# Preliminary Top Mesozoic Unconformity Subcrop Map, Cook Inlet Basin, Alaska Authors: Gregersen, L.S. & Shellenbaum, D.P.

## Data Location Map



**Formation Tops Table** 

ip ).	API Number	Well Name	Measured Depth (ft)	True Vertical Depth, Subsea (ft)	Formation	Confidence: A=High, B=Moderate, C=Low	Lithology: As Described In Cuttings Or Core	Specific Age Date
1 2	50009100010000 50009100030000	ROMIG PARK INC - 1 KNIK ARM ST - 1	2635 3620	-2494 -3521	Mantanuska Mantanuska	A A	claystone claystone	
3	50009100040000	LORRAINE ST - 1	7100	-6859	Mantanuska	A	sandstone; Inoceramus	Maastrictian to
4	50009100090000	J M NEEDHAM - 1	2121	-1742	Mantanuska	A	claystone; Inoceramus	Campanian (Zippi)
6	50009100110000	WASILLA ST - 1	3453 2970	-3309 -2937	Mantanuska	A	siltstone	
7 8	50009200020000 50133100020000	FISHHOOK - 1 NINILCHIK UNION - 1	1950 12700	-1230 -12373	Plutonic Rock Mantanuska	A A	granodiorite claystone	
9 10	50133100030000	NINILCHIK UNIT MOBIL - 1	12183 13780	-11946 -13143	Mantanuska Mantanuska	A A	siltstone shale: siltstone	E. Maastrichtian (Zipp
10	50135100047000		15/80	15145	Wantanuska			Campanian-Santonia
11 12	50133100170000 50133100210000	NAPTOWNE UNIT - 24-08 SWAN LK UNIT - 2	14705 5850	-14425 -5725	Mantanuska Talkeetna	A A	shale crystalline rock	(Zippi)
13 14	50133100220000	SOLDOTNA CK UNIT - 22-32	13685 11587	-13330 -11232	Matanuska Mantanuska	A A	claystone	
15	50133100280000	W FORELAND - 1	11307	-11404	Talkeetna	A	siltstone, sandstone, tuff	
16 17	50133100290000 50133100360000	BIRCH HILL UNIT - 22-25 PT POSSESSION UNIT - 1	15220 14895	-14992 -14680	Naknek Mantanuska	A A	shale claystone	
18	50133101090000	SOLDOTNA CK UNIT - 341-04	11090 11830	-10910 -11705	Naknek Naknek	B	claystone	
20	50133101310000	SOLDOTNA CK UNIT - 12-16	12200	-12034	Mantanuska	A	lithology logs unavailable	
21 22	50133101360000 50133101450000	SWANSON RIV UNIT - 34-10 SWANSON RIV UNIT - 34-16	12020 12137	-11666 -11859	Naknek Naknek	B	silty shale silty claystone; sandstone	
23	50133200050000	MIDDLE RIV ST SHELL - 1	5250 6686	-5124	Talkeetna	A	volcanic rock	
25	5013320050000	SWANSON LKS - 1	12043	-11801	Mantanuska	A	claystone; Inoceramus	
26 27	50133201540000 50133201700000	KUSTATAN RIV - 1 JOHNSON SLOUGH - 1	3828 6090	-3780 -6045	Talkeetna Talkeetna	A A	sandstone volcanic rock	
8	50133201770000	BACHATNA CK ST 36448 - 1	6170	-6138	Talkeetna	A	volcanic rock	
9	50133202340000	BACHATNA CK UNIT - I	3030	-2990	Talkeetha	A		
0	50133202350000	BACHATNA CK UNIT - 3 BACHATNA CK UNIT - 7	2825 2597	-2765 -2555	Talkeetna Plutonic Rock	A A	conglomerate; volcanic gravel granite	
2	5013320250000	W FORELAND ST A - 1	8606	-8549	Talkeetna	A	tuff; pebbles	
