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Bedrock Geologic Map of the 15' Sleetmute A-2 Quadrangle, Southwestern Alaska

By Robert B. Blodgett, Frederic H. Wilson, Nora B. Shew, and James G. Clough

Pamphlet to accompany

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Conversion Factors

International System of Units to U.S. customary units

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
meter (m)	1.094	yard (yd)

Datum

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Horizontal coordinate information is referenced to the 1927 North American Datum (NAD 27).

Bedrock Geologic Map of the 15' Sleetmute A-2 Quadrangle, Southwestern Alaska

By Robert Blodgett[1], Frederic H. Wilson[2], Nora B. Shew[2], and James G. Clough[3]

Abstract

Twelve unnamed, bedrock stratigraphic units are recognized within the Sleetmute A-2 1:63,360-scale quadrangle of southwestern Alaska. These units range in age from late(?) Proterozoic through Devonian and can be divided into two distinct facies belts: 1) a southern facies of dominantly shallow-water platform carbonate and minor siliciclastic rocks (including Early Ordovician–Early Devonian platform edge algal buildups) with subordinate transgressive tongues of deeper-water platy carbonates; and 2) a northern facies belt of approximately age equivalent deep-water carbonate and siliciclastic rocks deposited in slope and basinal environments. Both facies belts belong to the Farewell terrane of Decker and others (1994). Two structural provinces are also recognized, which correspond directly with these belts. The Farewell terrane is interpreted as a continental margin sequence that rifted from Siberia. Many of the bedrock units recognized in the Sleetmute A-2 quadrangle are equivalent to units previously recognized to the east and northeast in the Lime Hills, McGrath, and Medfra quadrangles. Shallow-water carbonate platform rocks make up the majority of the southern facies and occur primarily along the crest and north side (and to a lesser degree along the south side) of a prominent crescentic-shaped, east-west trending anticlinal axis exposed in the southern part of the Sleetmute A-2 quadrangle. Because of the relatively low thermal alteration indices of the rocks of this area and the presence of highly porous dolostone intervals of good reservoir quality in the platform facies, this region elicited interest for petroleum exploration in the 1980s. However, low total organic carbon (TOC) content of potential source rocks within the Ordovician–Silurian basinal facies belt indicates low petroleum resource potential for this area.

Introduction

This report presents a detailed description of the bedrock geology of the Sleetmute A-2 quadrangle portion of the Holitna Lowland (Wahraftig, 1965), a region that to this day remains a true terra incognita in comparison with most of Alaska (see Blodgett and others [1999a]) for a geologic bibliography of the region). Overviews of the geology of the Sleetmute 1:250,000-scale quadrangle and adjoining areas of the central Kuskokwim Bay region are found in Cady and others (1955), Miller and others (1989), Decker and others (1994), Wilson and others (1998), and LePain and others (2000). The bedrock units of the map area provide a nearly complete record of late Proterozoic through Devonian sedimentation in southwest Alaska. Both shallow-water platform facies and age-equivalent deeper-water basinal facies rocks can be recognized in the map area. The relatively low degree of thermal alteration of these rocks made them an attractive target for petroleum exploration during the early and mid-1980's. The excellent preservation of megafossils and much of the carbonate rock fabric make the area useful for future detailed stratigraphic investigations. The time scale used in this report is based on the U.S. Geological Survey time scale (USGS, 2018) except where noted.

The geologic data presented here for the Sleetmute A-2 1:63,360-scale quadrangle are based on field studies conducted in the mid-1980s by the petroleum industry and the Alaska Division of Geological & Geophysical Surveys (ADGGS), in 1998 by ADGGS, and in 1999 by the U.S. Geological Survey. The authors of this report were involved at various times and in differing capacities in the above-mentioned field investigations. These studies were primarily focused on geochemical sampling for petroleum potential and reconnaissance geologic mapping and did not include measurement of stratigraphic sections in the area. Formal stratigraphic names for the units exposed in the map area would be useful but should be designated after detailed measurement of stratigraphic sections and concomitant biostratigraphic studies have been conducted. Several of the stratigraphic units recognized on the map are equivalent to platform and basinal stratigraphic units recognized in the Farewell terrane to the east and northeast in the Lime Hills, McGrath and Medfra quadrangles (see Gilbert [1981], Patton and others [1980], Dutro and Patton [1982], Blodgett and Gilbert [1983], and Babcock and others [1994]).

The study area (fig. 1) is in the southcentral portion of the Holitna Lowland physiographic division of Wahrhaftig (1965), which is mostly covered by marshy tundra. Sparse outcrops of Neoproterozoic and Paleozoic strata (predominantly carbonate

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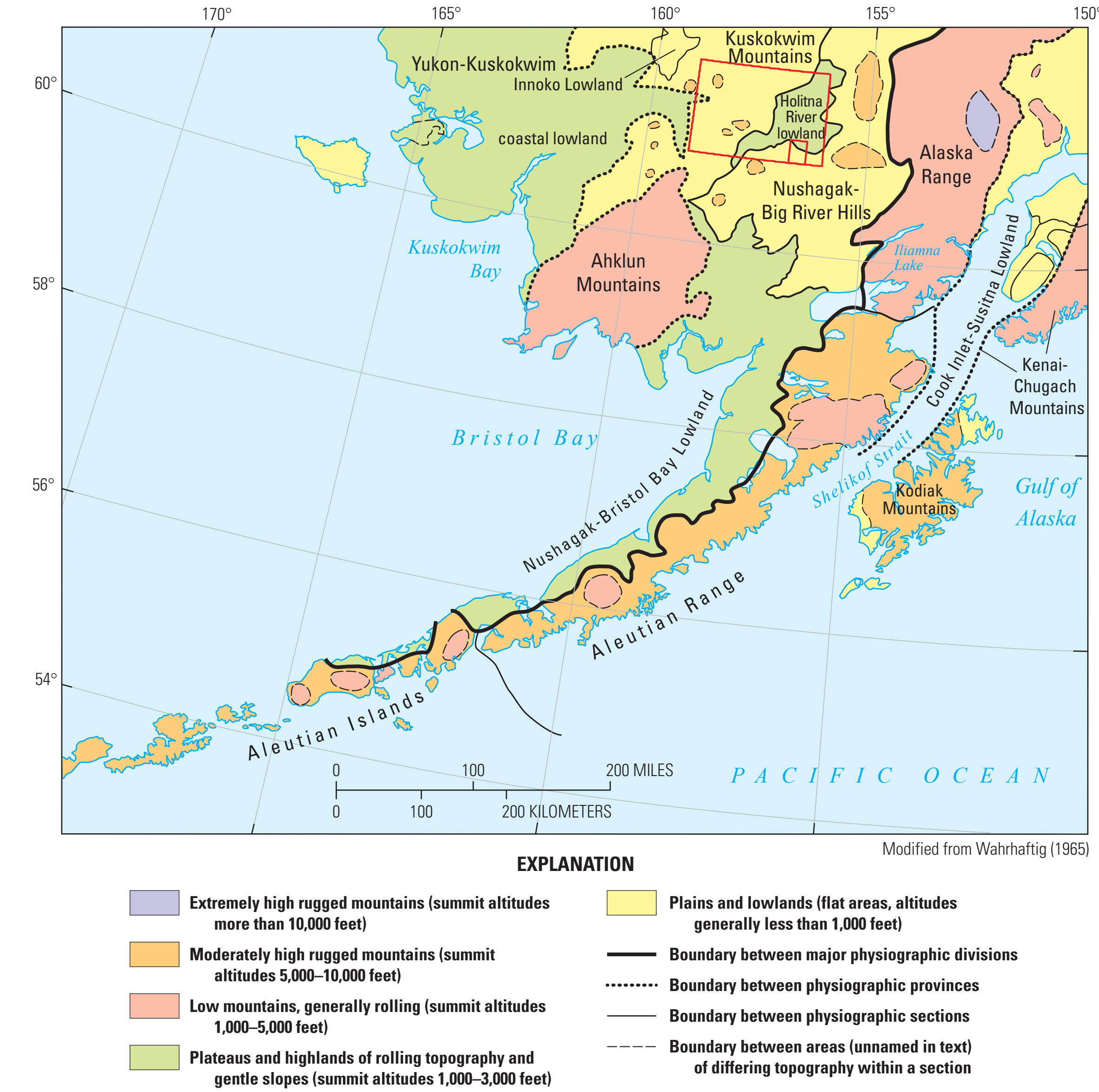

Figure 1. Map showing location of the Sleetmute A-2 1:63,360-scale quadrangle in the Holitna Lowland of southwestern Alaska. Outline of Sleemute A-2 quadrangle shown in red, that of Sleetmute 1:250,000-scale quadrangle shown within the quadrangle.

rocks) form prominent ridges that rise above the lowlands. Prominent outcrops are also situated along the banks of the Hoholitna River. The oldest rocks in the region are carbonate and siliciclastic rocks of probable late Proterozoic age exposed in a crescent-shaped outcrop belt trending generally east to west; this belt forms an anticlinal structure in the southern part of the Sleetmute A-2 quadrangle (Babcock and others, 1994; Jacobson and others, 1996). The rocks described in this report crop out primarily along the crest and the north side of this anticlinal axis.

