Geology of North-Central Jennings River Area (104O/14E, 15)

By JoAnne Nelson

KEYWORDS: Mississippian, Dorsey Terrane, Yukon Tanana Terrane, northern British Columbia, volcanogenic massive sulphides.

INTRODUCTION

The goal of this project is to trace into central northern B.C. stratigraphy known to host Mississippian volcanogenic massive sulphide deposits such as Kudz Ze Kayah, Wolverine, and Fyre Lake, which lie within the Yukon Tanana Terrane in the Finlayson Lake belt of central Yukon. It is part of the Jennings River/Wolf Lake component of the Ancient Pacific Margin NATMAP project, a cooperative effort with the Geological Survey of Canada that aims to decipher the stratigraphically and structurally complex late Paleozoic pericratonic sequences along the B.C.-Yukon border near Swift River.

The present map area, 104O/14E and 15, is centrally located between other areas covered by the Jennings/Wolf project, and thus provides geological linkages between them. It abuts both the Big Salmon Complex to the west (Mihalynuk *et al.*, 1998, 2000), and the southwestern Wolf Lake map area to the north (Roots *et al.*, 2000, Roots and Heaman, 2001; Figure 1), and is separated from the southern Dorsey Terrane area (Nelson , 1999, 2000; Nelson *et al.*, 2000) by the Early Jurassic Nome Lake batholith.

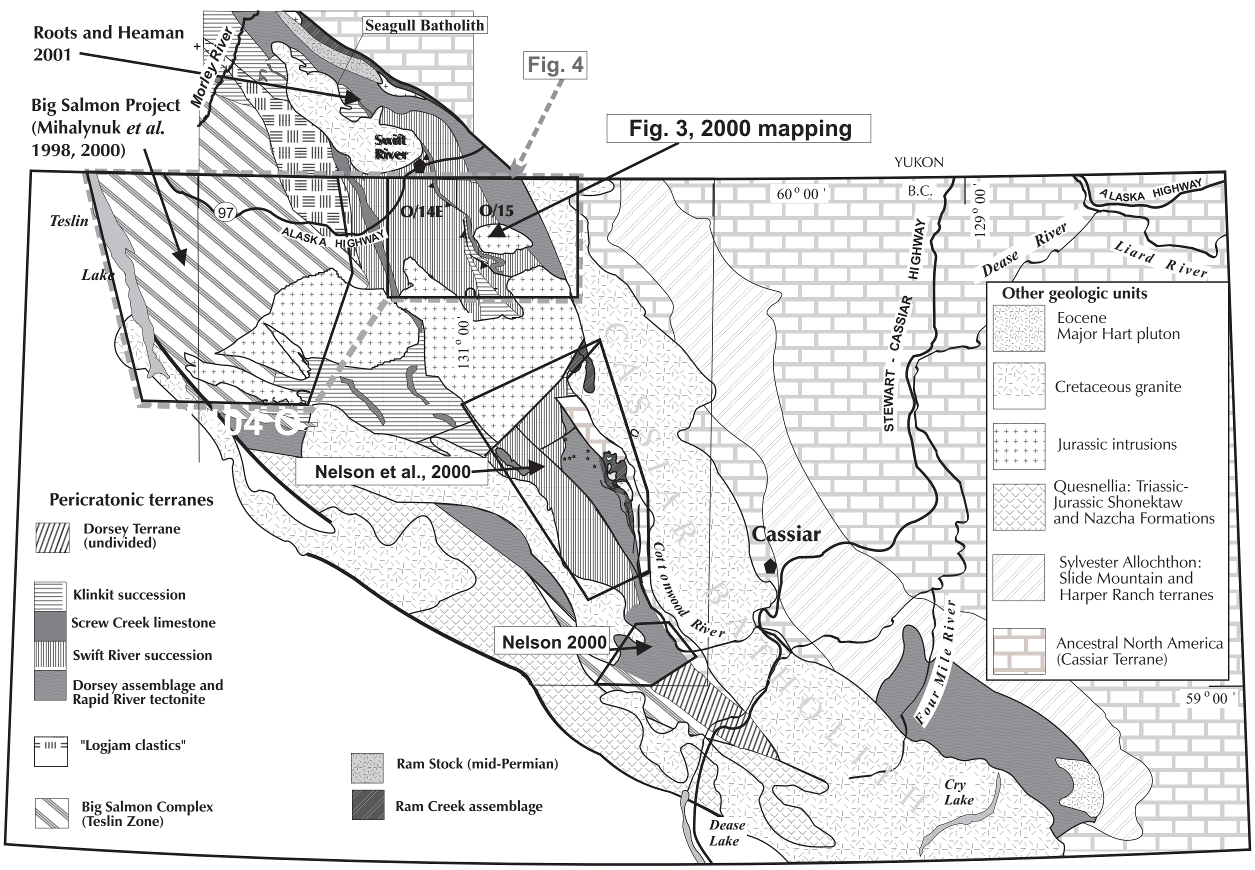

Figure 1. Location and tectonic setting of 104O/14E and 15 in the context of the Wolf-Jennings project. Regional geology from Gabrielse (1963, 1969, 1994), Stevens and Harms (1995), Mihalynuk *et al*., 2000, and Nelson *et al*., 2000.

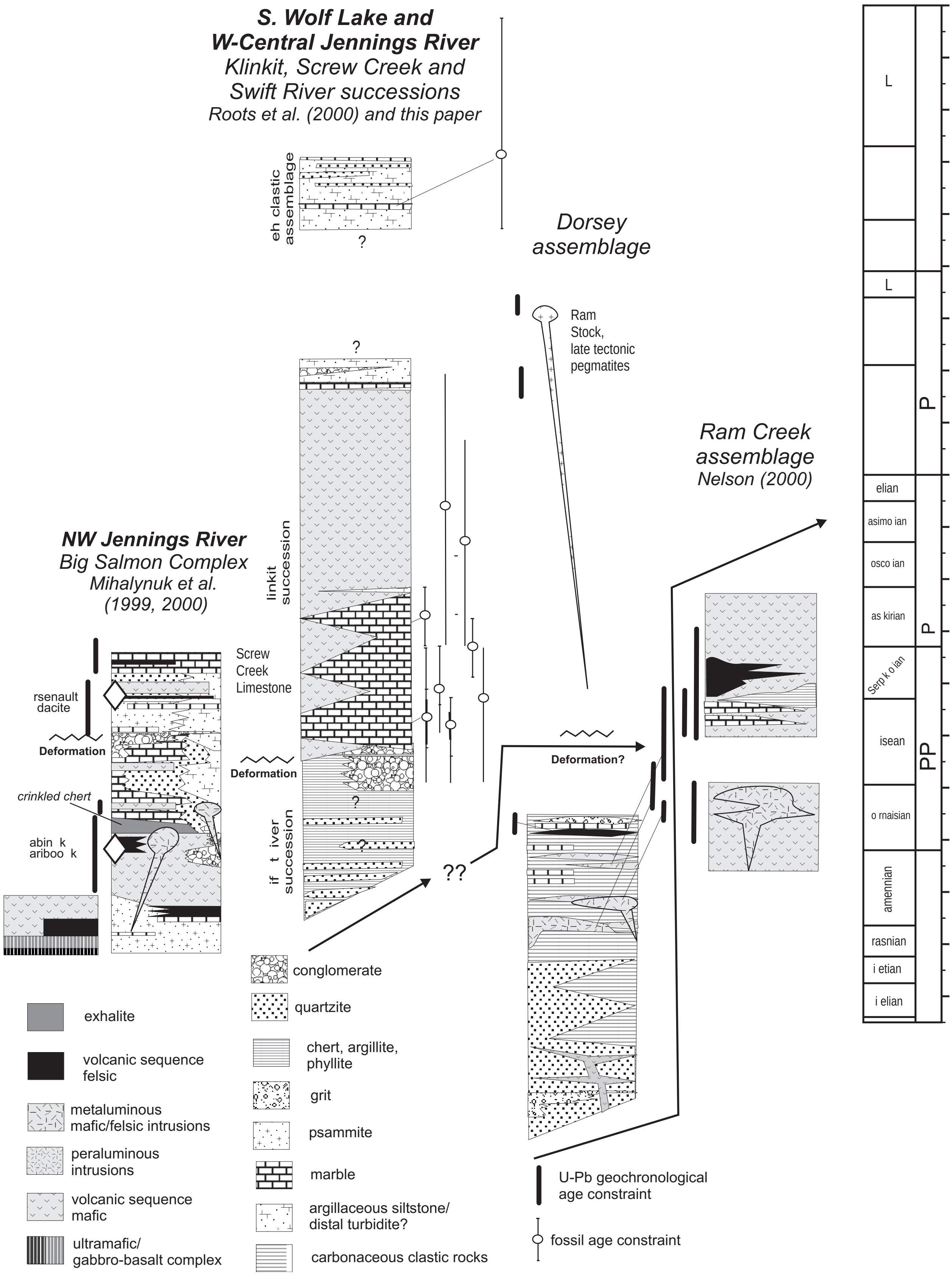

Figure 2. Stratigraphic columns for units of the Dorsey Terrane and Big Salmon Complex. Data sources for fossil and radiometric constraints: 1. E.W. Bamber (personal communication 1998): this paper Table 1. 2. E.W. Bamber (personal communication 2000) 3. Stevens and Harms (2000) 4. Roots and Heaman (2001) 5. Nelson *et al*. (2000).

