Environment and Climate Change Canada
Environnement et Changement climatique Canada

Seasonal Summary

North American Arctic Waters

Summer 2021

By the Canadian Ice Service

Canada

Summary over North American Arctic Waters

At the beginning of June all regions experienced ice breakup or melt; however, the region that had a head start was the Hudson Bay area. The pump was primed for the Hudson Bay region as it experienced the mildest conditions during the previous wintertime thereby setting up an early onset of melting despite cooler than normal temperatures during parts of the summer.

By the beginning of July, the Hudson Bay region was still experiencing greater than normal ice melt; however, a few regions were having greater than normal ice concentration. In particular, the area in the northeastern part of Hudson Bay as well as the southwestern coastal region of Hudson Bay where persistent northwesterly winds were causing these conditions. Meanwhile, greater than normal ice melt was prevalent in the Eastern Arctic, notably the western part of Lancaster Sound and all of Barrow Strait where ice concentration were significantly below normal. This, in part, was do to a lack of fast ice in the area; the ice had a chance to drift eastwards several weeks earlier than normal. Ice melt in the Western Arctic region was still emerging, as was usually the case at that time of year. However, there was a broad area of greater than normal ice concentration in the southeastern part of the Beaufort Sea as well as the western part of Amundsen Gulf. That signature continued throughout the month of July and, in fact, increased in terms of greater than normal ice concentration. This scenario caused issues for shipping. In other areas along the western Northwest Passage, the usual areas of break-up or melt were mostly ahead of the normal for the month of July except in Coronation Gulf where melt was slower than normal.

At the start of August, the last of the ice in southwestern Hudson Bay melted earlier than normal. Davis Strait also saw the ice disappear sooner than usual. For the most part, the Eastern Arctic region continued to experience greater than normal ice melt at the beginning of August. In particular, parts of the coastal areas of eastern Baffin Island, all of Jones Sound, parts of Norwegian Bay and most of Prince Regent Inlet. However, there were some signs of slower than normal ice melt in some areas at the beginning of the month. An overall slower than normal ice melt was observed in Foxe Basin due to cooler than normal temperatures, while western Lancaster Sound and parts of Barrow Strait were exhibiting less than normal ice melt. The Barrow/Lancaster area had cleared earlier than normal thereby providing an area for fractured fast ice farther west to drift into this region. The greater than normal ice concentration in the southeastern part of the Beaufort Sea continued into early August. In fact, this unusual presence of ice extended into the south-central part of Amundsen Gulf. Meanwhile, ice lingered longer than normal in Coronation Gulf as well as the southern part of Queen Maud Gulf. More ice than usual was also flowing southwards through Prince of Wales Strait. The southwestern part of the Beaufort Sea, north of the Alaskan Coast, had less than normal ice concentration.

By the beginning of September, all of the Hudson Bay area was free of ice while the Foxe Basin region still had notable areas of greater than normal ice concentration. Davis Strait and Baffin Bay were bergy water. Less ice than normal ice was drifting southwards through Nares Strait. Norwegian Bay experienced below normal ice concentration during most of the month. At the same time, Eureka Sound was mainly bergy water. However, the Lancaster Sound and Barrow Strait continued to experience greater than normal ice concentration. In fact, the ice from southwestern Lancaster Sound had drifted into northern and southwestern Prince Regent Inlet causing this area to have greater than normal ice. As for the rest of Prince Regent Inlet as well a good part of Gulf of Boothia, these areas had less than normal ice concentration. The coastal area of Committee Bay as well as the entrance and northern parts of Pelly Bay started to manifest greater than normal ice. The greater than normal ice concentration from Barrow Strait had also drifted into the extreme northern portion of Peel Sound while the rest of the sound remained mostly bergy water. However, once in Larsen Sound and Victoria Strait, a significant portion of the area had greater than normal ice concentration. Open water to ice free conditions prevailed in Queen Maud, Coronation Gulf and the eastern Amundsen Gulf yet once in western part of Amundsen Gulf the area continued to experience greater than normal ice concentration. The southeastern part of the Beaufort Sea continued to have greater than normal ice concentration. In fact, close to very close pack thick first-year ice with some old ice was covering the areas from southwestern Banks Island to Ballie Island thereby hampering east-west shipping. Meanwhile, the shipping zone along the coast from the Tuktoyaktuk Peninsula to the western Alaskan coast was mostly open water while farther north, less than normal ice concentration was observed. The M'Clure Strait and Viscount Melville Sound had the usual very close pack old ice; however, the ice pack had shifted northwards thereby causing the northern parts of these areas to have greater than normal ice concentration while the southern section had less.

By the end of September, all of Hudson Bay and most of Foxe were ice free while Hudson Strait, Davis Strait and most of Baffin Bay had bergy water. The usual ice cover in Nares Strait had extended into the extreme northwestern part of Baffin Bay. Jones Sound was experiencing slightly less than normal ice concentration. Norwegian Bay also had less than ice than normal despite having new and grey ice forming around the floes. Eureka Sound was progressing close to normal in terms of ice coverage as new and grey ice began to appear around the open drift old and thick first-year ice. One of the major themes of this season was the greater than normal ice concentration in Barrow Strait and Lancaster Sound. At the end of September, this trend was still present. Favorable winds continued to push the ice eastwards and reached the northern coast of Bylot Island by the end of the month. Some new ice also appeared, mostly around the floes of old and thick first-year ice.

Overall, the weekly ice coverage spread versus the median remained consistent until mid-June (the spread never went higher than about 4%) however, afterwards the spread increased to 6% or greater for the next 4 weeks (see Figure 1: Weekly Ice Coverage for the Northern Canadian Waters – 2021 Season). This coincided with the rapid decrease in ice concentration over the Hudson Bay area. However, passed the midway point of July, the contribution of the decrease in ice

concentration from the Hudson Bay area became marginal hence, the spread began to decrease for the Northern Canadian Waters.

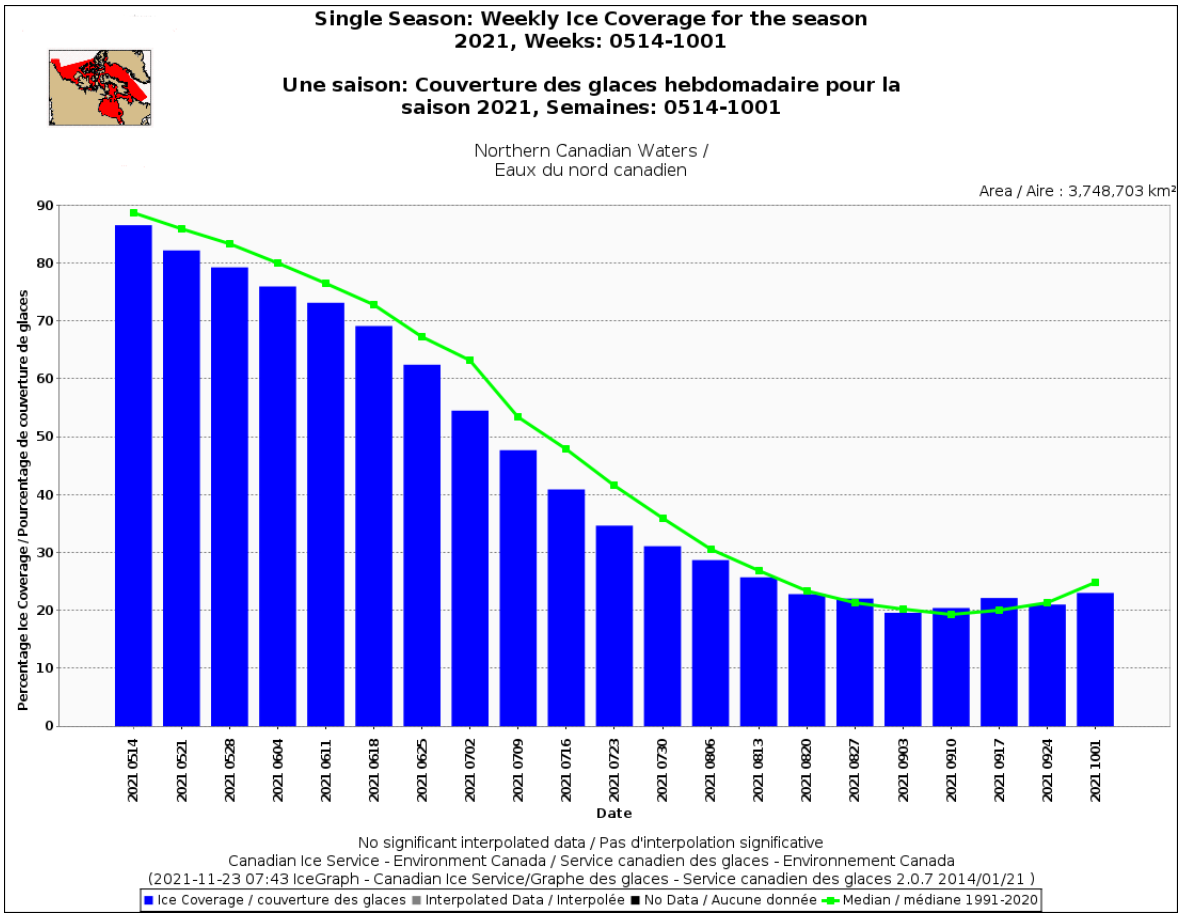

Figure 1: Weekly Ice Coverage for the Northern Canadian Waters – 2021 Season

As stated above, the biggest and earliest ice melt was over Hudson Bay. During the first week of June, the Hudson Bay region was already about 12% below the median. The spread between the

median and the actual ice coverage persisted until the second week of July (see Figure 2: Weekly Ice Coverage for the Hudson Bay region – 2021 Season).

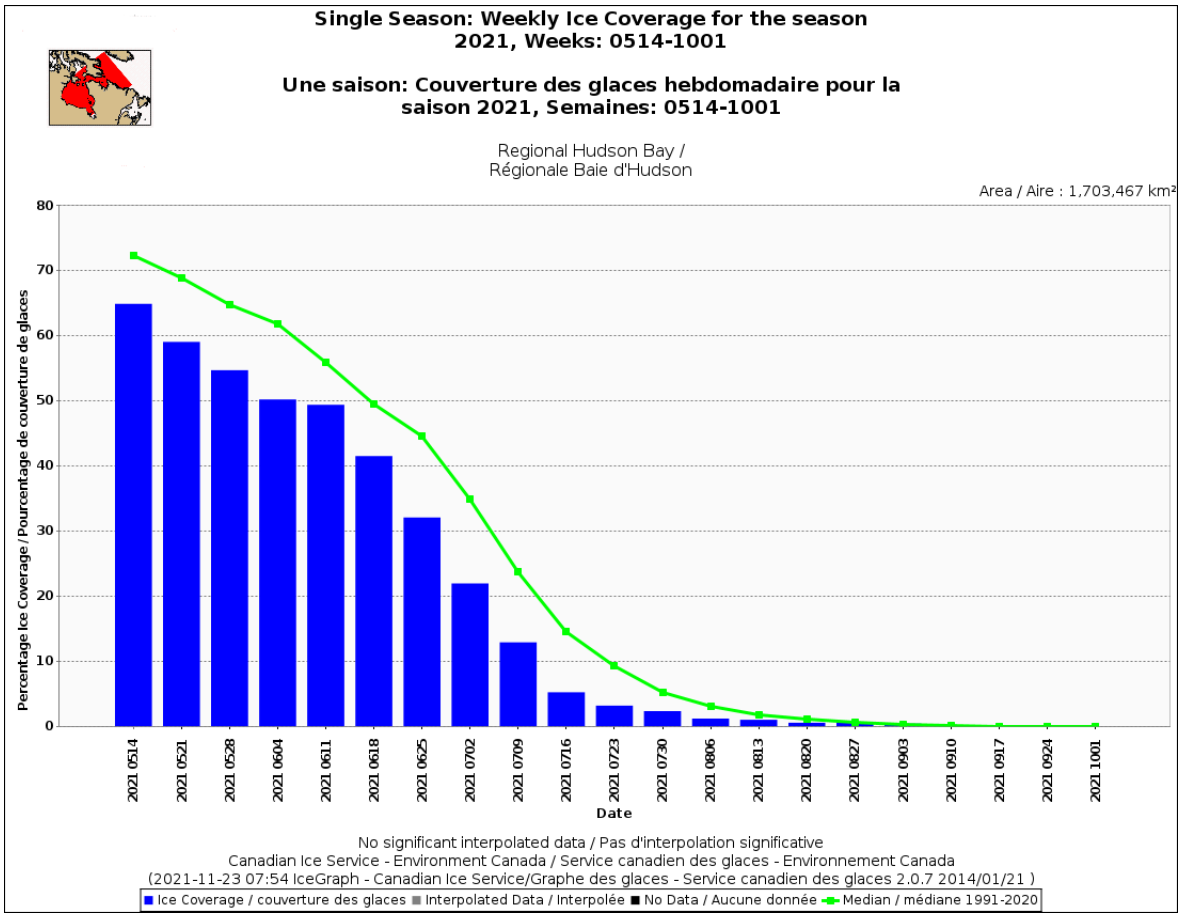

Figure 2: Weekly Ice Coverage for the Hudson Bay region – 2021 Season

As background information, the TAC (Total Accumulated ice Coverage) for this past season over the entire northern Canadian waters ranked 11th lowest. This year's TAC was slightly lower than last year's (see Figure 3: Historical Total Accumulated Ice Coverage for the weeks of 0514-1001).

- October 1st, 2021 – 44.9% vs 2020 – 45.5%

Since 2005, only three years where the TAC was above the median (48.2%).

- 2009 – 49.0%
- 2013 – 48.9%
- 2018 – 49.6%

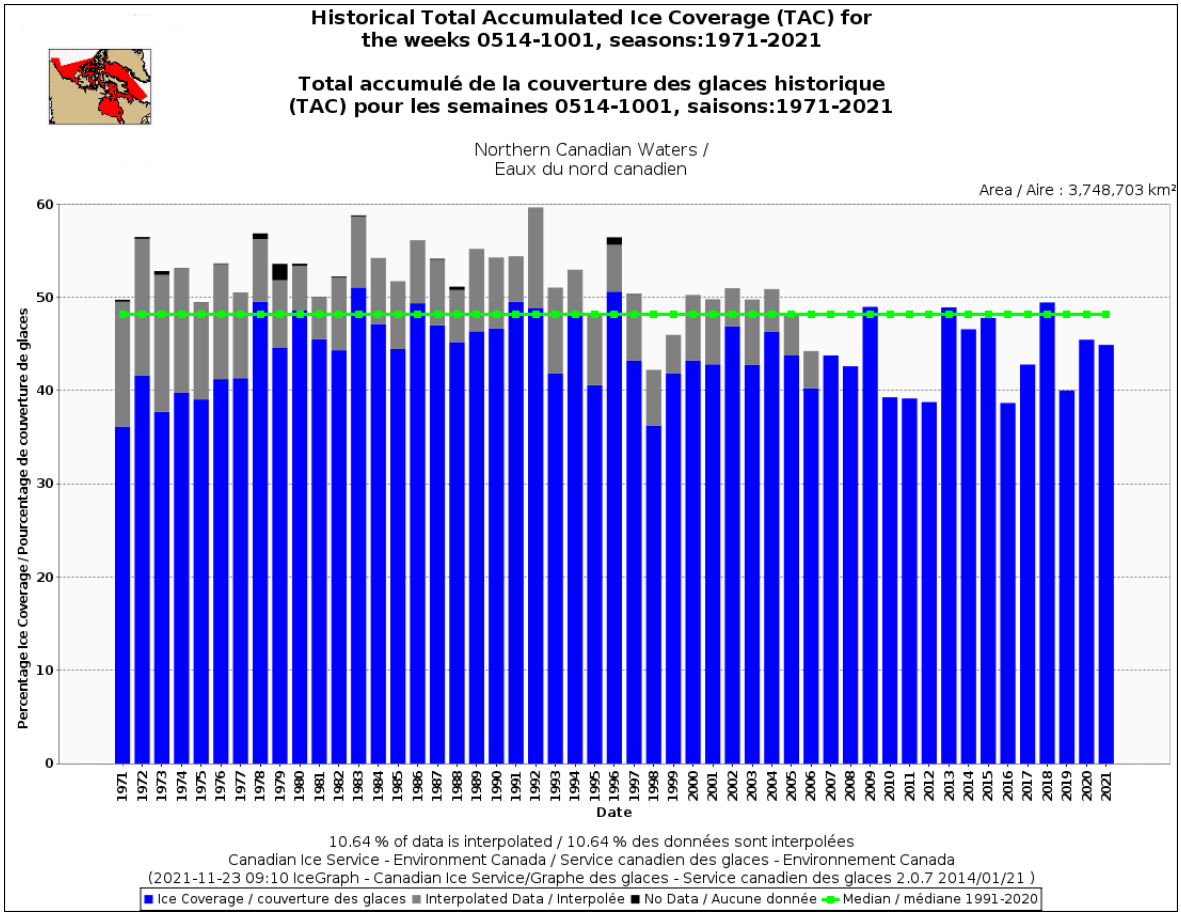

Figure 3: Historical Total Accumulated Ice Coverage for the weeks of 0514-1001 – Northern Canadian Waters

The melt season essentially ended during the first week of September, which was about one week earlier than normal. However, a period of warmth and moderate southerly winds invaded the central part of the Northern Canadian Waters area during the last days of September and early October thereby causing young ice melt and destruction.

