid Fault (Downey and MacDonald, 1977). Downey and MacDonald's (1977) maps do not refer to the Parrsboro Formation by name, but they do provide an excellent guide to outcrop locations and general lithologic character within the Carboniferous. From this information it is possible to infer the general distribution of the Parrsboro Formation.

Geological maps of the Cobequid Highlands prepared by Donohoe and Wallace (1982) also included the Carboniferous strata immediately south of the Cobequid Fault. The outcrop locations and bedding attitudes within the Carboniferous were largely compiled from earlier workers. However, Donohoe and Wallace (1982) provided important new interpretations regarding the distribution of the Parrsboro Formation and the location of major faults.

Detailed study of the sedimentology and depositional environments of the Parrsboro Formation, in the Parrsboro area, was undertaken by Pluim (1980) and D'Orsay (1986). Their work also involved some local mapping of coastal and inland exposures. Generally, their work supported a fluvial lacustrine origin for the Parrsboro Formation.

Ryan *et al.* (1991) proposed that the Riversdale Group be dropped as a stratigraphic unit and reassigned the Riversdale strata to the lower part of the Cumberland Group. Although Ryan *et al.* (1991) do not specifically mention the Parrsboro Formation it can be inferred that they intended it to be included in the Cumberland Group. For this study we consider the Parrsboro Formation to form the lower part of the Cumberland Group as defined by Ryan *et al.* (1991). Ryan *et al.* (1991) also dropped the term Canso Group and redefined Belt's (1962, 1965) Mabou Group to include all strata above the Windsor and below the Cumberland groups. For this study we are using the Mabou Group as defined by Ryan *et al.* (1991).

Stratigraphy

North River Area

Figure 1 illustrates the areas of the Parrsboro Formation that have been mapped as part of this project. North of Truro most of the mapping has been in the North River area between the Chiganois and Salmon rivers. In this area the Formation is approximately 2650 m thick (Fig. 2) and comprises grey and red sandstone and mudrock with local interbeds of black shale. The lower 850 m of the formation comprises thick (50 m maximum), grey, multistoried sandstone units interbedded with thick (10-60 m) intervals of red and grey mudrock. Rare <20 cm interbeds of impure coal were also noted within some mudrock sequences. Good exposures of the lower 850 m of the Parrsboro Formation can be found on the West Branch North River beginning about 1 km south of the North River Fault and continuing for about 1.2 km down river.

The upper 1800 m of the Parrsboro Formation is finer grained than the lower 850 m and comprises grey and red mudrock, dark grey and black shale and thin (< 4 m) intervals of red and grey sandstone. Further lithostratigraphic subdivision of these strata may be possible because it is often possible to trace grey- and redbed-dominated packages laterally. However, additional work is required to determine if these units can be consistently mapped over large areas.

In the North River area, good exposures of the upper part of the Parrsboro Formation can be found on North River and along the West Branch North River. A particularly good section of dark grey to black shale outcrops on North River, 450 m up river from the confluence with the South Branch North River. An exposure that nicely illustrates the sedimentology of the red and grey mudrock and thin sandstone can be found on the West Branch North River approximately 1.6 km up river from the confluence with the North River.

