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Seven short papers describe changes in stratigraphic nomenclature in Alaska, Utah, New Mexico, North Carolina, South Carolina, Puerto Rico, and eastern North America; geologic time chart revised



**STRATIGRAPHIC CLARIFICATION OF THE SHELIKOF FORMATION,
ALASKA PENINSULA**

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INTRODUCTION

This paper clarifies the contact between the Shelikof Formation and the Kialagvik Formation so that both formations are mappable lithostratigraphic units.

The Shelikof Formation was named by Capps (1923, p.97) because " * * * it is the prevailing rock formation on the northwest shore of Shelikof Strait from Katmai Bay at least as far southwest as Kialagvik Bay [Wide Bay] * * *." Although Capps (1923, p. 97-98) did not designate either a type locality or type section for the formation, he did describe the unit as consisting of three members: a lower shale (siltstone) member, a middle sandstone member with minor shale and conglomerate, and an upper shale (siltstone) member. Capps placed the lower boundary of the Shelikof Formation at the base of a conglomerate bed that occurs at the base of the lower siltstone member on the northeast shore of Puale Bay (formerly Cold Bay). Capps considered that the thick siltstone unit immediately below this conglomerate was Early Jurassic, and that an unconformity separated the two. He recognized a similar unconformity at Wide Bay (formerly Kialagvik Bay) (fig. 1). He placed the upper contact at the base of the basal conglomerate of the Naknek Formation, which overlies the upper siltstone member in "nearly every normal section" (Capps, 1923).

If the lateral continuity of the three members as defined by Capps (1923) could be mapped throughout the Alaska Peninsula, then the Shelikof Formation would be a valid lithostratigraphic unit. However, our recent work (1979-81) indicates that many lateral changes in facies occur throughout the area and that vertical sections are quite different even if they are separated by short (0.5-1 km) distances. These changes in facies make the present definition of the Shelikof Formation incorrect. In addition, the lower and upper contact relations are not as simple as originally described by Capps.

Confusion arose over where to place the lower contact in the Wide Bay area when recent workers (Kellum and others, 1945; Westerman, 1964, 1969) used biostratigraphic or chronostratigraphic methods to define what should be a lithostratigraphic unit. In Capps' (1923) original description, the lower contact in this area was marked by a conglomerate which overlies with angular unconformity sandy siltstone of the Kialagvik Formation. This conglomerate, however, does not persist laterally and, as a result, subsequent workers (Kellum and others, 1945; Westerman, 1964, 1969) used fossil evidence to choose the contact where the conglomerate was not present. They reasoned that the disconformity between the lower Bajocian and the lower Callovian corresponded to the angular unconformity described by Capps (1923). However, the apparent hiatus between the lower or middle Bajocian and the lower Callovian has very little, if any, lithologic expression and therefore does not represent a mappable contact. In fact, our recent work suggests that in many places there may not be a hiatus. A literature

Capps (1923)		Smith (1926)		Imley and Datterman (1977)		Allaway and Others (this report)	
Formation	Lithology	Formation	Lithology	Formation	Lithology	Formation	Lithology
Naknek Formation	Shale, sandstone, and conglomerate	Not shown		Not shown		Naknek Formation	Sandstone, conglomerate, and siltstone
Shelikof Formation	Sandstone, conglomerate, shale, and minor basic dikes	Shelikof Formation	Sandstone	Shelikof Formation	Siltstone	Shelikof Formation	Siltstone and sandstone
		Kialagvik Formation	Shale				
	Conglomerate	Conglomerate	Kialagvik Formation	Conglomerate	Kialagvik Formation	Conglomerate	
Probably Lower Jurassic sedimentary rocks	Unconformity	Lower Jurassic sedimentary rocks	Unconformity	Unnamed Lower Jurassic beds	Sandstone, siltstone, limestone, and tuff	Unnamed Lower Jurassic beds	Sandstone, siltstone, limestone, and tuff
	Shale, sandstone, and limestone		Shale, sandstone, and limestone				

FIGURE 1.—Generalized columnar sections defined by various workers in Wide Bay-Puale Bay area. Thickness not to scale.

search conducted by J. H. Calloman (written commun., 1981) indicates that many fossils from the Shelikof Formation generally thought to be Callovian may range down into the Bathonian; thus the hiatus may be more a result of inadequate collecting or lack of fossils rather than of a period of nondeposition.