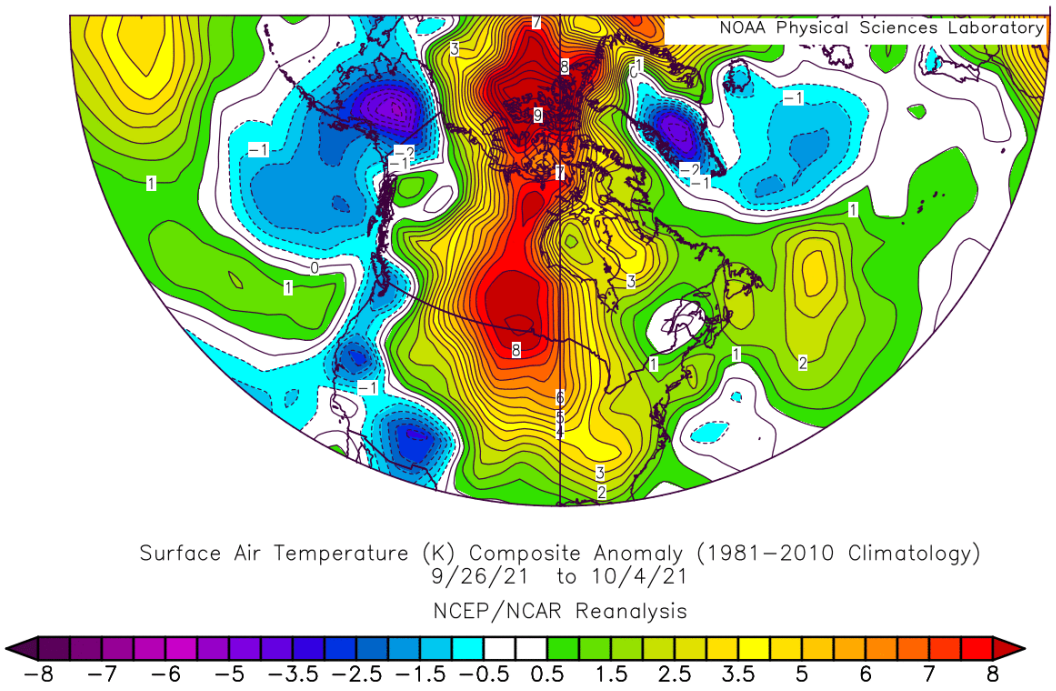

Figure 4: Departure from normal temperatures – September 26 to October 4th, 2021

Hudson Bay and the Labrador Coast

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

Surface air temperatures were near to below normal over most of the region except along the Labrador Coast where above normal temperatures were observed.

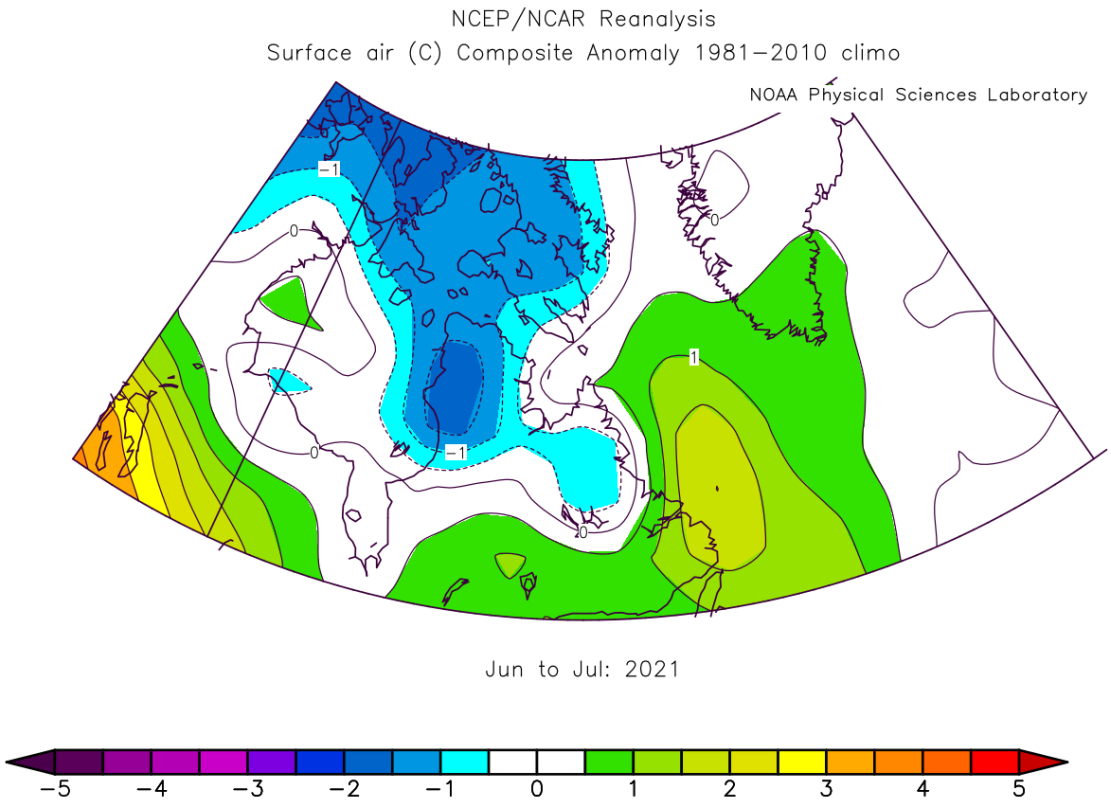

Figure 5: Air temperature anomaly for the Hudson Bay area from June and July 2021

Summary of Ice Conditions:

At the beginning of June, generalized ice melt was well underway over the entire area. Most of the ice along the coastal area of Hudson Bay, all of James Bay, parts of Hudson Strait and portions of Davis Strait and all of the coastal area of Labrador was already deteriorating. However, due to onshore winds in the northeastern part of Hudson Bay and southwestern Hudson Strait, ice pack concentrations increased due to compaction, delaying normal ice melt. Meanwhile, all of the Labrador Coast was bergy water during the last week of June, which was about 3 weeks earlier than normal.

By the first week of July, the general trend from June was still present. However, the greater than normal ice concentration along the northeastern Hudson Bay/southwestern Hudson Strait was more prominent (see Figure 6: Departure from normal ice concentration – July 5th, 2021). Eventually, warmer temperatures eroded this surplus of ice so that by the third week of July, the ice was gone from these areas. At the same time most of the northern part of Hudson Bay was open water to ice free while some ice still remained in the south. The Hudson Strait region had ice in the northwestern section with a few patches elsewhere. Otherwise, conditions were bergy water. As for Davis Strait, the southern section was bergy water while the north still had significant ice, particularly north of Cape Dyer. By the last week of July, most of Hudson Bay was open water to ice free except for a small patch of ice in the southwestern section. Hudson Strait was entirely bergy water as well as the Davis Strait area south of Cape Dyer. North of Cape Dyer still had ice with a few patches of above normal ice concentration along the coast. Finally, by the beginning of the second week of August, all the ice had melted in Hudson Bay while the Davis Strait ice was gone before mid-month. Occasional patches of ice from Foxe Channel drifted into western Hudson Strait from mid-August to early September. Otherwise, for the month of September, Hudson Bay and James Bay were ice free while Hudson Strait, Ungava Bay and Davis Strait were bergy water.

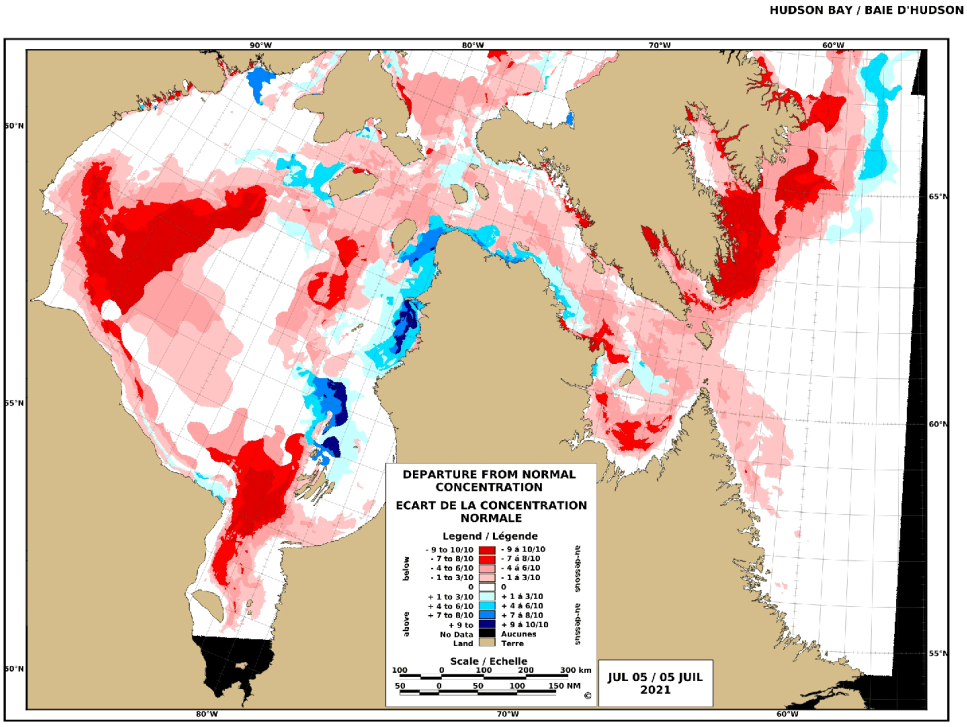

Figure 6: Departure from normal ice concentration – July 5th, 2021

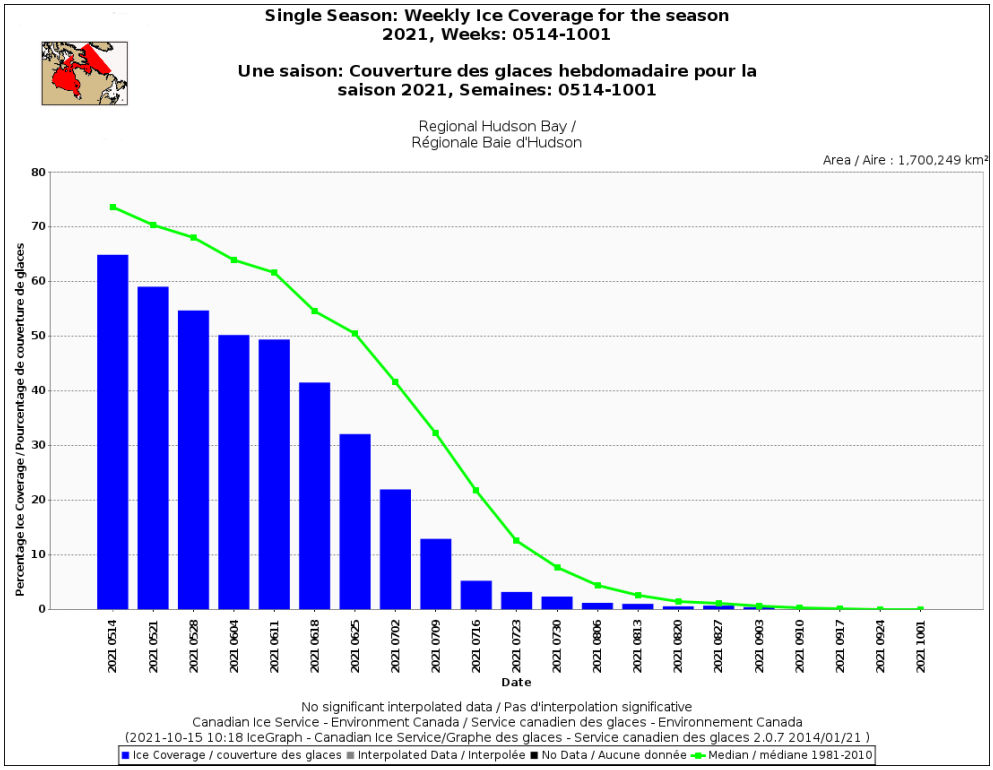

Figure 7: Weekly Ice Coverage for Hudson Bay region – May 14 to October 01, 2021

June Ice Conditions:

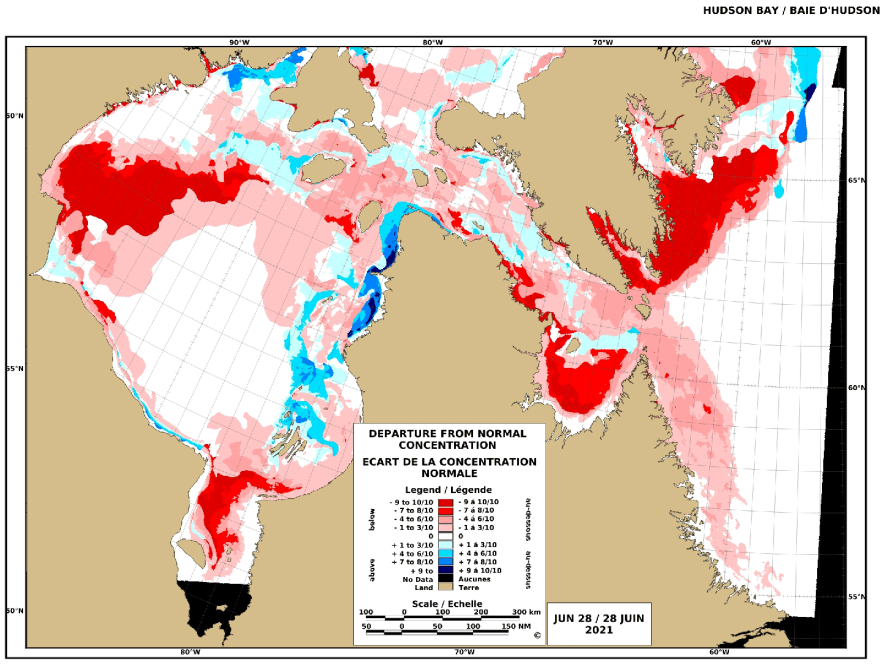

Figure 8: Departure from normal ice concentration for the Hudson Bay area on June 28th, 2021

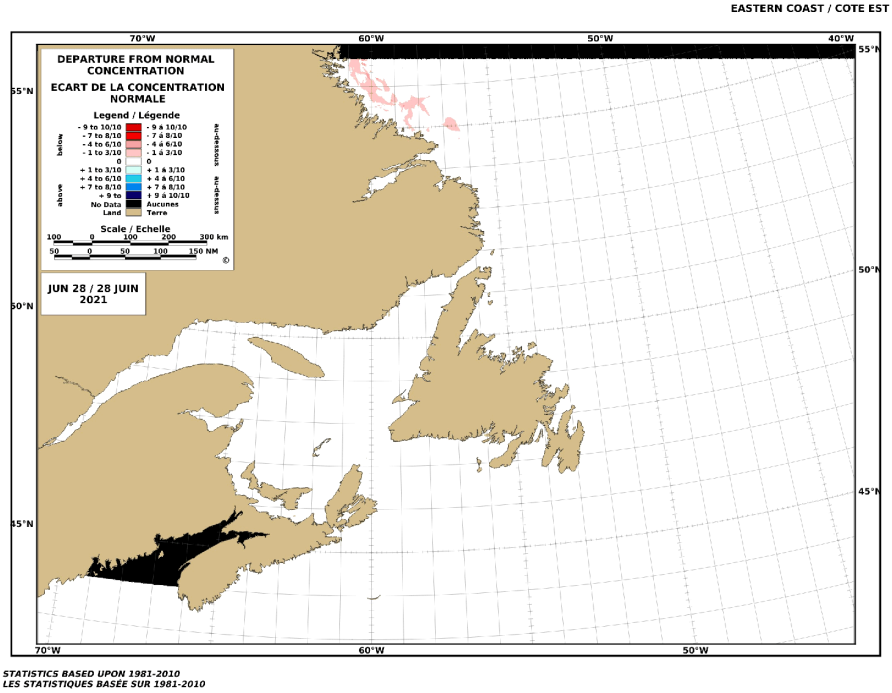

Figure 9: Departure from normal ice concentration for the East Coast on June 28th, 2021

At the beginning of June, only a narrow band of open drift to very close pack medium and thick first-year ice including a trace of old ice remained within 30 to 45 nautical miles of the Labrador Coast, north of the Groswater Bay. Soon after the first week of June, most of the ice had melted or was destroyed due to winds except for an area of very open drift to close pack conditions just north of Groswater Bay and within 60 nautical miles of the coast. Very open drift to close pack medium and thick first-year ice including a trace of old ice from the entrance to Hudson Strait edged into the extreme northern part of the Labrador coast area. This area of ice extended about 90 nautical miles from the coast. By mid-month, only a small patch of open drift medium first-year ice remained along the coast just north of Groswater Bay. Farther north, the area of mostly close pack medium and thick first-year ice including a trace of old ice from the entrance to Hudson Strait continued to drift south and was located within 90 nautical miles of the coast and north of 5830N. Elsewhere, bergy water. By the end of the third week, only very open drift medium and thick first-year ice including a trace of old ice was located within 60 nautical miles of the coast and north of 5950N. Elsewhere, bergy water prevailed. During the last week of the month, all the ice had melt to bergy water conditions.

Due to the early onset of warm weather, all of Lake Melville was already ice free at the beginning of June.

The area within 140 nautical miles of the Baffin Island coast in the western Davis Strait area was covered with mostly open drift to very close pack thick first-year ice including a trace of old ice except open to very open drift medium and thick first-year ice including a trace of old ice near the entrance to Cumberland Sound. By mid-month, close to very close pack thick first-year ice including a trace of old ice covered the area within 120 nautical miles of the coast of Baffin Island. The exception was the area south of the entrance to Cumberland Sound where open to very open drift medium and thick first-year ice including a trace of old ice was located within 90 nautical miles of the coast. By the end of June, most of the ice had melted south of the entrance to Cumberland Sound with only the area within 90 nautical miles of the Cumberland Sound where close to very close pack thick first-year ice including a trace of old ice prevailed.

