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PALYNOLOGICAL ANALYSIS OF 228 OUTCROP SAMPLES FROM THE KENAI, SELDOVIA, AND TYONEK QUADRANGLES, COOK INLET REGION, ALASKA

by
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Palynological Analysis of 228 Outcrop Samples from the Kenai, Seldovia, and Tyonek Quadrangles, Cook Inlet Region, Alaska

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INTRODUCTION

The palynological samples included in this Raw Data File were collected as part of the Alaska Department of Natural Resources' (Alaska Division of Geological & Geophysical Surveys [DGGS] and Alaska Division of Oil & Gas [DOG]) Cook Inlet Basin Analysis program. The focus of this program is to evaluate the stratigraphic trap potential and reservoir quality of coal-bearing Cenozoic strata in upper Cook Inlet basin and the reservoir quality of Mesozoic strata throughout the basin. The samples included in this report were collected in the Tyonek, Kenai, and Seldovia quadrangles from September 2006 through July 2010. All samples in this report were processed by Russ Harms of Global Geolab Limited in Medicine Hat, Alberta, Canada. Prepared slides of recovered palynomorphs were analyzed by Dr. Pierre Zippi (Biostratigraphy.com, LLC). Sample collectors include Paul Decker (DOG), Emily Finzel (Purdue University), Bob Gillis (DGGS), Trystan Herriott (DGGS), Dave LePain (DGGS), Dave Mauel (DGGS), Jacob Mongrain (UAF and DGGS), and Marwan Wartes (DGGS). Sample numbers include year collected, collector initials, field location number, and sample location in measured stratigraphic section, if tied to a measured section. Collector initials include:

- Paul Decker – PLD
- Bob Gillis – BG
- Trystan Herriott – TMH
- Dave LePain – DL
- Dave Mauel – DJM
- Jacob Mongrain – JRM
- Marwan Wartes – MAW

An example of the sample numbering scheme follows:

- 07DL085-35 Indicates the sample was collected in 2007 by Dave LePain at his field location 85. In this case the sample is tied to a measured stratigraphic section and the last number shows its position in meters above the base of the section.

Another example includes:

- 08BG184b Indicates the sample was collected by Bob Gillis in 2008 at his field location 184. The letter "b" indicates that other samples (not for palynological analysis) were collected at that location.

The following sample numbers deviate from the numbering convention outlined above:

- ST1 –
- TY –
- BG1 –

These samples were collected by Emily Finzel (Purdue University). ST1=Sterling Formation; BG1 = Beluga Formation; TY=Tyonek Formation

Figure 1 is an overview map showing the distribution of samples analyzed. Figures 2–5 offer a more detailed look at sample locations. Table 1 summarizes the palynological results for each sample.