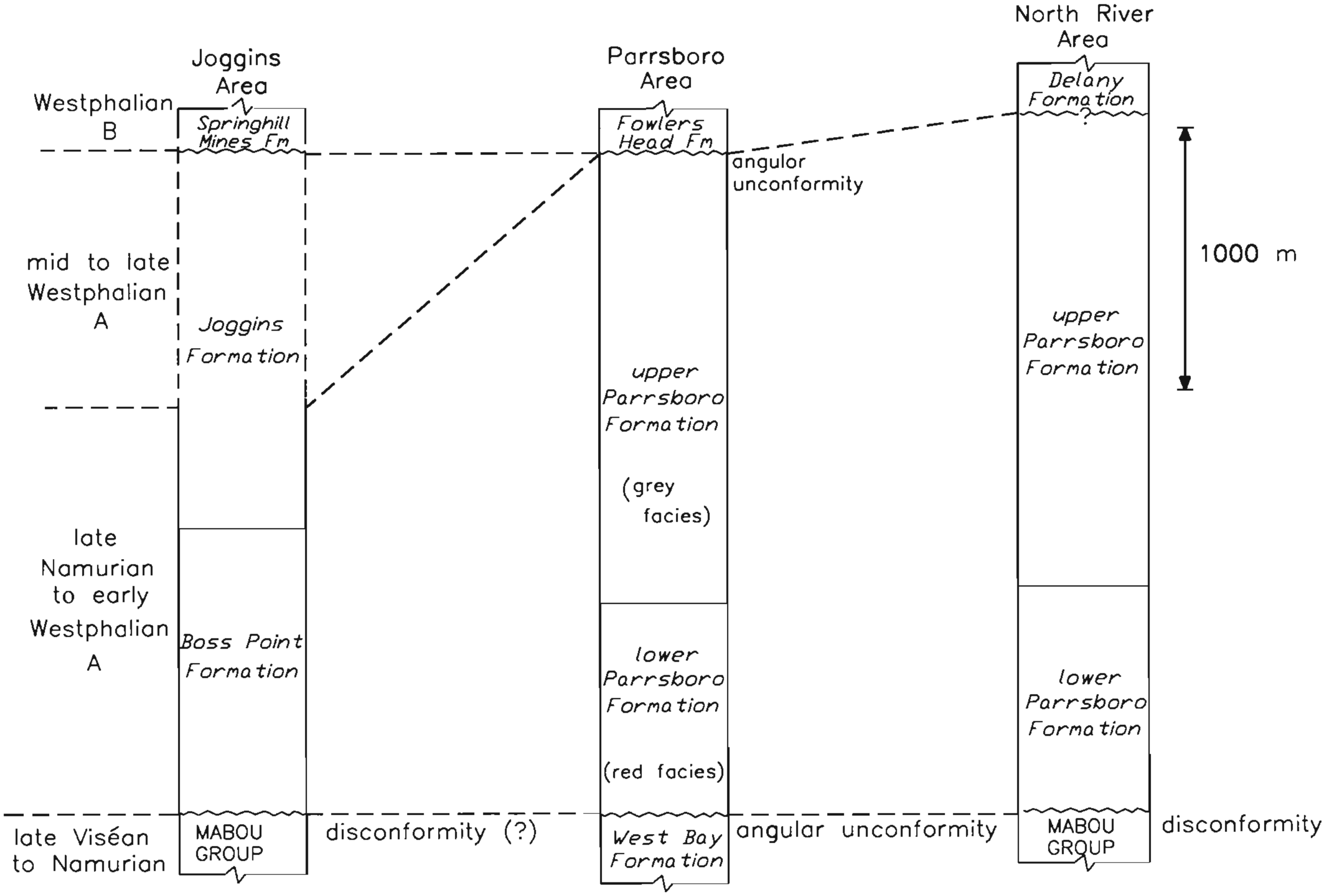

Figure 2. Thickness of the Parsborro Formation and contact relationships with other lithostratigraphic units in the Parrsboro and North River areas. Also illustrates the thickness of the Boss Point and Joggins formations in the Joggins area which are, in part, coeval with the Parrsboro Formation.

Contact relationships between the Parrsboro Formation and other stratigraphic units are somewhat difficult to determine. It appears that locally, adjacent to the North River Fault, strata similar to the West Bay Formation of the Mabou Group underlie the Parrsboro Formation (Fig. 2). The contact between these two units is nicely exposed on the West Branch North River, 100 m southeast of the North River Fault. At this location thick channel sandstones of the Parrsboro Formation have eroded into a succession comprising red mudrock and dark grey calcareous siltstone with 10-15 cm interbeds of buff coloured limestone. Clasts of the buff coloured limestone form lag conglomerates locally within the Parrsboro sandstones. The 'West Bay' strata appear more tightly folded than the Parrsboro Formation, but bedding attitudes in the two units are similar. Coal-bearing strata of the Delany Formation (Lortie,1979) overlie the Parrsboro Formation (Fig. 2), however this contact is not exposed. Recent mapping west of Folly River suggests it may be possible to determine the nature of this contact west of Londonderry.

Dolby (1996) determined the Parrsboro Formation, in the North River area, was late Namurian to early Westphalian A age on the basis of palynology samples. A single sample of the Mabou Group strata that underly the Parrsboro Formation, on the West Branch North River, was determined by Dolby (1996) to be late Viséan.

Parrsboro Area

Near the Town of Parrsboro coastal and inland exposures provide a fairly complete section through the Parrsboro Formation. Based on measurements by Hyde in 1914 (reported by Bell, 1944), Carroll *et al.* (1972) estimated the thickness of the Parrsboro Formation in this area to be 2288 m. D'Orsay (1986) estimated the thickness of the Parrsboro Formation to be 2500 m (Fig. 2).

Belt's (1962, 1965) informal subdivision of the Parrsboro Formation into a lower red facies and an upper grey facies provides a useful basis for stratigraphic subdivision in the Parrsboro area (Fig. 2). The lower red facies is approximately 800 m thick and comprises red and subordinate grey mudrock with interbeds of fine grained sandstone that are usually less than 4 m thick. Thick channel sandstones are generally absent. Red matrix supported conglomerates interbedded with red sandstone and mudrock are locally developed near the base of the Formation.

The overlying grey facies of the Parrsboro Formation is approximately 1700 m thick and comprises grey mudrock interbedded with thin (< 4 m) intervals of pale grey, fine grained sandstone. Carbonate rich mudrock, bivalve-bearing limestone and thin beds of impure coal are developed locally.