During the first week of June, a southeasterly circulation over Cumberland Sound and Frobisher Bay drove some of the ice from southern Davis Strait into these areas. By the end of the first week, along the southern coast and northwestern section of Cumberland Sound was covered with very close pack medium and thick first-year ice including a trace of old ice while the rest of the sound had bergy water to very open drift thick first-year ice including a trace of old ice. Meanwhile, parts of the northeastern coast of Frobisher Bay was covered very close pack medium and thick first-year ice including a trace of old ice while the rest of the bay had very open drift medium and thick first-year ice including a trace of old ice. By mid-month, the northern part of Cumberland Sound was mainly bergy water while the southern coast was covered with very close pack medium and thick first-year ice. The rest of the sound had open to very open drift medium and thick first-year ice including a trace of old ice. At the same time, Frobisher Bay had a mix of bergy water and open drift medium and thick first-year ice including a trace of old ice. During the second half of the month, ice conditions continued to loosen due mostly to ice melt. By the end of the month of June, both Cumberland Sound and Frobisher Bay had mostly bergy

water with areas of open to very open drift medium and thick first-year ice mostly along the coast as the areas of fast ice continued to fracture during the last two week of June.

At the early part of June, Hudson Strait already had significant areas of bergy water in the northern section while the southern part was covered with very close pack medium and thick first-year ice except north of Ungava where open drift medium and thick first-year ice was present. By mid-month, the bergy water areas continued to expand and covered essentially the northern part of strait with some patches of very open drift medium and thick first-year ice, mostly originating from the fast ice fracturing in the northwestern section. The south continued to be covered with very close pack medium and thick first-year ice. Patches of very open drift medium and thick first-year ice including a trace of old ice in the extreme northeastern section, drifting in from southwestern Davis Strait. A shift in wind direction caused the ice in the southern section to disperse northwards and decrease in concentration. The area of bergy water in the northern section also shrunk. By the end of the month, narrow areas of bergy water remained along the northern coast while emerging along the southern coast. The balance of the strait had a mix of open to very open drift medium and thick first-year ice with a few patches of close pack ice.

The coastal area of Ungava began to clear quickly during the first week of June. The southwestern part of the bay was mostly bergy water with a few patches of very open drift medium first-year ice. Very close pack medium and thick first-year ice covered the northwestern section and the coastal areas in the eastern section while the rest of the northeastern section had mostly open to very open drift medium and thick first-year ice. By mid-month, the bergy water area covered the southern part of Ungava Bay while the northwestern section continued to experience very close pack medium and thick first-year ice and the northeast was somewhat looser with close pack medium and thick first-year ice. The ice shifted a bit and dispersed during the third week of June due to a weak southeasterly circulation. The southeastern section was a mix of very open drift medium and thick first-year ice with some bergy water, mostly along the coast. Meanwhile, the northwest had close to very close pack medium and thick first year ice. By the end of the month, a significant amount of ice had melted or drifted out of the bay. The southern two thirds of the bay was bergy water while the north had open drift to close pack medium and thick first-year ice.

The northwestern part of Hudson Bay already showed signs of clearing as a narrow band of open water was already established along the coast or fast ice edge during the first week of June. At the same time, larger than normal open water areas emerged in James Bay and the southeastern part of Hudson Bay. Somewhat looser than normal ice concentration were present in the northeastern part of the bay while the rest of the bay remained very close pack medium and thick first-year ice. Looser ice conditions began to appear in the pack ice in the northwestern section during the second week while some of the fast ice areas along the coast fractured causing the open water to experience some areas of open to very open drift medium and thick first-year ice. The open water areas in James Bay and the southeastern part of Hudson Bay continued to expand while looser ice conditions bordered these open water areas. By the last week of June, a northwesterly circulation caused the open water area along the northwestern coast to expand significantly. Conversely, the ice concentration along the northeastern coast remained high due to onshore winds over the area. By the end of the month, the open water

was between 120 to 150 nautical miles from the northwestern coast with close pack thick first-year ice farther south. Areas of very open drift thick first-year ice appeared in the open water as the shore fast ice was fracturing. Looser conditions of open drift medium and thick first year ice with some open water patches were present along the coast in the southwestern section. Almost all the ice in James Bay had melted or drifted northward thereby leaving mostly open water with a small patch of open drift medium and thick first-year ice north of Akimiski Island. The coastal zone from south of Inukjuak to the northeastern entrance to James Bay was open water. Close to very close pack medium and thick first-year ice covered the remainder of southern and all of central Hudson Bay as well as the coastal zone from north of Inukjuak to the northwestern tip of Quebec. This last zone of ice along the coast in the northeast was unusual where normally there should be areas of open drift to close pack ice.

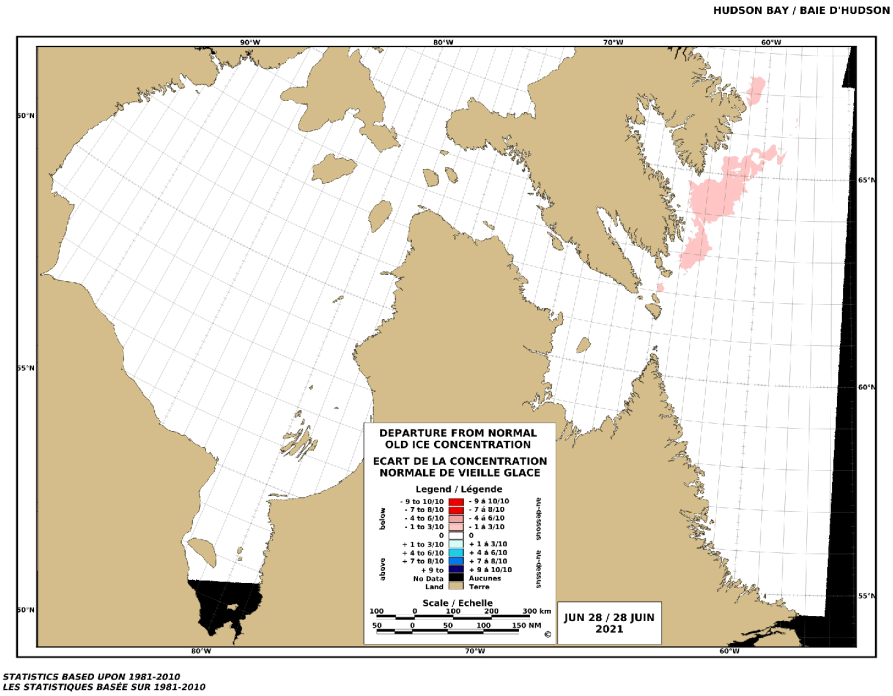

Figure 10: Departure from normal old ice concentration for Hudson Bay on June 28th, 2021

July Ice Conditions:

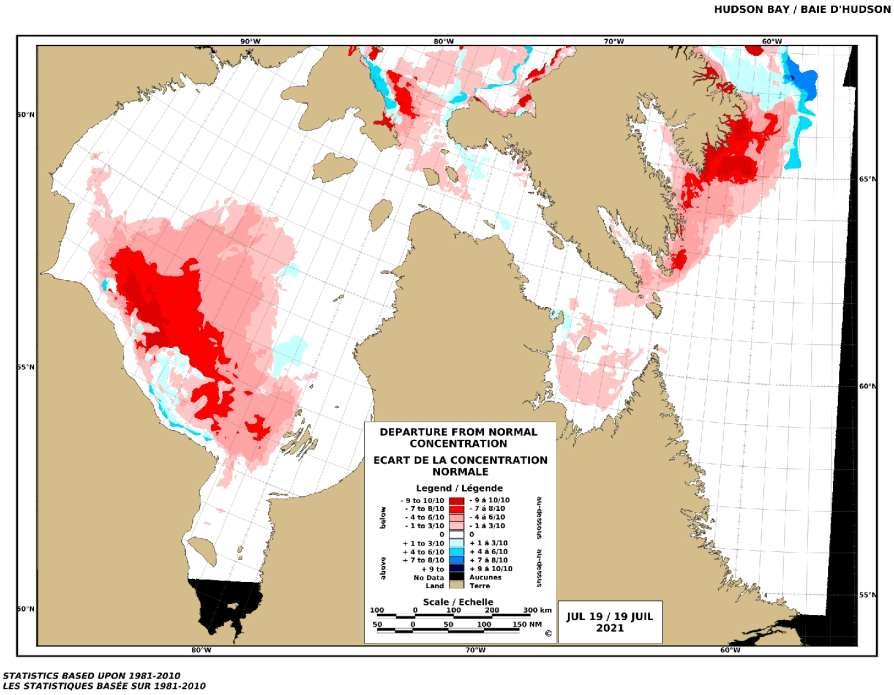

Figure 11: Departure from normal ice concentration for the Hudson Bay area after mid-July 2021

The entire Labrador coast as well as the southern part of Davis Strait remained bergy water. The ice located from east of the entrance to Cumberland Sound northwards expanded eastwards during the first week of July due to offshore winds. Open to very open drift thick first-year ice with areas of bergy water within 140 nautical miles from the Cumberland Peninsula. North of Cape Dyer, ice concentrations remained very close pack with medium and thick first-year ice including a trace of old ice. Not much changed during the second week except for looser ice conditions along the coast north of Cape Dyer with a few small areas of bergy water. By the end of the third week, all ice south of Cape Dyer had melted while the ice to the north loosened to close to very close pack within about 120 to 140 nautical miles of the coast. By the end of the month, some very open drift thick first-year ice including a trace of old ice from north of Cape Dyer drifted southwestward along the Cumberland Peninsula coast, mostly in the northern section. North of Cape Dyer, a mix of very open to close pack thick first-year ice including a trace of old ice within 100 nautical miles of the coast.

By the end of the first week of July, all the drifting ice in Cumberland Sound had melted with only the fast thick first-year ice along parts of the coast. Ultimately, all the fast ice had melted by end of the third week. For the remainder of the month, conditions remained bergy water throughout the sound.

A patch of open to very open drift medium first-year ice remained in the extreme northwestern part of Frobisher Bay during the first week of July; however, soon after, all the ice had melted to bergy water conditions for the balance of the month.

During the first week of July in Hudson Strait, the ice in most of the eastern section as well as northwest had either melted or drifted to the south. By the end of that first week, the southwestern section as well as the coastal area west of Ungava Bay, a mix of open to very open drift medium and thick first-year ice covered the area with a few patches of very close pack medium and thick first-year ice. There was also a significant amount of fast thick first-year ice along most of the coast along the southwestern Baffin Island. A continued deterioration of the pack ice in the southwestern part of Hudson Strait as well as the fast ice along the southwestern coast of Baffin Island. At mid-month, a mix of very open to close pack rotten medium and thick first-year ice with some patches of bergy water in the southwest part of Hudson Strait. Most of the fast ice had fractured and melted along the southwestern coast of Baffin Island. By the end of the third week of July, all of the ice along the southwestern coast of Hudson Strait had melted. The only area where very open drift rotten medium first-year ice was left was around Salisbury Island and to the northwest towards the northern portion of Foxe Channel. Mid way through the last week of July, all the remaining ice had melted to bergy water conditions.

By the end of the first week of July, the northwestern part of Hudson Bay as well as the coastal area in the southeastern part of the bay including James Bay, mostly open water conditions prevailed except for some patches of fast ice along parts of the coast in northwestern Hudson Bay. The northeastern part of Hudson Bay had a mix of open water with open drift to close pack thick first-year ice. A few patches of very close pack thick first-year ice were also present, particularly along the coast in the northeastern section. The south-central section of the bay was covered with mostly open drift to close pack medium and thick first-year ice with large areas of very close pack medium and thick first-year ice, mostly in the middle of the area. A significant amount of ice deterioration and melt occurred during the second week so that by mid-month, most of the western part of the bay was open water to ice free. James Bay was ice free and the coastal area in southeastern Hudson Bay, south of Inukjuak, was open water. Within 30 nautical miles of the coast, north of Inukjuak, areas of open to very open drift rotten medium and thick first-year ice. Elsewhere in the bay, very open to close pack medium and thick first-year ice with a few patches of very close pack medium and thick first-year ice, mostly in the southeastern section. During the third week of July, the ice along the northeastern coast of Hudson Bay melted entirely to open water. By the end of the third week, only the south-central part of the bay, within 90 nautical miles of the southern shore, was covered with open drift to very close pack rotten medium and thick first-year ice. The northwestern part of the bay had mostly ice free conditions. The remaining ice in the south-central part of the bay continued to shrink so that by the end of July, only a patch of rotten open drift medium and thick first-year ice, within a 60 nautical mile radius, was left.

August Ice Conditions:

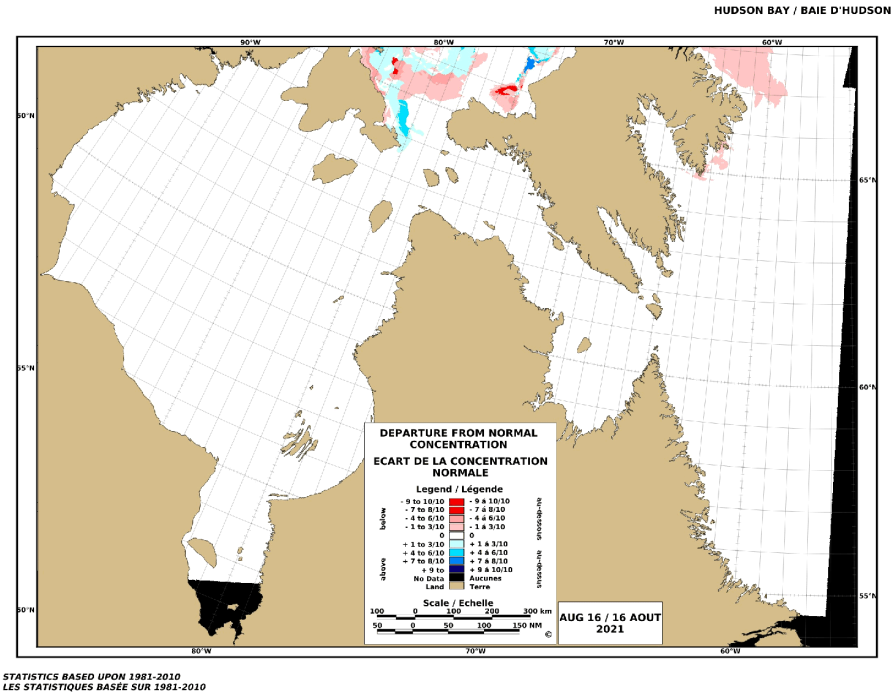

Figure 12: Departure from normal ice concentration for the Hudson Bay area near mid-August 2021

Labrador Coast, southern Davis Strait, Cumberland Sound, Frobisher Bay, Ungava Bay and Hudson Strait remained bergy water for the entire month of August.

The northern portion of Davis Strait experienced a significant decrease in ice extent during the first week of August. By the end of the first week, most of the ice was within 45 to 70 nautical miles from the coast, north of Cape Dyer. Generally, open to very open drift rotten thick first-year ice including a trace of old ice with some bergy water areas near the coast was present. By the end of the second week, all of the ice melted. Bergy water conditions prevailed for the balance of the month.

The northern and eastern part of Hudson Bay as well as James remained ice-free for the month.

The last patch of very open drift rotten thick first-year ice in the south-central part of Hudson Bay shrunk significantly during the first week of the month. This ice was gone entirely during the early part of the second week. The remainder of the month was ice free for south-central Hudson Bay.

September Ice Conditions:

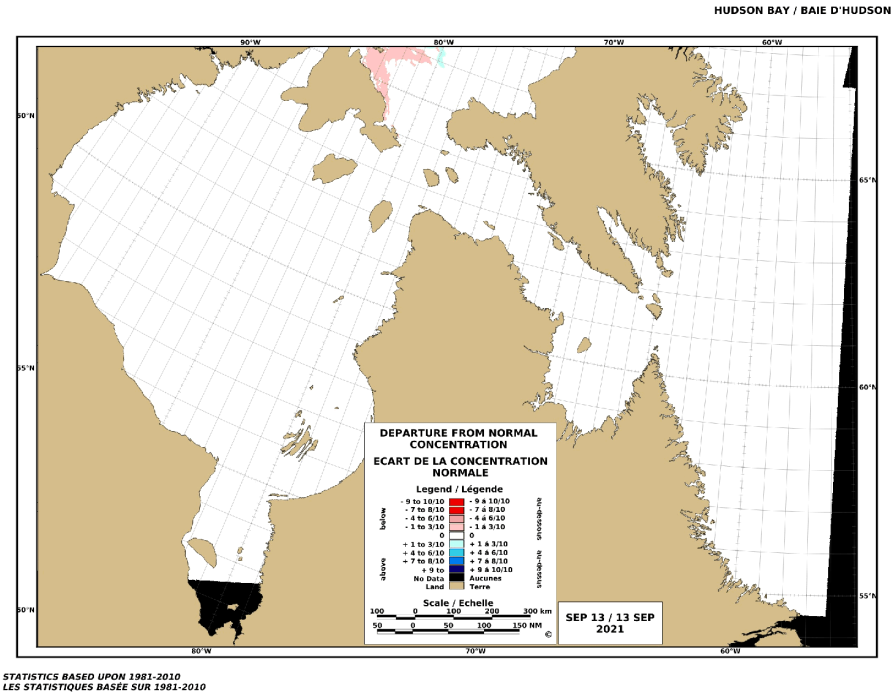

Figure 13: Departure from normal ice concentration for the Hudson Bay area near mid-September 2021

Generally bergy water to ice free conditions prevailed for the month of September over the Hudson Bay, Davis Strait and Labrador Coast region.