3 4	50133202660000 50133202930000	W MCARTHUR RIV UNIT-INEXCO - 1 SOLDOTNA CK UNIT - 33-33	5746 11601	-5707 11446	Talkeetna Naknek	A A	voicanic rock claystone; siltstone	
5	50133203620000	WOLF LK ARCO CIRI - 1	13075	-12801	Mantanuska Mantanuska	A A	claystone; Inoceramus	
7	50133203750000	WOLF LK ARCO CIRI - 2	13350	-12738	Mantanuska	A	sandstone	
8 9	50133204320000 50231100010000	KUSTATAN-CHEVRON - 1 HAPPY VALLEY - 31-22	5190 13209	-4866 -12580	Talkeetna Mantanuska	A A	altered volcanics; claystone sandstone; Inoceramus	
0	50231100030000	ANCHOR RIV - 1	6720	-5224	Metasedimentary Rock	В	claystone; highly siliceous; chert	
1	50231100040000	N FORK UNIT - 41-35	11040	-10260	Matanuska	В	sandstone	
2	50231100050000	ANCHOR PT - 1	8974	-8719	Mantanuska	A	sandstone; argillite;	
3	50231100060000 50231200020000	FRITZ CK - 1 N FORK UNIT - 11-04	3580 12120	-3425 -11007	Metasedimentary Rock Kaguyak/Matanuska	A	muscovite schist	
5	50231200020000	S CARIBOU HILL UNIT - 1	9964	-8047	Metasedimentary Rock	A	shale	
5 7	50283100070000 50283100080000	STEDATNA CK - 1 IVAN RIV UNIT - 44-01	7080 15135	-6326 -15082	Plutonic Rock Kaguyak/Matanuska	A A	quartz diorite sandstone; tuff	Maastrichtian (Zippi)
3	50283100300000	TYONEK ST 17587 - 2	12260	-12154	Tuxedni	B/C	claystone	$155 m_{1} \pm (12)(7 m_{1})$
9	50283200010000	CAMPBELL PT - 1	4140	-4252	Mantanuska	A	tuff; claystone	133 my +/-12 (2ippi)
1 2	50283200340000 50283200360000	W TYONEK - 1 NICOLAI CK UNIT UNION - 5	6620 8540	-6195 -8451	Talkeetna Talkeetna	A	welded tuff volcanic rock	
3	50733100090000	OLDMAN'S BAY ST - 1	11640	-11431	Naknek	A	sandstone	
4 5	50733100150000 50733100160000	KALGIN IS ST - 1 DRIFT RIV ST - 1	14101 5010	-14056 -4951	Naknek Talkeetna	A A	sandstone claystone; siltstone	
6 7	50733100240000	REDOUBT SHOAL ST 22064 - 1	14239	-14208	Tuxedni	B/C	claystone claystone: tuff	
8	50733100350000	W FORELAND UNIT - 4	11070	-11141	Talkeetna	A/B	sandstone;	
9 0	50733100370000 50733100410000	STATE SRS - 1 MIDDLE RIV ST ARCO - 1	16130 6954	-16199 -6873	Naknek Talkeetna	A A	shale; tuff claystone	
1	50733100450000 50733100520000	KUSTATAN-UNION - 1 TRADING BAY - 14	11737 6010	-11373	Talkeetna Talkeetna	A/Β Δ	claystone; tuff	
3	50733100560000	TRADING BAY ST - A-02	6605	-6291	Talkeetna	A	tuff	
4 5	50733100590000 50733100770000	GRANITE PT - 1 MIDDLE GROUND SHOAL ST SRS - 1	11508 9049	-11447 -8995	Tuxedni Naknek	B/C A	claystone; indurated claystone	
6	50733100820000	MIDDLE GROUND SHOAL - A43-11	9712	-9549 12001	Naknek	A	claystone	
8	50733200310000	W TRADING BAY ST - 1	6251	-6211	Talkeetna	A	lithology logs unavailable	
Э 0	50733200760000 50733200960000	TRADING BAY ST - A-12 W FORELAND UNIT - 5	7255 8585	-6275 -8494	Talkeetna Talkeetna	A A	lithology logs unavailable basalt	