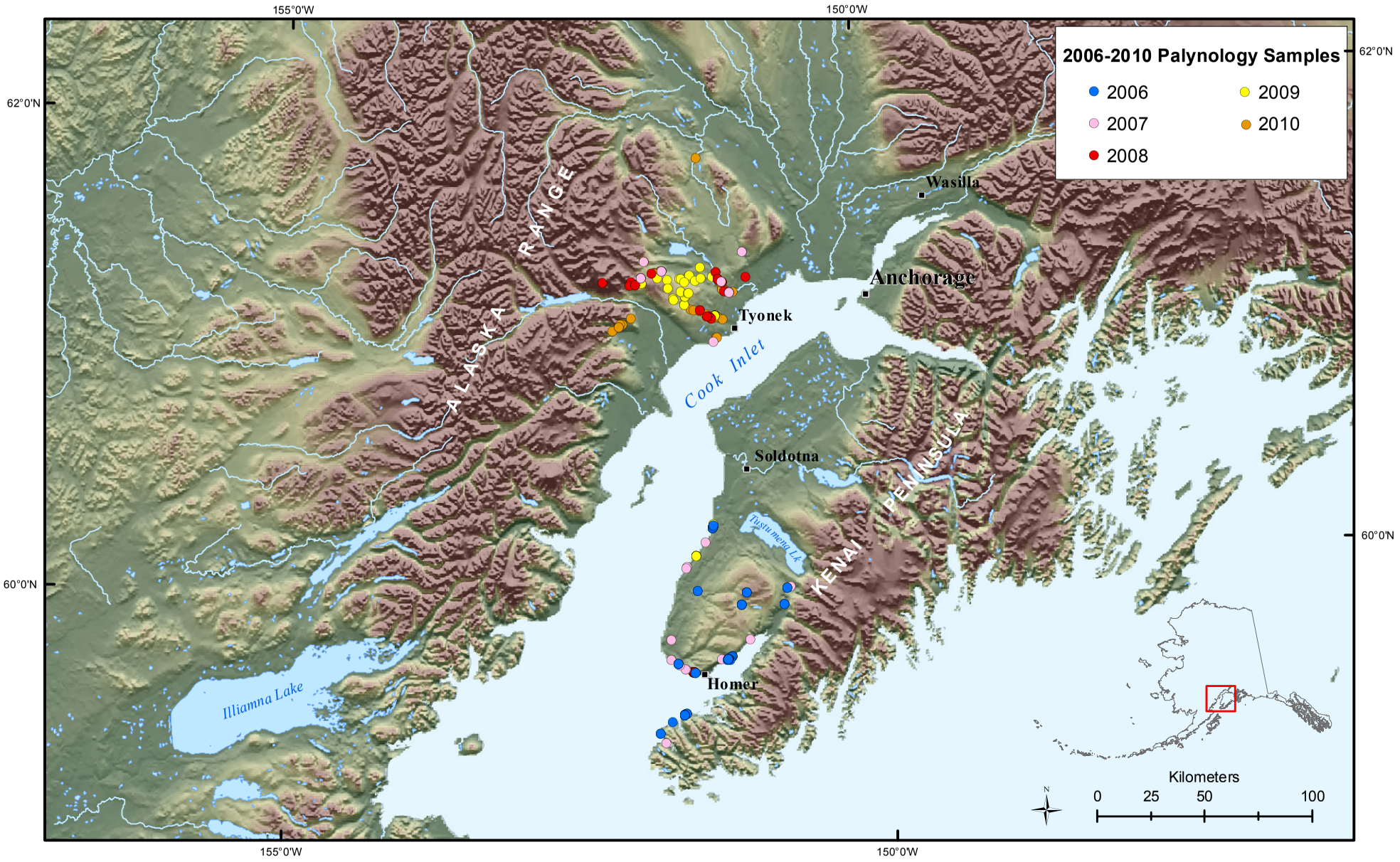

Figure 1. Map showing the distribution of palynology samples collected during the 2006–2010 field seasons.

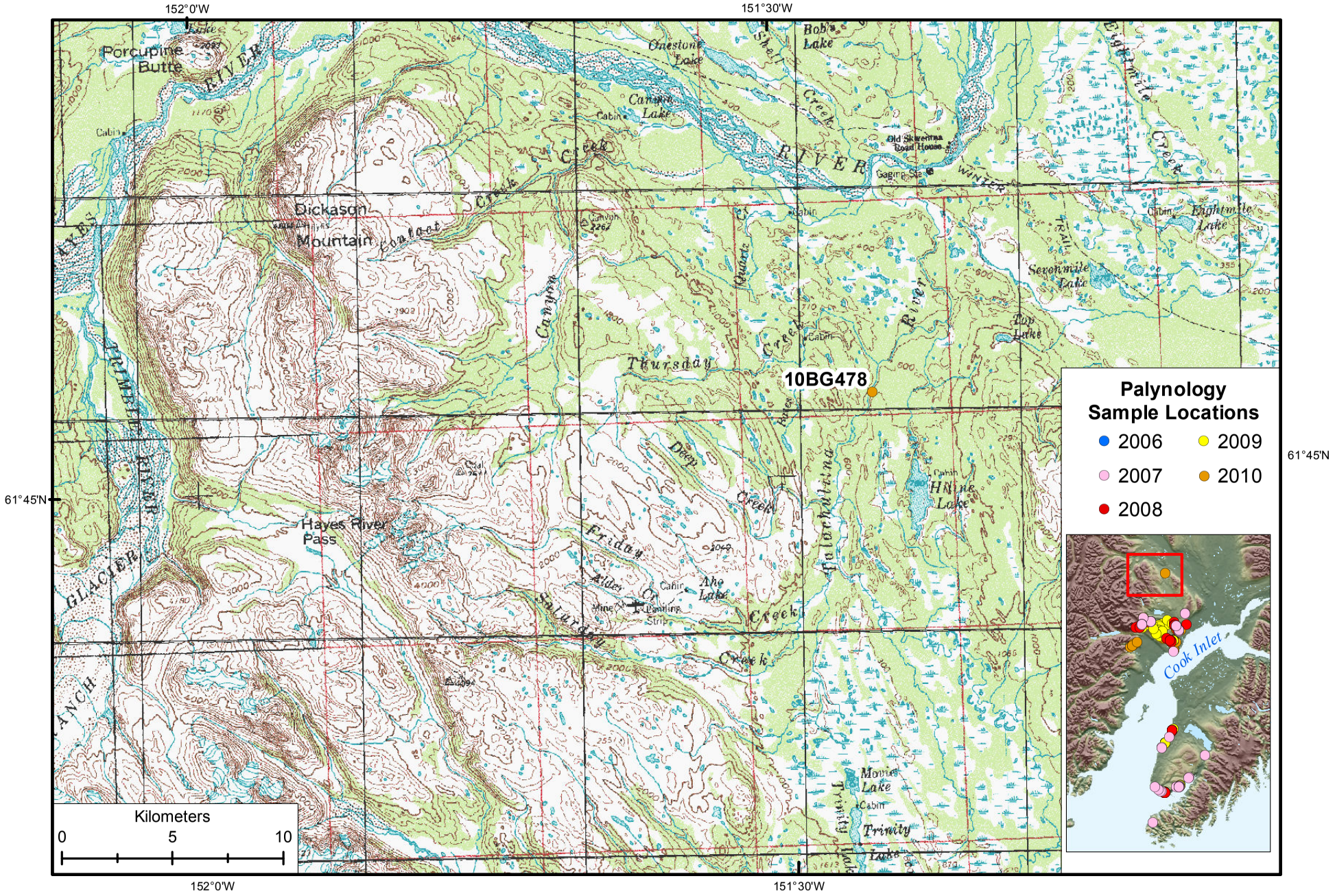

Figure 2. Map showing station locations in the northernmost portion of the study area from which palynology samples were collected and analyzed.