The rocks in the study area were previously included in the now abandoned Holitna Group of Cady and others (1955). This term was applied to Paleozoic carbonates exposed along the middle course of the Holitna River and surrounding area; no formal stratigraphic subdivisions were designated for this group. Fossils of Silurian and Devonian age were reported by Cady and others (1955), but they inferred that Ordovician strata might also be present because of the occurrence of Ordovician units in correlative strata to the northeast (Medfra quadrangle), and because Silurian and Devonian faunas were recovered only from the upper part of the Holitna Group. The thickness of the group was estimated “to be at least 5,000 and probably closer to 10,000 feet thick (ft; approximately 1,500 to 3050 meters [m]) (Cady and others, 1955, p. 24). Although this investigation did not include the measuring of stratigraphic sections, it is now apparent, based on field work conducted in the region since 1983, that rocks that were assigned to the group have a much greater total thickness, potentially up to 4,500 m. Previous field work has also discovered strata as old as Neoproterozoic (Babcock and others, 1994, 1995) and as young as Triassic (Blodgett and others, 2000). Adrain and others (1995, p. 724) suggested that the term "Holitna Group" was too broadly defined, and that its usage should be abandoned and replaced with more finely divided stratigraphic units.

The Paleozoic strata described here were earlier assigned to the Nixon Fork and Dillinger terranes by Jones and others (1987) and Silberling and others (1992). These terranes, along with the previously defined Mystic terrane, were subsequently recognized by Decker and others (1994) to be genetically related to one another, and their strata were incorporated into to a single newly defined Farewell terrane. Commonly the Nixon Fork, Dillinger, and Mystic terranes have been regarded in subsequent literature to be subterranes of the Farewell terrane. In this report we assign the Paleozoic strata to the Farewell terrane and distinguish only platform and basinal facies, preferring not to continue the usage of the cumbersome subterrane nomenclature.

Recent work on the biogeographic affinities of Farewell terrane fossil biotas indicates that it is a continental margin sequence that probably rifted away from the Siberian paleocontinent during middle Paleozoic (most likely Late Devonian time) (Palmer and others, 1985; Blodgett and Brease, 1997; Blodgett, 1998; Blodgett and Boucot, 1999; Blodgett and others, 1999b, 2002). In previous years, the Farewell terrane or its various component sequences were interpreted as portions of Laurentia that were displaced right-laterally along the Farewell Fault and western splays of the Tintina Fault (Blodgett, 1983; Blodgett and others, 1984; Blodgett and Clough, 1985; Decker and others, 1994) or rifted from the craton margin of western Canada (Churkin and others, 1984; Abbott, 1995).

Geologic Setting

Bedrock strata of the Sleetmute A-2 quadrangle range in age from late(?) Proterozoic to Devonian. Two fundamental facies belts are recognized: (1) primarily shallow-water, platform carbonate rocks that crop out in the southern half of the quadrangle; and (2) deeper-water basinal and slope facies, which consist of platy limestone, siltstone, and shale of the SOsl unit and chert of the ₽zcb unit, which crop out in the northern part of the quadrangle. These facies belts correspond, respectively, to the Nixon Fork and Dillinger terranes of previous workers. Throughout much of Ordovician to Devonian time, these two facies were separated by distinctive algal reef buildups (thrombolite mounds) that were typical of the platform-edge transition and that now separate Nixon Fork terrane facies from Dillinger terrane facies. The reef front orientation varies along the shelf margin; in this map area it trends east-west and displays a history of northward progradation through time. It was situated in the northern part of the Taylor Mountains D-1 quadrangle during the Early Ordovician (Blodgett and Wilson, 2001) but by the Middle to Late Ordovician the reef front was delineated by the Oab unit in the southern part of the Sleetmute A-2 quadrangle. By Early Devonian time, the algal reef trend (Dab unit) was established farther north in the Sleetmute A-2 quadrangle. Because the Dab unit occurs as south-verging thrust sheets, it was likely situated even farther north before thrusting began. Fossils from the basinal and slope facies include graptolites and conodonts that range in age from Early Ordovician to Silurian. Lateral equivalence of this basinal assemblage of rocks with adjacent platform rocks to the south is indicated by the presence of numerous limestone debris flows intercalated in hemipelagic platy carbonate intervals of the basinal rocks. The clasts within the debris flows commonly consist of comminuted fragments of algal reef material, suggesting local collapse of the reef margin and transport to the present-day north of this shallow-water derived debris. Debris flows within deeper-water platy limestone are well exposed along the crests of the east-west trending ridges of the Door Mountains in the east-central portion of the quadrangle, and eastward into the adjoining Sleetmute A-1 quadrangle. Similar, dominantly deep-water rocks are recognized to the east and northeast along the south side of the Farewell fault in the Sleetmute A-1 quadrangle and farther east in the Lyman Hills area of the McGrath quadrangle, and are recognized even farther northeast into the northern flank of the Alaska Range. The East Fork Hills Formation of Dutro and Patton (1982), which is part of their East Fork terrane, comprises similar approximately coeval rock types to our unit O€ls; this unit ranges from Late Cambrian to Early or Middle Devonian (Dumoulin and others, 1999). We regard the East Fork terrane as a more northerly exposure of the Farewell terrane in Interior Alaska.

Structure

The Sleetmute A-2 quadrangle can be divided into two structural provinces controlled by lithology. The northern structural province is dominantly basinal and slope facies unit SOsl unit of Gilbert (1981), and the southern structural province consist primarily of shallow-water, carbonate platform rocks.

The northern structural province includes most of the northern half of the quadrangle. It consists mostly of the platy limestone and shale of unit SOsl, as well as the chert of the ₽zcb unit, known from only two exposures along western boundary of the quadrangle. The rocks of this structural province are generally poorly exposed in the study area, except for scattered excellent exposures along either side of the Hoholitna River. Here strata are deformed into broad, open folds, with dips of 15º to 40º on the flanks. These folds trend roughly N60ºW along the eastern border of the quadrangle and change their trend to a more northerly orientation of N45ºW in the northwest corner of the quadrangle, where dips increase to as much 90°. The folds represent a westward extension of the excellently exposed, generally east-west trending anticlines and synclines of the Door Mountains in the adjoining Sleetmute A-1 quadrangle that continue northeastward into the Lime Hills 1:250,000-scale quadrangle, which results in an overall arcuate regional structural trend. This arcuate trend probably reflects to some degree the original topography of the basinal facies of the White Mountain sequence rocks in the Holitna Lowland.

The southern structural province includes primarily shallow-water, carbonate platform rocks on the eastern part of an east-west trending, arcuate-shaped anticlinal axis (convex side directed south) in the southern part of the Sleetmute A-2 and A-3 quadrangles. Most of the strata exposed in the southern part of the Sleetmute A-2 quadrangle are situated either on the north side or along the crest of the anticlinal axis. Smaller subparallel secondary folds are superimposed on the primary anticlinal axis.

Superimposed on the northern margin of the southern structural province is an extensive, south-verging thrust sheet composed of Devonian algal boundstone (unit Dab). The upper plate of this east-west trending thrust system consists of a massive algal-barrier reef complex that occupied the outermost platform edge during Early Devonian time. The onset of thrusting postdates the Early or early Middle Devonian, because rocks of this age (unit Dls) provide the basement that the thrust sheet overrode in the Sleetmute A-2 quadrangle but cannot be further constrained.