1	50733201280000	KUSTATAN RIV UNIT - 43-30	10440	-10362	Talkeetna	A	sandstone	
3	50733201300000	N TRADING BAY UNIT - SPR-04	9985	-10422 -9187	Talkeetna	A	lithology logs unavailable	
4 5	50733201380000 50733201680000	MIDDLE RIV ST UNIT - 2 TRADING BAY UNIT - D-17	8080 11630	-7792 -10746	Talkeetna Talkeetna	A A/B	silstone; conglomerate	
5	50733201730000	GRANITE PT ST 18761 - MUCI-1	13365	-12041	Naknek	B	shale; sandstone	
/ 3	50733201780000	TRADING BAY UNIT - G-19 TRADING BAY UNIT - G-31	12033	-10985 -10459	Talkeetna	A A/B	lithology logs unavailable	
)	50733201980000 50733202140000	TRADING BAY UNIT - G-32 TRADING BAY ST - A-11	11535 7180	-10323 -6924	Talkeetna Talkeetna	A/B A	lithology logs unavailable	
l	50733204140000	TBU M-28	, 100		Talkeetna	A/B	tuff	
<u>-</u> 3	50733203250000 50733203610000	S MCARTHUR RIV - 1	8660 12830	-8300 -12149	Tuxedni	A B/C	claystone;	
1	50733203720000	BEARD ST - 1-11 STURGEON - 1	11246 6894	-11126	Naknek Talkeetna	A A	claystone siltstone	
5	50733204280000	TRADING BAY UNIT - M-29	11191	-10340	Talkeetna	A/B	tuff; claystone	
/ 3	50831100020000 50831100070000	STARICHKUF ST - 1 COAL BAY ST - 1	8750 3965	-8682 3908	кадиуак/Matanuska Metasedimentary Rock	A B	claystone silstone; clay; thin bed chert	
9	50883100020000	TYONEK ST 17588 - 1 N COOK INI FT ST - 1	13200	-13111	Naknek	B	sandstone; conglomerate	
1	50883200050000	TURNAGAIN ARM UNIT - 1	4213	-4143	Matanuska	A	shale	
<u>'</u> 3	50883200850000 55219000050000	N FORELAND ST - 1 OCS 0168 COHO - 2	15569 4052	-15451 4001	Matanuska Kaguyak/Matanuska	A A	sandstone claystone; siltstone	
4	55220000010000 55220000020000	OCS COST LOWER COOK INLET - 1 OCS 0097 RAVEN - 1	2550 2595	-2459 -2505	Kaguyak/Matanuska Kaguyak/Matanuska	A	siltstone siltstone; claystone	Maestrichtian - microfossils (Turner 1986)
5	55220000030000	OCS 0086 GUPPY - 1	5010	-4965	Kaguyak/Matanuska	A	siltstone; claystone	forams & nannofossils (BSEE) Campanian or older
3	55220000050000 55220000060000	OCS 0152 BOWHEAD - 1	3505 3935	-3427 -3856	kaguyak/Matanuska Kaguyak/Matanuska	A A	claystone	(∠ippi)
9	55220000070000	OCS 0124 S ARCH - 1A	1350	-1271	Kaguyak/Matanuska	A A	claystone; shale	
1	5522000000000	OCS 0243 FALCON - 1	1995	-391 -1884	Kaguyak/Matanuska	A	siltstone; claystone	Maastrichtian (BSEE)
2 3	50283100110000 50283200060000	BELL IS - 1 ALBERT KALOA - 1	11000 13510	-10951 -13204	Naknek Tuxedni	A B/C	claystone claystone	
1	50283200110000	LEWIS RIV - 13-02	11170	-11026	Tuxedni	B	claystone	
2 5	50231200210000	RED - 1	13940	-13826 -10719	Kaguyak/Matanuska	A	claystone; siltstone	
7 8	50231200340000	NORTH FORK UNIT - 32-35	11965	-11286	Kaguyak/Matanuska	A	claystone; siltstone	ļ