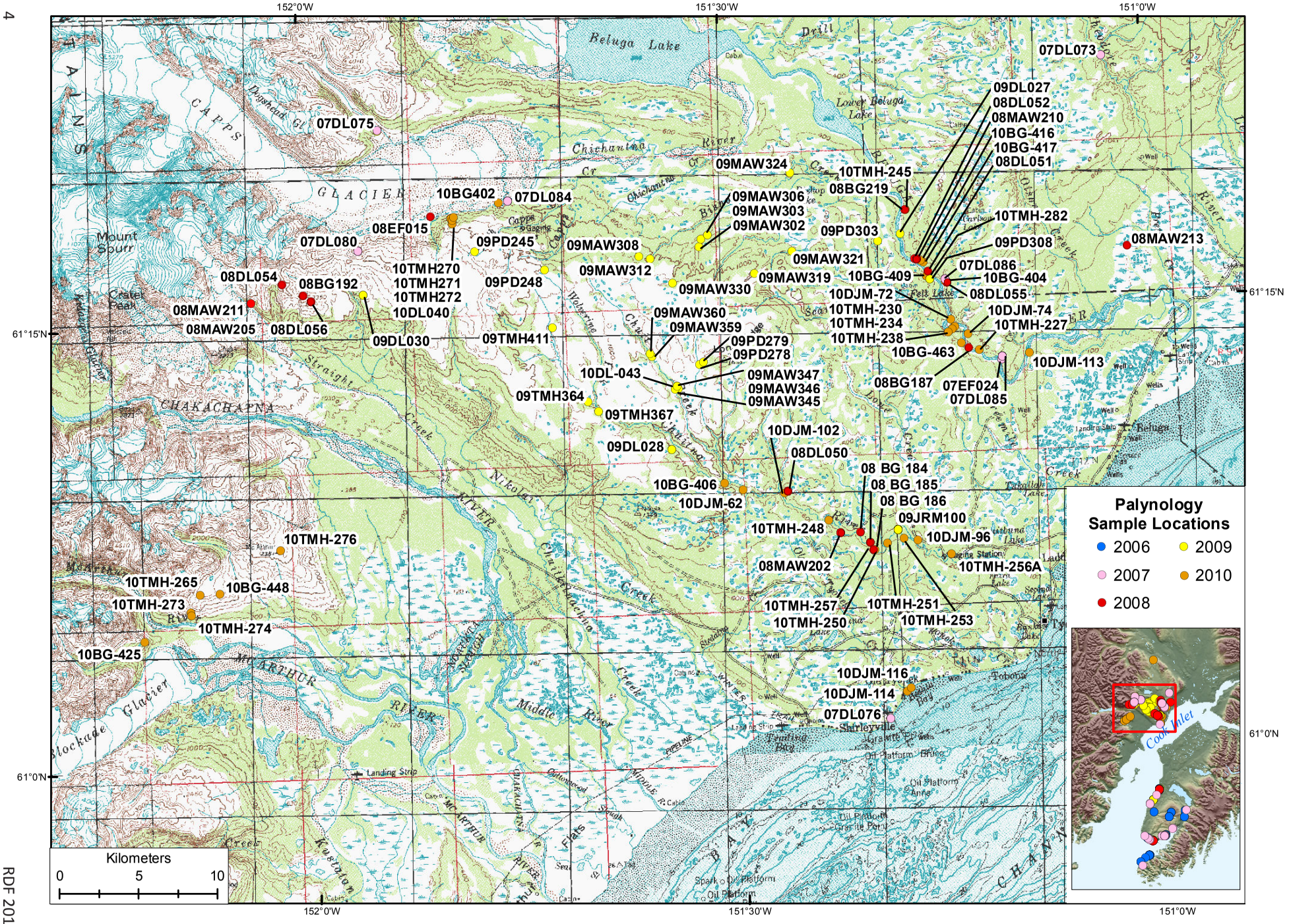

Figure 3. Map showing station locations on the northern side of Cook Inlet from which palynology samples were collected and analyzed.