Paleontology

Fossils are relatively common in many of the stratigraphic units of the Sleetmute A-2 quadrangle. Middle Cambrian trilobites from two separate intervals have been the focus of much attention in the geological literature, because they are of great biogeographic significance and represent the oldest megafossils known from southwestern Alaska. Five abstracts (Palmer and others, 1985; Babcock and Blodgett, 1992; Babcock and others, 1993; St. John and Babcock, 1994; Kingsbury and Babcock, 1998), one paper (St. John and Babcock, 1997), and two unpublished graduate theses (St. John, 1994, Kingsbury, 1998) have dealt with these faunas. These trilobite faunas have a close biogeographic affinity to faunas known from the eastern part of the Siberian Platform, recovered from strata of the early Middle Cambrian (Mayan; Palmer, 1979) and late Middle Cambrian (Amgan, Palmer, 1979) stages of the Siberian Platform, respectively. This biogeographic affinity supports the Siberian origin model we favor for the Farewell terrane of southwestern and west-central Alaska. With the exception of the Cambrian trilobite faunas, no other fossils have been described from the Sleetmute A-2 quadrangle, although several papers present description, discussion, or illustration of fossils from platform facies rocks of this terrane in adjoining quadrangles. These include: lower Silurian (upper Llandovery or Telychian) trilobites (Adrain and others, 1995) and a gastropod (Rohr and Blodgett, 2003) from the Taylor Mountains D-2 quadrangle, upper Silurian aphrosalpingid sponges in Taylor Mountains D-2 (Rigby and others, 1994), upper Lower Devonian (Emsian) ostracodes from a limestone conglomerate interval in the Sleetmute A-3 quadrangle (J.M. Berdan in Blodgett, 1983, p. 126), and Middle Devonian corals in the Sleetmute A-3 quadrangle (Oliver and others, 1975). Tabular lists of fossils are provided for Ordovician–Silurian strata of the Taylor Mountains D-1 quadrangle (Blodgett and Wilson, 2001) and by Cady and others (1955) for two localities in the Sleetmute A-4 quadrangle (U.S. Geologic Survey (USGS) collections 2687 and 2688) and two localities in the Sleetmute B-4 quadrangle (USGS collections 2681 and 2683–2686). The latter locality (represented by USGS collections 2683–2686) is a measured section for which sedimentological and additional paleontological data were subsequently provided by Clough and others (1984). Conodonts from this section indicated a late Silurian to Early Devonian (Lochkovian or Gedinnian) age (Written commun. by N.M. Savage in Clough and others, 1984). The collections reported in Cady and others (1955) were considered to be of Silurian and Devonian age. One of these localities (USGS collection 2688) is now recognized to be of early Middle Devonian (Eifelian) age and to contain several brachiopod species in common with coeval faunas of the upper part of the Cheeneetnuk Limestone of Blodgett and Gilbert (1983) in the McGrath A-4 and A-5 quadrangles. Several abstracts provide additional information on the overall Paleozoic fauna of the Holitna Lowland (Blodgett and others, 1999b) and the Upper Triassic (Norian) fauna from the Taylor Mountains D-2 and D-3 quadrangles (Blodgett and others, 2000).

Petroleum Potential

The petroleum potential of rocks in the Holitna Lowland was addressed in two abstracts (Smith and others, 1984, 1985), and discussed at greater length in a report by LePain and others (2000). Conodont color alteration index (CAI) values for rocks of the Sleetmute A-2 quadrangle range from 2.5–3.5 (see table 1). CAI values in that range would suggest that these rocks are more likely to be gas, rather than oil-prone, source rocks. CAI values obtained from Paleozoic strata of the Holitna Lowland are lower than those from many age-equivalent rocks in Interior Alaska, making them a potentially attractive target for petroleum exploration. However, low total organic carbon (TOC) (Proprietary SOHIO, now BP data) values from fine-grained shelf and basinal strata in the lower Paleozoic section of the southern Holitna Lowland do not indicate significant petroleum potential (LePain and others, 2000). Although potential source rocks have not been found in the Holitna Lowland, potential reservoir rocks are common, especially in the Ordovician–Silurian dolostone and limestone (SOdl) unit that overlies the Ordovician algal boundstone (Oab) unit. Porous dolostone intervals are represented within this unit both by thick intervals of sacchroidal dolomitic grainstone and by vuggy dolomitic mudstone and have attracted the attention of several major oil companies involved in petroleum analysis of the Holitna Lowland. These intervals have been regarded by oil companies as the most likely target for potential petroleum reservoir capability in the Holitna Lowland. Petroleum may have migrated through some strata of the region, based on possible “dead oil” stains and organic(?) residue filling pore spaces within the Ordovician algal boundstone (Oab) in the Sleetmute A-3 quadrangle (section 6, T. 11 N., R. 42 W) 2.4 kilometers (km) (1.5 miles) west of the western boundary of the Sleetmute A-2 quadrangle. Unfortunately, analysis of this sample by Paul Lillis of the USGS organic geochemistry laboratory in Denver did not yield soluble organic matter from the stains and particles using chloroform (Paul Lillis and Richard Stanley, written commun., May 11, 2000).

DESCRIPTION OF MAP UNITS

[The **Description of Map Units** that follows consists of geologic units from Wilson and others (2015) portrayed as pastel underlays on sheet 1 and geologic units of this study based on field studies from the mid-1980s and late 1990s. The local geologic units (darker hues on sheet 1) are described using observation of outcrop and fossil data, and they represent a redefinition of the geologic units from Wilson and others (2015). The **Description of Map Units** that follow list units of Wilson and others (2015) first, followed by their local definitions as second-order rankings in primarily a youngest to oldest and by facies (shallow-water platform versus deep-water basinal) order. The areal distribution of these units is shown on sheet 1. Table 1 is a list of identified taxa from all known fossil localities within the Sleetmute A–2 quadrangle. The time scale in use here is based on the U.S. Geological Survey time scale (USGS, 2018) except where noted]

UNCONSOLIDATED DEPOSITS

Qs **Undifferentiated surficial deposits (Quaternary)**—Primarily unsorted gravel, sand, and silt produced, deposited, and reworked by action of wind, water, and frost, including solifluction. Locally subdivided into Qal

Qal **Alluvium (Quaternary)**—Primarily gravel and sand, consists in part of glacial and glaciofluvial material reworked by postglacial streams. Forms floodplains along major streams and rivers

BEDROCK

PLATFORM FACIES

Pzcu **Black chert (lower Paleozoic, Devonian or older) of Wilson and others, 2015**—Predominantly black and gray chert, but also includes rare white, buff, red, or green bedded to massive chert. Occasionally vitreous, banded, or fractured. Interbedded or structurally interleaved with minor amounts of limestone, amygdaloidal basalt, and thin intervals of pitted calcareous graywacke. Occurs in the southwest corner of the Taylor Mountains quadrangle and northwest corner of Dillingham quadrangle (Wilson and others, 2006a, 2017). This is mapped as the following local unit:

Pzcp **Chert unit, platform (Paleozoic)**—Medium-bedded, light- to dark-gray to black chert, exposed as rubble crop. Chert is rich in sponge spicules and radiolarians; minor light-gray limestone (recrystallized) associated with unit. Exposed only near the southern boundary (secs. 29 and 32, T. 11 N., R. 41 W) of the quadrangle. Stratigraphic relationship with adjacent units is uncertain due to extensive tundra cover. Differs from Pzcb (basinal facies chert) unit in being typically lighter in color and in the abundance of visible radiolarians and sponge spicules, as well as its association with minor limestone. Age of unit is probably Paleozoic; radiolarian taxonomy has not been done. We have placed it in the platform facies because of its spatial association with nearby platform units, but it may possibly not be genetically associated

DSwc **Whirlwind Creek Formation and correlative units (Upper Devonian, Frasnian, through Silurian, Ludlow) of Wilson and others, 2015**—Several repeated cycles of marine limestone and dolostone. In the lower part of the formation, the cycles grade from algal-laminated dolostone into pelletoidal limestone and then into silty limestone and siltstone. In the upper part, the cycles grade from thick-bedded reefy limestone to thin-bedded limestone. The formation contains an abundant late Silurian and Devonian conodont, brachiopod, coral, and ostracode fauna. In the Taylor Mountains and adjacent Sleetmute quadrangles, rocks representative of the lower part of the Whirlwind Creek Formation consist of thick- to massive-bedded, locally dolomitized, light-gray algal boundstone; composed primarily of spongiostromate algal heads (including abundant oncoid forms). Unit represents a barrier reef complex on the outer or seaward margin of the Silurian carbonate platform (Blodgett and Clough, 1985; Blodgett and Wilson, 2001). Contains scattered pockets of brachiopods, which mostly belong to the superfamily Gypiduloidea. Locally abundant are aphrosalppingid sponges (notably *Aphrosalpinx textilis* Miagkova; Rigby and others, 1994), which are known elsewhere only from the Ural Mountains of Russia and the Alexander terrane of southeastern Alaska. Equivalent to unit "Sl" of Gilbert (1981) as well as the Cheeneetnuk Limestone (Blodgett and Gilbert, 1983) and Soda Creek Limestone (Blodgett and others, 2000b). On generalized maps, this is included as part of unit DZwp. This is mapped as the following local units:

Dls **Limestone (Devonian)**—Medium-bedded, medium- to dark-gray to brownish-gray, lime mudstone to wackestone. Several localities bearing rugose and tabulate corals (notably hemispherical favositids and digitate forms), bulbous stromatoporoids, and *Amphipora* are present in the Sleetmute A-2 quadrangle (fossil localities 7 and 10). Overlain in the Sleetmute A-2 quadrangle by thrust sheets of the older Dab unit. Underlying stratigraphic relation cannot be determined because of extensive tundra cover. Similar both lithologically and faunally to the upper part of the Cheeneetnuk Limestone (Blodgett and Gilbert, 1983) of the McGrath A-4 and A-5 quadrangles and the uppermost part of the Whirlwind Creek Formation of Dutro and Patton (1982) in the Medfra quadrangle. Unit also extends to the west and fauna of Early to Middle Devonian (Emsian to Eifelian) age is recognized at several localities in the Sleetmute A-3 and A-4 quadrangles. In the eastern part of the Sleetmute A-3 quadrangle, a distinctive limestone conglomerate interval with rounded cobbles is recognized in the unit

Dab **Algal boundstone (Devonian)**—Thick- to massive-bedded, light-gray algal boundstone, locally dolomitized. This facies is one of the most widely distributed of the Paleozoic units in the region with an estimated thickness of at least 400 m in the study area. The boundstone is composed primarily of spongiostromate algal heads, including abundant oncoid forms. The Dab unit occurs in the Sleetmute A-2 quadrangle as a plate thrust above Lower to Middle Devonian (Emsian–Eifelian) carbonate rocks of the Dls unit. Rocks within the thrust sheets are pervasively fractured and strongly recrystallized in both the Sleetmute A-3 and western part of the Sleetmute A-2 quadrangle. Dab strata are much better preserved in the eastern part of the Sleetmute A-2 quadrangle, and their petrofabric is much easier to study in both hand specimen and thin section. The unit crops out extensively to the east and northeast in the Lime Hills A-8, B-7, and B-8 1:63,360-scale quadrangles, where it forms the majority of rock exposures in the Lime Hills proper and detailed sedimentological studies have been made (Clough and Blodgett, 1985, 1988, and 1992). Age of the unit is primarily Early Devonian (Lochkovian) to the east and northeast in the Lime Hills. Only one definitive age has been obtained in the Sleetmute A-2 quadrangle—at fossil locality 12, where brachiopods indicate a middle to late Early Devonian (Pragian to Emsian) age. This is the youngest age for the algal boundstone found anywhere in the Farewell terrane. Brachiopods from locality 12 have Uralian biogeographic affinities and include such distinctive elements as *Clorindina* cf. *C. kuzbassica* Kul'kov and *Carinatina* cf. *C. arimaspa* (Eichwald). Early Devonian (Lochkovian) brachiopods from the Lower Devonian algal reef buildups in the Lime Hills are similar to faunas from the Ural Mountains and the Central Asian portion (Tian Shan mountains) of the former Soviet Union. Uralian faunal affinities also characterize upper Silurian brachiopods from the earlier formed portions of the thick, diachronous, algal barrier reef complex that typified the seaward, platform edge. Aphrosalpingind sponges common to the upper Silurian reefs of southwest Alaska, are also of Uralian origin (Rigby and others, 1994). Unit is considered to represent a "barrier reef" complex, which occupied the seaward edge of the carbonate platform in the Farewell terrane. Regionally, the massive algal reef complex includes rocks of late Silurian to Early Devonian age, and Dab probably represents a diachronous development of similar facies recognized in upper Silurian strata in the White Mountain area (McGrath A-4 and A-5 quadrangles; "Sl" unit of Gilbert, 1981). Older algal limestone (boundstone) units also characterize the platform margin edge in the Farewell terrane as far back as the Ordovician, but the older buildups (pre-late Silurian) are never as thick and differ markedly in accessory biotic elements present within the framework of the reefs

DZwp **Farewell platform facies (Upper Devonian, Frasnian, to Neoproterozoic) of Wilson and others, 2015**—Limestone, dolostone, and less common chert; also contains algal reefs of various ages. Blodgett (written commun., 1998) reports a thin- to medium-bedded, commonly finely laminated, dark-gray platy limestone estimated to be at least 300 to 400 m thick in the southern Sleetmute quadrangle. This unit contains minor distinctive flat-pebble limestone conglomerate that forms distinctive marker beds. Near the top of the unit, immediately below the transition into the algal reef facies of unit Ols (described below), platy limestone contains many thick-bedded, fining-upward, debris-flow deposits, which suggest that the depositional environment rapidly shallowed. Conodonts from uppermost beds of the platy limestone indicate a Middle Ordovician age (N.M. Savage, written commun., 1999). Contact of this platy limestone with the overlying Ols unit appears to be gradational but rapid. Ols is lithologically similar to unit "Ol" of Gilbert (1981) in the McGrath quadrangle and, in part, is similar to the Novi Mountain Formation and the lower part of the East Fork Hills Formation of Dutro and Patton (1982) in the Medfra quadrangle Trilobites, conodonts, corals, stromatoporoids, and brachiopods indicate a Middle Devonian to Middle Cambrian age range; a nonfossiliferous dolostone unit below the Middle Cambrian strata has been assigned to late Proterozoic (St. John and Babcock, 1997; R.B. Blodgett, written commun., 1998). This is mapped as the following local units:

SOdl **Dolostone and limestone (Silurian to Ordovician)**—Poorly bedded, typically rubble-crop forming, weathering white, light- to medium-gray, or sometimes brownish-gray dolostone. Commonly sacchroidal in texture, vugs common in dolomitic mudstone matrix. Contains lesser amounts of prominent, medium- to thick-bedded, light-gray to light yellow-gray weathering peloidal to ooidal lime grainstone. Minor interbeds of lime mudstone to wackestone are also present. Thickness of individual peloidal-ooidal grainstone intervals is ≥20–40 meters (m). Gastropods and ostracodes are the only faunal elements recognized in the grainstone intervals. Large, smooth unidentified ostracodes were noted at one locality in lime mud-wackestone interbeds (fossil locality 13). Age of unit probably ranges from Late Ordovician (based on stratigraphic superposition above Oab unit) to Silurian and may be even as young as Early Devonian. Total thickness of unit unknown, but regionally may be at least 700 m. The stratigraphic relationship with the underlying Oab unit is not directly exposed due to tundra cover, but SOdl is presumed to rest accordantly above it The unit appears to represent a shallow-marine, inner platform paleoenvironment that included moderate- to high-energy shoals where peloidal-ooidal grainstone intervals formed