In the Puale Bay area, the Shelikof Formation has been redefined twice; it was redefined by Smith (1926), who reported fossils of Kialagvik age above the conglomerate. He redefined the lower contact to be the base of the massive sandstone approximately 457 m higher in the section. The second redefinition of the lower contact was made by Imlay and Detterman (1977) on the basis of fossil evidence; they placed the contact in the middle of the siltstone interval between the massive sandstone of Smith (1926) and the conglomerate of Capps (1923). Other workers (Martin, 1926; Burk, 1965) have referred back to Capps' original descriptions.

The upper contact is also more complex than originally described by Capps (1923). The basal unit of the Naknek Formation consists of two different lithofacies in the Puale Bay-Wide Bay area: a granite-pebble conglomerate and an arkosic sandstone that is commonly crossbedded, cross-laminated, or laminated with magnetite defining the laminations. These two lithofacies of the Naknek have been seen in contact with all the following three lithofacies of the Shelikof Formation: dark laminated and massive siltstone, volcanic-rich sandstone, and volcanic conglomerate. At Puale Bay, the upper contact consists of mainly Shelikof siltstone overlain by Naknek conglomerate as reported by Capps (1923). Locally, Shelikof siltstone is overlain by Naknek sandstone. In both the Alai Creek and Big Creek reference sections in the Wide Bay area (fig. 2), the contact is marked by

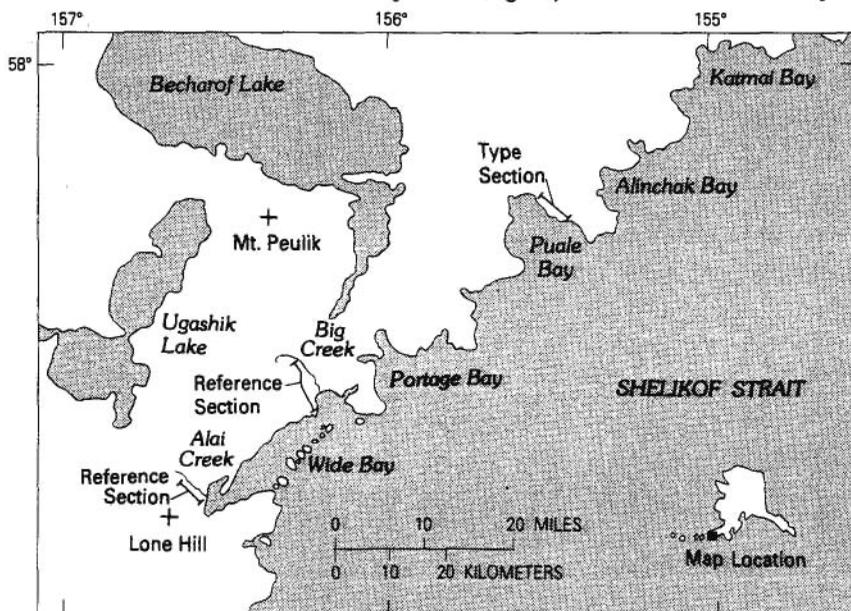


FIGURE 2.—The Wide Bay-Puale Bay area of the Alaska Peninsula showing the type and reference sections of the Shelikof Formation.

Shelikof conglomerate overlain by Naknek sandstone. In other places a conglomerate-on-conglomerate contact was observed, and in these cases the contact is gradational with a gradual upward decrease in volcanic rock clasts and an upward increase in plutonic rock clasts. Although lateral changes in lithology along the contact characterize both formations, the lithologic differences between the two make the contact relatively easy to identify.