Contact relationships between the Parrsboro Formation and other stratigraphic units are well exposed in the Parrsboro area. The angular unconformity between the Parrsboro Formation and underlying, fine grained sediments of the West Bay Formation (Fig. 2) is very well exposed at McLaughlin Bluff, 3 km southeast of Parrsboro (Fig. 1). The Parrsboro Formation also appears to unconformably overlie the Windsor Group in a coastal section at East Bay. At this location an interval of folded Windsor limestone and mudrock appears to be overlain with angular discordance by 'red facies' of the Parrsboro Formation. Further work is required to more accurately determine the nature of this contact. D'Orsay (1986) recognized that the Parrsboro Formation is overlain unconformably by the Fowlers Head Formation (Fig. 2). The Fowlers Head Formation is an 810 m succession of late Westphalian B to early C conglomerate, sandstone and mudrock with rare coal seams up to 53 cm thick.

Palynological studies by Barss (see Carroll *et al.*, 1972, p. 63 and D'Orsay, 1986, p. 119) suggested that the Parrsboro Formation is late Namurian to early Westphalian A. Dolby (1997) undertook palynological studies of coastal sections of the Parrsboro Formation at Pinky Point and West Bay (Fig. 1). His work supports the late Namurian to early Westphalian A ages identified by Barss (*in* Carroll *et al.,* 1972 and D'Orsay, 1986).

Sedimentology and Depositional Environments

An indepth description of the sedimentology and depositional environments of the Parrsboro Formation is beyond the scope of this report. Research presented here is intended to supplement the studies of previous workers such as Pluim (1980) and D'Orsay (1986).

North River Area

The strata that comprise the lower 850 m of the Parrsboro Formation in the North River area can be grouped into four lithofacies assemblages: (1) channel sandstone, (2) poorly-drained floodplain, (3) well-drained floodplain, and (4) lacustrine. Figures 3a and b illustrate the general features and vertical arrangement of these assemblages.