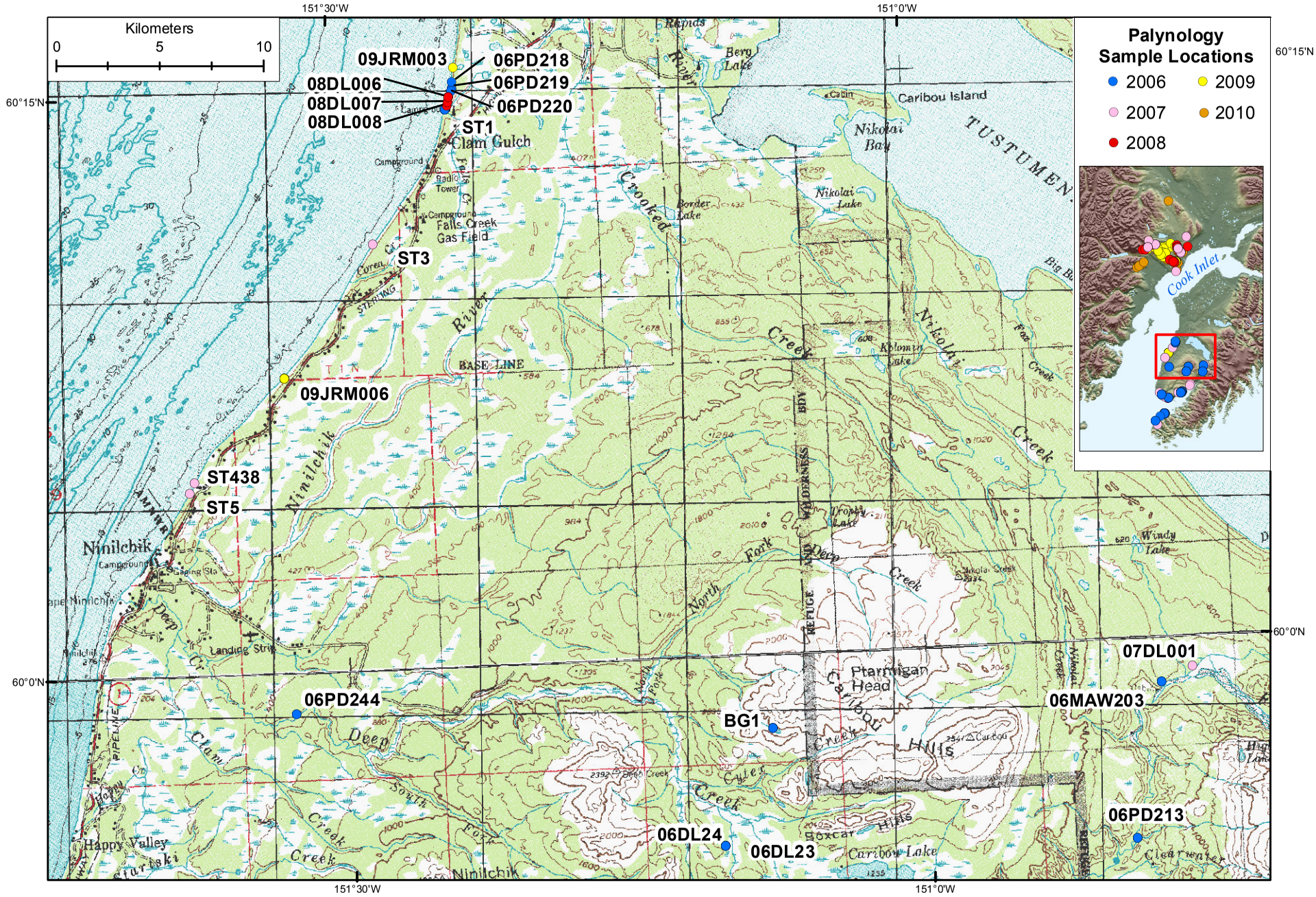

Figure 4. Map showing station locations from the Kenai Peninsula from which palynology samples were collected and analyzed.