O€ls **Platy limestone (Middle Ordovician to Upper Cambrian)**—Discrete thin- to medium-bedded packages of dark-gray platy limestone, commonly finely laminated unit at least 300–400 m thick. Contains some minor distinctive edge-wise (flat pebble) limestone conglomerates forming distinctive marker beds. Near top of unit, platy limestone is interbedded with numerous thick-bedded, fining-upward debris flows immediately below transition into algal reef facies of the Oab unit. The contact with the overlying Oab unit appears to be gradational but with rapid change from underlying platy limestone of the O€ls unit into algal boundstone buildups of the overlying Oab unit. Two exposures situated along the west bank of the Hoholitna River in secs. 12 and 13, T. 11 N., R. 41 W. are questionably assigned to the unit. These exposures consist of thin-bedded platy limestone beds with appreciable shaly interbeds reminiscent of the SOsl unit exposed further downstream along the Hoholitna River. However, it is deemed more likely that these exposures belong the O€ls unit, based on the presence of a meter-thick flat pebble conglomerate debris flow bed similar to those found in the O€ls unit in the Sleetmute A-3 quadrangle, as well as close spatial association with the SOdl unit of this area, which is part of the platform facies stratigraphy on the north side of the anticlinorium. No megafossils were seen in this unit in the Sleetmute A-2 quadrangle, but numerous planar trace fossils and one large, unidentified trilobite mold was observed in rocks of the same unit in the Sleetmute A-3 quadrangle. Conodonts recovered from uppermost beds of the O€ls unit in the Sleetmute A-3 quadrangle were identified by N. M. Savage (written commun., 1985) as indicating a Middle Ordovician age; maximum age of unit is based on the underlying €ls unit, although the nature of contact is uncertain due to extensive tundra cover. The O€ls unit is lithologically similar to the coeval "Ol" unit of Gilbert (1981) in the McGrath A-4 and A-5 1:63,360-scale quadrangles and in part with the Novi Mountain Formation of Dutro and Patton (1982) in the northern Medfra 1:250,000-scale quadrangle, and the lower part of the East Fork Hills Formation of Dutro and Patton (1982) in the southern part of the Medfra quadrangle. Similar coeval rocks also are exposed in the low hills on the west side of Lone Mountain in the McGrath C-4 1:63,360-scale quadrangle of west-central Alaska

Ols **Lime mudstone (Ordovician) of Wilson and others, 2015**—Limestone and lime mudstone exposed in the northeast Taylor Mountains and southeast Sleetmute quadrangles. Unit consists of distinctive limestone lithologies, boundstone and packstone to wackestone, interspersed with the mudstone: the stratigraphically lowest part of the unit is thin- to medium-bedded, dark-gray, yellow-gray-weathering, burrow-mottled lime mudstone and lesser peloidal mudstone. Age control based on poorly preserved low-spired gastropods and conodonts including *Drepanoistodus*? sp., *Fryxellodontis*? n. sp. and other conodonts. This is apparently overlain by medium- to thick-bedded, dark-gray to brown algal-thrombolitic boundstone interbedded with light-gray-weathering, thin- to medium-bedded lime mudstone (Blodgett and Wilson, 2001). Trilobites and conodonts (identified by N.M. Savage, written commun., 1985), including fossils of the genus *Hystricurus*, indicate an Early Ordovician age for this boundstone. Overlying this is an extremely poorly exposed brown and dark gray 'chippy' shale, silty shale and minor silicified limestone exposed in very small areas in the Taylor Mountains quadrangle, where exposures consist only of frost-boil chips of shale and rubbly outcrop; a better exposed area of rubble contains numerous diplograptid graptolites. The uppermost part of unit Ols consists of brown, medium- to thick-bedded skeletal lime packstone to wackestone (Blodgett and Wilson, 2001), which contains abundant pentameroid brachiopods (*Tcherskidium*, *Proconchidium* [or *Eoconchidium*] and a new smooth genus aff. *Tcherskidium*). Karl and others (2011) provide a comprehensive database of fossil data for the Taylor Mountains quadrangle and adjacent areas to the southwest. This is mapped as the following local units:

Oab **Older algal boundstone (Ordovician)**—Medium- to thick-bedded, dark-gray to brown, algal thrombolites (boundstone) interbedded with light-gray weathering thin- to medium-bedded lime mudstone. The boundstone is composed of spongiostromate algal buildups that are typically darker in color, thinner bedded, and have different accessory algal and faunal components than the overlying Devonian algal boundstone (Dab). No age definitive megafossils were recovered from this unit in the Sleetmute A-2 quadrangle, but several localities yielded trilobites (large, smooth trilobite carapaces, probably bumastids) to the immediate west in the Sleetmute A-3 quadrangle. Conodonts from the uppermost platy limestone beds of the O€ls unit immediately below the Oab unit in the Sleetmute A-3 quadrangle were identified by N.M. Savage (written commun., 1985) and indicated a Middle Ordovician age. Because of this, the Oab unit in the Sleetmute A-2 quadrangle is considered to be of Middle and (or) Late Ordovician age. Only one fossil locality (locality 23) is known from this unit in the Sleetmute A-2 quadrangle, which yielded only undetermined trilobite exuvae. Minimum thickness of the unit is probably at least 50 m. The abundance of algal thrombolite mound buildups and presence of open-marine trilobite fauna suggest an outer platform margin depositional environment for this unit. The unit is lithologically equivalent to the Oab unit recognized to the southwest in the Taylor Mountains D-1 quadrangle (Blodgett and Wilson, 2001). However, the unit there is of Early Ordovician age, thus, it would appear that the reef-rimmed carbonate margin represented by Oab was time-transgressive in a northerly direction This unit rests conformably above the underlying O€ls unit, and the nature of the contact appears to be transitional, with reef debris appearing commonly in uppermost beds of the underlying unit, rapidly grading upward into the algal boundstone unit proper

Obm **Burrowed mottled limestone (Ordovician)**—Thin- to medium-bedded, medium gray to yellow-gray weathering, dark-gray fresh, burrow mottled, lime mudstone. This unit is restricted to one exposure in the southeastern part of the Sleetmute A-2 quadrangle at Hill 920, sec. 28, T. 11N., R. 40 W. Fossil locality 24, near the summit of the hill, yielded numerous horizontal burrows, a fine-ribbed orthid brachiopod and an undetermined smooth brachiopod. The orthid brachiopod is of a morphology compatible with an Early Ordovician age. Unit was originally defined in the Taylor Mountains D-1 quadrangle (Blodgett and Wilson, 2001), where it yielded faunas indicative of Early Ordovician age

€Zls **Dolostone, limestone, orthoquartzite, and minor chert (Cambrian and Neoproterozoic?) of Wilson and others, 2015**—Exposed in the Sleetmute and Taylor Mountains quadrangles are two separate Middle Cambrian limestone subunits and in the Sleetmute quadrangle is a presumed upper Proterozoic unit of mixed lithology (Blodgett and others, 2000a, and unpub. data). Also included, in the McGrath quadrangle, are red beds and carbonate rocks of the Khuchaynik Dolostone, Lone Formation, Big River Dolostone, and Windy Fork Formation of Babcock and others (1994). The uppermost and thickest of the Middle Cambrian limestone subunits in the Taylor Mountains quadrangle is composed of medium- to thick-bedded, commonly light-gray to dark-gray, rarely pink-weathering (light-gray fresh) lime mudstone that has locally abundant, well developed wavy styolites. Minor green-gray shale intervals present locally. Trilobites are locally abundant and diverse in this subunit and are indicative of a late Middle Cambrian age (Palmer and others, 1985; Babcock and Blodgett, 1992; Babcock and others, 1993; St. John, 1994; St. John and Babcock, 1994, 1997). The lower limestone subunit is poorly exposed and consists only of scattered rubble-crop of coquinoid limestone (lime wackestone to packstone) that has an abundant and diverse trilobite fauna (agnostids notably common) and ancillary acrotretid brachiopods, hyoliths, and cap-shaped fossils of early Middle Cambrian age. Thickness of this subunit is uncertain, but probably at least 5 m. Faunas from both subunits are most closely allied biogeographically with coeval faunas from the Siberian Platform. Stratigraphically below these are medium-bedded, medium-gray, orange-weathering dolostone, limestone, orthoquartzite, and minor chert in the Sleetmute quadrangle. Dolostone has locally abundant floating quartz grains, is locally trough cross stratified, but also has well developed parallel laminations, low domal stromatolites, and local paleokarst intervals. Total thickness of unit uncertain but is at least 300 to 400 m in thickness. Several repeated sedimentary cycles observed in unit. The Khuchaynik Dolomite is medium-gray, light- to medium-gray-weathering dolostone at least 228 m thick that contains numerous packstone or grainstone beds and locally numerous discontinuous bands of gossan are present. Lone Formation is dominantly thin- to medium-bedded siltstone and fine- to coarse-grained sandstone at least 107 m thick. Contains interbeds of lime mudstone or dolomudstone as much as 12 m thick. Usually weathering maroon, it locally weathers earthy yellow, tan, white, gray, gray-green, or reddish-brown. "Sedimentary features in sandstone include planar crossbeds, symmetrical ripple marks, load casts, and siltstone intraclasts" (Babcock and others, 1994). Contact with Big River Dolostone is conformable and sharp; the Big River Dolostone is a distinct bed of earthy yellow-weathering dolomitic lime mudstone that lacks coated grains. Distinguished from Windy Fork Formation by presence of much more sandstone and dolostone and much less siltstone. Big River Dolostone is light- to medium-gray-weathering dolomudstone that has a fenestral fabric and numerous packstone to grainstone beds composed of coated grains. Unit contains two distinctive white-weathering dolostone bands in the upper part of unit. Distinguished from the overlying Khuchaynik Dolostone by these distinctive white bands, the presence of poorly sorted, large, irregular grains, and the lack of major sulfide deposits. Windy Fork