109 50283100270000 BELUGA RIVER UNIT - 212-35 14760 -14657 Kaguyak/Matanuska B claystone



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QUADRANGLE INDE

Two regional 2-D marine seismic datatsets (data location map) were used to interpret three Mesozoic horizons, Upper Jurassic Naknek, Middle Jurassic Tuxedni, and Lower Jurassic Talkeetna. The primary data were the same Cl88 and Cl89 multi-client seismic (~2,280 miles, now marketed by Spectrum Geo and Seitel, Inc.) used in the construction of the top Mesozoic unconformity depth map. USGS seismic data from lower Cook Inlet were migrated and interpreted to provide additional control (~1,020 miles, 1975 vintage ALC data available from the NAMSS website). The final interpretation was an internally consistent set of horizon picks that honored all of the well control. Between well control the interpretation was sometimes based on wavelet character, but in many areas depended on projections and dip interpretation rather than consistent character picks. The fact that the Naknek and Talkeetna Formations are significant unconfor mities, often angular, aids in the regional correlation and extrapolation away from well control. Naknek and Tuxedni/Talkeetna horizons are also often characterized by high-energy packages. Wells with Mesozoic formation tops used to constrain the horizon picks included Outer Continental Shelf [OCS] wells in lower Cook Inlet and the North Forelands St 1 well in upper Cook Inlet. In the middle and upper Cook Inlet, where Mesozoic well control was sparse, the horizon picks were influenced by the formation picks at the top Mesozoic unconfomity and by seismic character. Synthetic seismograms from sonic and density logs were created when available, but due to low seismic frequencies and poor signal to noise in the deeper data, statistical or character ties were problematic. Insights from the synthetics were used to guide the picks away from wells, (for instance, in the OCS synthetics the Naknek Formation was often a strong peak); and the Talkeetna Formation often had a strong peak near the base of a high-energy section. Picks away from well control were also guided by higher/lower energy trends in the section and interpretations of regional dip. Interpretations were complicated by interference from strong multiples, which overrode true formation dips in many places.

Formation top depths were projected in seismic two-way time based on interpolated check shots constrained by the top Mesozoic unconformity depth surface. Public check shots are available in three wells, OCS 0243 (Falcon) #1, OCS 0086 (Guppy) #1, and OCS 0168 (Coho) #2. In areas where little to no publicly available seismic or well data were available, interpreted aeromagnetic data were used to guide map unit boundaries (R.W. Saltus, written commun.; Haeussler and others, in press).

## Subcrop Map Units

Eight map units were established for the top Mesozoic subcrop map, based on well formation picks, 2-D seismic interpretation, reted aeromagnetic data, and surrounding bedrock geology. The sedimentary rock units include: Kaguyak–Matanuska Formations, divided (Upper to upper Lower Cretaceous); Naknek Formation (Upper Jurassic); Chinitna Formation–Tuxedni Group, undivided (Middle assic); Talkeetna Formation (Lower Jurassic); Talkeetna Formation–Border Ranges ultramafic and mafic complex (BRUMC), undivided ower Jurassic); and Pogibshi–Port Graham formations, undivided (Lower Jurassic to Upper Triassic). The metamorphic rocks are lumped o one unit, Metamorphic rocks, undivided (Cretaceous to Triassic); the igneous rocks are lumped into one unit, Plutonic rocks, undivid-(Triassic to Tertiary). A composite of 15 map units exist from the combined subcrop map in the subsurface and the surrounding drock geology from the USGS 2012 geologic map of the Cook Inlet region (Wilson and others, 2012). These units include the eight bcrop map units listed above as well as surficial deposits (Quaternary); Tertiary sedimentary rocks, undivided; Lower Cretaceous dimentary rocks; Valdez Group (Upper Cretaceous); and McHugh–Uyak, undivided (Cretaceous to Mississippian). The following paragraphs provide rock descriptions for the eight subcrop map units as they are observed in outcrop, cuttings,

## uvak-Matanuska Formations. undivide

The Kaguyak–Matanuska Formations, undivided, are interpreted at the top Mesozoic unconformity in wells in central and t-central Cook Inlet basin. In the subsurface these two units are treated as correlative, with the formation name changing from Matanuska in upper Cook Inlet to Kaguyak south of Kalgin Island in lower Cook Inlet. Outcrops of Matanuska Formation are present along trend o the northeast in the Matanuska Valley, and outcrops of the Kaguyak Formation are present along trend to the south on the upper

The Matanuska Formation is described in outcrop as dark-gray, marine shale, siltstone, sandstone, and conglomerate with ceramus fragments and ammonites (Grantz, 1964; Trop, 2008). The Kaguyak Formation is described in outcrop as dark-gray to ale-brown, marine, fossiliferous, siltstone, sandstone, and shale (Detterman and Miller, 1985; Wartes and others, 2013b). Documentation nonmarine sediments in the Kaguyak is found in the COST LCI well and in outcrop (Magoon, 1986; Magoon, and others, 1980; LePain d others, 2012). The cuttings interpreted as Kaguyak–Matanuska Formations, undivided, are described as dark-gray shale, gray–green to gray-brown siltstone, and sandstones with Inoceramus prisms. Palynology data analyzed in these wells are interpreted to be Late Cretaous (Zippi, 2006), which supports the Kaguyak–Matanuska Formation, undivided, interpretation.