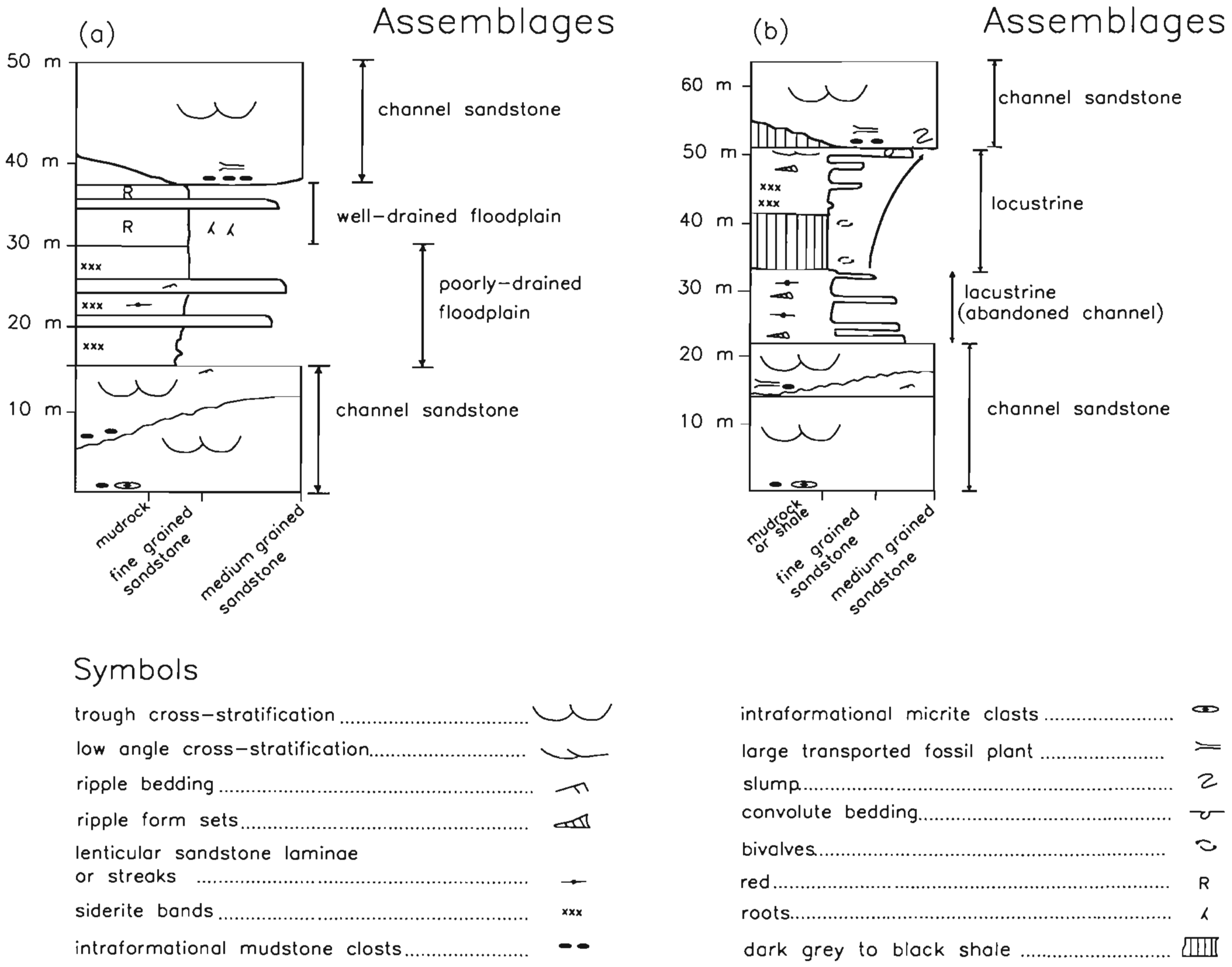

Figure 3a and b. Typical vertical arrangement of facies assemblages, lower part of the Parrsboro Formation, North River area.

The channel sandstone assemblage is comprised of thick (8-50 m), pale grey, fine- to medium-grained, multistoried sandstone units. Vertical changes in grain size are generally not well developed, however, crude fining upward trends were locally noted. The bases of channels are often marked by 0.05-1.5 m thick beds of intraformational lag conglomerate (Fig. 3a and b). Red and grey mudrock pebbles, micritic limestone and siderite clasts, and large pieces of fossil plant debris are the most common components of these lags. Trough crossbedding (often low angle) is the predominant bedform, although planar and ripple bedding are both locally common (Fig. 3a and b). Larger scale bedforms such as lateral accretion surfaces were not observed, possibly due to the intense fracturing and faulting that is common within these sandstones. Thin, even, parallel and ripple laminae formed by finely macerated plant fragments are common within finer grained channel sandstone.

No attempt is made here to characterize the type(s) of river systems in which these channel sandstone deposits accumulated. In many ways the evidence is some what conflicting. The general lack of a vertical change in grain size and bedforms appears to be more consistent with a sandy braided system. However, the thick mudrock dominated units between the sandstone bodies are more typical of deposits associated with a meandering river system.

The poorly-drained floodplain assemblage (Fig. 3a) is the most common of the mudrock-dominated assemblages that intervene between the channel sandstone units. This assemblage comprises grey mudrock, thin (0.1-2 m) intervals of grey, fine grained sandstone and very rare beds of impure coal. The grey mudrock generally appears massive except for the occasional occurrence of varve-like laminae or thin, pale grey, sandy streaks. Siderite layers are common and fossil roots and plants are rare to absent. The thin sandstone intervals are planar bedded and can appear massive or contain ripple laminae. Impure coal beds have only been observed on three occasions. They are generally poorly exposed and difficult to recognize. The poorly-drained floodplain assemblage is generally found in gradational contact with the well-drained floodplain assemblage or with sharp to erosional contact with the channel assemblage (Fig. 3a). Gradational and sharp contacts with the dark grey to black shales of the lacustrine assemblage have also been observed.

The scarcity of fossil plants and roots within the poorly-drained floodplain assemblage suggests that floodplain water levels were generally too high to allow plants to grow. This coupled with the grey versus red colour provides support for floodplains being poorly drained and perhaps perennially flooded.

The well-drained floodplain assemblage (Fig. 3a) comprises red and green-grey mudrock that contains rooted horizons, occasional calcrete nodules and thin interbeds of red or grey sandstone. This assemblage is locally common, but definitely subordinant to the poorly-drained floodplain assemblage. The red colour, fossil roots and calcrete nodules suggest a floodplain environment that had a low water table that favoured development of plants and soils.

The lacustrine assemblage (Fig. 3b) comprises 2-8 m thick sequences of dark grey to black shale overlain by grey siltstone and occasionally capped by pale grey, fine grained sandstone. In some cases, only the dark grey shale is present. Shale intervals occasionally contain fossil bivalves and ostracodes while sandstone near the top of some coarsening upward sequences contain occasional fossil roots and rare upright fossil trees. This facies assemblage is not particularly common in the lower part of the Parrsboro Formation.

The grey colour and the coarsening upward nature of this assemblage coupled with the occurrence of fossil bivalves and ostracodes and general lack of bioturbation by roots indicates these are lacustrine fill deposits. Fossil roots at the top of some coarsening upward sequences indicate some lakes became infilled providing a suitable surface for plant growth.