Mapping results from this year's program are available at 1:50,000 scale (Nelson *et al*., 2001). Field work focused on the Dorsey Terrane, a complex pericratonic entity that outcrops west of the Cretaceous Cassiar batholith. Harms and Stevens (1996) divided the eastern and central Dorsey Terrane into four assemblages (Figure 2). From most easterly and structurally lowest they are: the Ram Creek, Dorsey, Swift River and Klinkit assemblages. It should be noted that the Dorsey assemblage is a sub-unit of the Dorsey Terrane. The Jennings/Wolf project has further subdivided these assemblages into regionally mappable subunits and has provided age control by uranium-lead dating. It has also explored relationships between the various assemblages; and between them and the Big Salmon Complex, now recognized as the southeastern extension of the Yukon Tanana Terrane in the Teslin and Wolf Lake map areas (Mihalynuk *et al*., 1998, 2000).

Coverage includes the Plate Lake (104O/15) and eastern half of Swan Lake (104O/14E) map areas. The Alaska Highway, which locally follows the Swift River and crosses into B.C. east of McNaughton Creek, offers access to a small part of it. Most access is by helicopter. In this region, isolated mountains and ridges are separated by broad, flat, outwash and till-filled valleys; bedrock exposure accordingly varies from excellent to non-existent.

LOCAL GEOLOGY

The map area straddles two terranes, the allochthonous, pericratonic Dorsey and the para-autochthonous, miogeoclinal Cassiar terrane, which here are separated by the Cassiar Fault (Figure 3, Figure 3-legend). The Cassiar Fault is a dextral transcurrent fault of regional extent, with K-Ar evidence for mid-Cretaceous displacement (Gabrielse, 1985). Lower Paleozoic Cassiar Terrane strata only occur within an embayment in the Cassiar batholith in northeastern 104O/15. They are contiguous with extensive miogeoclinal exposures located farther east in 104O/16 (Nelson and Bradford, 1987).

The Dorsey Terrane consists of stratified and metamorphic rocks intruded by several large Early Jurassic plutons, the Simpson Peak and Nome Lake batholiths and the Plate Creek Stock. The structurally lowest, regionally metamorphosed rocks in the Dorsey Terrane are assigned to the Dorsey assemblage, based on their correlation with along-strike exposures in southern Yukon (Stevens and Harms, 2000) and south of the Nome Lake Batholith (Nelson, 2000). Structurally overlying the Dorsey Assemblage, and dominating the central and western parts of the map area, are stratified rocks of the Swift River succession, Mississippian to Pennsylvanian Screw Creek limestone, and Klinkit succession (Figure 2). [The term "succession" is introduced here in preference to "assemblage" in naming these stratified units, because they exhibit clear sedimentary and volcanic protolith textures, stratigraphic continuity, and depositional contacts, in spite of considerable penetrative deformation.] The stratigraphically lowest Swift River succession overlies the Dorsey assemblage along faulted contacts. It is dominated by cherts and argillites with lesser siliclastic components. A local accumulation of grits and quartzites interbedded with chert, argillite and dust-tuff occurs at its top in northern 104O/14E (Figure 3). It is unconformably overlain by the Screw Creek limestone. The Klinkit succession, which overlies and also interfingers with the Screw Creek limestone, is dominated by volcaniclastic/ epiclastic rocks with lesser siliciclastic components.

The northern margins of the Early Jurassic Nome Lake and Simpson Peak batholiths are exposed in the southern part of the map area. They are post-tectonic, cutting all units and structures in the Dorsey Terrane, including the Dorsey assemblage/Swift River succession contact and a set of northerly-striking normal faults with west-side down displacement.

Dorsey Terrane

DORSEY ASSEMBLAGE

The Dorsey assemblage forms a narrow strip along the eastern margin of the Dorsey Terrane, lying structurally above the Ram Creek assemblage and below the Swift River succession/Screw Creek limestone/Klinkit succession (Figure 1). In 104O/15, the Ram Creek assemblage is cut out by the Cassiar Fault and the Dorsey assemblage is juxtaposed directly against the Cassiar Batholith. The Dorsey assemblage here is divisible into two units, upper and lower. Unlike the other stratified units except the base of the Swift River succession, it has undergone regional metamorphism to garnet grade. In 104O/15, its lower part is a thick (probably structurally repeated) sequence of metamorphosed quartz-plagioclase grit, greywacke, quartzite, and phyllite. Its upper part is more variable, with magnetite-porphyroblastic biotite-sericite-chlorite schist and quartz-sericite schist representing intermediate and felsic meta-tuffs respectively, interlayered with meta-chert, quartzite, phyllite, meta-grit and meta-tonalite. The two units are now juxtaposed across northerly normal faults. The upper/lower distinction within the Dorsey assemblage here does not directly correspond to that defined farther south, which is based on the presence of abundant metabasites in the lower unit (Nelson *et al*., 1999; 2000). Metabasites are notably missing in this area, although in other respects, such as the mixed siliciclastic/basinal/distal volcanic protoliths, degree of metamorphism and intensity of deformation, the Dorsey assemblage in 104O/15 strongly resembles localities to the north and south.

Although minor grits occur near the top of the Dorsey assemblage in the Yukon (Roots *et al.*, 2000; author's field observations near Munson Lake), the thick sequence of coarse siliciclastics in the lower Dorsey assemblage in 104O/15 is unusual. Its closest parallel is in 104O/1, in the southeastern Jennings River area near the Cottonwood River, where a thick sequence of metamorphosed quartzose clastics is intruded by pre-metamorphic ultra-