The Lower Cretaceous is not included in this map unit because of seismic and outcrop observations. In lower Cook Inlet, on the st side of the basin, the Lower Cretaceous appears to pinch out, based on seismic data, before it reaches the subcrop surface (see erpreted seismic line). In lower Cook Inlet on the west side of the basin, the Upper Cretaceous Kaguyak–Matanuska, undivided, map unit (Saddle Mountain) is in contact with the underlying Naknek Formation.

The Naknek Formation is interpreted at the top Mesozoic unconformity in wells in the west-central portion of the basin, along strike of Naknek outcrops on the Iniskin Peninsula. The Naknek Formation is also interpreted at the top Mesozoic unconformity in wells at Swanson River Field on the east side of the basin. Seismic data in lower Cook Inlet indicate a northeast-southwest subcrop trend for the Naknek on the east side of the basin. The 2-D data also suggest that there is a window of Naknek at the top Mesozoic unconformity, offshore, northwest of the Ninilchik Union 1 well.

The Naknek Formation is described in outcrop as light- to dark-gray, fossiliferous, marine sandstone, arkose, conglomerate, siltstone, and shale having a primarily plutonic provenance (Detterman and Hartsock, 1966; Detterman and others, 1996; Trop and others, 1005; Wartes and others, 2013 b). Multiple wells in the west-central portion of the basin are assigned an age of Late Jurassic at the top Mesozoic unconformity: Bell Island 1, State SRS 1, MGS State SRS 1, Kalgin Island State 1, and Oldmans Bay State 1 (Zippi, 2006; Boss and others, 1976). Cuttings in these wells at the top Mesozoic unconformity are described mostly as gray to gray–green claystone, siltstone with some sandstone, arkose, tuff, and argillite. In the Swanson River field area, the cuttings interpreted to be Naknek include: gray to gray–green siltstone, sandstone, and claystone, mica, tuff, and glauconite.

## Chinitna Formation-Tuxedni Group, undivided

The Chinitna Formation–Tuxedni Group, undivided, is interpreted at the top Mesozoic unconformity in wells on the west side of pok Inlet, along strike of the Chinitna and Tuxedni outcrops on the Iniskin Peninsula. On the east side of the basin, seismic data in lower book Inlet indicate a northeast-southwest subcrop trend, but no wells are interpreted to have Chinitna Formation or Tuxedni Group at the op Mesozoic surface on the east side of the basin.

In outcrop, the Chinitna Formation and Tuxedni Group are described as light- to dark-gray and green, marine, fossiliferous, tstone, sandstone, and shale with the Chinitna Formation having many limy concretions (Detterman and Hartsock, 1966; Detterman and teed, 1980). Both the Chinitna Formation and the Tuxedni Group contain a mixture of plutonic and volcanic detritus and clasts presumed o be derived from erosion of the Talkeetna Formation and related plutonic rocks of the early Jurassic magmatic arc (Detterman and lartsock, 1966; Trop and others, 2005). Two wells, Iniskin Unit Beal and Iniskin Unit Zappa, are drilled in surface outcrops of Tuxedni. Green–gray and brown–gray siltstone, sandstone, conglomerate, and shale are documented in cuttings in these wells. A Middle Jurassic age call was assigned to the rocks at the top Mesozoic unconformity in the State 364651 1 well (Zippi, 2006). The cuttings in those wells re described as light-gray to green–gray and brown, claystone, silty claystone, indurated, argillaceous, weathered, and slightly micaceous