Formation is “dominantly thin- to medium-bedded siltstone and fine- to coarse-grained sandstone that weather earthy yellow or orange-brown, at least 84 m thick. Some sandstone shows planar crossbeds. Interbeds of lime mudstone or dolomudstone are a minor part of unit” (Babcock and others, 1994). Each of these units contains finely disseminated pyrite throughout. Age of unit in the Sleetmute quadrangle is thought to be upper Proterozoic based on distinctive and very similar or identical lithologies shared with units in the McGrath quadrangle of presumed late Proterozoic age (Babcock and others, 1994; R.B. Blodgett, written commun., 2000). On generalized map, included as part of unit DZwp. This is mapped as the following local units:

Ꞓls **Older limestone (Middle Cambrian)**—Two middle Cambrian limestone subunits are included in this unit. The upper and thicker subunit is composed of medium- to thick-bedded, commonly light- to dark-gray, rarely pink weathering (light-gray fresh), lime mudstone with locally abundant, well developed wavy stylolites. Some minor green-gray shale intervals are present locally. Thickness of this limestone subunit is at least15 m. Locally abundant and diverse trilobites in this subunit are indicative of a late Middle Cambrian age (Mayan in terms of Siberian Platform nomenclature) (Palmer and others, 1985; Babcock and Blodgett, 1992; Babcock and others, 1993; St. John, 1994; St. John and Babcock, 1994 and 1997). The lower subunit is poorly exposed (known at only one locality, no. 17) and consists of scattered rubble crop of coquinoid limestone (lime wackestone to packstone) containing an abundant and diverse trilobite fauna (agnostids notably common), and ancillary acrotretid brachiopods, hyoliths, and cap-shaped fossils of early Middle Cambrian age (Amgan in terms of Siberian Platform nomenclature). Trilobites from this subunit discussed by Palmer and others (1985), Babcock and Blodgett (1992), Babcock and others (1993), Kingsbury (1998), and Kingsbury and Babcock (1998). Thickness of subunit is uncertain, but probably is at least 5 m. Faunas from both subunits are most closely allied biogeographically with coeval faunas from the Siberian Platform. Contact with underlying Ꞓs unit is covered. Overlain by OꞒls unit, but the nature of contact is unclear due to tundra cover

Ꞓs **Orthoquartzite, dolostone, chert, and siltstone (Lower Cambrian?)**—Unit recognized from a single large exposure in the northern half of sec 27, T. 11. N., R. 42 W. The unit is composed of four separate subunits consisting from bottom to top of: (1) dark-gray (light-gray weathering) orthoquartzite, consisting of locally well-developed parallel laminations; (2) orange-yellow (light-yellow weathering) dolomudstone, locally with weakly developed parallel laminations; (3) medium- to dark-gray rubble crop of chert; and (4) red-orange to maroon weathering siltstone, also forming rubble crop. Total thickness of interval uncertain, but is at least 100 m. Age uncertain, but Early Cambrian age is suggested by stratigraphic position immediately beneath early Middle Cambrian limestone and above underlying unit correlative with upper Proterozoic (?) strata in the McGrath quadrangle. Contact with overlying Ꞓls and underlying Ᵽdlo units uncertain due to extensive tundra cover

Ᵽdlo **Dolostone, limestone, orthoquartzite, and minor chert (Neoproterozoic?)**—Primarily medium-bedded, medium-gray, tan to yellow-gray weathering dolostone (dolomitic mudstone), containing locally abundant floating quartz grains. Unit locally trough cross-stratified, but also contains well developed parallel laminations, low domal stromatolites, and local paleokarst breccia intervals; grades upward into a thin, minor chippy shale interval, followed by yellow-orange weathering, parallel laminated to high-angle cross laminated dolosiltstones and yellow-brown laminated siltstone with rip-up mud clasts, overlain by yellow-brown to yellow-gray, fine- to medium-grained orthoquartzite, succeeded by yellow-gray weathering dolomudstone. Minor bedded chert with alternating dark and light bands observed at base of unit. Total thickness of unit uncertain, but it is at least 300–400 m. Nature of contact with overlying Ꞓs unit uncertain. Several repeated sedimentary cycles are observed within the unit, probably representative in part of high energy, high intertidal paleoenvironments. Unit is lithologically correlative with some of the Neoproterozoic(?) units recognized in the lower part of the stratigraphic succession of the platform facies of the Farewell terrane west of Lone Mountain, McGrath C-4 1:63,360-scale quadrangle in west-central Alaska (Babcock and others, 1994). Overall, the Sleetmute succession is most similar to the Big River Dolostone and overlying Lone Formation of the Lone Mountain area. Age of Ᵽdlo is thought to be late Proterozoic based on distinctive, yet closely similar to identical lithologies shared with the presumed late Proterozoic units exposed to the northeast in the McGrath quadrangle

BASINAL FACIES

DꞒd **White Mountain sequence, basinal facies (Devonian to Cambrian or older) of Wilson and others, 2015**—Finely laminated limestone and dolomitic limestone and subordinate chert and siliceous siltstone indicative of deep-water deposition. Rocks included here were originally considered part of the now-abandoned Holitna Group and later were assigned to the Dillinger terrane, now considered the basinal facies of the White Mountain sequence of the Farewell terrane (Decker and others, 1994). They were originally assigned an Ordovician to Devonian age on the basis of a sparse conodont fauna (Dutro and Patton, 1982). More recent work, however, indicates that the unit also contains conodonts of Cambrian age (Dumoulin and others, 1997). Includes East Fork Hills, Post River, and Lyman Hills Formations, Terra Cotta Mountains Sandstone, and Barren Ridge Limestone, all interpreted as slope or basinal deposits (Patton and others, 2009). This is mapped as the following local unit:

Pzcb **Chert unit, basinal (Paleozoic)**—Medium-bedded, dark-gray chert, typically forming rubble crop exposures. Differs from Pzcp unit in being typically much darker in color and lacking visible radiolarians and sponge spicules, as well as its spatial association with basinal facies strata. Restricted to northwestern part of the quadrangle (secs 35 and 36, T. 13 N., R. 42 W.) Age most likely Paleozoic

S€pl **Post River Formation and correlative units (middle Silurian, Wenlock, to Upper Cambrian) of Wilson and others, 2015**—Best described by Churkin and Carter (1996), the Post River Formation consists mainly of fissile shale, mudstone, and silty and argillaceous limestone divided into five members. At the base is (1) a lower siltstone member, as thick as 300 m, characterized by thin beds of cross-laminated calcareous siltstone and argillaceous limestone rhythmically interbedded with shale and argillite. Above this is (2) a relatively noncalcareous mudstone member, at least 75 m thick, overlain by (3) another calcareous siltstone and argillaceous interval only 30 m thick that is thinner than, but otherwise closely lithologically resembles, the lower siltstone member. Overlying these is (4) the formally defined, 220-m-thick Graptolite Canyon Member, a nearly pure, dark-gray shale and siliceous shale that contains abundant graptolites and forms most of the upper two-thirds of the formation. The uppermost part of the Post River Formation is (5) the limestone member, a dark, laminated limestone, probably not much more than 18 m thick, interbedded with thin beds of black graptolitic shale (Churkin and Carter, 1996). Age control from graptolites indicates that most of the Ordovician and early Silurian is represented. The Lyman Hills formation of Bundtzen and others (1997), equivalent to the lower siltstone of the Post River Formation as defined by Churkin and Carter (1996), consists of silty limestone and shale, is commonly cross-laminated, and locally contains Bouma ‘cde’ intervals. Age of the Lyman Hills formation of Bundtzen and others (1997) is constrained by uppermost Cambrian conodonts and Ordovician and Silurian graptolites. This is mapped as the following local unit:

SOsl **Platy limestone and shale (Silurian to Ordovician)**—Primarily thin- to medium-bedded, finely laminated platy lime mudstone with lesser amounts of dark-gray fissile shale and siltstone in a thick succession. Planar trace fossils are common in platy limestone, whereas shale commonly contains abundant and well-preserved graptolites. Discrete intervals of either shale or limestone were noted in exposures along the Hoholitna River, although at present this unit has not been subdivided due to the lack of detailed stratigraphic study. In the Door Mountains of the east-central part of the Sleetmute A-2 quadrangle, the unit is exposed as resistant ridges of thin- to medium-bedded, platy limestone. Apparently, shale-rich intervals are more susceptible to erosion, and do not form the crests of the northwest-trending strike ridges which characterize the unit. Graptolites from outcrops of the unit (identified by Claire Carter and Gil Raasch, written commun., 1984 and 1985 respectively) along the Hoholitna River (fossil localities 1, 2, and 5) indicate a range of Early Ordovician to Silurian ages for this unit. Two age definitive conodont collections, also from along the Hoholitna River (fossil localities 2 and 4) were identified by N.M. Savage (written commun., 1985) to indicate an Early Ordovician (Arenig) age. Thickness of the unit of the uncertain but is estimated to be at least 350–400 m. Lithologically, the SOsl unit closely resembles many other contemporaneous deep-water, basinal to slope successions exposed in southwest and west-central Alaska. The East Fork Hills Formation of Dutro and Patton (1982) of the southern part of the Medfra 1:250,000-scale quadrangle is one such unit, and it includes beds ranging in age from late Cambrian to Early or Middle Devonian (Dumoulin and others, 1999). The East Fork Hills Formation was assigned by Dutro and Patton (1982) to a separate tectonostratigraphic terrane they termed the East Fork terrane. We regard this entity as belonging to the basinal facies of the Farewell terrane. Other correlative rocks include the deep-water, basinal succession of the Post River Formation established by Churkin and Carter (1996) in the Terra Cotta Mountains of the southeastern McGrath quadrangle, which forms a major part of the stratigraphic succession in that region.

UNDESCRIBED BEDROCK

bu **Bedrock of unknown type or age or areas not mapped**

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Table 1. Fossil data from the Sleetmute A-2 quadrangle, southwestern Alaska.

[Collector's initials shown in Field numbers (no.) are: RB (Robert B. Blodgett), JC (James G. Clough), DL (David L. LePain), TNS (Thomas N. Smith, formerly of ADGGS), AKE (1984 Sohio Field Party—Bob Egbert, Ray Sullivan, Jeff S. Knoth). Open circles designate Sohio localities which could only be generally located on 1:250,000 scale base map (1:63,360 scale maps used by Sohio in the field are presumably now lost). One Sohio graptolite collection (83AKE73) of Middle Ordovician (Porterfieldian, *Nemagraptus gracilis* Zone) age reported by Sohio field party notes as being from black fissile shale in Section 7, T. 12 N., R. 41 W. is not shown owing to uncertainty of its actual location (not shown even on their 1:250,000 scale maps). Most likely it is from the low bluffs along the east side of the Hoholitna River (Ray Sullivan, oral communication, 2000)]

Fossil locality no., map unit	Location	Field no.	Fossils	Fossil age	Reference	Comments
1, SOsl	sec. 6, T. 13 N., R. 41 W.	83-TNS-99 locality (fossil colln. no. 83-TNS-92F)	Graptolites: *Pseudotrigonograptus ensiformis* (Hall); *Tetragraptus* cf. *T. serra* (Brongniart); *T. quadribrachiatus* (Hall); *T. amii* Elles and Wood, *Phyllograptus* sp. aff. *P. nobilis* Harris and Keble, *Isograptus victoriae divergens* Harris, *I. caduceus australis* Cooper, *Pseudisograptus dumosus* (Harris), *Didymograptus* cf. *D. v-deflexus* Harris, **Loganograptus* cf. *L. logani pertenuis* Ruedemann, **Glossograptus ciliatus* Emmons, **Glyptograptus* cf. *G. intersitus* Harris and Thomas, **Pseudoclimacograptus* sp.	Late Early and early Middle Ordovician	Claire Carter, written commun., 1984	This collection is a mixture of two graptolite zones – the *Oncograptus* Zone and the *Paraglossograptus tentaculatus* Zone of Cooper (1979). The *tentaculatus* Zone fauna is denoted by asterisks (*) in the list. The remainder of the listed species are characteristic of the *Oncograptus* Zone.
2, SOsl	sec. 7, T. 13 N., R. 41 W.	85RB7 (=84-TNS-85; approx.= 84AKE65)	Conodonts from 84AKE65: *Periodon flabellum* (Lindström), *Prioniodus* cf. *P. navis* (Lindström), *Prioniodus* cf. *P. evae* (Lindström), *Semiacontiodus* sp., *Drepanoistodus* cf. *D. forceps* (Lindström), *Scapellodus* sp., *Pseudobelodina* sp.	Middle Arenig; *evae–navis* zones (Early Ordovician)	Norman M. Savage, written commun., 1985 (internal report to Sohio)	47 conodont elements; CAI 2.5
			Graptolites from 84AKE65: *Tetragraptus* cf. *T. denticulatus* (Hall), *Tetragraptus fruticosus* (Hall), *Tetragraptus* sp. aff. *T. quadribrachiatus* (Hall)	Middle Early Ordovician (Jeffersonian); *Tetragraptus fruticosus* Zone	G. O. Raasch, 1985, internal report to Sohio	
3, SOsl	sec. 20, T. 13 N., R. 41 W.	84AKE69	Conodonts: indeterminate fragments		Norman M. Savage, written commun., 1985 (internal report to Sohio)	4 conodont elements; CAI 3.0
4, SOsl	sec. 1, T. 12 N., R. 42 W.	84AKE71	Conodonts: *Scalpellodus* cf. *S. longibasis* (Lindström), *Protopanderodus* cf. *P. rectus* (Lindström)	Arenig; *evae-originalis* zones (Early Ordovician)	Norman M. Savage, written commun., 1985 (internal report to Sohio)	2 conodont elements; CAI 2.5
5, SOsl	sec. 17, T. 12 N., R 41 W.	84JC60F	Graptolites	Undifferentiated Silurian	Claire Carter, oral commun., January 1985	

Table 1. Fossil data from the Sleetmute A-2 quadrangle, southwestern Alaska—*Continued*

Fossil locality no., map unit	Location	Field no.	Fossils	Fossil age	Reference	Comments
6, Dab	sec. 28, T. 12 N., R. 42 W.	84RB68 (=84AKE58, =98RB4)	Gypidulid brachiopod		R.B. Blodgett, 1984	
7, Dls	sec. 35, T. 12 N., R. 42 W.	99RB16 (=84RB97, =84JC21, =84TNS26F)	Digitate tabulate corals, *Syringopora*? sp., small hemispherical favositid corals, bulbous stromatoporoids, *Amphipora*, and a large limpet-like gastropod	Emsian (late Early Devonian) or Eifelian (early Middle Devonian)	R.B. Blodgett, 2000	
8, SOdl	sec. 35, T. 12 N., R. 42 W.	84RB95 (=99RB21)	Indeterminate high-spired gastropods in cross-section, undetermined biotic debris (tabulate corals?)		R.B. Blodgett, 2000	In medium- to thick-bedded, light grayish brown, peloidal lime pack- to grainstone
9, Dls	sec. 35, T. 12 N., R. 42 W.	84RB96 (=84TNS25)	Small, poorly preserved, generically indeterminate brachiopods, 2 types: 1.) fine-ribbed shell with strophic hinge line, and 2.) smooth ambocoelid; also, numerous poorly preserved dacryoconarid tentaculitids (nowakiids?)	Devonian	R.B. Blodgett, 2000	Presence of abundant dacryoconarids suggest slightly deeper-water facies than typical for this unit
10, Dls	sec. 26, T. 12 N., R. 42 W.	84RB101	silicified tabulate corals, fauna same as at 84RB97 (fossil locality 7), but also includes hemispherical identifiable *Favosites* up to 1 ½ inches across	Emsian (late Early Devonian) or Eifelian (early Middle Devonian)	R.B. Blodgett, 1984	
11, SOdl	sec. 25, T. 12 N., R. 42 W.	84RB100	Small smooth, ostracodes, large leperditiid ostracode, murchisoniid gastropods, corals.		R.B. Blodgett, 2000	From medium-bedded, light brown-gray lime mudstone
12, Dab	sec. 31, T. 12 N., R. 41 W.	84RB70 (=84AKE59)	Brachiopods: Streptorhynchid n. gen., *Clorindina* cf. *C. kuzbassica* Kul'kov, *Carinatina* cf. *C. arimaspa* (Eichwald); ambocoelid and plicate spiriferoid brachiopods, solitary rugose corals, favositid tabulate coral, smooth ostracodes, crinoid ossicles	Early Devonian (Pragian-Emsian)	R.B. Blodgett, 2000	Brachiopod fauna is Uralian and (or) Siberian in affinity
13, SOdl	sec. 3, T. 11 N., R. 42 W.	99RB22 (=84RB130)	Undetermined smooth ostracodes		R.B. Blodgett, 2000	Lime mud-wackestone interbeds
14, SOdl	sec. 3, T. 11 N., R. 42 W.	84RB93	Straparollid-like gastropod		R.B. Blodgett, 1984	
15, SOdl	sec. 11, T. 11 N., R. 41 W.	84RB74 (=84AKE64)	Ostracodes: *Leperditia*? sp. *Knoxites* sp., *Aparchites* molt		W.K. Braun, 1985, internal report to Sohio	Remarks by Braun: Highly restricted fauna, *Leperditia* identification quite doubtful, *Knoxites* is known mainly from the Devonian.
16, O€ls	sec. 21, T. 11 N., R. 42 W.	84AKE104	Conodont: indeterminate fragment		Norman M. Savage, written commun., 1985 (internal report to Sohio)	1 conodont element; CAI 3.5; (according to air photos, this locality may be located slightly to the N. in Sec. 16).