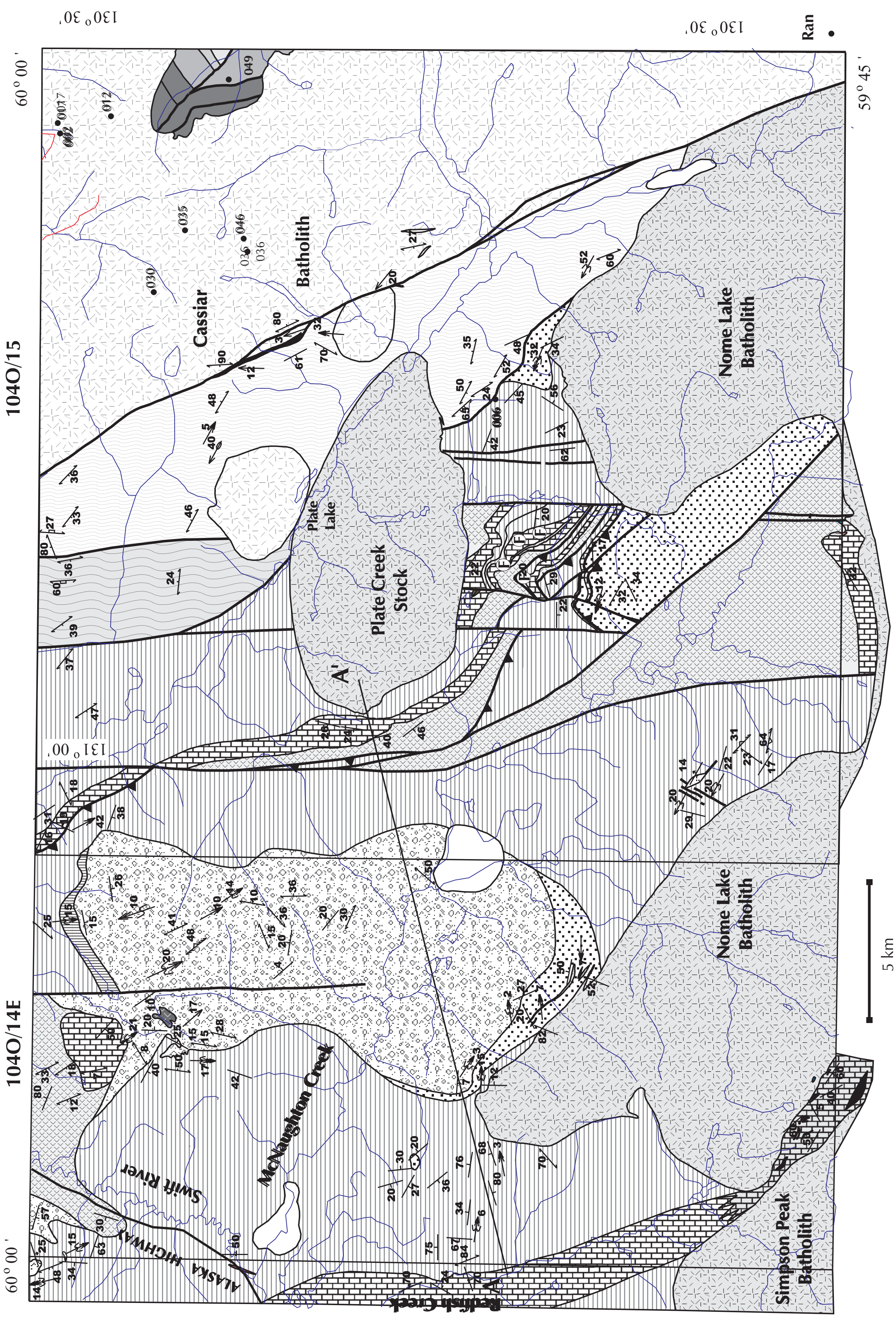

Figure 3. Geology of 104O/14E and 15.

LEGEND FOR FIGURE 3

POST-ACCRETIONARY UNITS
QUATERNARY

Tuya basalt: valley-filling basalt flows

EARLY CRETACEOUS (circa 110 Ma)
Granite, granodiorite, quartz monzonite, diorite; granite protomylonite and mylonite along Cassiar Fault

DORSEY TERRANE
EARLY JURASSIC (circa 188 Ma)
Simpson Peak and Nome Lake batholiths: coarse grained granodiorite, diorite, granite;
Plate Creek Stock: medium grained hornblende diorite, coarse grained gabbro, granodiorite

UPPER PALEOZOIC
KLINKIT SUCCESSION

Andesite flow or sill

Epiclastic and pyroclastic rocks, predominantly medium green lapilli tuff and tuffaceous siltstone; maroon and green tuffaceous phyllite, green to grey well-bedded chert, argillite and quartz arenite

MISSISSIPPIAN-PENNSYLVANIAN
SCREW CREEK LIMESTONE

Grey limestone, locally silicified, locally fossiliferous; maroon and green phyllite; green well-bedded chert, limestone-matrix and phyllite-matrix volcanic and/or chert-clast conglomerate

Calc-silicate hornfels, marble, metasandstone, metasiltstone, metavolcanic hornfels

White marble

UPPER PALEOZOIC
SWIFT RIVER SUCCESSION

Greywacke, quartz-plagioclase grit, quartz arenite , chert, grey to green-grey phyllite, minor thin limestone beds, maroon and green phyllite, pebble conglomerate

Black, grey, grey-green thick to thin-bedded chert, argillite with prominent grey to white quartzite beds

Green phyllite, fine grained, thin-bedded tuff

Black, grey, grey-green thick to thin-bedded chert, argillite, local clean grey to white quartz arenite; quartzite-clast conglomerate and chert-clast greywacke near top

PALEOZOIC (AND OLDER?)
DORSEY ASSEMBLAGE

Upper Dorsey assemblage: green phyllite with magnetite porphyroblasts, chlorite schist, mafic schist, quartz-sericite schist, metachert, quartzite, highly foliated metaplutonic rocks

Lower Dorsey assemblage: quartz-plagioclase grit, quartzite, quartz-feldspathic schist, phyllite, pelitic schist

CASSIAR TERRANE
SILURIAN-DEVONIAN
RAMHORN FORMATION

Dolomitic quartz arenite, quartzite, dolostone, limestone

ORDOVICIAN-SILURIAN
ROAD RIVER GROUP

Black, commonly limy slate, locally graptolitic; argillaceous limestone
OSRR?:Road River Group?: Black slate in sliver along Cassiar Fault zone (could be Earn Group)

CAMBRIAN-ORDOVICIAN
KECHIKA GROUP

Pale-coloured calcareous slate, siltstone, limestone, calc-silicate and biotite hornfels

LOWER CAMBRIAN
ROSELLA FORMATION

Limestone, dolostone, marble, thin-bedded calcsilicate hornfels mafic and mafic sills (Nelson, 2000). The tuffaceous protoliths in the upper part of the Dorsey assemblage in 104O/15 are like those in the upper Dorsey south of the Nome Lake batholith (Nelson, 1999, 2000) and in the Yukon (Roots and Heaman, 2001). In the Yukon, one quartz-phyric metatuff yielded a 355 Ma zircon age (Roots and Heaman, 2001), identical to that of a dated intrusion within the Dorsey assemblage near the Cottonwood River (R. Friedman personal communication, in Nelson, 1999). These dates on representative bodies of an extensive metavolcanic and metaplutonic suite constrain the Dorsey assemblage to be early Mississippian and older, and suggest that it represents both the thin volcanic carapace and pericratonic substrate of an early Mississippian arc.

SWIFT RIVER SUCCESSION

The Swift River succession overlies the Dorsey assemblage on a sheared contact south of Plate Lake. It is unconformably overlain by the Screw Creek limestone at numerous localities throughout the map area. It exhibits two depositional themes: hemipelagic, deep-water sedimentation that gave rise to thick successions of dark-coloured chert and argillite; and sporadic siliciclastic influx, represented by quartzite/phyllite sequences near its base, local units of quartz wacke, grit, argillite and phyllite, particularily near its top in northern 104O/14, and isolated beds of clean quartzite within otherwise monotonous chert-argillite piles. Swift River cherts are thin to thick ribbon-bedded (2-20 centimetre beds). They are predominantly black, also grey and greenish to olive grey: this attests to their deposition in deep, anoxic waters, in contrast with the bright maroon and green colours within the overlying Screw Creek limestone and Klinkit succession. The thickness of the Swift River succession cannot be determined within the present area, as no intact, unfaulted top to bottom sections are present. In the southern Yukon its structural thickness is of the order of 3.5 kilometres, of which over 95% is chert and argillite.

In places near the top of the unit, chert-chip breccias (sharpstone conglomerates) occur interbedded with chert. Black to grey angular chert clasts are identical to the bedded cherts around them, and so could be derived intraformationally. A particularily spectacular example of coarse clastics occurs around the Northwest Tel repeater tower located between Screw and Partidge Creeks, 3 kilometres west of the map area, where boulder conglomerates with chert and quartzite clasts are interbedded with the uppermost chert and argillite of the Swift River succession east of and stratigraphically below the base of the Screw Creek limestone. All of the clasts represent units found within the Swift River succession. In contrast with the smaller breccia occurrences, some of the clasts are rounded, indicating subareal, stream or beach transport prior to incorporation in submarine debris flows. Perhaps the sharpstone beds represent the development of seafloor relief (through faulting?), while the “Repeater Tower conglomerate” represents actual erosion into parts of the Swift River succession. There is no direct age control on the Swift River, other than that it predates the late Mississippian-early Pennsylvanian Screw Creek limestone.

In easternmost 104O/14 and western 104O/15, the highest Swift River unit is in part an unusual, undated siliciclastic sequence, uPSRgw, which contains elements that show a disturbing resemblance to the Klinkit or even the Dorsey assemblage. This enigmatic unit was previously assigned to the lower Jurassic by Gabrielse (1969), based on its coarse and immature clastic character. Most of its exposures are on the crest of a flat, bifurcating ridge crest in northeastern 104O/14E. There, it consists of strongly deformed quartzite, quartz- plagioclase-microcline grit, quartz wacke, phyllite, chert, argillite and minor calcareous layers. Colours are monotonous greys, grey-buffs, greenish greys. However, stratigraphically lower, nearer its basal contact above the Swift River succession, green tuffaceous phyllite and siltstone and maroon and green phyllite form part of the sequence. These suggest an affinity with the Klinkit succession. The base of the unit rests abruptly on top of Swift River black chert and argillite. This contact is well exposed on the low, forested ridge 7 kilometres east of the Swift River, and on the B.C.-Yukon border at the northwestern corner of 104O/14E, east of Partidge Creek. At the first locality, the two units are interfolded to form a series of recumbent secondary folds on the eastern limb of a westerly-overturned anticline (Figure 3). Here, the grit unit is overlain by two distinct units: on top of the ridge, by an andesite flow or sill with green tuffaceous siltstones at its base; and at the north end of the ridge by maroon and green tuffaceous phyllite that interfinger with a grey limestone assigned to the Screw Creek. Near Partridge Creek, Screw Creek-like limestone is missing altogether and monotonous black chert of the Swift River succession is overlain along strike either by grit, greywacke and phyllite or by green siltstone, tuff, and well-bedded sea-green chert of the lowest Klinkit. Such abrupt changes could be explained as the result of multiple unconformities and local volcanic, clastic and limestone facies development in a tectonically active arc.