Vertical gradations between facies assemblages of the lower Parrsboro Formation appear to reflect regional fluctuations in the level of the water table. For example vertical changes from poorly-drained floodplain deposits to lacustrine shales can be explained by a lowering of the sedimentation rate coupled with a rise in the water table. In contrast vertical gradations from poorly-drained floodplain deposits to well-drained floodplain deposits with roots and calcrete nodules suggests an overall lowering of the water table. Where the poorly-drained floodplain facies are developed immediately above a thick channel sandstone they may represent abandoned channel fill deposits.

The upper 1800 m of the Parrsboro Formation, in the North River area, has many similarities to the lower part of the Formation. The mudrock dominated assemblages (ie. poorly-drained floodplain, well-drained floodplain and lacustrine) are all common. It is the conspicuous absence of thick channel sandstone that distinguishes the upper Parrsboro Formation from the lower Parrsboro Formation.

The poorly- and well-drained floodplain assemblages of the upper Parrsboro Formation appear identical to those found in the lower Parrsboro Formation. Vertical transitions between these two assemblages are common.

The lacustrine assemblage is much more common in the upper Parrsboro Formation. Once again this assemblage generally comprises coarsening upward sequences 1-8 m thick. These coarsening upward sequences can be stacked in succession to form intervals tens of metres thick. It is important to note that thick (>5 m) intervals of lacustrine shale or siltstone, with no obvious vertical changes in grain size, are also common.

One additional mudrock facies assemblage has been recognized in the upper part of the Parrsboro Formation. This facies assemblage, referred to here as the lacustrine fill assemblage (Fig. 4), comprises fissile red and grey mudrock with thin, mottled, red, grey, fine grained sandstone interbeds. Grey mudrock units of this assemblage can be 2-15 m thick and red mudrock units are 1-10 m. The fissile nature of the mudrocks distinguishes them from the friable grey and red mudrocks of the floodplain assemblages. The thin sandstone interbedded with the fissile mudrock can be 0.05-1.5 m thick. These sandstones can be massive or ripple bedded and, in rare instances, contain fossil roots and upright fossil trees (Fig. 4).