# Calkeetna Formation and Talkeetna Formation-Border Ranges ultramafic and mafic complex, undivided

The Talkeetna Formation is interpreted at the top Mesozoic unconformity in the majority of the wells in the west forelands region n the west side of Cook Inlet basin. Outcrops of the Talkeetna Formation border these wells to the west and to the south. The Talkeetna prmation is also interpreted at the top of the Mesozoic unconformity on the east side of the basin in one well, Swan Lake 2. Outcrops of e Talkeetna Formation on the east side of the basin are found to the northeast in the Matanuska Valley. These outcrops are highly faulted and are in fault contact with ultramafic and mafic plutonic rocks referred to as the Border Ranges ultramafic and mafic complex (BRUMC) Burns, 1983; Winkler, 1992; Pavlis, 1982). Interpretations of aeromagnetic data suggest that both the BRUMC and the Talkeetna Formation e present on the east side of Cook Inlet basin along the Border Ranges fault (Mankhemthong and others, 2013; Burns and Winkler, 1994; altus, written commun.; Burns, 1985; Burns and others, 1991); however, besides the Swan Lake 2 well, no other well, seismic, or outcrop data are available on the east side of the basin to clearly determine if the Talkeetna Formation or the BRUMC is at the top Mesozoic unconformity. For this reason, we include the BRUMC with the Talkeetna Formation on the east side of the basin and designate this as a

In outcrop, the Talkeetna Formation is described as dark-green to black, red, and multicolored lava, agglomerate, breccia, and tuff with interbedded sandstone and shale (Detterman and Hartsock, 1966). The Talkeetna Formation is interpreted to be a product of extrusion and erosion of an early Jurassic arc (Detterman and Reed, 1980; Trop and Plawman, 2006). The cuttings and core chips interpreted as Talkeetna Formation are described as gray–green–brown–black volcanics, basalt, and tuffs. Wireline data corroborate an interpretation of tight, dense rocks. In most wells with Talkeetna Formation at the subcrop, as soon as the top Mesozoic unconformity is penetrated, resistivity and density log values increase significantly and sonic travel time decreases relative to the overlying Tertiary sedimentary rocks.

## Pogibshi-Port Graham Formations, undivided The Pogibshi–Port Graham formations, undivided, are interpreted at the top Mesozoic unconformity in the southeastern map

region, along strike of Pogibshi–Port Graham outcrops that are mapped by Kelley (1980) and Wilson and others (2012) from Seldovia Bay

In outcrop, these formations are described as volcaniclastic rocks, limestone, coal, and tuffaceous argillite (Kelley, 1980; Wilson and others, 2012). Magoon and others (1976), Bradley and others (1999), and LePain and others (2013) suggest that the Pogibshi Formation of Kelley (1980) corresponds to the Talkeetna Formation. D.W. Bradley (oral commun.) dated the zircons of the diorite of the Point Bede pluton (which intrudes the Pogibshi) and concluded a Late Triassic age. This suggests that the Pogibshi may be older than the Talkeetna (Wilson and others, 2012). We designate the map unit Pogibshi–Port Graham to reflect the recent 2012 USGS interpretation and

recognize that whether or not the Pogibshi should be included as part of the Talkeetna Formation is beyond the scope of this analysis. Plutonic rocks are observed at the top Mesozoic unconformity in wells at three different locations. Two of the areas, which

correspond to the Bachatna Creek Unit 7 and the Cottonwood State 1 wells, are located in the northwestern corner of the subcrop map near outcrops of Jurassic quartz diorite, diorite, and granodiorite (Magoon and others, 1976). The third area, which corresponds to the Fishhook 1 well, is in the northeastern corner of the subcrop map near outcrops of Jurassic quartz diorite, diorite, and granodiorite and outcrops of Tertiary–Cretaceous granodiorite and quartz diorite (Magoon and others, 1976). The cuttings in these wells are described as

Metamorphic rocks, primarily metasedimentary, are observed at the top Mesozoic surface along the southeastern edge of the subcrop map. The Metamorphic rocks, undivided, map unit is described as metasedimentary, metaplutonic, and metavolcanic rocks, metachert, slate, metasandstone, and marble (Magoon and others, 1976). Cuttings descriptions in these wells include sandstone, chert, argillite, guartzite, muscovite, schist, and loose grains of guartz. Heussler and others' (in press) interpretation of aeromagnetic data suggests that these metasedimentary rocks are part of the Chugach Terrane (McHugh Complex).