In thin section, grits of this unit are dominated by clasts of coarse, monocrystalline quartz and plagioclase with minor microcline and muscovite and traces of biotite, muscovite schist, tourmaline and zircon. A predominantly plutonic and subordinate metamorphic source is indicated. This source could be the Dorsey assemblage, in which case it was exposed and undergoing erosion by late Mississippian time.

SCREW CREEK LIMESTONE

Named for Screw Creek in 104O/14W, where it is extensively exposed, the Screw Creek limestone provides an excellent marker that is structurally repeated throughout the present map area as well as in adjacent parts of the Yukon (Figure 1). An important mapping result from this season was to trace the previously-known outcropping belt of the limestone from north of the Alaska Highway southwards for over 15 kilometres into the valley of Redfish Creek. It is inferred to extend farther south into marble/calcsilicate hornfels exposures that separate the Simpson Peak and Nome Lake batholiths in the southeastern corner of the map area. Along Redfish as well as Screw Creek north of the Alaska highway, the Screw Creek limestone occupies the core of a southwesterly-overturned syncline, with Swift River succession chert, argillite and siliciclastics exposed both to the east and west (Figures 1 and 3). This outrcrop belt extends from west of the Seagull Batholith to the narrow inlier between the Simpson Peak and Nome Lake batholiths, a distance of over 30 kilometres. In a second, more easterly area of exposure, the Screw Creek limestone, overlain by Klinkit succession volcaniclastic epiclastic strata, outcrops patchily in a much broader synclinal keel that runs from near the Swift River truck stop through the southern reaches of McNaughton Creek. A third group of exposures lies northeast of a thrust fault west of Plate Creek, which splays into a set of thrust faults that repeat the limestone on a set of ridges south of the Plate Creek Stock. Our mapping corroborates the suggestion of Gabrielse (1969) that other limestone bodies in the area, mapped by him as 12b, 12c, are in fact correlatives of the Screw Creek limestone.

The Screw Creek limestone exhibits considerable internal variation in all of its exposures, consistent with its probable development in an active arc or arc-marginal location. It includes grey limestone that ranges from barren to richly fossiliferous, green tuffaceous limestone, red and green chert-clast conglomerate interbeds, green and maroon phyllite, sea-green chert, and local green volcaniclastic accumulations. Fossils include crinoids, corals and brachiopods. Only a few have been observed in growth position; most occur in debris beds that suggest down-slope transport. Ages of separate fossil collections from the main Screw Creek limestone range from late Mississippian to early Pennsylvanian (M.J. Orchard, in Stevens and Harms 2000; W. Bamber personal communication 2000). The limestones south of the Plate Creek Stock yielded four collections, two of which are late Mississippian and one of which is early Pennsylvanian to Early Permian (W. Bamber, personal communication 1998; Table 1). A Pennsylvanian-Early Permian conodont age was obtained from the extension of this belt of limestone north of Swift River (M.J. Orchard, in Stevens and Harms 2000). These ages show that the Screw Creek limestone was deposited over a considerable time interval, at least from late Mississippian through early Pennsylvanian and perhaps into the Permian. The presence of volcaniclastic and epiclastic debris in it suggests that it interfingers with the volcanogenic Klinkit succession.

Klinkit Succession

The Klinkit succession in 104O/14E and 15 is characterized by its volcanic and epiclastic rocks. It also contains quartz clastics, and interfingers with the Screw Creek limestone. Its green and locally bright maroon palette contrasts sharply with the monotonous dark tones of the main Swift River succession. A 5-20 metre thick unit of maroon and green chert marks its base above the Screw Creek limestone in thrust imbricates south of the Plate Creek stock. Typical rock types throughout the Klinkit succession are green heterolithic lapilli tuff, volcanic sandstone and tuffaceous siltstone, accompanied by green tuffaceous phyllite, green chert, quartzite, and local conglomerates. The lapilli tuff contains chloritic ash lapilli and lesser lithic clasts of intermediate composition, including epidote-rich (altered?) fragments. Flow rocks are rare in this area. One andesite flow or sill occurs on a brushy summit 7 kilometres east of the Swift River. Fine fragmental units with a mixture of volcanic and sedimentary clastic material are common in the Klinkit succession. On the south side of the Alaska Highway, 3 kilometres east of the Swift River truck stop and 2 kilometres north of the Yukon border, volcanic-matrix conglomerate contains abundant large white limestone clasts. Just south of this outcrop, blocks of quartzite occur in a green

TABLE 1
MACROFOSSIL IDENTIFICATIONS FROM SCREW CREEK LIMESTONE IN CENTRAL 104O/15

Station	UTM East	UTM North	Fauna	Age
96JN38-4	397841.1	6632433.8	*Siphonodendron lisburnensis* Armstrong?	Early Carboniferous (Late Visean or Serpukhovian)
96JN38-8	397135.7	6632688.2	*Petalaxis* ? Spec. indet.	?Early Carboniferous to Early Permian (Asselian)
96JN38-10	399102.1	6636283.1	*Stelechophyllum* sp. cf. S. mclareni	Early Carboniferous (Late Visean or Serpukhovian)
96JN38-12	399366.1	6635738	*Paraheritschoides?* sp.	Bashkirian? to Early Permian (Asselian)

Identifications from E.W. Bamber, Geological Survey of Canada, Paleontological Report 1-EWB-1998 epiclastic sandstone “greenwacke” matrix. The blocks appear to represent pieces of a single, slumped bed. Polylithic conglomerate occurs a half-kilometer south of the Yukon border and 2.5 kilometres southeast of the limestone-clast highway exposure. It contains clasts of quartzite, chert, argillite and greenstone in a chloritic matrix. It is interbedded with green quartz-plagioclase grit, and occurs near green pyroclastic breccia with abundant subangular to subrounded andesitic clasts in the 1-5 centimetre range. This mixing of siliciclastic and volcanogenic units is a local microcosm of the Klinkit succession as a whole: it documents the development of discrete, mainly intermediate, volcanic centres in a pericratonic environment. The Klinkit succession in this area has a distal volcanic character, in contrast with the thick piles of flows and coarse fragmentals seen elsewhere, for instance south of Munson Lake in the southern Yukon, and near Teh Creek in west-central Jennings River area.

INTRUSIVE BODIES

Early Jurassic Suite

The Nome Lake and Simpson Peak batholiths outcrop in the southern part of the area. They are essentially the same body, divided by a narrow screen of calc-silicate and hornfels in the headwaters of Redfish Creek. The Nome Lake batholith southwest of McNaughton Creek is a uniform, coarse-grained equigranular hornblende-biotite granodiorite characterized by large, round, equant quartz “raisins” .5 centimetres in diameter, and scattered mafic inclusions. The abundance (roughly 20%) and prominent shapes of the quartz grains in this phase are unusual in the Early Jurassic intrusive bodies, which tend to contain only minor, interstitial quartz except in uncommon granite phases. The eastern margin of the Simpson Peak body is exposed in the southwestern corner of the map area. It consists of coarse grained biotite-hornblende tonalite and granite. The multiphase Plate Creek Stock crops out in the centre of the map area. Its areal extent is smaller in our interpretation than that of Gabrielse (1969), restricted to the area southwest of the Plate Creek valley. It is a highly variable body, as is typical of the Early Jurassic suite. Near its western margin it has two compositional variants: medium grained equigranular granodiorite to diorite with 20 to 25% mafic minerals, hornblende > biotite; and coarse grained granodiorite with 10-15% biotite and scarce hornblende. Along its southern margin a mafic to ultramafic border phase shows extreme variation in grain size, from medium grained to pegmatitic, and in percentage of mafic minerals, from 40% in medium grained diorite to over 80% in hornblende pegmatites.

Hornblende-phyric dikes occur sporadically throughout the terrane. Typically, they are andesitic to trachyandesitic in composition, with acicular hornblende and subordinate lath-shaped plagioclase phenocrysts. Small mafic inclusions are a typical, though not universal feature. Like the larger Early Jurassic bodies, these dikes are unfoliated, and in some cases cut faults and shear zones. They are assumed to be part of the Early Jurassic intrusive suite.

Mid-Cretaceous? Intrusions

Two separate, texturally and compositionally distinctive bodies intrude the Dorsey assemblage northeast of Plate Creek. Previously included within the Plate Creek stock (Gabrielse, 1969), these have been distinguished in our mapping (Figure 3). The more northerly body is a Kspar-megacrystic granite cut by aplite and pegmatite dikes, which strongly resembles the nearby Cassiar Batholith. The more southerly body is a coarse grained, equigranular granite dominated by equant plagioclase and globular quartz. The interstitial mafic minerals in it, biotite and hornblende, are completely chloritized. It cuts strongly deformed and metamorphosed lower Dorsey assemblage schists, but is itself unfoliated. A zircon age determination is in progress.