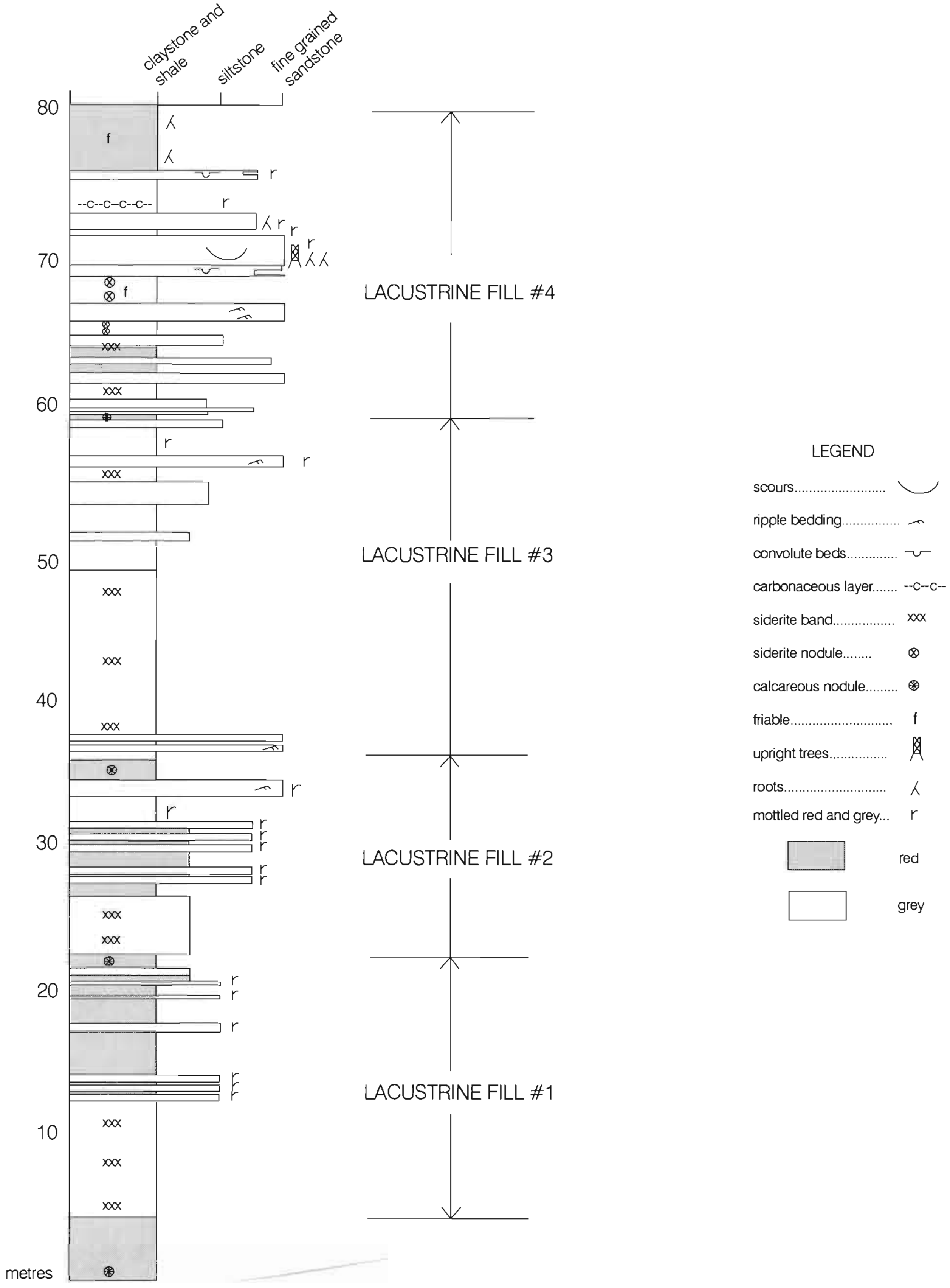

Figure 4. Vertical arrangement of facies in lacustrine fill assemblage of the Parrsboro Formation, North River area.

Figure 4 illustrates the typical arrangement of facies within the lacustrine fill assemblage. Fissile, grey mudrock with thin, siderite layers is overlain by red and mottled red mudrock with interbeds of mottled red and grey sandstone. Note that the uppermost red mudrock interval of each lacustrine fill sequence contains calcareous nodules.

Although the lacustrine fill assemblage contains thick, red mudrock units we still interpret this assemblage to be almost entirely comprised of lacustrine deposits. Supporting evidence is the fissile nature of the mudrocks coupled with the complete lack of bioturbation by roots. The vertical transition from red to grey mudrock may reflect a gradual shallowing of the lake as it becomes infilled. Calcrete nodules at the top of each lacustrine cycle suggest a period of little or no sedimentation coupled with a fluctuating water table. Upright fossil trees and roots near the top of some lacustrine fills (e.g. #4, Fig. 4) indicate lakes periodically became completely infilled and colonized by vegetation.

Parrsboro Area

We have only undertaken a cursory examination of the lower Parrsboro Formation (ie. the Red Facies of Belt, 1962, 1965) in the Parrsboro area. For this reason we have not yet attempted to identify facies assemblages or interpret deposit types within this part of the formation. Based on our preliminary examination and the findings of previous workers (eg. Belt, 1962; D'Orsay, 1986; Pluim, 1980) we can make the following general observations:

(1) Thick channel deposits are rare except for the coarse grained units developed over the lower 100 m of the formation.

(2) Sandstone units are typically less than 2 m thick, commonly coarsen upward and are often ripple bedded.

(3) Mudrock sequences are predominantly red and can be at least 20 m thick.

(4) Grey mudrock becomes increasingly common upsection.

(5) Fossil roots are common within most sandstone and mudrock units.

These observations appear to support the findings of Belt (1962) and Pluim (1980) who suggested a predominantly fluvial origin for the redbed dominated lower Parrsboro Formation in this area. Pluim (1980) suggested the majority of the strata comprise crevasse and floodplain deposits with a minor lacustrine component. The only channel sandstone recognized by Pluim(1980), with the exception of the basal, coarse grained deposits, are rare, 2 m thick, fining upward, trough crossbedded units that have thin intraformational lags at their base. It seems unusual that thicker channel deposits are not found in association with the crevasse and floodplain sequences. Possibly the river system(s) that supplied this overbank material was trapped elsewhere due to basin asymmetry. It appears more likely, however, that sediment was carried into this area by small laterally restricted distributary channels. Further work is required to more fully understand the deposits that comprise the lower Parrsboro Formation in the Parrsboro area.

More time was spent examining the upper part of the Parrsboro Formation (ie. the Grey Facies of Belt, 1962, 1965), near Parrsboro. The lithologies that comprise this part of the formation can be grouped into the following facies assemblages: (1) restricted lacustrine, (2) lacustrine delta, (3) overbank, and (4) distributary channel (Fig. 5).

The restricted lacustrine assemblage comprises dark grey to black, calcareous claystone and grey, calcareous siltstone that form intervals 2-10 m thick. The dark grey to black claystone appears massive and is very organic rich. Ripple form sets and desiecation cracks are occasionally found within the siltstone beds. Both of these lithologies commonly give off a strong hydrogen sulphide odour when broken with a geological hammer. Fossil bivalves are commonly found in both lithologies. Vertical transitions to the lacustrine delta facies association are common (Fig. 5).