The most easily mappable lithologic break useful in separating the two formations is at the base of the lowermost massive sandstone bed of the Shelikof Formation. This lithologic break conforms to the redefined contact proposed by Smith (1926). The type section, here designated, occurs along the northeast shore of Puale Bay (fig. 2) between the southern half of sec. 9, T. 28 S., R. 38 W. and sec. 19, T. 28 S., R. 37 W. in the Karluk C-4, C-5, and D-5 15-minute quadrangles. In addition, two reference sections (fig. 2) are designated in the Wide Bay area. The principal reference section is along the ridge southwest of Big Creek between sec. 5, T. 31 S., R. 43 W. in the Ugashik C-1 15-minute quadrangle and sec. 3, T. 32 S., R. 43 W. in the Ugashik B-1 15-minute quadrangle. The other reference section is along the ridge southwest of Alai Creek between sec. 13, T. 33 S., R. 46 W. and sec. 19, T. 33 S., R. 45 W. in the Ugashik B-2 15-minute quadrangle. The generalized sections in figure 3 show the variability of lithofacies and thickness in the Shelikof Formation, and the variety of its contacts with the Kialagvik Formation and the Naknek Formation.

LITHOLOGY

The type section of the Shelikof Formation (fig. 3) consists of approximately 1,402 m of sandstone, siltstone, and conglomerate. The contact with the underlying Kialagvik Formation is conformable. The lower half is mainly volcanic sandstone with lenses of conglomerate containing volcanic, sandstone, and calcareous sandstone clasts, interbedded with minor siltstone. The upper half consists of volcanic sandstone interbedded with massive and laminated siltstone whose upper part is a fining-upward sequence with mainly sandstone at its base and mainly siltstone with thin sandstone interbeds near its top. Naknek Formation conglomerate unconformably overlies this section.

The principal reference section (Big Creek) consists of approximately 1,524 m of conglomerate, sandstone, and siltstone. The lower contact with the Kialagvik Formation is an erosional unconformity marked by Shelikof conglomerate that fills paleochannels cut into Kialagvik siltstone. The lowermost part of the section consists of channel conglomerate with sandstone interbeds. The conglomerate clasts are mainly volcanic, but locally beds contain predominantly sedimentary clasts. The sandstone is volcanic and ranges from lithofeldspathic to lithic. The middle part of the section consists of siltstone and two thick intervals of sandstone and conglomerate. The upper part consists of volcanoclastic sandstone overlain by massive and channel conglomerate. The major clast type is volcanic; clasts composed of intrusive rocks are a minor component. The contact with the overlying Naknek Formation is defined by the presence of laminated and crossbedded arkosic sandstone.

The reference section along Alai Creek (fig. 3) shows that the Shelikof Formation thins considerably from almost 1,524 m at Big Creek to only 823 m. The lower contact of the Shelikof Formation with the Kialagvik Formation is conformable; massive, laminated, and crossbedded sandstone of