Cassiar Terrane

STRATIFIED UNITS

Lower Paleozoic Cassiar Terrane strata are exposed in an embayment in the Cassiar batholith in the northeastern corner of the map area. They include the Lower Cambrian Boya and Rosella formations and the Kechika and Road River groups. Geology in this area is continuous with more extensive exposures to the east (104O/16; Nelson and Bradford, 1987).

CASSIAR BATHOLITH

The mid-Cretaceous Cassiar Batholith outcrops in the highest ranges of the Cassiar Mountains on both sides of Tootsee Lake. It is predominantly granitic, ranging from coarse grained equigranular to Kspar-megacrystic, and granodioritic in areas of higher hornblende-biotite concentration. Aplites and pegmatites cut the main phases.

Structure

The map area can be seen as four structural zones, with different phases of deformation dominating in each (Figure 3). East of the Cassiar Fault, the relatively undeformed Cassiar batholith intrudes folded and block-faulted strata of the Cassiar Terrane. Although farther south the Dorsey and Cassiar terranes are juxtaposed across a gently-dipping thrust fault (Nelson, 2000; Nelson *et al*., 2000) in this area the post-accretionary Cassiar Fault forms the terrane boundary. The fault is expressed as anastomosing mylonite zones at the western edge of the Cassiar Batholith in the high country northeast of Plate Lake and in the headwaters of Carlick Creek. From the Cassiar Fault westwards to McNaughton Creek in the south, and to the eastern margin on 104O/14 in the north, the stratified rocks of the Dorsey Terrane dip moderately southwestward, forming a homocline with the lower Dorsey assemblage exposed at its northeastern base, overlain sequentially by the Swift River succession, Screw Creek limestone and, in places, Klinkit volcanics. This central panel is bounded to the southwest by a thrust fault, or set of thrust faults, that repeat the upper Paleozoic stratigraphy. Southwest of the thrust faults, in the fourth structural zone, the stratified rocks dip very gently, except for the steep to overturned Screw Creek limestone along Redfish Creek on the western boder of 104O/14E. The structure of this western area is interpreted as a series of southwesterly-vergent recumbent folds involving the Swift River, Screw Creek and Klinkit successions.

At least five phases of deformation are recognized in the Dorsey Terrane stratified rocks (Figure 4). All of them predate the Early Jurassic intrusions. The earliest phase (D1) involved the development of a foliation in all units, which was affected by subsequent folding events. The issue of whether the metamorphic Dorsey assemblage underwent deformation that did not affect the other units, cannot be resolved from current data in this area. South of the Nome Lake Batholith, a strong east-west quartz stretching lineation is restricted to the Dorsey assemblage and lowermost part of the Swift River succession (Nelson, 2000).

In the current map area, the first recognizable folding event (D2) created minor and outcrop-scale recumbent folds in the Swift River succession southwest of McNaughton Creek. Their trends, roughly easterly, are sharply discordant with those of the major north-northwesterly D3 recumbent folds; they may represent an event that only affected the Swift River and not the overlying Screw Creek limestone and Klinkit succession.

The best example of a regional D3 fold is the overturned, southwesterly-verging syncline that involves the Screw Creek limestone in the valleys of Screw and Redfish creeks. It trends north-northwest over more than 30 kilometres. The axis of a D3 anticline is interpreted in the Swift River succession just southwest of McNaughton Creek; farther to the northeast, overlying Klinkit and Screw Creek strata reappear. Thrust faults (D4) east of McNaughton Creek truncate the southwesterly verging fold pattern: this suggests that they are younger. They dip southwest, and are inferred to have northeasterly displacement. Thus, in the Dorsey Terrane, southwesterly-verging ductile deformation (D3) was succeeded by brittle northeasterly-vergent thrusts (D4). Northeasterly-vergent minor chevron folds form part of this late episode. The thrust faults are truncated by a series of north-trending, generally west-side-down normal faults (D5). The top of the Dorsey assemblage between the Nome Lake Batholith and Plate Creek stock is a more gently southwest-dipping, layer-parallel shear zone with Swift River succession in its hanging wall. The normal sense on this contact is shown by shear bands and upward decrease of metamorphic grade. Both the Dorsey assemblage/Swift River succession contact and the high angle faults are cut off by the Early Jurassic intrusions.

D1

Foliation parallel to layering is developed in all of the Dorsey Terrane units in the map area, from the basal Dorsey assemblage to the uppermost Klinkit volcaniclastics. Particularily in the upper units, foliation development is variable. This may largely reflect compositional control. Metatuffs and phyllites with abundant platey minerals - sericite, chlorite, and biotite - more readily acquire a foliation than cherts, quartzites, or limestones. Foliation development in clastic rocks is dependant on the amount and nature of the matrix, whether phyllitic or quartz-rich.

D2

The D2 event involved recumbent folding in the Swift River succession around axes that average 257/24 (Figure 4), now shown in concentrations of minor folds and local modification of gently dipping contacts. The D2 fold axes are geometrically very distinct from the north-northwesterly trends of D3. This early episode does not have the regional expression of D3; no map-scale F2 folds have been identified. Although D2 minor folds are prevalent between Redfish McNaughton Creeks, the basal surface of the Screw Creek limestone along Redfish Creek has not been modified by east-northeasterly folding: for this reason, D2 is considered to predate deposition of the limestone.

D3

This episode of north-northwest-trending recumbent folding produced the major map patterns in the western part of the map area (Figure 3). The character of D3 deformation is shown in the cross section in Figure 4. To the west along Redfish Creek, the Screw Creek limestone forms a tight, westerly-verging synclinal closure. This outcrop belt is separated from gently-dipping Screw Creek and Klinkit units to the east by a recumbent anticline cored by Swift River chert, argillite and siliciclastics. Along Redfish Creek, the Screw Creek limestone is nearly vertical. Bedding facing directions in the uppermost Swift River there show tops to the west. Northeast of the anticlinal axis, the S3 cleavage dips somewhat more steeply to the northeast than do major unit contacts: this is seen clearly on the flat ridge 10 kilometres east of the Swift River. Minor fold axes (F3) associated with this event average 151/15 (Figure 4). Some of these measurements come from mountain-side exposures in northern 104O/14E, where the contact between Swift River cherts and the highest Swift River clastic unit is intricately interfolded on the northeastern limb of the regional anticline.

D4

Just northeast of McNaughton Creek in the south, and at the eastern margin of 104O/14 in the north, the stratified rocks tilt southwestwards and are cut by at least one northwesterly-striking, southwesterly-dipping thrust