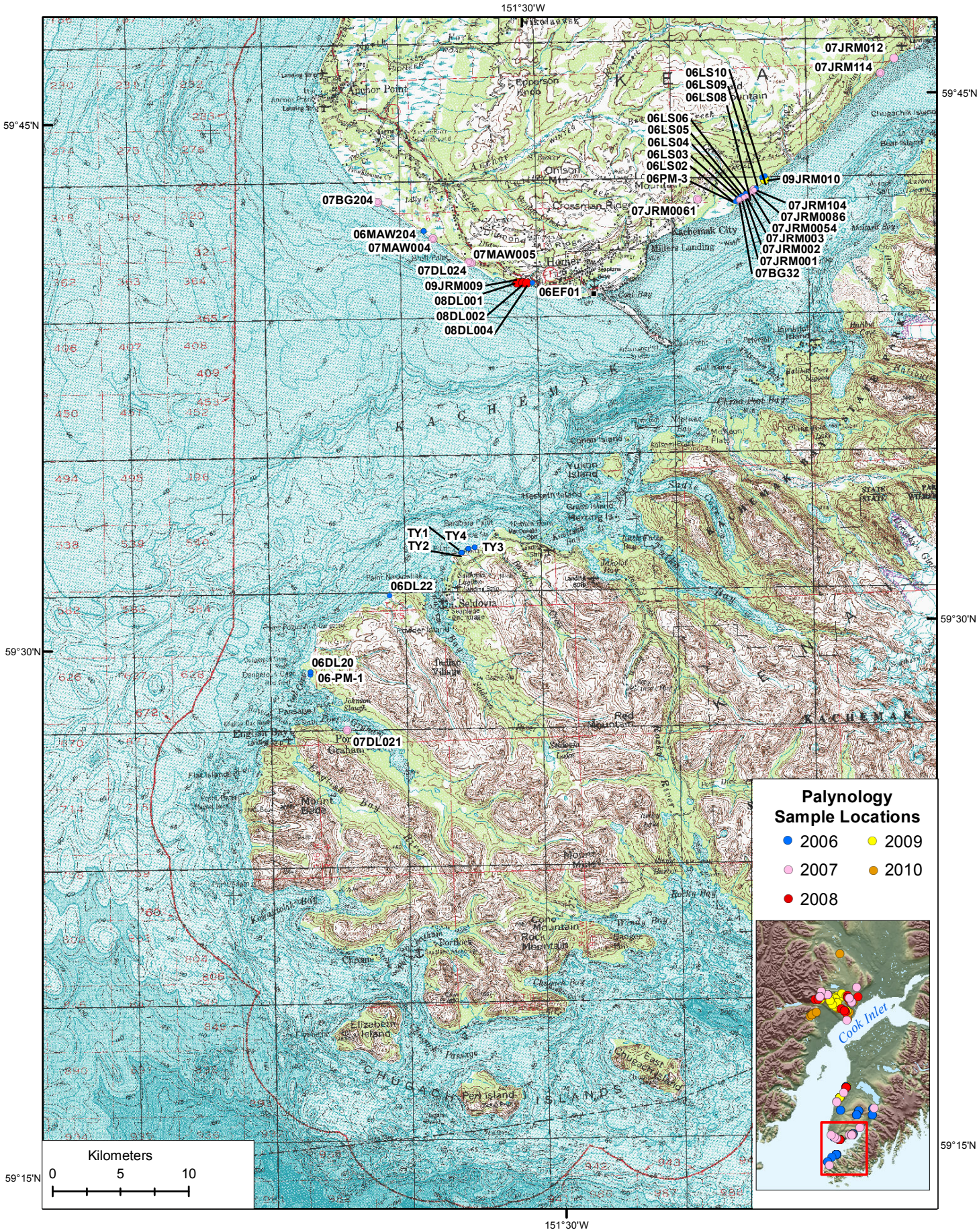

Figure 5. Map showing station locations from the southern Kenai Peninsula from which palynology samples were collected and analyzed.

Table 1. Summary of Palynology Samples from the Cook Inlet Region.

Sample	Latitude	Longitude	Geologic_Formation	Geologic_Age	Confidence_Level
06DL20a	59.394550	-151.892470	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL20b	59.394550	-151.892470	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL22c	59.442990	-151.786760	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL23-A	59.918330	-151.180270	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL24-0.8	59.918330	-151.180270	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL24-12.6	59.918330	-151.180270	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL24b	59.918330	-151.180270	Tyonek	Mid Miocene, Late Seldovian	not assigned
06DL24c	59.918330	-151.180270	Tyonek/Quaternary?	Mid Miocene, Late Seldovian	not assigned
06EF010A	59.644200	-151.588180	Beluga	Late Miocene, Late Homerian	not assigned
06EF010B	59.644200	-151.588180	Beluga	Late Miocene, Late Homerian	not assigned
06LS02	59.692490	-151.317180	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS03	59.693810	-151.313000	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS04	59.695070	-151.307920	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS05	59.696120	-151.303530	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS06	59.692000	-151.294680	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS08	59.701300	-151.290250	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS09	59.706360	-151.277830	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06LS10	59.708670	-151.277830	Beluga	E. Pliocene, E. Clamgulchian	not assigned
06MAW203-34a	59.980660	-150.796420	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06MAW203-54a	59.980660	-150.796420	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06MAW203-60a	59.980660	-150.796420	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06MAW204a	59.680850	-151.726330	Beluga	Late Miocene, Late Homerian	not assigned
06MAW204b	59.680850	-151.726330	Beluga	Late Miocene, Late Homerian	not assigned
06MAW204c	59.680850	-151.726330	Beluga	Late Miocene, Late Homerian	not assigned
06MAW204d	59.680850	-151.726330	Beluga	Late Miocene, Late Homerian	not assigned
06PD213-22.5A	59.913620	-150.823700	Beluga/Sterling?	E. Pliocene, E. Clamgulchian	not assigned
06PD213-30.5a	59.913620	-150.823700	Beluga/Sterling?	E. Pliocene, E. Clamgulchian	not assigned
06PD213-7a	59.913620	-150.823700	Beluga/Sterling?	E. Pliocene, E. Clamgulchian	not assigned
06PD218a	60.252590	-151.391720	Sterling	E. Pliocene, E. Clamgulchian	not assigned
06PD219a	60.248650	-151.392910	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06PD220-23	60.249630	-151.392000	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06PD220-40.2	60.249630	-151.392000	Sterling/Quaternary?	E. Pliocene, E. Clamgulchian	not assigned
06PD244-1a	59.982500	-151.547210	Sterling	E. Pliocene, E. Clamgulchian	not assigned
06PD244-25.3b	59.982500	-151.547210	Sterling	E. Pliocene, E. Clamgulchian	not assigned
06PM-1-1	59.394800	-151.892500	Beluga	Mid Miocene, Late Seldovian	not assigned
06PM-1-2	59.394800	-151.892500	Beluga	Mid Miocene, Late Seldovian	not assigned
06PM-1-3	59.394800	-151.892500	Beluga	Mid Miocene, Late Seldovian	not assigned
06PM-3-10	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
06PM-3-11	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
06PM-3-12	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
06PM-3-17	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
06PM-3-7	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
06PM-3-9	59.693380	-151.313410	Beluga	Late-Mid Miocene, E. Homerian	not assigned
07DL001-b	59.986890	-150.769350	Sterling	Pleistocene, above Clamgulchian	high
07DL076c	61.01714	-151.32707	Beluga	Late Miocene	low-medium
07DL080-1.8-3.1a	61.29171	-151.93504	West Foreland	Middle Eocene	medium
07DL080-25.8a	61.29171	-151.93504	West Foreland	Middle Eocene	high
07DL080-36.0b	61.29171	-151.93504	West Foreland	Middle Eocene	high
07DL080-44.0	61.29171	-151.93504	West Foreland	Middle Eocene	high
07DL080-59.0a	61.29171	-151.93504	West Foreland	Late Eocene	medium
07DL084-1.6a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL084-13.5a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL084-23.0a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL084-29a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL084-4.0 a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL084-9.5a	61.31741	-151.75624	Tyonek	late Middle Miocene	high
07DL085-06	61.21909	-151.17781	Beluga	early Late Miocene	high
07DL085-35	61.21909	-151.17781	Beluga	Late Miocene	medium
07DL085-44.0	61.21909	-151.17781	Beluga	early Late Miocene	high
07DL085-45.7b	61.21734	-151.17934	Beluga	early Late Miocene	high
07DL085-49.1a	61.21734	-151.17934	Beluga	early Late Miocene	high
07DL085-64	61.21909	-151.17781	Beluga	early Late Miocene	high
07DL085-90a	61.21909	-151.17781	Beluga	early Late Miocene	high
07DL086-1.8a	61.26407	-151.2429	Beluga	late Middle Miocene	high