Eastern Arctic and Canadian Archipelago

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

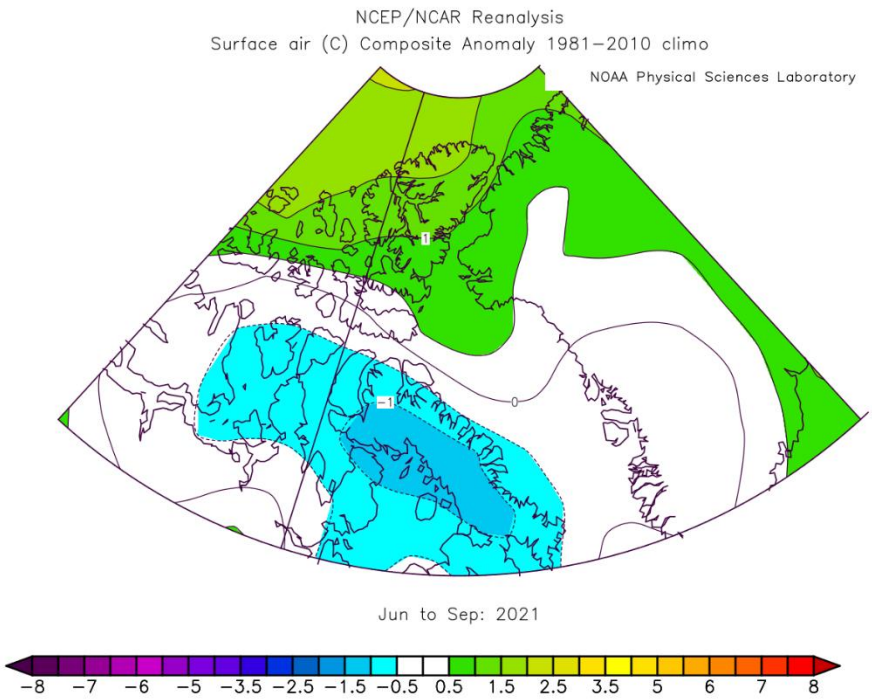

Figure 14: Air temperature anomaly for the Eastern Arctic area from June to September 2021

From June to September, surface air temperatures were above normal over Queen Elizabeth Island while the rest of the eastern Arctic region was near to slightly below normal.

Summary of Ice Conditions:

The start of the melt season was somewhat muted compared to previous years; however, clearing had already begun in the northern part of Baffin Bay by June 1st. Due to a lack of fast ice in western Lancaster Sound and most of Barrow Strait, clearing in this area was well ahead of normal. The ice was already drifting eastwards and out of those regions at the beginning of June. The eastern edge of the pack ice in Baffin Bay was also less than what should normally be expected for this time of year.

By mid-month, a significant area of bergy water was already established in southern Nares Strait into extreme northwestern Baffin Bay. A good part of Barrow Strait as well as portions of western Lancaster Sound and extreme northern Prince Regent Inlet also had bergy water; well in advance of the normal clearing pattern. Continued erosion along the eastern ice edge in Baffin Bay was still happening; however, the eastern part of Lancaster Sound as well as the

approaches to the sound had greater than normal ice concentration. Looser ice concentrations started to appear in the northern part of Baffin Bay, generally across the shipping route from near the western Greenland coast to the entrance to Lancaster Sound. However, a slightly greater than normal ice concentration was present in the northwestern part of Baffin Bay as well as portion of eastern Lancaster Sound. Jones Sound started to show signs of fracturing.

By the second week of July, a bergy water route was established across the northern portion of Baffin Bay. All of Lancaster Sound as well as a significant portion of Barrow Strait were generally bergy water or open water. General deterioration of the pack ice in Baffin Bay, particularly along the eastern edge, was still ahead of the normal pace. Clearing of northern Prince Regent Inlet was well underway; about two weeks earlier than normal. One of the few spots showing some signs of slower than normal clearing was the Foxe Basin region due to persistent cooler than normal temperatures over the region. The fast ice in Navy Board and Pond Inlets had also fractured during the second week of July, which was slightly earlier than normal. In addition, most of Jones Sound had fractured except for a narrow band across the eastern section. Eureka Sound began to show signs of fracturing.

During the third week of July, a significant change in wind direction and speed started pushing ice from western Barrow Strait into western Lancaster. Significant clearing occurred in both Admiralty Inlet as well as Navy Board and Pond Inlets during the same period. By the beginning of the last week, Admiralty Inlet was cleared to bergy water conditions while the ice in Navy Board and Pond Inlets took a little longer to melt; however, before the end of the month, bergy water prevailed. The southern part of Norwegian Bay had fractured during the same period while the entire length of Eureka Sound had mobile ice.

By the start of August, a narrow band of ice was present in the central part of Baffin Bay as well as along parts of the central section of the eastern Baffin Island coast. These ice conditions were generally less that what would normally be expected at that time of year except for a few patches of greater than normal ice concentration. Some ice from Nares Strait started to edge into the extreme northern portion of Baffin Bay. The ice in western Lancaster Sound continued to persist to the point where slightly greater than normal ice concentration started to emerge in this area. A similar situation developed in eastern Barrow Strait. Meanwhile, faster than normal clearing continued in most of Prince Regent Inlet as well as parts of the Gulf of Boothia region. The sign that ice melt in the Foxe Basin slowed relative to normal was becoming more evident at the start of August. Jones Sound cleared significantly by the time the calendar hit August. Mostly bergy water with some areas of ice remained at that time. Eureka Sound had significant portions that had bergy water.

By the middle of August, Baffin Bay was entirely bergy water except for some ice drifting south of Nares Strait into the extreme northwestern section of the bay. All of Jones Sound, most of Lancaster Sound, all of Prince Regent Inlet as well as the northern portion of the Gulf of Boothia were bergy water. The exception was the lingering ice in the extreme western part of Lancaster Sound as well as all of Barrow Strait. These regions experienced greater than normal ice concentration at that time of year. A similar phenomenon was also happening in parts of southern

Committee Bay as well as the entrance to Pelly Bay. Meanwhile, Foxe Basin continued its trend to greater than normal ice concentration during that point of the month.

By the beginning of September, bergy water prevailed in most of Baffin Bay except for a few patches of old ice from Nares Strait invading the extreme northwestern portion of the bay. Nares Strait also had less than normal ice concentration at the same time. Lancaster Sound continued to experience greater than normal ice concentration in the southwestern section while most of Barrow Strait saw the same effect. The same ice continued to drift into northern and southwestern Prince Regent Inlet and caused some issues near the eastern entrance to Bellot Strait. Most of the northern part of the Gulf of Boothia still had less than normal ice at the start of the month while the western entrance to Fury and Hecla Strait, southern Committee Bay as well as the area near the entrance to Pelly Bay contained more ice than normal. A significant amount of ice had melted in Foxe Basin; however, there where still areas in the bay that had more ice than normal; in particular the southwestern section and around Prince Charles Island. Jones Sound, for the most part, was bergy water except in the extreme northwestern section, just southeast of Hell Gate and Cardigan Strait where some old ice was present. Norwegian Bay was clearing faster than normal as well as portions of Eureka Sound to the point where some bergy water areas had emerged.

By mid-September, Baffin Bay was entirely bergy water while some patches of ice covered most of Nares Strait; however, higher concentration of old ice from the Lincoln Sea covered the coastal area in the northwestern section of the Strait. Most of Lancaster Sound was bergy water except in the extreme southwestern section where there was greater than normal ice concentration, particularly along the northern coast of Somerset Island, where very close pack old ice was present. The southern part of Barrow Strait was also experiencing greater than normal ice. Some patches of this ice also made to the northern part of Admiralty Inlet. The northern and western part of Prince Regent Inlet continued to have more ice than normal. Meanwhile, greater than normal ice concentration from eastern Gulf of Boothia had also crept up the coast into southeastern Prince Regent Inlet. The southeastern part of the Gulf of Boothia, Committee Bay and northern Pelly Bay also had more ice than normal. Ice from Hell Gate and Cardigan Strait continued to drift into western Jones Sound while the rest of the sound was bergy water. New ice began to appear around the drifting ice in Norwegian Bay and caused a few areas to have greater than normal ice concentration despite most of the bay having less. New ice also appeared in parts of Eureka Sound, which was earlier than normal.

By the end of September, some changes occurred in extreme northwestern Baffin Bay as more ice from Nares Strait combined with some new ice continued to edge into the area. Nares Strait was mostly covered with old ice with some grey and new ice between the floes. Jones Sound still had some patches of old ice; however, freeze-up was slower than normal. Lancaster Sound saw a significant expansion in terms of ice coverages as ice drifted eastwards and covered most of the sound. In fact, some of this ice drifted into the northern part of Admiralty Inlet. A good portion of Prince of Regent and Gulf of Boothia continued to have greater than normal ice concentration; however, ice finally cleared out of Pelly Bay. Furry and Hecla Strait experience somewhat greater than normal ice concentration that edged into the extreme northwestern part of Foxe Basin while the rest of the basin was open water to ice free. Norwegian Bay saw a net

import of significant amount of old ice; however, a looser than normal ice concentration was still observed due to mild temperatures and moderate southerly winds.

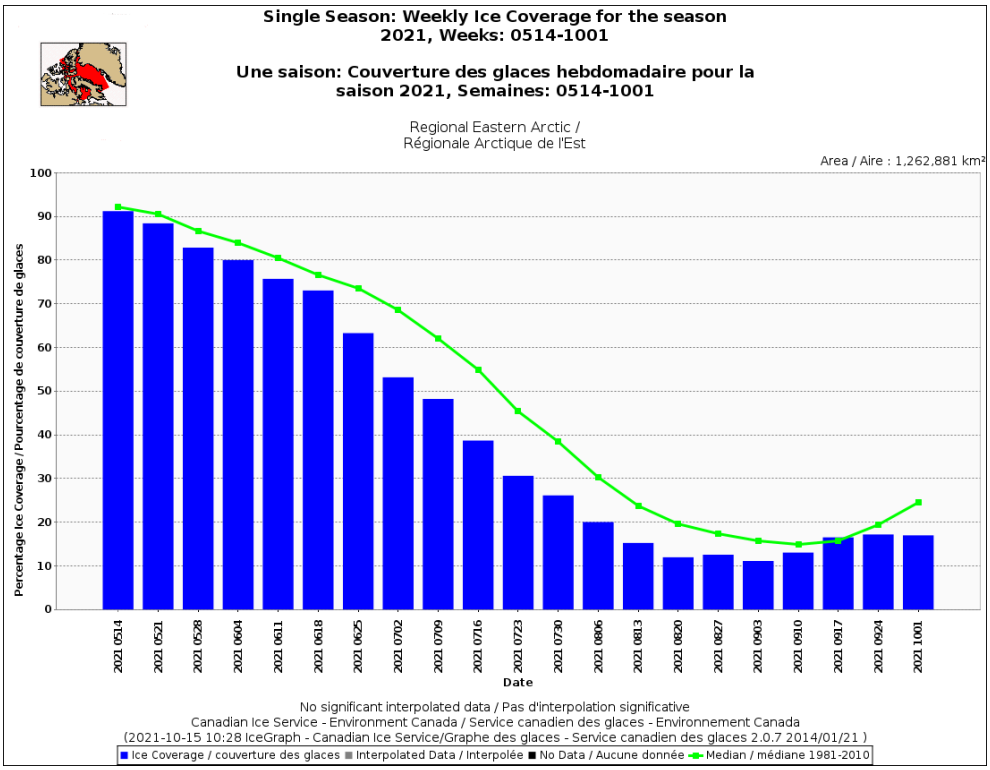

Figure 15: Weekly ice coverage for the Eastern Arctic area for the 2021 season

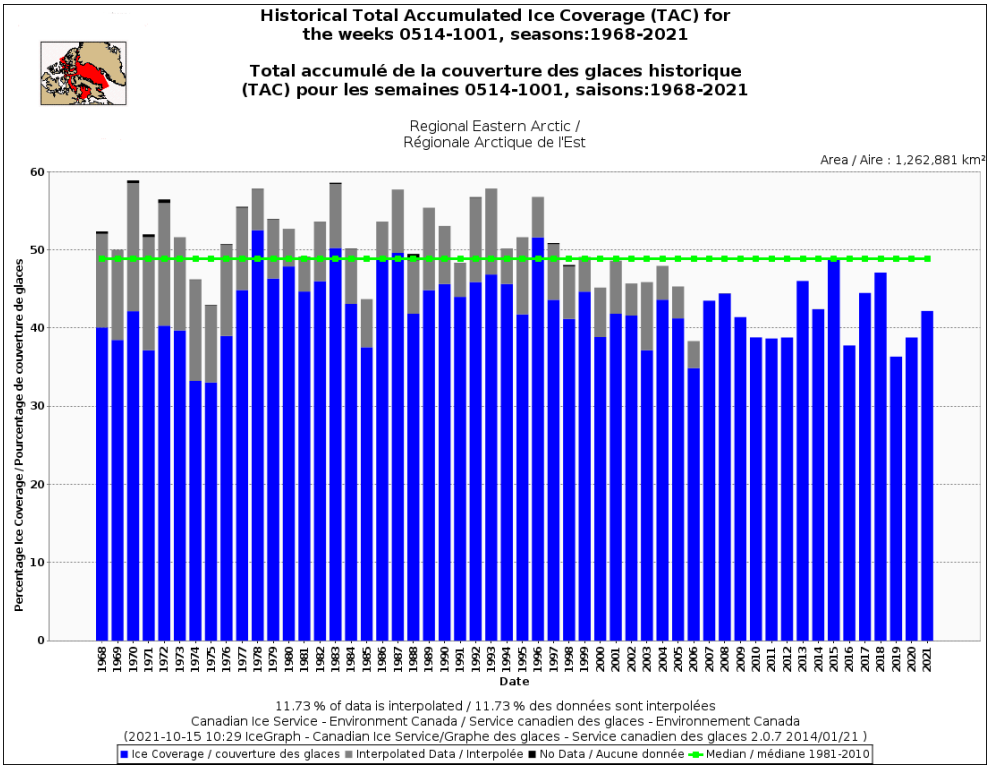

Figure 16: Historical Total Accumulated Ice Coverage for Eastern Arctic area (1968-2021)

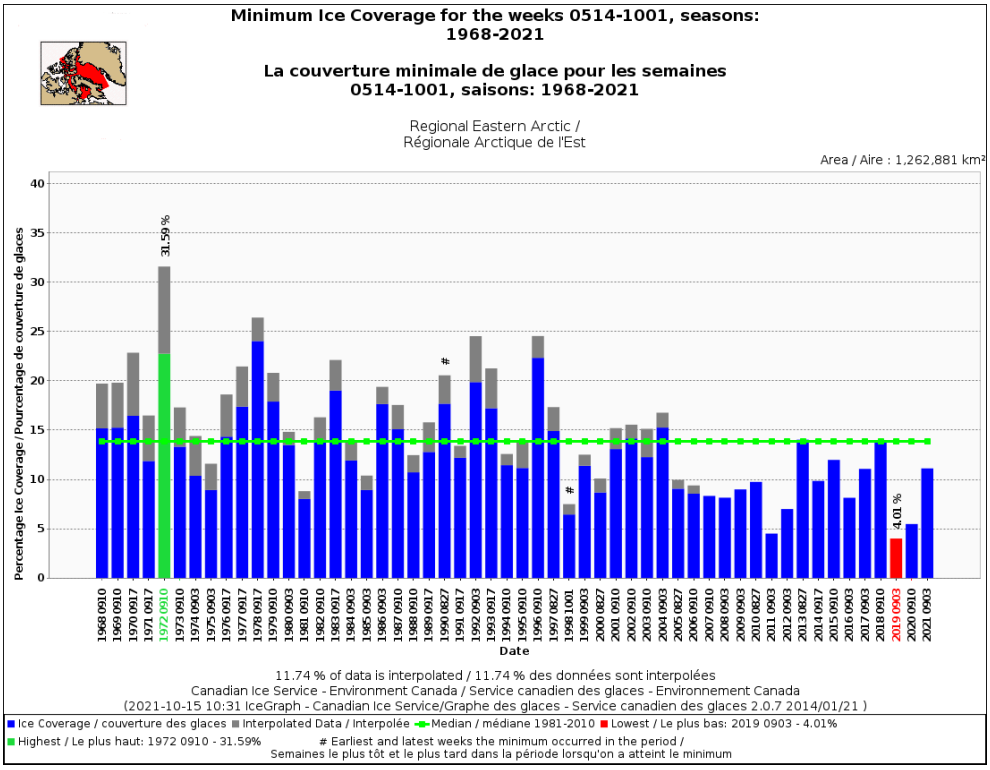

Figure 17: Minimum Ice Coverage for Eastern Arctic area (1968-2021)

June Ice Conditions:

The first week of June, bergy water areas with areas of very open drift to close pack medium and thick first-year ice including a trace of old ice in the extreme northwestern part of Baffin Bay while the rest of northern Baffin Bay was very close pack medium and thick first-year ice. A trace of old ice was mostly along the eastern coast of Baffin Island. By mid-month, a significant area of bergy water was established in the extreme northwestern Baffin Bay area. The areas south of Melville Bay of Greenland, looser ice conditions began to emerge. The rest of Baffin Bay still remained very close pack medium and thick first-year ice with a trace of old ice in the western part of the bay. The bergy water area along the western coast of Greenland crept up the coast and reached just south of 75ºN. Ice conditions in the northern part of Baffin Bay continued to loosen during the second half of June so that by the end of the month, mostly open drift to close pack medium and thick first-year ice covered the area. Bergy water was still present in the extreme northwestern part of the bay; however, there was a narrow band of very open drift thick first-year ice that had fractured from fast along the coast. Bergy water along the Greenland coast had crept up to 75º30'N. In the southern part of Baffin Bay, it was mostly very close pack medium and thick first-year ice including a trace of old ice except for an area of bergy water to close pack medium and thick first-year ice along the eastern Baffin Island coast.