# Subcrop Map Pattern

Each Mesozoic sedimentary map unit regionally trends northeast-southwest, with minor perturbations in the map pattern due to localized faulting and folding. The Mesozoic sedimentary rocks, in general, form a broad syncline with the Lower Jurassic Talkeetna Formation map unit contacting the plutonic rocks of the Alaska Range Batholith on the west and the Lower Jurassic and Upper Triassic map units contacting metasedimentary rocks of the McHugh Complex on the east (Fisher and Magoon, 1978, Boss and others, 1976; Plafker and others, 1982). The Middle and Upper Jurassic map units parallel the Talkeetna Formation on each side of the basin and the Upper Cretaceous Kaguyak–Matanuska map unit lies in the center of the subcrop map. On the west side of the basin, the Jurassic sedimentary map units, Talkeetna, Chinitna–Tuxedni, and Naknek, are found in outcrop

on the Iniskin Peninsula. These same map units continue along trend in the subsurface in a northeasterly direction. In the northwestern corner of the subcrop map, plutonic rocks are in contact with the Talkeetna Formation. In the central portion of the basin, the Cretaceous sedimentary map unit, Kaguyak–Matanuska, undivided, continues south and west from the Matanuska Formation outcrops in the Matanuska Valley. Kaguyak Formation outcrops continue the trend to the south. In the north-central part of the Kaguyak–Matanuska subcrop a small window of plutonic rocks is present. In the east-central portion of the Kaguyak–Matanuska subcrop, at Swanson River Field, a window exists into the Naknek. Seismic data indicate that one other window of

Naknek may be present, offshore, northwest of the Ninilchik Union 1 well. On the eastern side of the basin, along the Border Ranges fault, the Lower Jurassic Talkeetna–BRUMC, undivided, map unit is in fault contact with the McHugh Complex in the north and the Lower Jurassic–Upper Triassic Pogibshi–Port Graham map unit is in fault contact with metasedimentary rocks in the south. Seismic data in lower Cook Inlet indicate a northeast–southwest subcrop trend for the Talkeetna Formation, Chinitna Formation–Tuxedni Group, undivided, and the Naknek. The Jurassic Chinitna–Tuxedni and Naknek map units parallel the Talkeetna map unit on the east side and pinch out in Turnagain Arm.

## Error and Uncertaint

The supporting data for the subcrop map vary regionally, and within each region the uncertainty varies. Lower Cook Inlet has the greatest control of all regions: formation picks in the OCS wells, age data, 2-D seismic control, and outcrop. In upper and middle Cook Inlet well formation picks, age data, and outcrop extents primarily define the subcrop limits, with seismic character and fabric substantiating the interpretation. Along the eastern edge of the subcrop map, where little to no seismic data or well data exist, interpreted aeromagnet data, outcrop extents, and unpublished zircon age dates (R. Gillis, written commun.) are the main controls on the subcrop map unit boundaries. Map unit boundaries are dashed and are designated with question marks where little to no control is present.

The structural surface onto which the subcrop map is projected is taken directly from the top Mesozoic unconformity depth map published by Shellenbaum and others (2010). Contours outside of the CI88 and CI89 two-dimensional seismic coverage are dashed to indicate uncertainty. Contours outside seismic coverage with little well control have even higher uncertainties, and are designated with question marks. There is also a certain amount of spatial uncertainty regarding the intersection of the top Mesozoic unconformity horiz with the Bruin Bay and Castle Mountain–Lake Clark fault systems that bound the basin to the west. The fault traces (Magoon and others 1976) indicate surface expression, whereas the top Mesozoic surface lies at varying depths. The Border Ranges and Eagle River faults ar modified from Wilson and others (2012). The modifications conform to aeromagnetic boundaries shown by data provided by R. Saltus (written commun.) and Haeussler and Saltus, in press.

The uncertainty when picking formation tops is qualified by assigning a confidence rating (A = high confidence, B = moderate confidence, and C = low confidence). Lithologic data were unavailable for seven wells. In those cases, wireline log correlations and proximity to known formation picks were used to assign the age. Without core or age date data available at the top Mesozoic unconformity, it is difficult to clearly identify the Upper Jurassic Naknek Formation and the Middle Jurassic Chinitna Formation–Tuxedni Group, undivided, from only cuttings and wireline log signature. Seismic character, proximity to well control with known picks, and proximity to mapped bedrock helped differentiate between the Upper and Middle Jurassic rock units.

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