Sample	Latitude	Longitude	Geologic_Formation	Geologic_Age	Confidence_Level
07DL086-27.0	61.26399	-151.24214	Beluga	late Middle Miocene	high
07JRM012-70	59.78246	-151.10204	Sterling	Early Pliocene, Lower Clamgulchia	high
7JRM011-25.4-24.7	59.77309	-151.12128	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
7JRM010-34.9-33.9	59.69879	-151.29545	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
7JRM009-18.0-20.0	59.70012	-151.29219	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
7JRM008-26.5-27.0	59.6962	-151.30368	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
7JRM006-11.8-13.0	59.69522	-151.86672	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
7JRM005-24.0-22.5	59.69517	-151.30707	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
07JRM003-3.5-4.5a	59.69379	-151.3125	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
07JRM002-4.5-5.5a	59.69376	-151.31279	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	high
07JRM001-1.7-3.5a	59.69343	-151.31347	Sterling/Beluga?	Early Pliocene, Lower Clamgulchia	medium
07EF024-TK6	61.21909	-151.17781	Beluga	early Late Miocene	medium
08BG184b	61.123050	-151.353580	Tyonek	Late Pliocene	high
08BG185b	61.116980	-151.342820	Tyonek	Pliocene	high
08BG186b	61.112790	-151.339290	Tyonek	Late Miocene	high
08BG187b	61.224610	-151.217180	Tyonek	Possibly late Middle Miocene	high
08BG192c	61.267430	-152.001330	West Foreland	Early Oligocene, possibly Latest Eocene	high
08BG219a	61.304090	-151.285930	West Foreland	Late Eocene, Early Oligocene?	high
08DL050-0.0	61.147940	-151.437180	Tyonek	late Middle Miocene	high
08DL050-24.5	61.147940	-151.437180	Tyonek	late Middle Miocene	moderate
08DL052.19	61.276060	-151.275050	West Foreland	Late Eocene?	moderate
08DL052-7.0a	61.276060	-151.275050	West Foreland	Middle to Late Eocene?	moderate
08DL054-48.8a	61.273940	-152.025620	West Foreland	Early Oligocene to Late Eocene?	moderate
08DL055-0.0	61.262270	-151.239880	Tyonek	Middle Miocene	high
08DL055-101.0	61.262270	-151.239880	Tyonek	Middle Miocene	high
08DL055-57.2	61.262270	-151.239880	Tyonek	Middle Miocene	high
08DL055-81.0	61.262270	-151.239880	Tyonek	Middle Miocene	high
08DL056-10.0	61.264150	-151.992483	West Foreland	Middle Eocene	high
08EF015	61.309760	-151.848140	not assigned	Late Pliocene, possibly Pleistocene	very low
08MAW202-13.7a	61.123270	-151.376590	Tyonek	Mid Miocene	moderate
08MAW202-5.0a	61.123270	-151.376590	Tyonek	Late Pliocene	moderate
08MAW205-1.9a	61.263930	-151.063780	not assigned	late Middle Miocene	high
08MAW210-2.7a	61.276060	-151.275010	West Foreland	Early Pliocene	low
08MAW211 -7.0a	61.276400	-151.277150	West Foreland	early Late Oligocene	moderate
08MAW213-48.7a	61.278850	-151.025820	West Foreland	Middle Eocene	high
09BG464b-a	61.26566	-151.26103	not assigned	Middle to Late Eocene	high
09DL027-10.0a	61.29063	-151.29332	West Foreland	Late Eocene?	high
09DL028-1.3a	61.17379	-151.57197	West Foreland	Late Eocene?	high
09DL028-23.4a	61.17379	-151.57197	West Foreland	Middle to Late Eocene	high
09DL030-0.6a	61.26697	-151.93033	West Foreland	Middle to Late Eocene	high
09DL030-1.8a	61.26697	-151.93033	West Foreland	Late Eocene	high
09DL033-0-1.5a	61.35918	-151.90815	Tyonek	Late Eocene	high
09DL033-15.7a	61.35918	-151.90815	Tyonek	Late Eocene	high
09JRM100-1	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-1.5	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-10	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-11.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-12.55	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-15.1	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-15.2	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-2	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-20.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-23.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-29.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-29.5	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-31.5	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-32.25	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-32.5	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-33.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-35.0	61.12353	-151.3096	Beluga	Late Miocene	high
09JRM100-38.0	61.12353	-151.3096	Beluga	Late Miocene	medium
09JRM100-40.7	61.12356	-151.30971	Beluga	Late Miocene	moderate
09JRM100-43	61.12356	-151.30971	Beluga	Late Miocene	moderate
09JRM100-46	61.12356	-151.30971	Beluga	Late Miocene	moderate
09JRM100-47	61.12356	-151.30971	Beluga	Late Miocene	moderate