The Lancaster Sound area was already showing signs of loosening at the beginning of June. At the end of the first week, mostly bergy water was present in the western section of the sound with some open drift to very close pack medium and thick first-year ice including a trace of old ice along the southwestern section. The rest of Lancaster Sound was mostly very close pack thick first-year ice including a trace of old ice with a large area of close pack near the eastern entrance. A general clearing continued during the second week so that by mid-month, a mix of bergy water with areas of very open drift thick first-year ice in the western section and part of the central section. Meanwhile, the eastern part was still mostly very close pack medium and thick first-year ice including a trace of old ice. By the end of the third week, bergy water with patches of very open drift thick first-year ice including a trace of old ice in the western half of the sound while the east was open to very open drift medium and thick first-year ice including a trace of old ice. By the end of the month, predominantly bergy water with bands of very open drift thick first-year ice over the entire Lancaster Sound area.

A mix of consolidated old and thick first-year ice was present in the northwestern and extreme western part of Barrow Strait at the beginning of June while the rest of the sound had significant bergy water conditions with bands of very close pack thin, medium and thick first-year ice including a trace of old, mostly along the southern section. Throughout the first part of June, the mobile ice continued to drift eastwards; only a few patches of open drift medium and thick first-year ice including a trace of old ice prevailed due to small areas of consolidated ice fracturing during the period. The same trend continued during the second half as mainly bergy water with areas of very open drift old and thick first-year ice covered the strait.

Pond, Navy Board and Admiralty Inlets remained consolidated with thick first-year ice during the entire month of June.

The northern part of Prince Regent Inlet started with very close pack thick first-year ice including a trace of old ice while the rest of the inlet was very close pack thick first-year ice. Looser ice conditions developed during the first half of June so that by mid-month, the extreme northern part was mainly bergy water. No significant change occurred over the remainder of the inlet. The bergy water area continued to spread southwards so that by the end of June, the northern part was almost entirely bergy water while the south was still covered with very close pack thick first-year ice.

No significant change occurred over the Gulf of Boothia area during June. Very close pack thick first-year ice prevailed with consolidated thick first-year ice covered parts of the coastal areas.

For the most part, Jones Sound remained covered with consolidated thick first-year ice including a trace of old ice during the month of June. The exceptions were the eastern entrance and the extreme northwestern sections where bergy water with very small patches of fractured consolidated ice drifting into these areas during the month.

The remainder of the Eastern Arctic remained covered with a mix of old and thick first-year ice for the month of June.

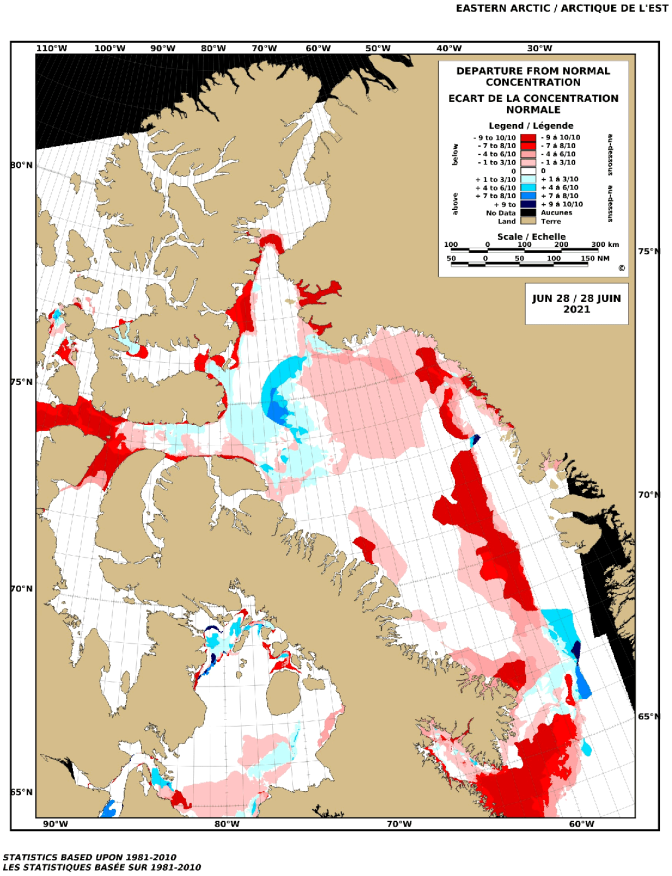

Figure 18: Departure from normal ice concentration for the Eastern Arctic area on June 28th, 2021

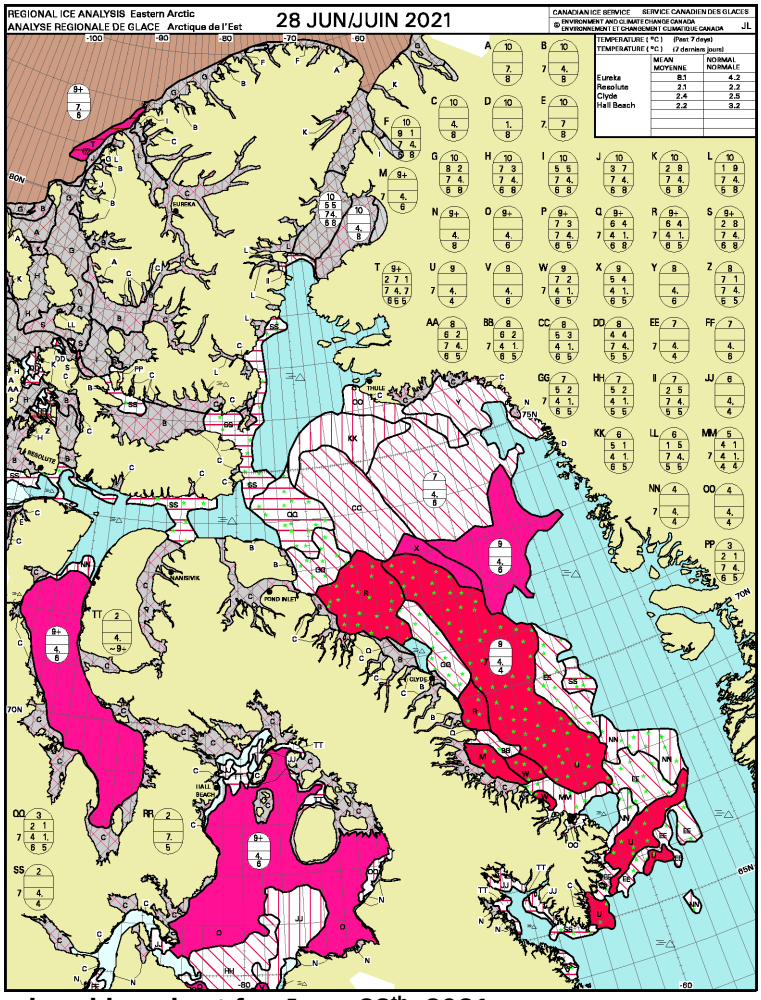

Figure 19: Eastern Regional ice chart for June 28th, 2021

July Ice Conditions:

The first week of July saw a narrow bergy water area develop in northwestern Baffin Bay towards the entrance to Lancaster Sound. Farther south, mostly very open drift to close pack thick first-year ice covered the west-central part of the bay while the areas along the western Greenland coast were bergy water. The southern part of the bay was very close pack thick and medium first-year ice including a trace of old ice. Near the middle part of July, the bergy water route across the northern part of Baffin Bay had widened to 60 nautical miles, just southwest of Melville Bay. The northwestern part of Baffin Bay was mostly bergy water with only small patches of very open drift medium and thick first-year ice along the eastern Devon Island coast. The rest of Baffin Bay was covered with open drift to very close pack medium and thick first-year ice. A trace of old ice was present in the western section. During the third week, the bergy water area from the northwestern part of Baffin Bay expanded in the southwestern section while the coastal area continued to have a mix of very open drift to very close pack thick first-year ice including a trace of old ice. All of the consolidated ice along the coast fractured during the same week. A broad band of very open to very close pack thick first-year ice in the central part of bay with a 60 nautical mile wide area of bergy water in the north, south of Melville Bay. By the end of the month, there was a band of very open drift to close pack thick first-year ice including a trace of old ice through the central part of Baffin Bay while the eastern, northern and western parts of the bay were mostly bergy water. The only area with open to very open drift thick first-year ice including a trace of old ice along the east coast of Baffin Island was near the Clyde River area.

The Lancaster Sound area had mostly bergy water except for occasional patches of open to very open drift thick first-year ice including a trace of old ice due to consolidated fast ice fracturing in the vicinity of the sound or drifting in from the northwestern part of Baffin Bay. By the end of July, almost all of the sound was bergy water except for the extreme western section; this area saw a significant influx of very open to close pack thick first-year and old ice from the Barrow Strait area.

No significant change occurred in the Barrow Strait area during the first week of July; however, by the beginning of the second week, large chunks of fast began to fracture in the northwestern and extreme western sections. By mid-month, the fractured ice drifted eastwards to cover the entire western section of the strait while the rest was bergy water. The western side of the strait was covered with very open drift thick first-year ice including a trace of old ice with close to very close pack thick first-year ice including a trace of old ice in the extreme western section. By the end of the third week, the southern section was covered with very close pack thick first-year ice including up to 2 tenths old ice while the northwestern section had very close pack thick first-year ice including a trace of old ice. Elsewhere, bergy water with areas of open drift thick first-year ice including up to 1 tenth old ice. By the end of the month, the western section had a mix of very open drift thick first-year ice including a trace of old ice in the northern section with very close pack thick first-year ice including up to 2 tenths old ice. At the same time, the eastern section had mostly open drift to close pack thick first-year ice including up to 2 tenths old ice except for very open drift thick first-year ice including a trace of old ice in the southern section.

The Prince Regent Inlet continued to clear to bergy water from the northwest section as well as the western section, along the eastern Somerset Island coast during the first week of July. At the same time, the very close pack thick first-year ice started creeping up along the western Brodeur Peninsula. During the second week, a more easterly circulation dispersed the ice into the central part of the inlet with very little change in the southern section. Hence, the northern part was bergy water, the central part had very open to open drift thick first-year ice while the southern part was generally very close pack thick first-year ice except for some open drift thick first-year ice along the western coast. A return to a more westerly circulation caused the ice pack to drift eastwards. By the end of the third week, the western side of the inlet was generally bergy water, about 30 nautical miles wide in the north while

within about 10-20 nautical miles of the western coast in the south. Elsewhere, very close pack thick first-year ice. During the last week, the ice from southwestern Lancaster Sound drifted into western Prince Regent Inlet along parts of the eastern coast of Somerset Island coast as open to very open drift thick first-year ice including a trace of old ice. Elsewhere in the northern part, generally bergy water. The central and southern part of the inlet had very open drift to close pack thick first-year ice except for bergy water along the western coast.

No significant change occurred in the Gulf of Boothia during the first two weeks of July, however by the third week, a narrow band of bergy water along the western coast developed. Meanwhile the consolidated ice in Pelly Bay fractured with some open water conditions developing in the southern section. Elsewhere, conditions remained very close pack thick first-year ice. By the end of the month, conditions loosened in the northern section as well as along parts of the eastern coast to close to very close pack thick first-year ice. Pelly Bay was mostly open water with some areas of very open to open drift thick first-year ice. Elsewhere, very close pack thick first-year ice.

The consolidated thick first-year ice including a trace of old ice in the central part of Jones Sound was still intact during the first week of July; however, the eastern entrance as well as the extreme northwestern part showed signs of fracturing. At the end of the first week, mostly very open drift old and thick first-year ice was drifting southeastwards from Hell Gate and Cardigan Strait into the extreme northwestern Jones Sound with some of the consolidated ice in the areas fracturing to very close pack thick first-year ice including a trace of old ice. As for the eastern entrance to the sound, mostly bergy water with some patches of very close pack thick first-year ice including a trace of old ice in the northern section. During the second week, the central section fractured so that by the middle of July, most of Jones Sound had very close pack thick first-year ice including a trace of old ice while the northwestern section had very open drift old and thick-first year ice. As for the eastern entrance of Jones Sound, mostly bergy water with areas of open drift to close pack thick first-year ice including a trace of old ice, primarily in the western and northern parts of the entrance. During the third week, a general southerly wind direction caused the very close pack thick first-year ice including a trace of old ice to drift into the northern section of the sound while most of the southern section as well as the extreme northwestern section had very open drift thick first-year ice including a trace of old ice. A more moderate southerly to southeasterly circulation caused a significant clearing of the southern part of the sound during the last week of July so that by the end of the month, close to very close pack thick first-year ice including a trace of old ice covered the northern coast. The rest of the sound was mostly bergy water with a few areas of very open drift thick first-year ice including a trace of old ice.

Norwegian Bay was still consolidated with a mix of old and thick first-year ice in the south and primarily thick first-year ice including a trace of old ice in the north. The only area that was mobile with very close pack old and thick first-year ice was in the southern section, just north of Hell Gate and Cardigan Strait. Incremental fracturing of the consolidated ice occurred in the southern section during the first three weeks; however, by the last week, all the southern half of the bay and small parts of the north, just south of Eureka Sound, fractured. At the end of the month, a mix of bergy water and very close pack old and thick first-year ice covered the south. Very close pack thick first-year ice including a trace of old ice over the extreme northern section near the southern entrance to Eureka Sound while the rest of the sound was still consolidated thick first-year ice including a trace of old ice.

Eureka Sound began to show some signs of fracture in the southern section during the first week. Otherwise, consolidated thick first-year ice in the north with consolidated thick first-year ice including a trace of old ice in the southern part. The central part of the sound completely fractured during the second week so that by mid-month, close to very close pack thick first-year ice covered the area. The

rest of the sound remained consolidated. More of the sound fractured during the third week so that by the end of the month, the entire length of the sound had fractured. The northern two-thirds was very open drift thick first-year ice with up to 1 tenth old ice with the southern third was very close pack thick first-year ice including a trace of old ice.

In Kane Basin, consolidated ice began to fracture during the first few days of July. By the end of the first week, very close pack mostly old ice with up to 5 tenths thick first-year ice except for consolidated thick first-year ice including up to 5 tenths old ice in some of the bays along the Ellesmere Island coast. A narrow ice bridge of consolidated old ice in Kennedy Channel caused some looser ice conditions to the south of this ice bridge. During the second week, the ice bridge fractured. By the end of the month mostly open to very open drift old ice with a few areas of very close pack old ice covered Kane Basin.

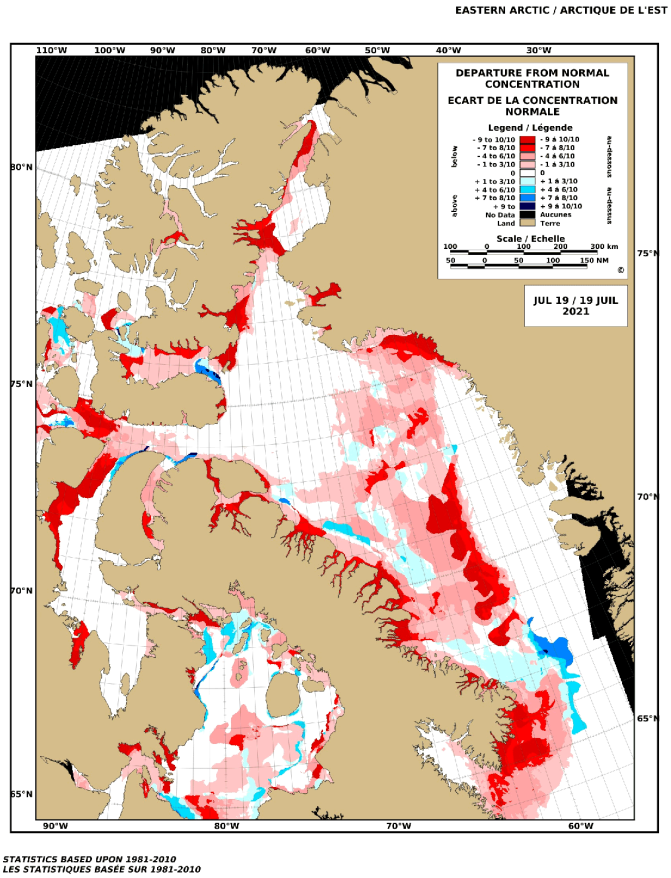

Figure 20: Departure from normal ice concentration for the Eastern Arctic area July 19th, 2021

August Ice Conditions:

Patches of very open to open drift old ice including up to 3 tenths thick first-year ice in the extreme northwestern section of Baffin Bay, drifting in from Kane Basin during the first week. Meanwhile in the rest of Baffin Bay, the area of open drift to close pack thick first-year ice including a trace of old ice continued to shrink. By the end of the first week of August, patches of close pack thick first-year ice including a trace of old ice through the south-central part of the

bay as well as along parts of the coast in the southwestern section. Before the end of the second week most of the ice the southern half of the bay was melted. The extreme northwestern part of the bay, along the coast, continued to see areas of open to very open drift old ice including up to 2 tenths thick first-year ice for the balance of the month. Elsewhere, bergy water conditions prevailed.

Lancaster Sound was mostly bergy water except for very open drift to close pack thick first-year ice including up to 2 tenths old ice in the southwestern section during the first week and parts of the second week. By mid-month, only a small area of very open drift old ice remained in the extreme southwestern part of the sound, along the northeastern coast of Somerset Island. However, during the third week, a significant amount of ice from Barrow Strait made its way into western Lancaster Sound. By the end of the third week, very open drift to close pack old ice including up to 3 tenths thick first-year ice in the southwestern section of the sound. This ice continued to creep eastwards to reach the northern tip of the Brodeur Peninsula by the end of the month.