The abundance of carbonate, common occurrence of bivalves and overall fine grain size suggests that the restricted lacustrine assemblage consists of deposits that accumulated in a sediment starved lake. Desiccation cracks and abundant carbonate indicates seasonal expansion and contraction of the lakes. Lake bottom muds were probably anoxic based on the high organic content of the claystone. However, lake waters must have been oxygenated and rich enough in nutrients to sustain a restricted bivalve population.

The lacustrine delta assemblage typically occurs as 4-8 m thick intervals comprising grey claystone coarsening upward through grey siltstone and very fine grained sandstone to pale grey, fine grained sandstone (Fig. 5). Claystone intervals are locally dark grey and generally become increasingly silty upsection. Siltstone and very fine grained sandstone beds commonly exhibit pale grey, sandy laminae that form lenticular and streaked bedding. Ripple bedding, low angle trough crossbedding

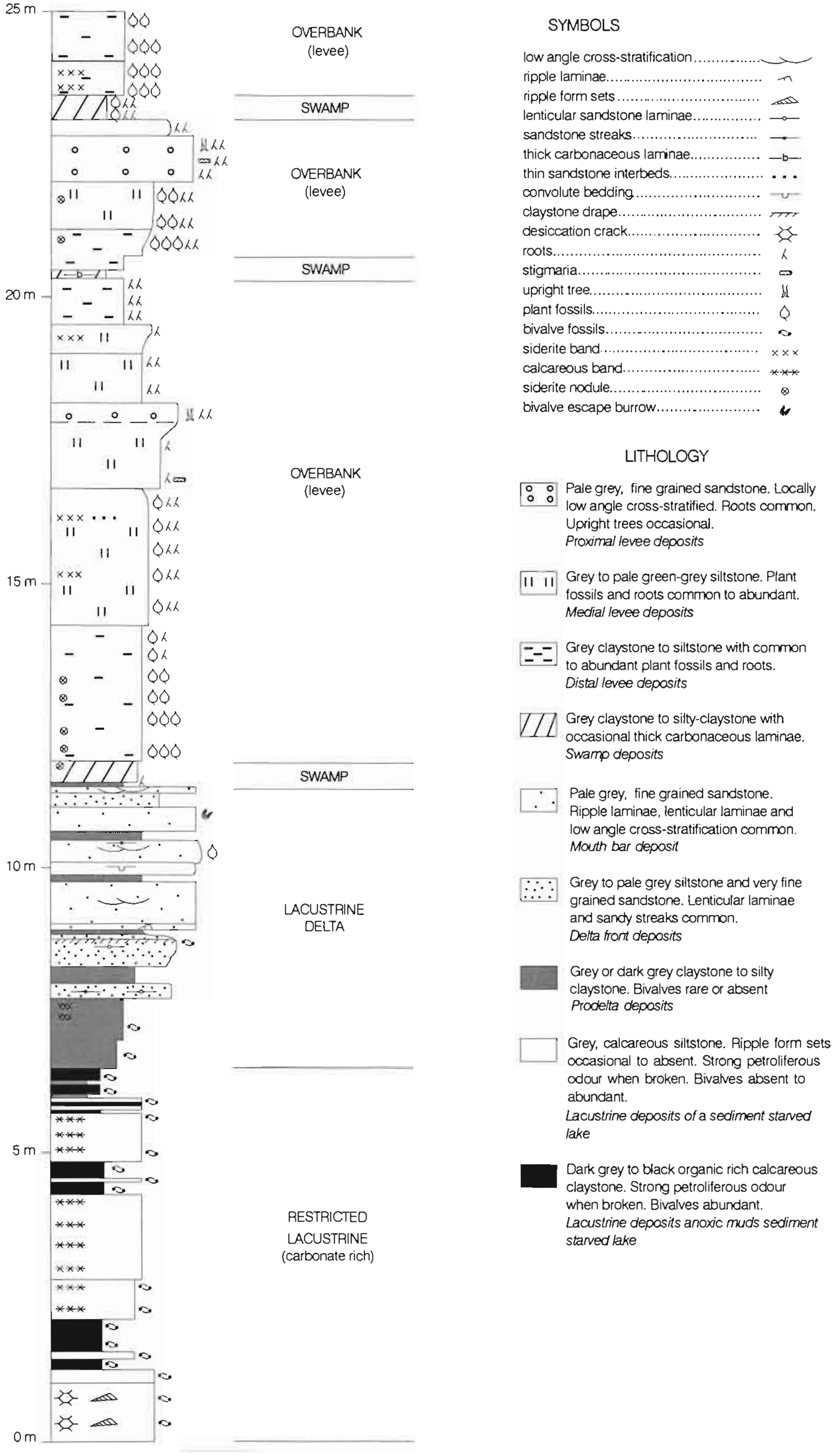

Figure 5. Typical vertical arrangement of facies in the upper part of the Parrsboro Formation, Parrsboro area.

and lenticular laminae are the most common structures observed within the fine grained sandstone. Fossil bivalves were occasionally noted within the claystone and siltstone and fossil plants are rare except for finely macerated plant material that forms laminae within the fine grained sandstone. Rare bivalve escape burrows were noted within fine grained sandstone near the top of some coarsening upward successions. The lacustrine delta assemblage can be found in vertical contact with all the other assemblages.