Sample	Latitude	Longitude	Geologic_Formation	Geologic_Age	Confidence_Level
09JRM100-5	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-5.5	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-6	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-6.5	61.12356	-151.30971	Beluga	early Late Miocene	high
09JRM100-7	61.12356	-151.30971	Beluga	early Late Miocene	high
09MAW302a	61.2877	-151.53159	Hemlock/Tyonek?	Early Miocene - Late Oligocene	medium
09MAW303a	61.29188	-151.52861	Hemlock/Tyonek?	Early Miocene - Late Oligocene	medium
09MAW306	61.29413	-151.52089	Hemlock/Tyonek?	Early Miocene - Late Oligocene	low
09MAW308a	61.28328	-151.60304	Hemlock/Tyonek?	Early Miocene	moderate
09MAW312a	61.28196	-151.59036	Hemlock/Tyonek?	Early Miocene - Late Oligocene, possibly Middle Eocene	low-medium
09MAW319a	61.27144	-151.46733	West Foreland	Middle Eocene	high
09MAW321a	61.28325	-151.42183	West Foreland	Middle Eocene	low
09MAW324a	61.32767	-151.4209	Hemlock	Late Oligocene	low-medium
09MAW330a	61.26768	-151.56367	Hemlock/Tyonek?	Late Oligocene	low-medium
09MAW345a	61.20785	-151.562	Tyonek	late Middle Miocene	high
09MAW346a	61.20784	-151.56561	Tyonek	late Middle Miocene	high
09MAW347a	61.20948	-151.56361	Tyonek	late Middle Miocene	high
09MAW359a	61.22662	-151.59159	West Foreland	Middle Eocene	moderate-high
09MAW360a	61.22841	-151.59436	West Foreland	Oligocene to Middle Eocene	moderate
09PD245b	61.28949	-151.79686	Tyonek	early Late Miocene-late Middle Miocene	moderate
09PD248b	61.27774	-151.71515	Tyonek	late Middle Miocene	high
09PD278a	61.22113	-151.53584	Hemlock/Tyonek?	Early (mid) Oligocene	moderate
09PD279a	61.22257	-151.53107	Hemlock/Tyonek?	Early (mid) Oligocene	moderate
09PD303a	61.28702	-151.31953	West Foreland	Middle Eocene	high
09PD308a	61.26453	-151.26039	Tyonek	Middle Miocene	high
09TMH-335B	61.30284	-151.82562	Hemlock/Tyonek?	early Middle Miocene	high
09TMH364b	61.20236	-151.66896	Hemlock/Tyonek?	Early Miocene	moderate
09TMH367a	61.19684	-151.65691	Hemlock/Tyonek?	Early Miocene	moderate
09TMH411	61.24491	-151.70836	Hemlock/Tyonek?	Middle Miocene	high
10BG-402A	61.31646	-151.76685	Tyonek	Middle Miocene	moderate-high
10BG-404A	61.26308	-151.24252	Tyonek	Middle Miocene	moderate-high
10BG-406A	61.15346	-151.51147	Tyonek	Middle Miocene	moderate-high
10BG-409A	61.26608	-151.26408	Hemlock?	Early Miocene	moderate
10BG-416A	61.27428	-151.26744	Tyonek	Middle Miocene	moderate-low
10BG-417A	61.27522	-151.27048	Hemlock?	Early Miocene-latest Oligocene?	moderate
10BG-425A	61.07438	-152.19998	Tyonek?	Middle Miocene	moderate-low
10BG-448A	61.10042	-152.1097	Tyonek?	Early Miocene	moderate
10BG-463A	61.22773	-151.22552	Tyonek	Middle Miocene	moderate-high
10BG-478A	61.78238	-151.42191	Sterling?	Middle Miocene	moderate
10DJM-102A	61.14694	-151.44104	Tyonek	early Late Miocene	moderate
10DJM-113A	61.22049	-151.1456	Sterling?	latest Miocene-Early Pliocene	moderate
10DJM-114A	61.03226	-151.30663	Beluga	early Late Miocene	moderate
10DJM-116B	61.03394	-151.30157	Beluga	latest Miocene	moderate
10DJM-62A	61.14941	-151.48997	Tyonek	Middle Miocene	moderate
10DJM-72A	61.24105	-151.23723	Tyonek	Middle Miocene	moderate
10DJM-74A	61.23261	-151.21729	Beluga?	Middle Miocene	moderate
10DJM-96A	61.11749	-151.28677	Beluga	early Late Miocene	moderate
10DL-040A	61.30844	-151.8237	Hemlock?	early Middle Miocene	moderate
10DL-040B	61.30844	-151.8237	Hemlock?	early Middle Miocene	high
10DL-040C	61.30844	-151.8237	Hemlock?	early Middle Miocene	high
10DL-043E	61.2095	-151.56357	Hemlock?	early Middle Miocene	low-moderate
10TMH-227A	61.22345	-151.2057	Beluga?	latest Miocene	moderate-high
10TMH-230A	61.23698	-151.23288	Beluga?	latest Miocene	moderate-high
10TMH-234A	61.23576	-151.23547	Beluga?	Middle Miocene	moderate-high
10TMH-238B	61.23412	-151.24075	Beluga?	latest Miocene	moderate-high
10TMH-245B	61.30422	-151.28571	Tyonek?	Middle Miocene	moderate-high
10TMH-248A	61.13046	-151.39043	Tyonek	Late Miocene	low-moderate
10TMH-250A	61.11292	-151.33788	Beluga	early Late Miocene	moderate
10TMH-251A	61.11618	-151.32272	Beluga	Middle Miocene	moderate-high
10TMH-253A	61.11871	-151.30269	Beluga	Middle Miocene	moderate-high
10TMH-256A	61.10861	-151.24725	Beluga	Middle Miocene	moderate-high
10TMH-257E	61.11695	-151.34256	Tyonek?	Middle Miocene	moderate-low
10TMH-265A	61.10003	-152.13268	Tyonek	Middle Miocene	moderate-high
10TMH-270A	61.30535	-151.82275	Tyonek	Middle Miocene	moderate-high