Navy Board, Pond and Admiralty Inlets remained bergy water during the entire month of August.

A continuous flow of ice from Viscount Melville Sound into Barrow Strait kept the overall ice concentration on the high side. Mostly open drift to very close pack thick first-year and old ice covered the region during the entire month of August. Occasional areas of open water or bergy water developed during the month, mostly in the northern section.

During the first few days of August, ice from Lancaster Sound has been drifting into northwestern Prince Regent Inlet. Mostly open to very open drift first-year ice including a trace of old ice was present along the eastern coast of Somerset Island at the end of the first week. Meanwhile, farther south, a mix of bergy water with areas of open to very open drift thick first-year ice. Near mid-month, generally bergy water conditions prevailed except for patches of very open drift thick first-year ice including a trace of old ice along parts of the western coast. These conditions persisted into the third week however, an influx of ice from Lancaster Sound into Prince Regent Inlet during the last week of August changed the situation in the area. The ice migrated towards the southwestern part of the inlet, near the eastern entrance to Bellot Strait. Areas of open to very open drift thick first-year and old ice with bands of close pack old and thick first-year ice in the northwestern section. Elsewhere, bergy water conditions prevailed.

The Gulf of Boothia continued to show signs of clearing, particularly in the northern section during the first week of August. By the end of the first week, a mix of bergy water and open to very open drift thick first-year ice covered the northern section while mostly very close pack thick first-year ice was present in the southern section. The exception was Pelly Bay where mostly open water conditions had developed during that period. General clearing continued in the northern reaches of the gulf so that by mid-month, mostly bergy water prevailed with just some areas of very open drift first-year ice as present. Ice conditions were finally loosening up in the southern section. Some patches of open drift to close pack thick first-year ice were seen within the mostly very close pack thick first-year ice. Some open to very open drift thick first-year ice covered the northern part of Pelly Bay with open water in the south. During the third week, the northern part of the gulf became entirely bergy water while ice conditions farther south continued

to loosen. By week's end, open drift to very close pack thick first year ice was observed in the south while bergy water prevailed in the northern. Ice farther north of Pelly Bay continued to drift into the bay in the form of open to very open drift thick first-year ice. The last week of August had northwesterly winds and caused the ice to drift eastwards so that by the end of the month, mostly very close pack thick first-year ice covered the southeastern part of the gulf as well as the area just north of the entrance to Pelly Bay. Pelly Bay had a mix of open water and very open drift thick first-year ice. The rest of the gulf had bergy water.

By the end of the first week of August, Jones Sound had a mix of bergy water and very open drift thick first-year ice including a trace of old ice. By mid-month, generally bergy water conditions prevailed except for some open to very open drift thick first-year and old ice from Hell Gate and Cardigan Strait into extreme northwestern part of the sound. This situation continued until the end of the month.

The last of the fast ice in Norwegian Bay, located in the northern section, finally fractured during the second week of August. By the middle of the month, the western side of the bay was covered with very close pack mostly old ice while the eastern side had a mix of bergy water and open drift to very close pack thick first-year ice including up to 3 tenths old ice. A band of very close pack old and thick first-year ice was mostly around Graham Island at the end of the third week of August, while the rest of the bay was very open drift to close pack thick first-year and old ice. At the end of the month, the northern part as well as parts of the southern section of the bay were bergy water. The band of very close pack thick first-year and old ice around Graham Island was still present while the rest of the bay had very open drift to close pack thick first-year and old ice.

During most of the month, Eureka Sound had bergy water with areas of very open to close pack thick first-year ice including a trace of old ice. By the fourth week, mostly bergy water conditions covered the sound and prevailed until the end of August.

Kane Basin saw a continuous stream of mostly open drift to close pack old ice during the month of August.

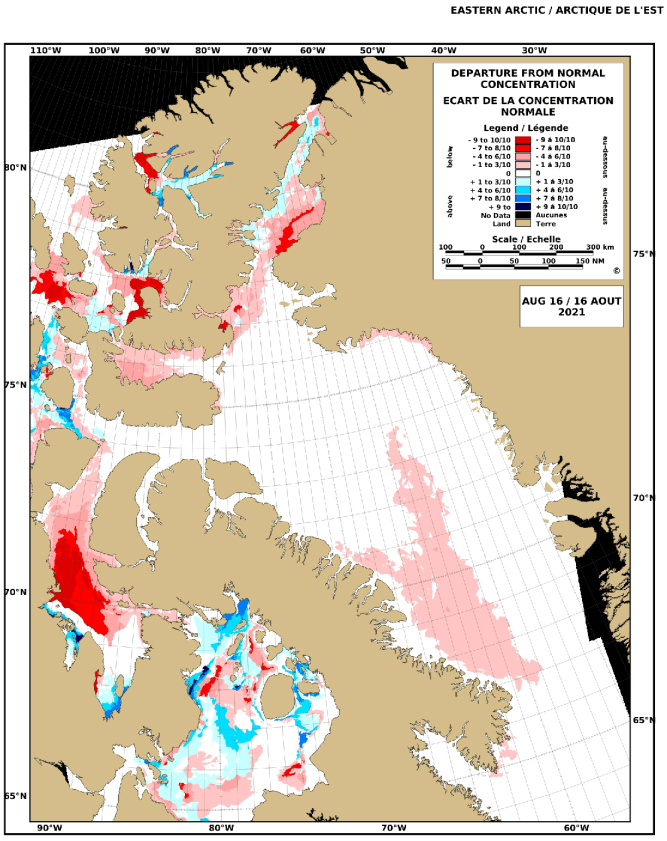

Figure 21: Departure from normal ice concentration for the Eastern Arctic area August 16th, 2021.

September Ice Conditions:

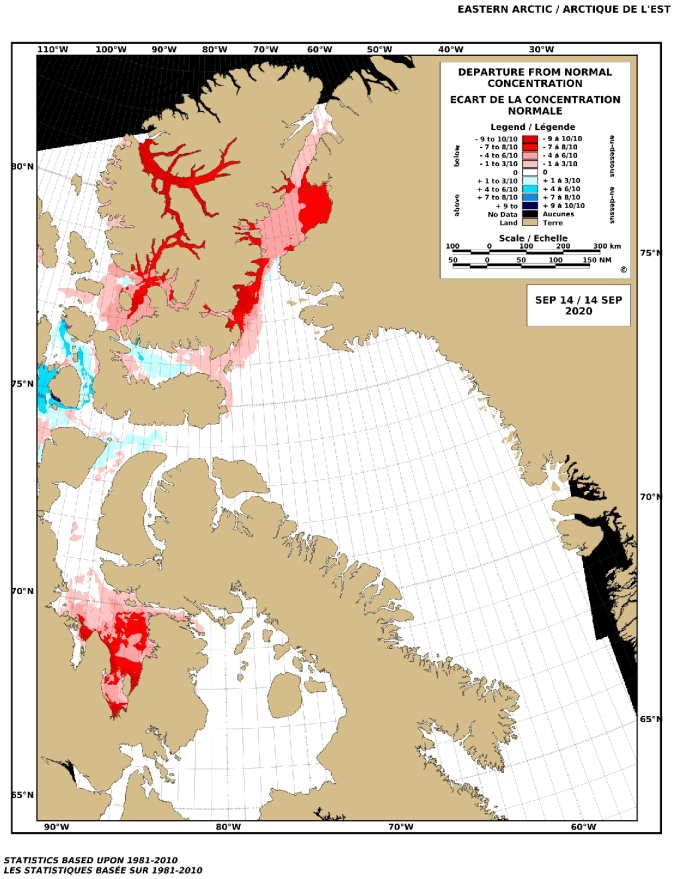

Figure 22: Departure from normal ice concentration for the Eastern Arctic area September 14th, 2021

Almost all of Baffin Bay was bergy water for the entire month of September however by last week, areas of very open drift to close pack old ice drifted into the extreme northwestern section of the bay originating from Kane Basin.

Much like Baffin Bay, Lancaster Sound was mostly bergy water except for the southwestern section, just northeast of Somerset Island. This area was covered with very close pack thick first-year ice including up to 4 tenths old ice at the end of the first week. The ice began to disperse and propagate eastwards into the extreme southern section and reached the northern entrance to Admiralty Inlet during the second week. A mix of very open to open drift thick first-year and old ice with some new ice forming between the floes at mid-month. No significant change occurred during the third week however during the last week of September, a southerly circulation caused the ice to disperse into most of the sound. By the end of the month, open to very open drift old and thick first-year ice with areas of close pack old, thick first-year and grey ice in the central and western

section. The eastern section had bergy water in the northern section with open to very open drift old and thick first-year ice in the south.

The southern part of Barrow Strait was covered with very close pack old and thick first-year ice during the first week of September while the rest of the strait had open water/bergy water with areas of very open drift to close pack old and thick first-year ice. By the end of the second week, the southern section had close to very close pack old and thick first-year ice. The northeastern part had bergy water while the rest of the northern section had very open drift to close pack old and thick first-year ice. Some new and grey ice formed during the third week so close to very close pack old and thick first-year ice with some new and grey ice in the southern and western sections. Elsewhere, a mix of bergy water with areas of very open to open drift old, thick first-year and new ice. Like in Lancaster Sound, the circulation shifted to be from the south and caused the pack ice to drift northwards during the last week of September. By the end of the month, close to very close pack old and thick first-year ice in the northern and parts of the central section while bergy water with very open to open drift old and thick first-year ice covered the southern section. The southerly circulation drew in milder temperatures and caused the new and grey ice disappear.

In Prince Regent Inlet, the northern section was covered with open drift with areas of very close pack old and thick first-year ice at the end of the first week of September. Most of the coastal areas in the western section had very open to open drift old and thick first-year ice while the rest of the region was bergy water. During the second week, thick first-year ice from the Committee Bay area crept up the coast to reach the southeastern section of Prince Regent Inlet. Open drift to close pack thick first-year ice covered the area. Meanwhile, all of the northern section as well as southwestern section had very open to open drift old and thick first-year ice. Elsewhere, bergy water prevailed. By the end of the third week, the northern section had close to very close pack old, thick first-year, new and grey ice. The rest of the area had very open to open drift old and thick first-year ice except for the coastal area in the southeastern section where very open drift thick first-year ice prevailed. By the end of the month, open drift thick first-year, grey and new ice covered most of the east coast of the inlet. Elsewhere, open to very open drift old and thick first-year with a few patches of close to very close pack old, thick first-year and grey ice covered the region.

The Gulf of Boothia area had mostly bergy water, particularly in the northern section. However, mostly close to very close pack thick first-year ice covered Committee Bay and along the coast in the northeastern section. The southwestern coast had open to very open drift thick first-year ice with patches of very close pack thick first-year ice. Most of Pelly Bay was open water except very open drift thick first-year ice in the northern section. During the second week, the ice dispersed a bit but no significant changes occurred. By the end of the third week, mostly close pack thick first-year ice with new ice in the eastern section while the southwestern section had bergy water with open to very open drift thick first-year ice. The northwestern section had a mix of bergy water with very open drift old and thick first-year ice. Most of Pelly Bay had very open drift thick first-year ice. By the end of the month, open drift to very close pack old and thick first-year ice covered Committee Bay and the northeastern section. Meanwhile, the southwestern section had very open drift old ice while the northwestern section was bergy water. Pelly Bay was finally open water at the end of the month.

Jones Sound was mostly bergy water except for very open drift old with some new ice in the extreme northwester section, southeast of Hell Gate and Cardigan Strait at the end of the first week of September. The ice spread to the southwestern coast of the sound during the second week. By

mid-month, the extreme western section had very open drift old and new ice. During the third week, the ice continued to spread along the southern coast. By the end of the third week, very open to open drift old and new ice covered the extreme western and extreme southern sections while the rest of the sound was bergy water. By the end of the month, the western end of the sound was a mix of bergy water and very open drift old ice.

Northern Norwegian Bay was mostly bergy water except for a narrow band of very close pack thick first-year ice including a trace of old ice along the western side of the Bjorne Peninsula at the end of the first week. The southern part of the bay had very open drift old ice with some new ice between to floes. By mid-month, the ice distribution remained the same however, some new ice started to form in the smaller bays of northern Norwegian Bay while the south had open drift to close pack old, grey and new ice. Some very close pack old and some thick first-year ice drifted into the extreme northwestern section of the Bay. By the end of the third week, very close pack old and some thick first-year ice had drifted into the southwest part of the bay while most of the western section was covered with very close pack mostly old ice. Meanwhile a mix of open drift to close pack old ice with some new and grey ice was seen from southern Eureka Sound into most of northern Norwegian Bay. By the end of the month, the western side of the bay had mostly very close pack old and some thick first-year ice while the east side had very open drift to very close pack grey and new ice with up to 4 tenths of old and thick first-year ice.

At the beginning of September, Eureka Sound was bergy water however, by the end of the first week, ice from Nansen Sound had drifted into northern Eureka Sound. The ice was comprised of open drift thick first-year ice with up to 1 tenth old ice. The rest of the sound remained bergy water. By the end of the second week, the ice had spread over the entire length of the sound with very open drift old and thick first-year ice. By the end of the third week, close pack thick first-year ice with some old, grey and new ice covered the area. Finally, the southern third of the sound continued to have close pack old and thick first-year ice with some new ice while the rest of the area had very close pack grey and new ice with a trace of old ice.

Western Arctic

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

From June to September, surface air temperatures were near to below normal stretching from the northern Alaskan coast to western Amundsen Gulf as well as eastern Coronation Gulf north to M'Clintock and Peel Sounds. Elsewhere, above normal temperatures prevailed during the same period.

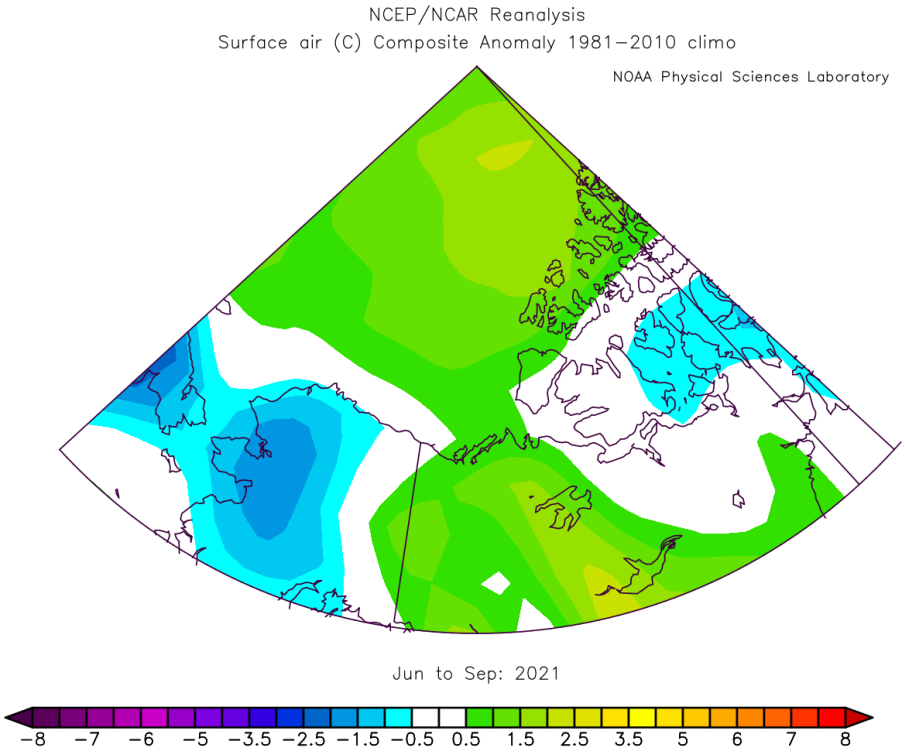

Figure 23: Air temperature anomaly for the Western Arctic area from June to September 2021

Summary of Ice Conditions:

The clearing started early in the southeastern Beaufort Sea and most of Amundsen Gulf at the beginning of June. Narrow bands of looser ice conditions were also observed near the western coast of Banks Island as well as the western entrance to M'Clure Strait.

By mid-June, conditions continued to loosen in the same areas while at the same time, the area southwest of Point Barrow was also seeing significant clearing. Elsewhere in the Western Arctic, no significant changes occurred at the middle of the month. Up until that point, no signs of greater than normal ice concentration had appeared anywhere in the Western Arctic; however, after mid-month, parts of the southeastern Beaufort Sea and along most of the area just west of Banks Island saw a slight change to greater than normal ice concentration.

By early July, this signal became stronger as most of the western Amundsen Gulf as well as the area just west of Banks Island continued to see greater than normal ice concentration. Generally, a slight westerly circulation over that area delayed the clearing of the ice thereby increasing the ice concentration to greater than normal for that time of year. As the month progressed beyond mid-month, the westerly circulation became more persistent and increased slightly. Hence, areas along the western coast of Banks Island and southeastern Beaufort Sea, which would be either open water to low ice concentration, was covered with greater than normal ice due to winds and cooler temperatures. Fast ice in most of M'Clure and Dolphin and Union Strait, as well as the western two thirds of Coronation Gulf had fractured. Mobile ice in Victoria Strait expanded into extreme northern Queen Maud Gulf.

By early August, broad areas of open water to low ice concentration emerged along the Alaskan coast due to a southwesterly circulation and milder than normal temperatures. Meanwhile, further east, ice from the southeastern Beaufort Sea drifted into the southwestern part of Amundsen Gulf due to an anomalous northwesterly circulation. Elsewhere, the rest of Amundsen Gulf, Dolphin and Union Strait including western Coronation Gulf was open water to ice free. The fast ice in Viscount Melville Sound, Barrow Strait, M'Clintock Channel, Peel Sound, Larsen Sound and the rest of Queen Maud Gulf had fractured.