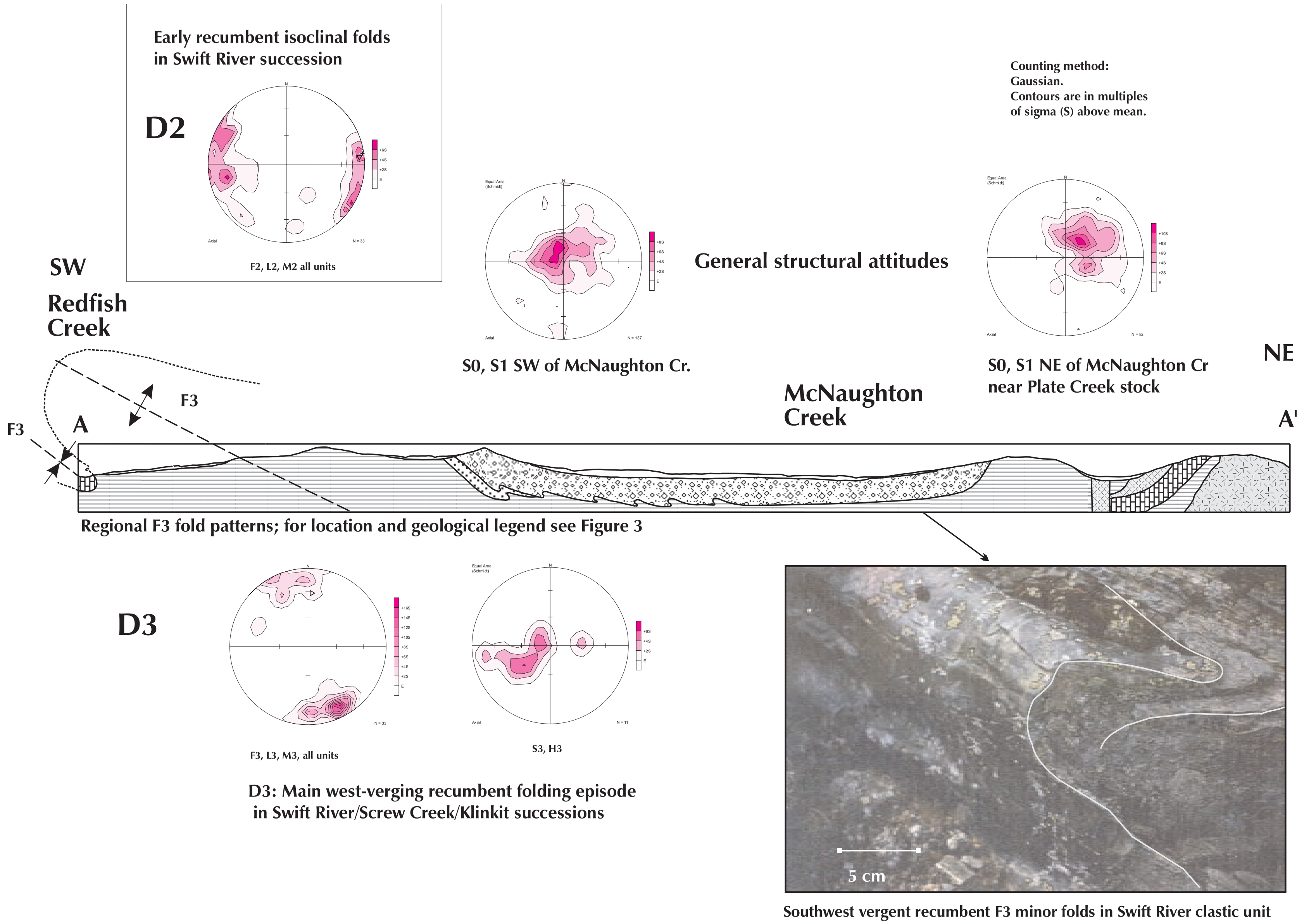
Early recumbent isoclinal folds
in Swift River succession
D2
F2, L2, M2 all units
SW
Redfish
Creek
A
F3
F3
S0, S1 SW of McNaughton Cr.
General structural attitudes
Counting method:
Gaussian.
Contours are in multiples
of sigma (S) above mean.
S0, S1 NE of McNaughton Cr
near Plate Creek stock
NE
McNaughton
Creek
A'
Regional F3 fold patterns; for location and geological legend see Figure 3
D3
F3, L3, M3, all units
S3, H3
D3: Main west-verging recumbent folding episode
in Swift River/Screw Creek/Klinkit successions
5 cm
Southwest vergent recumbent F3 minor folds in Swift River clastic unit

Figure 4.

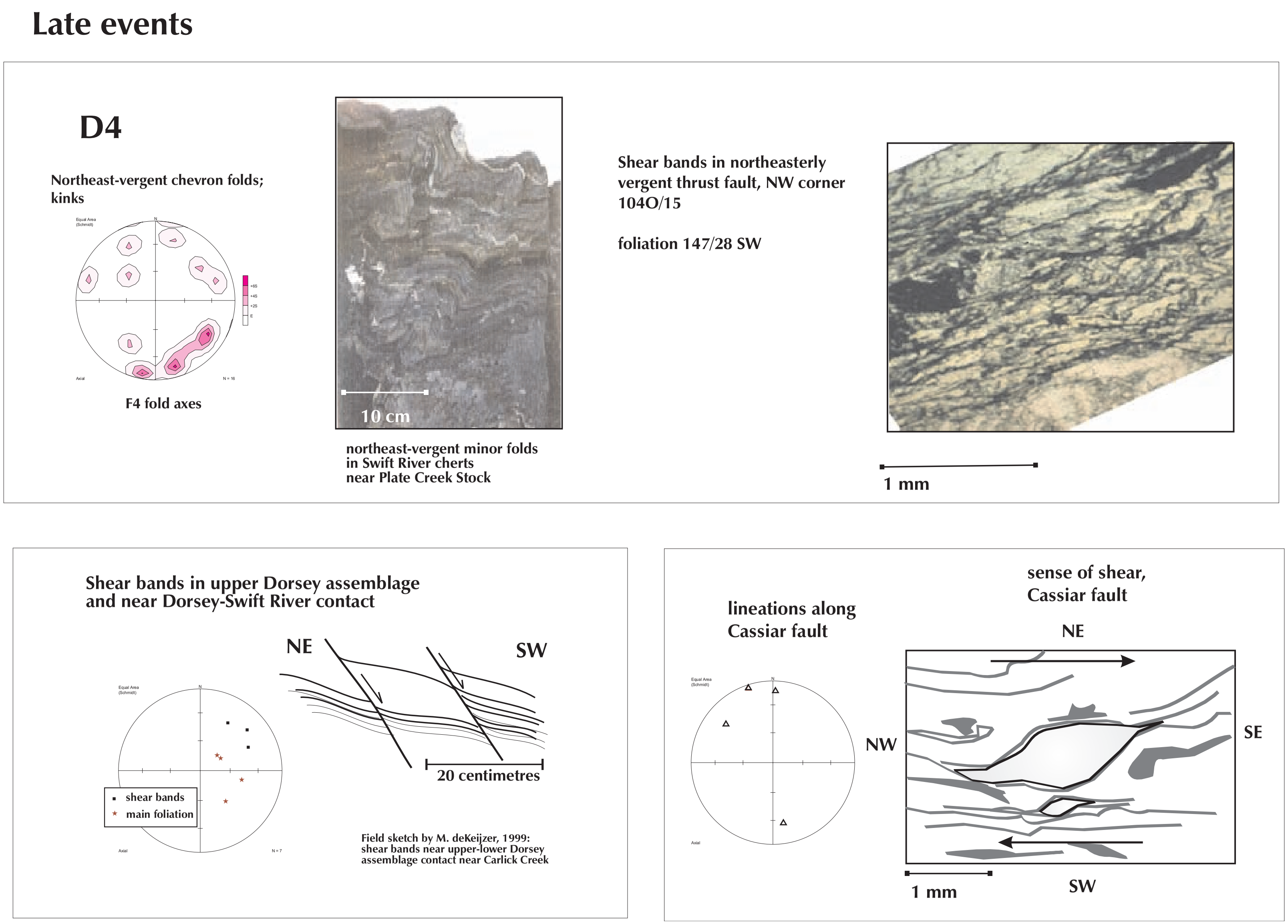

Figure 4. Deformational events and styles in the 1040O/14E, 15 map area.

fault. In the complex of thrust panels south of the Plate Creek stock, two fossil collections from the Screw Creek limestone show an older-over-younger relationship, with late Mississippian corals in the overlying, and Pennsylvanian in the lower panel. A shear zone related to this fault episode, located 2 kilometres west of Plate Creek near the northern boundary of the map area, shows top to the northeast shear bands (Figure 4). It is cut by an undeformed hornblende porphyry dike. Northwesterly-trending chevron folds (F4, Figure 4), many with northeasterly vergence, are best developed near the zone of thrusting.

NORMAL FAULTS

A set of steep north-stiking, west-side down normal faults cut the Dorsey assemblage and stratified units of the Dorsey Terrane in the central part of the map area. Such a fault is inferred to juxtapose upper and lower Dorsey assemblage in the Carlick Creek drainage. Well-developed shear bands in the upper Dorsey assemblage near it show top-down-to-southwest displacement. Another fault in this set juxtaposes thrust-imbricated Klinkit, Screw Creek and Swift River succession with Swift River between the Plate Creek stock and Nome Lake Batholith. On the ridges immediately east, parallel strands within the Swift River succession are expressed as zones of iron staining, high fracture density, and Fe-oxide-cemented breccias.

None of these faults appear the offset the Early Jurassic intrusions; and the two exposed strands described above are clearly truncated by the Plate Creek stock.

The southwest-dipping top of the Dorsey assemblage is well-exposed in a gully 4 kilometres south of Plate Lake. There, a lithologic transition occurs up-section over 200 metres of outcrop. At the base of the section, but above the highest Dorsey grits, a thin and highly variable upper Dorsey assemblage - garnetiferous and magnetite-bearing green biotite-sericite-chlorite schist, quartzite, amphibolite, black phyllite, and quartz-sericite schist - passes into monotonous black chert and phyllite/argillite of the lower Swift River succession. In the uppermost Dorsey assemblage, garnet-bearing schist occurs as nodules within retrograde magnetite-porphyroblastic biotite schist. There is not an appreciable metamorphic grade diifference between this retrograde assemblage, and biotite-bearing assemblages developed in Swift River phyllites immediately above the contact. The area of the contact is strongly sheared throughout. Lensoid bodies of intact rock are separated by distinct, anastomosing brittle shear zones that contain fault breccia and cataclasite. A tonalite dyke, texturally similar to the nearby Nome Lake Batholith and Plate Creek stock, cuts across the shear zone and is neither displaced nor deformed.