Sample	Latitude	Longitude	Geologic_Formation	Geologic_Age	Confidence_Level
10TMH-271B	61.30762	-151.8226	Tyonek?	early Middle Miocene	high
10TMH-272A	61.30914	-151.82076	Tyonek?	early Middle Miocene	high
10TMH-273A	61.09037	-152.14404	Tyonek	Middle Miocene	moderate-high
10TMH-274A	61.0884	-152.14334	Tyonek	early Late Miocene	low
10TMH-276B	61.12384	-152.03677	Tyonek	Middle Miocene	moderate-high
10TMH-282A	61.26455	-151.26038	Tyonek	Middle Miocene	moderate-high
BG1-26.3	59.968180	-151.135070	Beluga	Late Miocene, Late Homerian	not assigned
BG1-35.7	59.968180	-151.135070	Beluga	Late Miocene, Late Homerian	not assigned
BG1-5.1	59.968180	-151.135070	Beluga	Late Miocene, Late Homerian	not assigned
BG1-8.1	59.968180	-151.135070	Beluga	Late Miocene, Late Homerian	not assigned
ST1-15.4	60.240640	-151.398480	Sterling	E. Pliocene, E. Clamgulchian	not assigned
ST1-27.7	60.240640	-151.398480	Sterling	E. Pliocene, E. Clamgulchian	not assigned
ST1-74.5	60.240640	-151.398480	Sterling	E. Pliocene, E. Clamgulchian	not assigned
ST1-79.9	60.240640	-151.398480	Sterling	E. Pliocene, E. Clamgulchian	not assigned
TY1-15.8	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY1-21	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY1-26	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY1-32	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY1-4.5	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY1-9.5	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY2-10.8	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY2-12.5	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY2-17	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY2-3.0	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY2-4.8	59.469360	-151.690980	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY3-12.2	59.472720	-151.674270	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY3-2.0	59.472720	-151.674270	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY33-5.5	59.472720	-151.674270	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY4-10.3	59.471780	-151.682620	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY4-2.1	59.471780	-151.682620	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY4-2.9	59.471780	-151.682620	Tyonek	Mid Miocene, Late Seldovian	not assigned
TY4-6	59.471780	-151.682620	Tyonek	Mid Miocene, Late Seldovian	not assigned
ST3-87	60.183730	-151.465910	Sterling	Pleistocene/Late Pliocene, U. Clamgulchian or above	low
ST4-38	60.083530	-151.628860	Sterling	Pliocene, Clamgulchian	medium
ST5-7	60.079140	-151.633730	Sterling	Pliocene, Clamgulchian	medium