By mid-August, ice continued clearing along the Alaskan coast as well as north of the Mackenzie Delta; however, ice from the greater than normal region of southeast Beaufort Sea continued to leak into western Amundsen Gulf. The ice caused some issues for shipping transiting from eastern Amundsen to the Mackenzie Delta. However, further east in Amundsen Gulf to the western Queen Maud Gulf, conditions were mainly ice free. Most of Peel Sound and the northwestern parts of Larsen Sound were open water. The southwestern coastal section of Prince of Wales Island was also open water. These last regions had significantly less ice than normal.

By the end of August, the southeastern Beaufort Sea, from north of the Mackenzie Delta to near Baillie Island, as well as the western coast of Banks Island and western Amundsen Gulf continued to experience greater than normal ice concentration. At that point, the band of ice from Baillie Island to southwestern Banks Island had been causing issues to shipping for two weeks and continued into early September but finally during the second week the ice had moved or

melted northwards, clearing the passage from Amundsen Gulf to southeast Beaufort Sea. Eastern Amundsen to Queen Maud Gulf was ice free at the end of August. Peel Sound continued to be open water; however, most of Larsen Sound experienced greater than normal ice concentration. The northern side of M'Clure and Viscount Melville Sound had greater than normal ice concentration due to a weak southwesterly circulation while some of the southern section had less than normal ice.

By middle of September, the route from west of Point Barrow to Queen Maud was open water to ice free. The ice pack was about 60 to 120 miles north of the coast in the Beaufort Sea area. Further north, ice concentrations were looser than normal. Most of Victoria Strait was open water except for the extreme western section where some ice was still present. Larsen Sound had a mix of greater or lesser than normal ice concentration. Most of Peel Sound was open water except for the extreme northern section where ice from Barrow Strait was infiltrating the region. The northern section of M'Clure Strait and Viscount Melville Sound as well as most of Barrow Strait had greater than normal ice concentration due to southwesterly winds and new ice growth. The bays in the southern section had open water, which at that time of year, was unusual.

By the end of September, the ice pack sagged near the northeastern Alaskan coast as well as the northern coast of Yukon. To the west open water prevailed with only some new ice forming along the coast. The route from the Mackenzie Delta to Queen Maud Gulf was open water to ice free. The pack ice in the rest of the Beaufort Sea and Arctic Ocean had looser than normal ice concentration, particularly in the western sections. A continued mix of slightly greater and lesser than normal ice concentration prevailed in the Larsen Sound and southern Peel Sound while the northern part of Peel Sound had less than normal ice concentration. The M'Clintock Channel exhibited a significant lack of ice due to the continued and unusual southerly circulation. This circulation continued to have an impact on the Parry Channel as the majority of the pack ice had moved into the northern portion while the south continued to have open water due to winds and much above normal air temperatures.

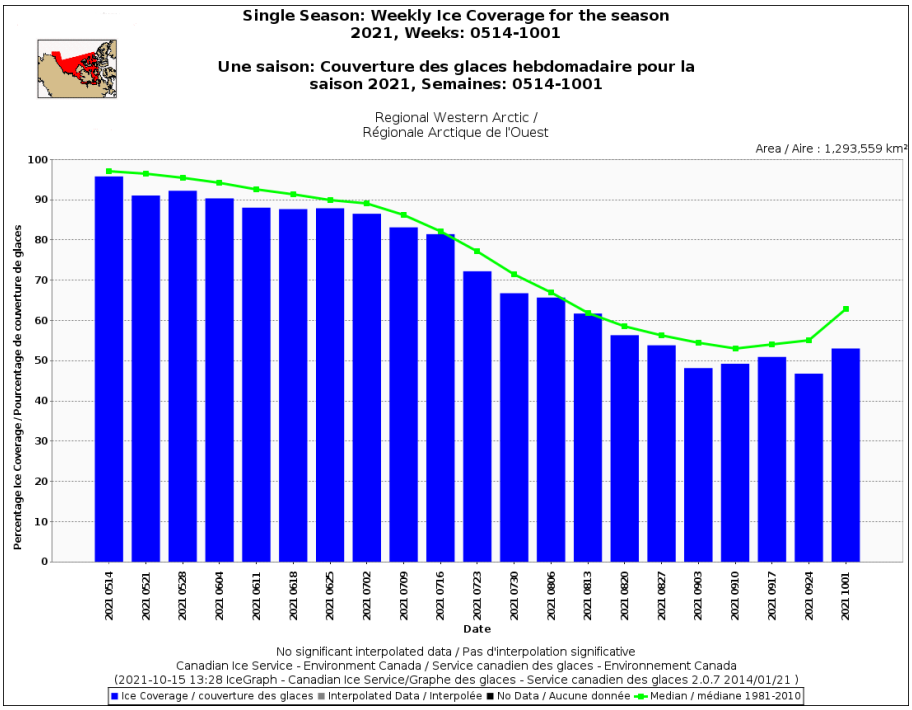

Figure 24: Weekly ice coverage for Western Arctic area for the 2021 season

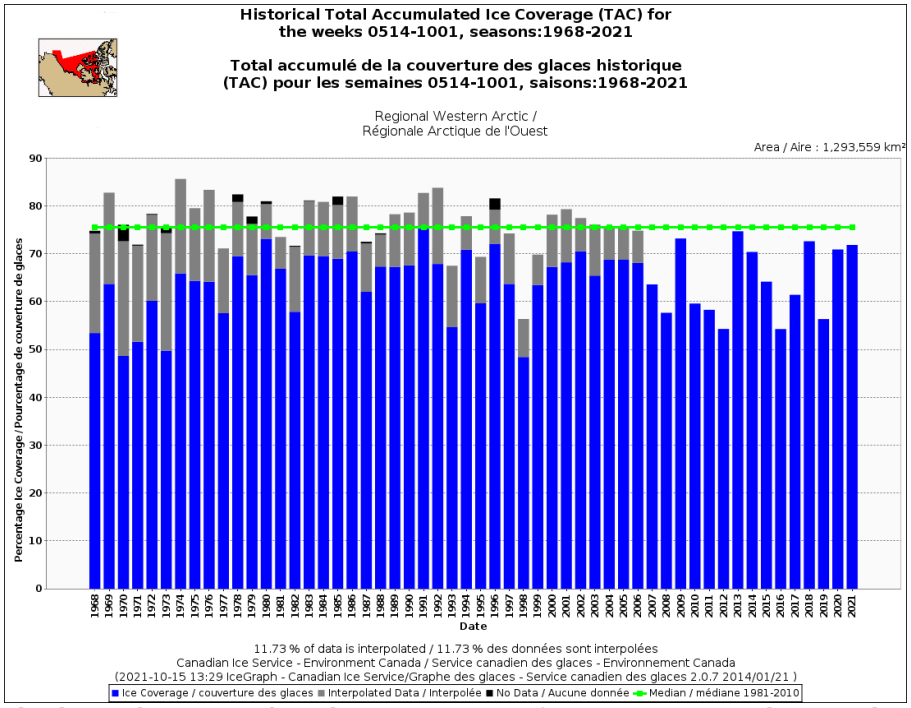

Figure 25: Historical Total Accumulated Ice Coverage for Western Arctic area (1968-2021)

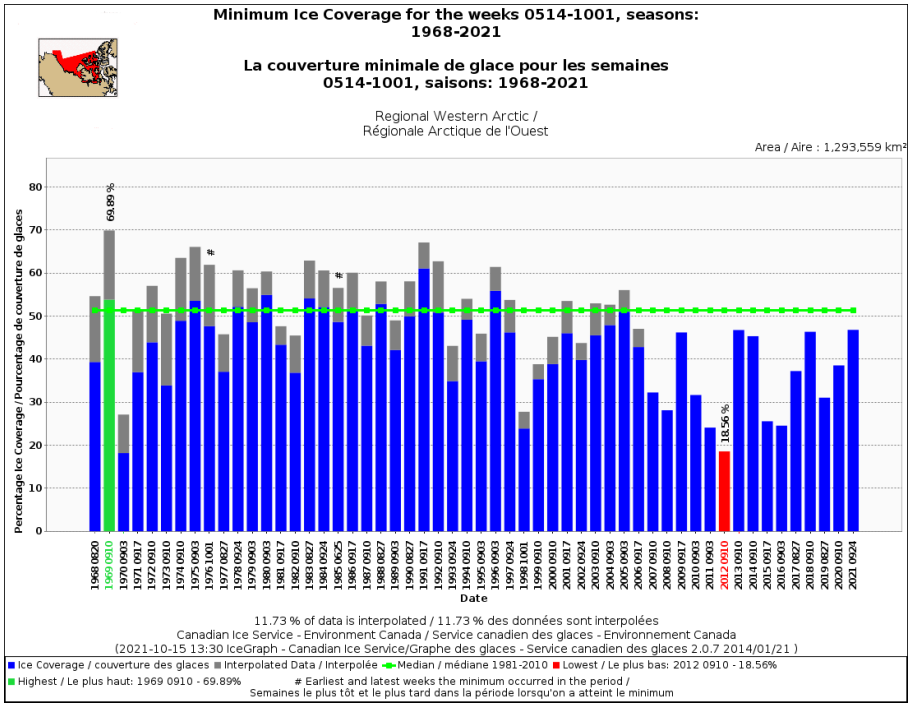

Figure 26: Minimum Ice Coverage for the Western Arctic area (1968-2021)

June Ice Conditions:

At the beginning of June, the southeastern Beaufort Sea began to clear north of the coastal fast ice. By the end of the first week of June, the southern and eastern section had open water areas with very open to close pack thick first-year ice including a trace of old ice with bands of very close pack old ice. Farther north, mostly very close pack thick first-year ice including a trace of old ice covered the area. Signs of fracturing were observed in the consolidated thick first-year ice including a trace of old ice along coast during the second week. North of the consolidated ice and west of Banks Island, mostly open water with some areas of very open drift thick first-year ice including a trace of old ice while farther north, the area had very close pack thick first-year ice with bands of very close pack old ice. By the end of the third week, almost all of the Mackenzie Delta as well as north of the rotten consolidated thick first-year ice including a trace of old ice was open water except for a few bands of close pack thick first-year ice including a trace of old ice. During the last week, all the remaining consolidated ice fractured. A mix of close to very close pack thick first-year ice including a trace of old ice was present near the coast and in Liverpool Bay. Farther north, mainly open water was present while the extreme northern section had close to very close pack thick first-year and old ice. The open water area along western Banks Island closed with open drift to very close pack thick first-year and old ice.

Fast ice remained mostly intact along the coastal area of Amundsen Gulf while some clearing was already well underway in the eastern section of the gulf. By the end of the first week of June, the southeastern section of the gulf was mostly open water with a few bands of very open drift thick first-year ice. In the northwestern section, close to very close pack medium and thick first-year ice including a trace of old ice. The consolidated thick first-year ice including a trace of old ice along the southern coast began to fracture during the second week of June. By the end of the second week, the southern part of the gulf was mostly open water except for a few bands of very open drift thick first-year ice including a trace of old ice along the southern fast ice edge. In the northern section, very close pack thick first-year ice including a trace of old ice covered the area. By the last day of June, almost all the consolidated ice in Darnley and Franklin Bays as well as the western end of Dolphin and Union Strait had fractured. Dolphin and Union Strait and Darnley Bay had open drift to close pack thick first-year ice while Franklin Bay had close pack thick first-year ice including a trace of old ice. The northern part of Amundsen Gulf was covered with mostly very open drift to close pack thick first-year ice with a trace of old ice. Elsewhere in the gulf, generally open water.

No significant change occurred in the Coronation Gulf, Queen Maud, Larsen Sound, Peel Sound, M'Clintock Channel and Viscount Melville Sound during the month of June. Coronation Gulf remained consolidated with thick first-year ice. Queen Maud Gulf had primarily consolidated thick first-year ice; however, the southern coast as well as eastern and northern sections had up to 5 tenths old ice. Most of Larsen Sound had consolidated thick first-year ice including a trace of old ice except along the northwestern coast of King William Island where up to 5 tenths old ice was present. Peel Sound was consolidated with thick first-year ice including a trace of old ice. M'Clintock Channel and Viscount Melville Sound had a mix of consolidated old and thick first-year ice.

Most of M’Clure Strait was consolidated with thick first-year ice including a trace of old ice except for consolidated old ice in the southern section at the end of the first week of June. Meanwhile, the extreme western part of the strait was a mix of open water and very close pack old and thick first-year ice. During the entire month of June, small wedges of consolidated ice in the western section peeled off so that by the end of June, the western third was covered with very close pack old and thick first year ice where the rest of the strait remained consolidated.

The Arctic Ocean saw very little change from the mostly very close pack old ice with some thick first-year ice during the month of June.

Along the Alaskan Coast during the first week of June, consolidated thick first-year ice including up to 3 tenths old ice was present along the coast while very close pack thick first-year ice covered the area in the eastern and central section. However, closer to Point Barrow as well as the extreme northeastern and north-central sections, very close pack mostly old ice with some thick first-year ice. By mid-month, some of the consolidated ice along the coast fractured and drifted northwestwards slightly. Open water with very open to open drift thick first-year ice including a trace of old ice started to appear in the extreme eastern section. Elsewhere, little change to the rest of the ice coverage. By the end of the month, the consolidated ice along the coast in the eastern section had fractured. The open water with some close pack thick first-year ice including a trace of old ice in the eastern section expanded a bit farther eastwards. However, the rest of the ice pack remained relatively unchanged.

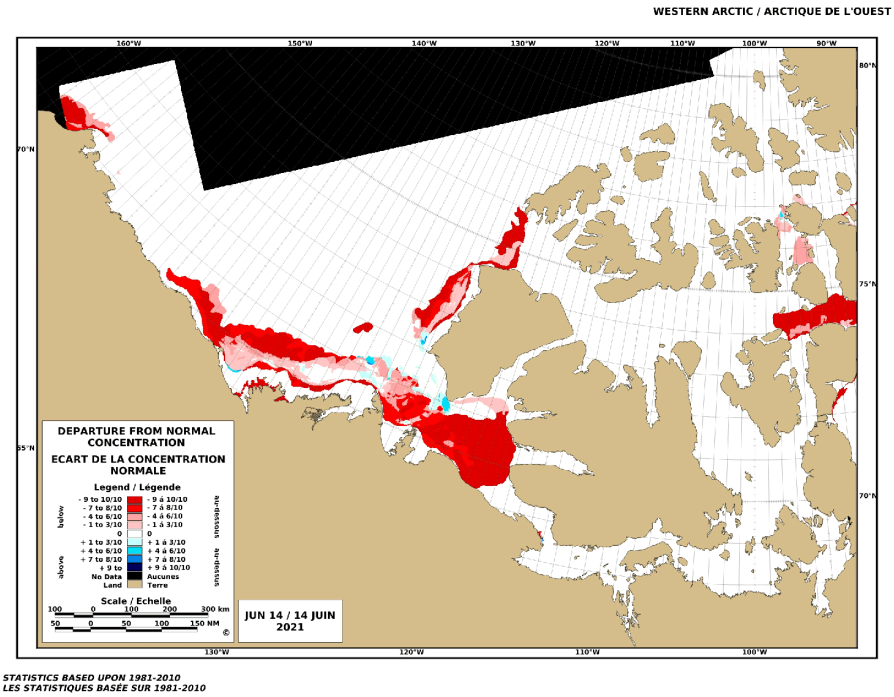

Figure 27: Departure from normal ice concentration for the Western Arctic area for June 14th, 2021

July Ice Conditions:

Due to the fracturing of the consolidated ice in Darnley and Franklin Bays, some of this ice drifted into the southwestern Beaufort Sea area so that by the end of the first week of July, very open drift to close pack thick first-year ice including a trace of old ice. The rest of the southern part of Beaufort Sea, particularly along the coast, was open water while the northern section was a mix of old, thick and medium first-year ice. These conditions persisted into the middle part of the month; however, a weak northern circulation caused the pack ice to slide a bit towards the south for the rest of the month. By the end of the month, the very close pack medium and thick first-year ice including a trace of old ice was about 20 nautical miles north of Cape Bathurst and about 90 nautical miles north of the entrance to the Mackenzie River. Some open to very open drift thick first-year ice including a trace of old ice in the southeastern as well as parts of the northern section, just south of the very close pack ice.

Amundsen Gulf continued to experience consolidated ice fracture, particularly in the northern and eastern section as well as in Dolphin and Union Strait. By the end of the first week of July, most of the gulf was a mix of open water and close pack thick first-year ice. A trace of old ice was present in the western section. The open water area became more wide spread during the second week. By mid-month, very open drift and close pack thick first-year ice along the coast in the eastern section while the northern and western section had open drift thick first-year ice including a trace of old ice. Some patches of open to very open drift ice were present in Darnley and Franklin Bays. Some consolidated ice was still present in the bays in the eastern section as well as parts of Dolphin and Union Strait. Elsewhere, open water. The last of the consolidated

ice fractured before the end of the third week. By the end of the month, a tongue of very open to close pack thick first-year ice including a trace of old ice from southeastern Beaufort Sea had crept into the western part of Amundsen Gulf. Only very open drift thick first year ice was present in eastern Dolphin and Union Strait while open drift to very close pack thick first-year ice covered Prince Albert Sound. Ice had also drifted southwards from Prince of Wales Strait into the northern section of Amundsen Gulf, along the southern coast of Banks Island. Mostly very open drift with areas of very close pack thick first-year ice including a trace of old ice stretched the length of Prince of Wales Strait.