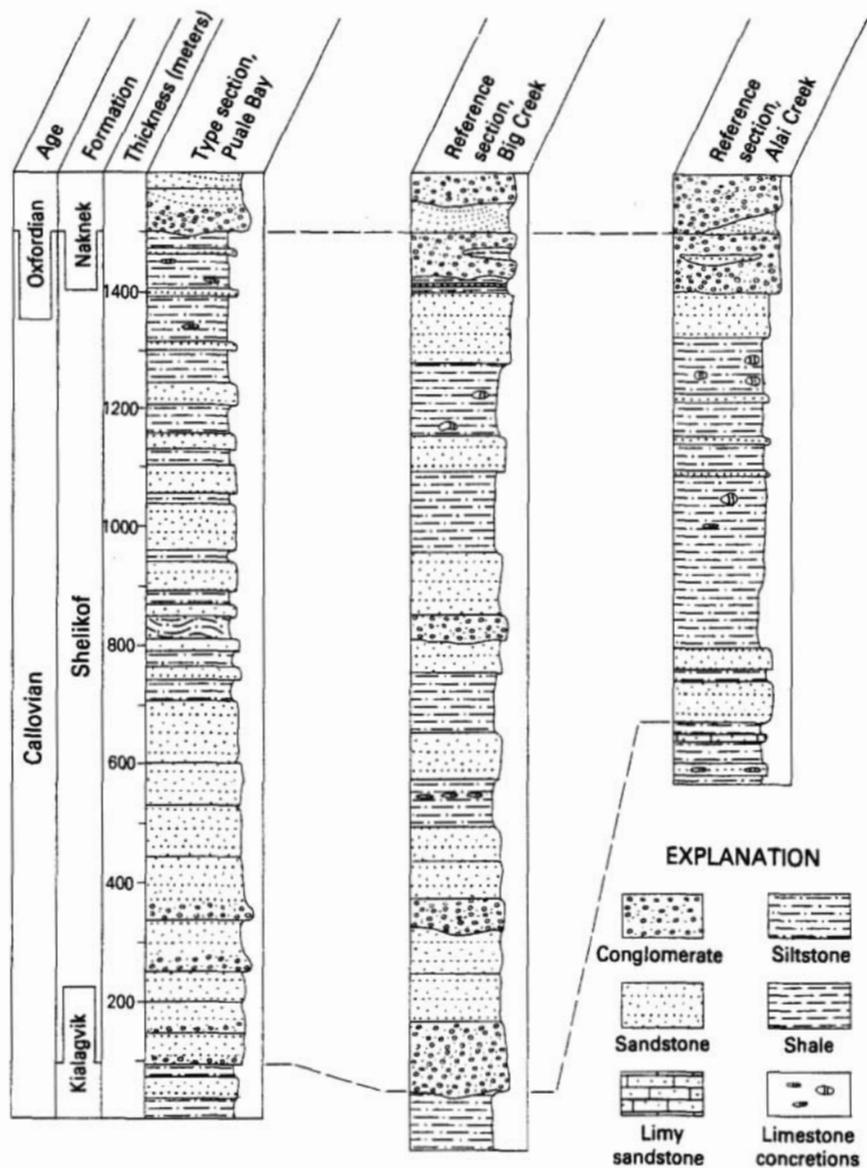


FIGURE 3.—Type and reference sections of the Shelikof Formation.

the lower part of the Shelikof overlies the laminated and massive siltstone here assigned to the Kialagvik. The sandstone is mainly volcanic lithofeldspathic to feldspatholithic graywacke and arenite. This sandstone is overlain by about 457 m of massive, laminated, and concretionary siltstone. The siltstone is locally calcareous but is mainly siliceous. The upper part consists of massive, laminated, and cross-laminated sandstone overlain by massive and channel conglomerate with lenses of sandstone. The major clast type is volcanic with minor intrusive rock clasts. The upper contact of the Shelikof is characterized mainly by conglomerate overlain by massive, laminated, and crossbedded Naknek arkosic sandstone. At a few localities, Naknek conglomerate forms channel-fill deposits which overlie the Shelikof conglomerate, and where this occurs the contact is gradational through 7.6 m of section with a gradual upward increase of intrusive rock clasts and a corresponding decrease in clasts of volcanic rock.

AGE AND CORRELATION

The Shelikof Formation was dated, using fossil evidence, as earliest Late Jurassic by all the early workers (Capps 1923; Smith, 1926; Martin, 1926; Kellum and others, 1945; Imlay, 1953). Imlay (1953) was the first to assign the Shelikof Formation to the Callovian Stage. The Callovian Stage has since been assigned to the Middle Jurassic in accordance with the recommendations of the Luxemburg Colloquium of 1962 (Ager, 1963). Imlay (1975) further restricted the age of the Shelikof to the early through middle Callovian. The Shelikof Formation is considered to correlate with the Chinitna Formation in the Tuxedni Bay and Iniskin Bay areas by most workers (Capps, 1923; Smith, 1926; Martin, 1926; Kellum and others, 1945; Imlay, 1953, 1975; Burk, 1965; Detterman and Hartsock, 1966).

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