Field observations showed shear bands and minor faults that dip more steeply to the southwest than the overall foliation. A thin section of black biotite phyllite from near the base of the Swift River succession indicates top-to-the-southwest shear sense in sigma-shaped composite biotite porphyroblasts. These features suggest that the last motion to occur near the Dorsey/Swift River contact was of normal sense. Similar observations were made at this contact south of the Nome Lake batholith (Nelson, 2000).

THE CASSIAR FAULT

Within the map area, the Dorsey and Cassiar terranes are juxtaposed across the Cassiar Fault. Farther south, this fault truncates an earlier thrust-faulted accretionary boundary (Nelson *et al.*, 2000). The Cassiar Fault strikes north-northwesterly and is essentially vertical. Protomylonite is developed along fault splays in the Cassiar Batholith up to 4 kilometres east of the main strand of the fault in the southeastern corner of the map area. Along the fault itself, mylonite development is intense: dark grey sugary mylonite stringers cut through protomylonitized Kspar-megacrystic granite. Field and thin section observations confirmed the dextral sense of motion on the fault (Figure 4).

In an area 3 kilometres northeast of Plate Lake, weakly deformed muscovite pegmatites, presumably a late phase of the Cassiar Batholith, cut across previously protomylonitized granite and are not displaced. Textures in these pegmatites - kinking of muscovite plates and mortar texture in quartz - suggest that they are late synkinematic to the mylonite-forming event. If they are late melts of the Cassiar batholith, this suggests that most of the motion on the Cassiar fault took place after overall cooling of the batholith, but before its final solidification.

MINERAL DEPOSITS AND MINERAL POTENTIAL

The known mineral occurrences in the map area are of three types: silver-lead-zinc veins within the Cassiar Batholith, one skarn and one instance of stibnite (epithermal?) veining near the Plate Creek stock.

POLYMETALLIC VEINS

The Holliday-Discovery (104O-001), Holliday-Shipment (104O-002), Lake (104O-012), and Pit (104O-017) are groups of narrow but high-grade veins hosted by Cassiar batholith granite in the headwaters of Freer and Alan Creeks. Narrow, decimetre-scale galena-sphalerite-pyrite veins are surrounded by thin selvages of sericitic alteration. A 14 tonne combined shipment from the Discovery and Pit zones in 1979 assayed 1.3 g/tonne Au, 532 g/tonne Ag, 29.1% Pb and 13.9% Zn (DIAND, 1983), and in 1983 the George Cross Newsletter reported inferred ore in the Discovery-Shipment-Pit veins at 36, 287 tonnes with 427.2 g/tonne Ag, 14.95% Pb and 20.78% Zn (cited in MINFILE). Lead isotopic signatures from the Lucky vein of this group plot in a cluster with other local polymetallic occurrences of known mid-Cretaceous (Silverknife) through Eocene (YP) age (Bradford, 1988). Abbott (1984) has related the veins and replacements of the Rancheria district to small granites that post-date the main Cassiar Batholith.

SKARNS

The Bear showing (104O-049) is a garnet-diopside skarn in the Kechika Group that contains scheelite, molybdenite, powellite and minor galena (MINFILE). It is located in the embayment in the Cassiar batholith in far eastern 104O/15, where granite probably underlies the strongly hornfelsed metasedimentary rocks at fairly shallow depths (Bradford, 1988). Trenching has exposed two stratabound skarn bodies up to 1 metre wide (MINFILE).

During fieldwork this year, malachite stains were noted in rusty calcsilicates in the inlier between the Nome Lake and Simpson Peak batholiths, suggesting the possibility of skarn-type mineralization. The new stream-sediment geochemical release (Jackaman, 2000) identified two highly anomalous Au values in Redfish Creek of 500 and 51 ppb (785930, 785931) 10 kilometres downstream from this area. Other elements such as As, Sb, Ag and base metals are low, suggesting that these may be placer gold accumulations; however the possibility of a local bedrock source remains.

FAULT-RELATED STIBNITE AND POLYMETALLIC? VEINS

At the Tan showing (104O-006), a 20 centimetre-wide quartz vein in the Dorsey assemblage contains stibnite and pyrite (MINFILE). It is located within an area of normal faulting. Some of the faults in the vicinity display zones of alteration, brecciation and Fe-staining. Iron oxide boulders occur in talus over the trace of one of the faults. The boulders, probably of fault breccia, consist of small, angular chert fragments in a rusty limonitic matrix. The fragments are much more angular and more regular in size than the surface talus, evidence that these are not parts of a dismembered ferrocrete deposit. Two grab samples from nearby gossanous zones are anomalous in Ba (Table 2). The area is characterized by anomalous stream-sediment results as well: the sample in the drainage containing the Tan showing, 785740, is statistically rated as 3rd highest in total base metal content, and 8th highest in total precious metals plus indicators (Au, Ag, Sb, As) for the whole sample suite in the Jennings River map area (Jackaman, 2000). The regional geochemical survey shows it as part of a northwesterly trend of high base metal as well as Au values As and Sb in stream sediments, that parallels Plate Creek for a distance of over 10 kilometres. The highest Au analysis in this trend is 206 pbb (sample 785735), is from a creek that drains northest into Plate Creek, 10 kilometres northwest of the Tan showing.

INTRUSION-RELATED GOLD

The Ran (104O/037), located in the southwestern corner of 104O/16 adjacent to the present map area, is an areally extensive area of sericitic alteration and quartz veining within protomylonitized granite of the Cassiar

TABLE 2
GEOCHEMICAL ANALYSES OF PROSPECTING SAMPLES FROM MAP AREA

Element				**Mo**	**Cu**	**Pb**	**Zn**	**Ag**	**Ni**	**Co**	**Mn**	**Fe**	**As**	**Au**	**Sb**	**Bi**	**Ba**	**Hg**	**Se**
Units				ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm	%	ppm	ppb	ppm	ppm	ppm	ppb	ppm
Method				ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS	ARMS
Field Number	**UTM-east**	**UTM-north**	**Description**																
00JN-2-4	403095.2	6634800.5	rusty feldspar porphyry cuts metachert	0.39	46.97	4.44	27.2	86	18.7	3.5	69	1.38	10.7	2.7	6.35	0.23	847.8	23	0.3
00JN-2-7	402097.5	6636811.8	rusty fault zone with Fe-ox cemented bx	0.38	90.8	2.74	49.9	317	4.5	0.6	27	2.98	0.9	1.7	1.41	0.22	2379	15	0.8
00JN-3-5	405643.1	6635648	rusty, bleached zone in siliceous argillite	1.37	20.58	4.43	15.9	79	5.7	0.7	96	0.86	7.2	0.3	4.69	0.23	92	< 5	0.4
00JN-4-7.5	403936	6637299.2	rusty qtzt near qss with pyrite streaks	11.98	20.24	2.65	9.7	48	7.3	1.2	137	1.07	0.6	0.4	2.91	0.21	43.9	< 5	0.5
00JN-21-6	382232.5	6646402.7	waxy pale green rhyolite or dacite w/pyrite	1.02	3.77	10.64	5	256	4.7	1	43	1.86	82.3	54	0.88	0.19	96.9	19	0.1
ACME Q/C				32.45	19.18	11.58	9.1	113	2.4	0.4	47	0.85	6.1	9.6	0.24	0.35	79.6	5	5
Std. Red Dog				12.73	159	7.13	48.3	70	11.2	9.8	415	3.79	5.3	34.1	0.24	0.49	53.3	17	3.3
ACME Q/C				13.69	125.3	32.51	150.9	245	33.7	11	792	2.97	61.6	193	9.59	10.55	150.6	223	2.1
NOTES																			
Analysis of steel milled crushed rock prepared by ACME Analytical																			
ARMS = Aqua regia digestion - ICPMS																			
ACM = ACME Analytical, Vancouver																			
ELEMENT				Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	Au	Sb	Bi	Ba	Hg	Se
Mean+2SD				15.5	177.3	7.816	53.306	92.29	13.8	12.64	470.1	4.285	6.81	88.28	0.215	0.547	60.61	30	4.029
Mean-2SD				10.9	160	6.284	47.894	81.71	11.14	9.829	431.2	3.822	5.524	-11.48	0.192	0.486	52.12	26	2.971
Std. Red Dog				12.73	159	7.13	48.3	70	11.2	9.8	415	3.79	5.3	34.1	0.24	0.49	53.3	17	3.3

Batholith (Nelson and Bradford 1987). The veins contain pyrite, galena, bismuthinite, argentite, sphalerite, chalcopyrite and molybdenite (MINFILE). Grab samples of the veins collected this summer show a pattern of strongly anomalous bismuth (1000-3000 ppm) as well as very high values of Ag and Pb; although gold and associated elements (As, Sb) are low (P. Wodjak, unpublished data). Nevertheless, the style of alteration and mineralization at the Ran, as well as the high Bi values, encourage further thought about the existence of intrusion-hosted gold deposits in the Cassiar Batholith.