Table 1. Fossil data from the Sleetmute A-2 quadrangle, southwestern Alaska—*Continued*

Fossil locality no., map unit	Location	Field no.	Fossils	Fossil age	Reference	Comments
17, Ꞓls	sec. 27, T. 11 N., R. 42 W.	84RB126 (=84AKE102, lower collection of Sohio)	Trilobites, molluscs, and brachiopods	Early Middle Cambrian	References available to the public: Palmer and others, 1985; Babcock and Blodgett, 1992; Kingsbury, 1998; Kingsbury and Babcock, 1998	Biogeographic affinities are with Siberia
			Trilobites: *Kootenia* cf. *K. anabarensis/jakutensis* Lermontova, *Macannia* cf. *M. ferox* (Lermontova), "*Parehmania*" cf. "*P*". *lata* Chernysheva, *Erbia* n. sp., cf. *E. sibirica* (Schmidt), *Kootenia* sp. 1, pagetiid, n. gen. aff. *Neopagetina*, "*Eoptychoparia*" sp., *Kootenia* n. sp., "*Chilometopus*" sp., ptychoparioid undet. 3, ptychoparioid undet. 4 Molluscs: *Scenella* sp. Brachiopods: acrotretid sp. indet.	Amgan (early Middle Cambrian)	A.R. Palmer, report dated Sept. 22, 1984 to Sohio Oil Company	Closest to faunas from the eastern part of the Siberian Platform
			Trilobites (cont.): *Neopagetina rjonsnitzkii* (Lermontova), *Macannaia ferox* (Lermontova), *Kootenia* cf. *K. moori* Lermontova *in* Lazarenko, *Kootenia florens* Suvorova, *Kootenia florens*? Suvorova, *Chilometopus consuetus* Suvorova, *Erbiella elegansia* Fedyanina, undetermined dinesid, *Eoptychoparia* sp., *Parehmania*? *lata* Chernysheva, *Anomocare salairensis*? Lermontova	Late Early Cambrian or early Middle Cambrian	Kingsbury, 1998	"All trilobites identified to species level in the fauna are of Siberian biogeographic aspect" (Kingsbury, 1998, p. ii).

Table 1. Fossil data from the Sleetmute A-2 quadrangle, southwestern Alaska—*Continued*

Fossil locality no., map unit	Location	Field no.	Fossils	Fossil age	Reference	Comments
18, €ls	sec. 27, T. 11 N., R. 42 W.	84RB125 (=84AKE102, upper collection of Sohio; =84JC43F)	Trilobites	Late Middle Cambrian	References available to the public: Palmer and others, 1985; Babcock and Blodgett, 1992; St. John, 1994; St. John and Babcock, 1997	Biogeographic affinities are with Siberia
			Trilobites: *Linguagnostus* cf. *L. gronwalli* Kobayashi, *Phalacroma* cf. *P. laevis* Pokrovskaya, *Phalacroma* sp. 2, *Agraulos* cf. *A. acuminatus* (Angelin), cf. *Forchammeria acuta* Chernysheva, *Bailiaspis* cf. *B. botomensis* Korobov, *Paradoxides* (*Eccaparadoxides*) n. sp., cf. *P. brachyrachis* Linnarsson, *Kootenia* sp. A, *Kootenia* sp. B, *Kootenia* sp. C, *Kootenia* sp. D., anomocarid n. gen., n. sp. aff. *Juraspis* Yegorova, *Solenopleura* sp. 1, *Solenopleura* sp. 2, Bailiaspis cf. *B. bobrovi* Korobov, *Tchaiaspis* n. sp., *Dasometopus* cf. *D. latus* Korobov, *Ciceragnostus* cf. *C. cicer* (Tullberg), *Anopolenus* cf. *A. henrici* Salter, *Granularia* sp., *Corynexochus* sp. indet., coryneochid gen. and sp. undet., *Pseudanomcarina*? sp. indet., anomocarid gen. and sp. indet., agnostid gen. and sp. indet. l, agnostid gen. and sp. indet. 2, *Hartshillia*? sp. Inarticulate brachiopods: *Acrothele* sp., *Linnarssonia* sp., *Micromitra* sp., indet. acrotretid 1, indet. acrotretid 2	Late Middle Cambrian (early part of the Mayan stage)	A.R. Palmer, report dated October 16, 1984 to Sohio Oil Company	"Clearly the strongest affinities are eastern Siberia"

Table 1. Fossil data from the Sleetmute A-2 quadrangle, southwestern Alaska—*Continued*

Fossil locality no., map unit	Location	Field no.	Fossils	Fossil age	Reference	Comments
18, €ls continued	sec. 27, T. 11 N., R. 42 W.	84RB125 (=84AKE102, upper collection of Sohio; =84JC43F)	Trilobites: *Linguagnostus gronwalli*, *Peronopsis* sp., *Megagnostus? laevis*, *Megagnostus? resecta*, *Peratagnostus cicer*, *Proampyx acuminatus*, *Proampyx difformis*, *Juraspis schabanovi*, *Bailiaspis picta*, *Dasometopus breviceps*, *Hartshillia clivosa*, *Tchaiaspis* n. sp., *Corynexochus perforatus*, *Kootenia* n. sp., *Granularaspis* n. sp., *Anopolenus henrici*, *Paradoxides* n. sp., *Solenopleura* sp., *Parasolenopleura* sp.	Late Middle Cambrian (Mayan stage)	St. John and Babcock (1997)	"of Siberian biogeographic aspect"
19, €ls	sec. 27, T .11 N., R. 42 W.	84RB133 (=84JC42F)	Trilobites	Late Middle Cambrian	A.R. Palmer, oral commun., 1985, to R.B. Blodgett	
20, €ls	sec. 26, T. 11 N., R. 42 W.	99RB3	Polymeroid trilobite	Late Middle Cambrian	R.B. Blodgett, 1999	
21, Pzcp	sec. 29, T. 11 N., R. 41 W.	99RB9	Chert full of sponge spicules and radiolarians visible in hand sample	Probably Paleozoic	R.B. Blodgett, 1999	
22, Pzcp	sec. 32, T. 11 N., R. 41 W.	99RB12	Chert similar to those at 99RB9 containing numerous sponge spicules	Probably Paleozoic	R.B. Blodgett, 1999	
23, Oab	sec. 28, T. 11 N., R. 41 W.	99RB10 (=84JC55)	Trilobite exuvae	Paleozoic	R.B. Blodgett, 2000	
24, Ols unit of Blodgett and Wilson, 2001	sec. 28, T. 11 N., R40W	84RB40 (=84AKE26; =99RB15)	Abundant horizontal burrows; fine-ribbed orthid brachiopod; undetermined smooth brachiopod	Early? Ordovician	R.B. Blodgett, personal observation, 2000	Lithologically similar to the Ols (burrow mottled limestone) unit of the Taylor Mountains D-1 quad. (Blodgett and Wilson, 2001). Brachiopod morphotypes consistent with a probable Early Ordovician age