Facies of the lacustrine delta assemblage appear to have formed in lakes that had a much higher rate of clastic sediment supply than the sediment starved lakes described above. A complete lack of fossil roots coupled with the occurrence of fossil bivalves and escape burrows supports a lacustrine origin for this assemblage. The coarsening upward sequences would have formed in response to progradation of a lacustrine delta into a shallow lake. Grey claystone at the base of the coarsening upward sequences are interpreted to be prodelta deposits. Grey siltstone and pale grey, fine grained sandstone are considered to be delta front and mouth bar deposits respectively. Sediment supply may generally have been too high to sustain bivalve populations for extended periods.

The overbank facies assemblage includes grey mudrock and fine grained sandstone that form 3-10 m thick sequences that coarsen and then fine upward (Fig. 5). Thin (<0.5 m) claystone beds with thick carbonaceous laminae often mark the base of coarsening upward sequences. The thin claystone beds are generally overlain by silty claystone and siltstone beds that contain occasional siderite layers and nodules. Sandstone beds that form the upper part of coarsening upward cycles are generally tabular and locally appear low angle, cross-stratified. Sedimentary structures are not well preserved, largely due to extensive bioturbation by roots. Mudrock and sandstone that underlie the thin claystone beds for 3-5 m are often intensely bioturbated by roots. Mudrock that immediately overlies thin claystone beds often lacks bioturbation by roots and contains abundant, well-preserved plant fossils. Upright fossil trees were occasionally noted within some sandstone beds.

The thin claystone beds at the base of the coarsening upward sequences are interpreted to be swamp deposits. Evidence for this includes the clay rich nature of the deposits, the presence of organic rich laminae and the abundance of fossil roots immediately below these units. The remainder of the lithologies that comprise the overbank assemblage are interpreted to be levee deposits. The finest grained levee deposits usually lack fossil roots and generally occur immediately above the swamp deposits. This suggests that the water table became too high to support further plant growth. Gradual encroachment of coarser grained levee deposits raised the land surface and allowed plants to re-establish. As a result the coarser grained levee deposits are bioturbated by roots.

Discussion and Conclusions

Prior to this study, detailed examination of the stratigraphy and sedimentology of the Parrsboro Formation was largely limited to coastal exposures near Parrsboro. As a result, no basis existed for regional depositional and stratigraphic analysis. Research presented in this report provides the initial support for undertaking this work.

One of the more interesting findings of our study is that in the North River and Parrsboro areas, the lower Parrsboro Formation is predominantly fluvial and the upper Parrsboro Formation predominantly lacustrine. Based on this observation it is tempting to suggest further stratigraphic subdivision of the Parrsboro Formation. However, significant differences exist between the types of lacustrine and fluvial deposits found in the two study areas. Until regional mapping and sedimentological analysis is completed we are hesitant to propose any new stratigraphic units.

Before proposing new stratigraphic units within the Parrsboro Formation it is also important to look at coeval strata outside the study area. Figure 2, includes an illustration of the thickness and general lithology of the late Namurian to early Westphalian A strata of the Joggins coastal section in the Cumberland Basin. The Boss Point Formation predominantly comprises grey channel sandstone (braided river deposits) and the Joggins Formation is a mixture of lacustrine and floodplain mudrock, coal, thin limestone and occasional laterally discontinuous channel sandstone. It is interesting to note that the Boss Point Formation appears to correlate reasonably well, in terms of thickness, with the lower Parrsboro Formation. In addition the channel sandstone of the Boss Point Formation is similar lithologically to the channel sandstone of the lower Parrsboro Formation in the North River area. The upward change from the fluvial dominated Boss Point Formation to the more mudrock rich Joggins Formation appears similar to the lower Parrsboro to upper Parrsboro Formation transition. This may reflect a regional change in climate or subsidence during the late Namurian to early Westphalian A. However, a more rigorous comparison of the Parrsboro Formation with the Boss Point and Joggins formations is required before any conclusions can be drawn.

During the 1998 field season we will undertake a closer examination of the coastal exposures of the Parrsboro Formation near Parrsboro. This work will be used in conjunction with 1:10 000 scale mapping to help with regional stratigraphic and depositional modelling. The nature of the contact between the Parrsboro Formation and the overlying coal-bearing Delany and Fowlers Head formations will also be examined in more detail. We will also initiate a more detailed comparison of the lithostratigraphy of the Parrsboro Formation with the Boss Point and Joggins formations.

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