VOLCANOGENIC MASSIVE SULPHIDE POTENTIAL

On the eastern slope of the forested ridge 7 kilometres east of the Swift River in northern 104O/14E, pyritic quartz-sericite schist with quartz eyes occurs in an area of poor outcrop within unit uPSRgw, the dominantly siliciclastic, uppermost unit of the Swift River succession. It resembles metarhyolite tuffs in the Ram Creek assemblage, Big Salmon complex, and upper Dorsey assemblage, and suggests that the Swift River succession, like them, may have potential for hosting volcanogenic deposits. A grab sample from this zone contains 82 ppm As (Table 2).

Tectonics

Mapping of the stratified Swift River succession, Screw Creek limestone and Klinkit succession has aided in reconstructing the tectonic history of the central Dorsey Terrane. Their integrity as a depositional sequence sheds light on its late Paleozoic history; their subsequent deformation helps to chronicle late Paleozoic to early Mesozoic (pre-Early Jurassic) tectonic events.

The lower Swift River succession in northern Jennings River area represents a deep basin with sources of siliciclastic and minor plutonic, but not volcanogenic debris. Its upper age limit is provided by the unconformably overlying Screw Creek limestone, which ranges down to probable late Visean age (late Mississippian, 340-333 Ma). Its oldest age is unknown, because it rests structurally on the Dorsey assemblage. If this is a modified depositional contact, then its base can be no older than 357 Ma (early Mississippian), the age of a metamorphosed tuff in the upper Dorsey assemblage in the Yukon (Roots and Heaman, 2001); and probably no older than 340 Ma, the age of the youngest dated intrusion in the southern Dorsey assemblage (Nelson *et al*., 2000). The entire Swift River succession must then have been deposited over a time duration of between 0 and 25 million years. This short interval is difficult to reconcile with the 3.5 kilometre section of mainly chert and argillite in the southern Yukon, even given the likelihood of structural thickening. If, on the other hand, the contact represents tectonic juxtaposition, then the Swift River succession could range to considerably older ages; moreover, if it does, then the complete absence in it of rocks representing the Early Mississippian igneous event displayed in the Dorsey assemblage would suggest considerable separation between them at that time. By contrast, the highest siliciclastic unit in the Swift River succession represents erosion of a plutonic/metamorphic source terrane, possibly the Dorsey assemblage.

The Screw Creek limestone and volcanic/clastic Klinkit succession are intimately associated. Using only the most tightly constrained available fossil ages, Screw Creek limestone ranges from late Mississippian to early Pennsylvanian (probable late Visean; late Visean-Serpukhovian; late Serpukhovian-early Bashkirian; Bashkirian; 340-333; 340-323; 327 (approx.) - 316 (approx.); 323-310 Ma). It is generally the lowest unit overlying the Swift River succession, but farther north in the Teslin map area, multiple limestone bodies occur at different levels within Klinkit volcaniclastics (units Mv and Ml; Gordey and Stevens 1994). The interfingering of volcanic, carbonate and quartz clastic facies suggests a late Mississippian to Early Permian volcanic arc with continental or pericontinental basement, within which limestone banks developed in favorable settings. This pericratonic arc environment is demonstrably of regional extent: the Klinkit succession and affiliated limestones are exposed at least from Teslin map area in the north (units Mv and Ml, Gordey and Stevens, 1994) to central Jennings River area in the south (Harms and Stevens, 1996), a distance of over 200 kilometres.

The age range of the Screw Creek limestone overlaps the interval of time in which at least the upper, siliciclastic-felsic tuff unit of the Big Salmon Complex was being deposited, based on a 325 Ma U/Pb zircon age (Mihalynuk *et al*., 1999; *see* Figure 2). Present time constraints are permissive of lithostratigraphic correlation with the fossiliferous limestone unit in the Big Salmon, which like the Screw Creek limestone contains crinoids, horn corals and at least one colonial coral. However the Big Salmon greenstone unit, instead of being equivalent to the overlying Klinkit volcanics, appears to stratigraphically underlie the limestone (Mihalynuk *et al*., 2000). Ongoing petrochemical and geochronological comparisons between the Big Salmon and Klinkit volcanics, part of an M.Sc. thesis by Renée-Luce Simard of St. Mary's University and an undergraduate project by Fionnulla Devine at the University of British Columbia, may help to clarify this apparent paradox.

The D3 folding event, which produced regional, north-northwest-trending, west-verging recumbent folds in the late Paleozoic sequence, is probably not confined to 104O/14 and 15. In northwestern Jennings River area, Mihalynuk *et al.* (1998) recognized a west-verging, post-peak-metamorphic, recumbent folding episode (also D3 in their sequence) that produced the major map patterns in stratified units of the Big Salmon Complex. Southwesterly-vergent recumbent folds affect the Klinkit succession south of the Simpson Peak batholith in 104O/11 and 12 (Mihalynuk *et al*., 2000). The Triassic Teh clastics are involved in this episode (T. Harms, personal communication, 2000), which predated the Early Jurassic intrusions.

The Dorsey Terrane has been correlated with the multi-phase arc terrane Quesnellia further south (Harms *et al*., 1997; Nelson 1997). Points of similarity can be adduced from rocks ranging from the oldest to the youngest in each. Both terranes have at least partial pericratonic basement with a Devonian-Mississippian igneous component (Roback and Walker, 1995, Simony 1979). The Swift River-Screw Creek-Klinkit sequence has close parallels in the late Paleozoic Lay Range Assemblage of central British Columbia (Nelson, 1997). Although, unlike Quesnellia, there is little evidence for a Late Triassic igneous episode in the Dorsey Terrane, it contains abundant Early Jurassic intrusions that are coeval with parts of the Hogem batholith and other Quesnellian bodies. A suite of andesitic to trachyandesitic dykes in the Dorsey Terrane resembles Jurassic volcanic and hypabyssal rocks of central Quesnellia, in terms of age, textures and shoshonitic petrochemistry.

In this context, the D3 folding event stands out as a significant divergence between the history of the Dorsey Terrane and that of central and southern Quesnellia. Although there is a minor unconformity between the Triassic and Jurassic successions in central Quesnellia (Nelson and Bellefontaine, 1996), major deformation is not inferred. The earliest evidence of ductile deformation is coeval with the 186-Ma Polaris body along the eastern margin of Quesnellia; it is associated with easterly tectonic transport (Nixon *et al*., 1993). Southwesterly-verging folding of the eastern margin of Quesnellia did not begin until after its accretion to North America, in mid-Toarcian to Aalenian time or about 180-174 Ma (Murphy *et al*., 1995). Completion of the preaccretionary D3 event predates this by at least 10 million years. It must be the result of collisions among the offshore arc elements, prior to the impingement of the continent on the pericratonic collage. Northern Stikinia fits the profile of the hypothetical collider: its tectonic history underwent a rapid shift from arc volcanism to coarse clastic sedimentation and rapid local uplift at about the Triassic-Jurassic boundary.

CONCLUSIONS

Mapping of 104O/14E and 15 in 2000 contributes to a growing geologic corpus in Jennings River and Wolf Lake map areas, facilitated by the Ancient Pacific Margin Natmap project. This area features well exposed late Paleozoic stratified rocks, whose stratigraphy and structure enable further understanding of the Dorsey Terrane, the southern continuation of the Yukon Tanana Terrane in the Finlayson Lake and Teslin belts. A major advance in this field season was the recognition that the Swift River succession, Screw Creek limestone and Klinkit succession are not separate assemblages, but constitute a single stratigraphic sequence. This has implications for the internal geological coherency of a large part of the allochthonous Dorsey Terrane.

Our studies have confirmed the possibility that equivalents of the early Mississippian arc strata that host VMS deposits near Finlayson Lake can also be found within the Dorsey Terrane. As well, extensive late Mississippian silica (-manganese-iron) exhalites have been documented in the Big Salmon Complex, located just to the west. The Screw Creek limestone and Klinkit succession, the upper two stratified units, may correlate with parts of the Big Salmon Complex.

Two prospecting discoveries were made this summer, malachite staining in calcsilicates between the Nome Lake and Simpson Peak batholiths, and pyritic quartz-sericite schist in the upper clastic unit of the Swift River succession. A re-release of regional geochemical survey data (Jackaman, 2000), including key new elements such as Au, As, and Sb, offers intriguing and unexplained anomalies for future follow-up.

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