Small signs of melting and fracturing were visible in the western end of Coronation Gulf during the first week of July. The rest of the gulf as well as Dease Strait were still intact in terms of the consolidated thick first-year ice. The trend continued during the second week. By mid-month, most of the gulf was fractured, particularly in the western section. An area of open water was established along the southwestern coast. By the end of the third week, all the consolidated ice in the eastern section of the gulf and Dease Strait was fractured. At this point, the open water was still present along the coast in the southwestern section while most of the rest of the gulf and strait were very close pack thick first-year ice. The end of the month saw the western part of Coronation Gulf and most of Dease Strait as open water. The rest had a mix of very open to open drift with some very close pack thick first-year ice.

All of Queen Maud Gulf was consolidated with thick first-year ice except for consolidated thick first-year ice including up to 5 tenths old ice along the coast and in the eastern section. The ice started to fracture from the Victoria Strait area where an area of ice was already mobile. The mobile ice area extended into the northern portion of the gulf during the second week. Some fracturing or melting started to appear around the middle part of the month, mostly along the coast and amongst the island in the northeastern section. A significant wind event during the last week caused the last of the consolidated ice to fracture. By the end of the month, mostly very close pack thick first-year ice including up to 2 tenths old ice. Elsewhere, open drift to close pack thick first-year ice including up to 3 tenths old ice except some open water in the northwestern section.

Larsen Sound and Victoria Strait had mostly consolidated thick first-year ice including a trace of old except for up to 5 tenths old ice along the northwestern coast of King William Island. There was also an area of 2 tenths old ice in the northwestern Larsen Sound. By mid-month, most of Victoria Strait was fractured with very close pack thick first-year ice including a trace of old ice. The rest of the area remained consolidated. During the last week, all the consolidated ice had fractured. By the end of the month, generally very close pack thick first-year ice including a trace of old ice except for up to 3 tenths old ice along the northwestern coast of King William Island and the northern part of Larsen Sound.

M'Clintock Channel remained consolidated with a mix of old and thick first-year ice until the middle of the third week where the northern section fractured. By the last week, the entire channel had fractured to very close pack old and thick first-year ice. Looser ice conditions were present along the southwestern coast of Prince of Wales Island.

Viscount Melville Sound was still consolidated during the first week of July with old and thick first-year ice in the eastern and southern sections while most of the north was consolidated thick first-year ice including a trace of old ice. During the second week, the eastern third of the consolidated ice fractured. By mid-month, the western end of the sound also fractured. Soon into the third week, the entire length of Viscount Melville Sound was very close pack old and thick first-year ice. No significant changes occurred during the rest of the month.

M'Clure Strait had mobile very close pack old and thick first-year ice in the western and southern sections except for very close pack thick first-year ice including a trace of old ice. However, the eastern part of the strait remained consolidated old and thick first-year ice in the southern section while consolidated thick first-year ice including a trace of old ice covered the north. The last of the consolidated ice fractured during the second week. By mid-month, very close pack thick first-year ice including a trace of old ice was in the northern section while very close pack old and thick first-year ice covered the south. By the end of July, an area of open water with some very open drift old ice was present in the extreme northwestern section, along the southern shores of the islands in the area. Meanwhile, very close pack thick first-year ice including a trace of old ice in the northeastern section while the rest of the strait was covered with very close pack old and thick first-year ice.

No significant changes occurred over the Arctic Ocean during the month of July. Generally very close pack old with some thick first-year ice covered the region.

Along the northern Alaskan Coast, the last of the consolidated ice was still present along the coast in the western section during the first week of July. Mostly consolidated thick first-year ice including a trace of old ice was present; however, with rivers running towards the coast, open water areas started appearing along the coast in the consolidated ice. Meanwhile, the southeastern section was covered with open drift thick first-year ice including a trace of old ice. Elsewhere in the eastern section, very close pack thick first-year ice including a trace of old ice while the western and extreme northern sections had very close pack thick first-year ice including up to 7 tenths old ice. The open water and looser ice conditions continued to progress westwards, particularly along the coast during the second week. By mid-month, open water to very open drift thick first-year ice was prevalent in the eastern section. The last of the fast ice was gone at this point. Elsewhere, generally a mix of very close pack thick first-year and old ice prevailed. By the end of the third week, open water to very open drift thick first-year ice including a trace of old ice developed along the coast. In the eastern section mostly open drift to close pack thick first-year ice including a trace of old ice while the rest was mostly very close pack old and thick first-year ice. By the end of the month, the southeastern half, the coast zone and extreme southwestern section were open water. Meanwhile, the northeastern half was covered with very open to open drift old and thick first-year ice while the western section was a mix of open drift to very close pack thick first-year ice with up to 2 tenths old ice.

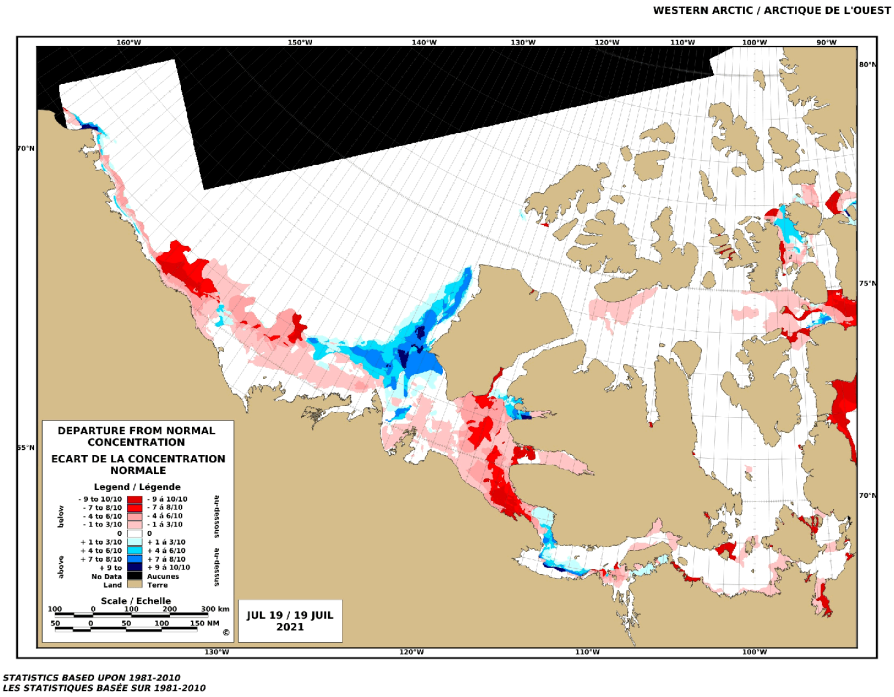

Figure 28: Departure from normal ice concentration for the Western Arctic area July 19th, 2021

August Ice Conditions:

The southeast Beaufort Sea continued to be plagued with a general northerly circulation, keeping the ice concentration in the southeast section greater than normal. At the end of the first week of August, the area from the Mackenzie Delta to the Tuktoyaktuk as well as Liverpool Bay was open water to ice free. Farther north, open to very open drift thick first-year ice including a trace of old ice prevailed. The edge of very close pack thick first-year ice was 10 to 30 nautical miles north of Baillie Islands while farther west, the pack was located about 130 nautical miles north of the entrance to the Mackenzie River. Not much changed during the second week. During the third week, the ice edge remained more or less at the same location however the pack ice loosened somewhat. The open water/ice free zone along the coast was well established from the Mackenzie River to Baillie Islands however soon afterwards, open drift to close pack ice was present. By the end of the month, the ice edge was about 60-80 nautical miles from the Mackenzie River, along the Tuktoyaktuk Peninsula and north of Liverpool Bay. Farther north, open drift to very close pack old and thick first-year ice was observed.

The western end of Amundsen Gulf had a mix of very open drift to close pack thick first-year ice including a trace of old ice at the beginning of August however a persistent wind from the northwest caused this band of ice to drift southwards. By the end of the first week, the extreme southwestern Amundsen Gulf, all of Franklin Bay and northwestern part of Darnley Bay were invaded with open to very open drift thick first-year ice including a trace of old ice. Elsewhere in Amundsen Gulf, open water to ice free except for some very open drift old ice originating from Peel Sound. At mid-month, most of Franklin Bay was open water except the extreme northern

section as well as northwestern Darnley Bay and extreme southwestern Amundsen Gulf where open to very open drift thick first-year ice including a trace of old ice. The rest of the northwestern half of Amundsen Gulf was open water while the southeastern section was ice free. Intermittent periods of northwesterly circulation continue to drive the ice edge farther southeast into Amundsen Gulf during the second half of August. At the end of the month, the southwestern part of the gulf and all of Franklin Bay were covered with very open drift to close pack thick first-year ice including a trace of old ice while the rest of the gulf was mostly open water.

A rapid decrease in ice extent occurred during the first week of August in Coronation Gulf. By the end of the first week, generally open water conditions prevailed. Before the end of the second week, ice free conditions emerged and persisted until the end of the month.

Clearing to open water occurred in the western end of Queen Maud Gulf during the first week of August. At the end of the first week, open water in the western section while very open to open drift thick first-year ice including a up to 1 tenth old ice covered most of the east. The exception was along the southern coast and just south of Victoria Strait where close to very close pack thick first-year ice including 2 tenths old ice prevailed. By mid-month, the open water to ice free conditions expanded to cover the western and most of central Queen Maud Gulf. In the northwestern section and along the coast in the southeastern section, very open drift thick first-year and old ice except for areas of close to very close pack thick first-year ice including up to 2 tenths old ice. At the end of the third week, open drift to close pack thick first-year ice including 2 tenths old ice along the coast in the extreme southeastern section while the area just south and southeast of Victoria Strait had very open drift to close pack thick first-year ice including a trace of old ice. Elsewhere, open water to ice free. And finally, by the end of the month, generally ice free in the western section and open water in the east except for a few strips of old ice.

At the end of the first week of August, all of Victoria Strait and most of Larsen Sound was covered with very close pack thick first-year ice including up to 2 tenths old ice except along the northwestern coast of King William Island where very close pack old ice prevailed. Elsewhere in the northeastern part of Larsen Sound, very open drift to close pack thick first-year ice including up to 1 tenth old ice. A northerly circulation during the second week pushed the ice southwards. At mid-month, open water covered most of Larsen Sound except in the extreme southern part of the sound and in Victoria Strait where thick first-year ice including a trace of old ice except along the northwestern coast of King William Island and western Victoria Strait where very close pack old ice prevailed. A return to a southerly circulation during the third week caused the ice to drift back into the northern part of Larsen Sound. At the end of the third week, the northeastern part of Larsen Sound was covered with open water with areas of open to very open drift thick first-year ice including a trace of old ice. The east-central part of the sound had close pack thick first-year ice including a trace of old ice while the southeastern section and northeastern Victoria Strait were very close pack thick first-year ice including a trace of old ice. The western part of Larsen Sound and northwestern Victoria Strait were close to very close pack old with some thick first-year ice. The southern part of Victoria Strait had a mix of open water and open drift old and thick first-year ice. By the end of the month, the ice had crept up farther north. The extreme eastern part of Larsen Sound was mostly open drift thick first-year ice including a trace old ice. The rest of Larsen Sound as well as most of Victoria Strait were covered with close to very close

pack old and thick first-year ice. Only the southern part of Victoria Strait was generally open water with very open drift old ice.

Peel Sound started to clear from the north during the first week of August. At the end of the first week, mostly open water with open drift to very close pack thick first-year ice including up to 2 tenths old ice especially along the western shore. Elsewhere, very open drift thick first-year ice including a trace old ice. By mid-month, most of the sound was open water except for areas of very open drift old and thick first-year ice along parts of the western shore. During the third week, some ice drifted into southern Peel from northern Larsen Sound. At the end of third week, open water with very open drift thick first-year ice including a trace of old ice in the southern third. The central part was open water while the north had a mix of open water to very open drift old and thick first-year ice except for some areas of very close pack old and thick first-year ice in the extreme northern section. By the end of August, open to very open drift thick first-year ice including a trace of old ice in the southern third. Most of the rest of sound was open water except for very close pack old and thick first-year ice in the extreme northern section.

M’Clintock Channel saw clearing in the area southwest of Prince of Wales Island during the first two weeks. At mid-month, open water along the southwestern coast of Prince of Wales Island while the rest of the channel was mostly old ice with some thick first-year ice. By the end of the month, open water with areas of open to very open drift old and thick first-year ice in the northwestern section as well as along the southwestern coast of Prince of Wales Island. Elsewhere, very close pack old and thick first-year ice.

Viscount Melville Sound and M’Clure Strait saw some loosening of ice condition, mostly in the northern section during the entire month. Otherwise, both areas had very close pack old and thick first-year ice.

Conditions along the northern Alaskan coast changed somewhat during the first half of August. At mid-month, open water along the coast in the southeastern and southwestern sections with a mix of open water and very open to close pack old ice in the northeastern, central and northwestern section. During the third week, a westerly circulation caused the open water area in the western section to extend eastwards. Elsewhere along the coast a mix of open water to very close pack old ice. Farther north, open water to open drift to close pack old ice prevailed. By the end of month, essentially open water conditions with only a few strips of old ice while farther north, open water with areas of open to very open drift old ice.

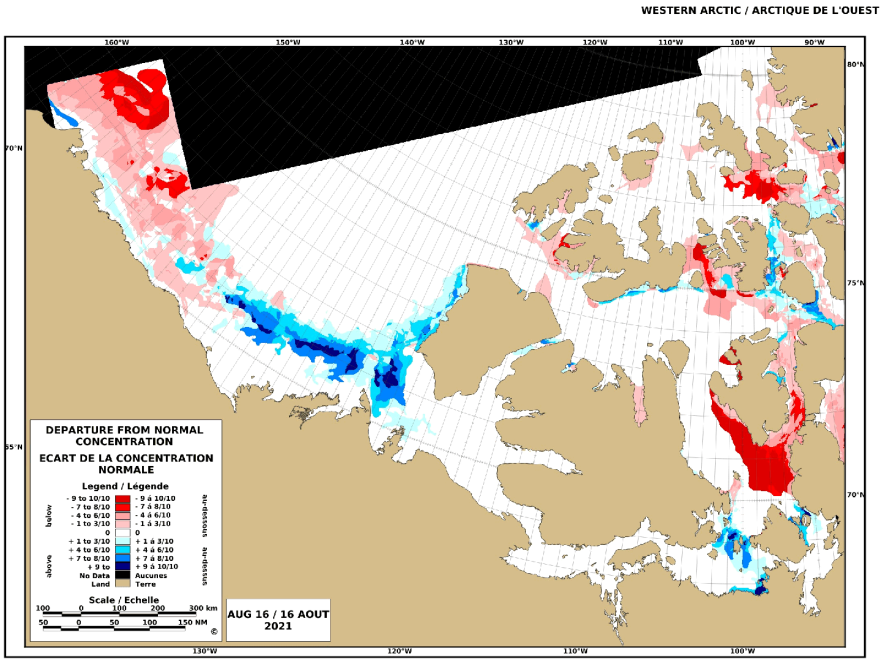

Figure 29: Departure from normal ice concentration for the Western Arctic area August 16th, 2021

September Ice Conditions:

During the first week of September, a southeasterly circulation had established itself causing the general migration of the ice towards the northwest for the southeastern part of the Beaufort Sea. By then end of the first week, the ice edge was located about 45 nautical miles north of Baillie Islands and about 150 nautical miles north of the entrance to Mackenzie River. Farther north, mostly open drift to very close pack thick first-year and old ice. By the end of the second week, mainly open water to ice free conditions prevailed except for open drift to close pack thick first-year ice including a trace of old ice in the northeastern section, just west of the southwestern coast of Banks Island. A return to a more normal circulation of the gyre caused the ice to slump southwards. By the end of the third week, the general ice edge was locate about 90 nautical miles north northwest of the entrance to the Mackenzie River. In fact, some new ice started to form around the old and thick first-year ice in the northern and northeastern sections due to a more calm wind situation and cooler temperatures. By the end of the month, Open water to ice free conditions prevailed within 60 to 80 nautical miles of the southern coast and about 40 to 60 nautical miles of the southwest coast of Banks Island. Farther north and west, a mix of open water to open drift to very close pack old and thick first-year ice including some new ice between the floes.

Like the southeastern Beaufort Sea, a mild southeasterly circulation during the first week of September caused the ice in Amundsen Gulf to drift northwestwards. By the end of the first week, all the ice melted or drifted out of the region and gave way to generally open water to ice free conditions. By the third week, the entire region was ice free and prevailed until the end of the month.

Coronation Gulf and Dease Strait were ice free for the first half of September with only some open water conditions appearing during the later half of the month in Dease Strait.

Only a few strips of old ice were present in the extreme northern section of Queen Maud Gulf, just south of Victoria Strait at the beginning of September however, a mild southeasterly circulation during the first week caused the last of the ice to melt. No significant change occurred during the rest of the month.

A persistent and unusual southeasterly circulation during the entire month of September had a significant impact on the ice situation in Larsen Sound and Victoria Strait. By the end of the first week, most of Victoria Strait was open water except for the extreme western section where very open to close pack old and thick first-year ice was present. Meanwhile, most of the southern half of Larsen Sound was open drift to very close pack old and thick first-year ice. Moreover, the northern section had a mix of open water to very open drift old and thick first-year ice. No significant changes occurred in Victoria Strait during the second week; however, a mix of open water and very open to open drift old and thick first-year ice with some new ice between the floes developed. The exception was the extreme southwestern section of Larsen Sound where very close pack mostly old ice prevailed. A more dispersive effect occurred during the third week so that by the end of the week, very open drift old and thick first-year ice was observed in northern and extreme western Victoria Strait while most of Larsen Sound had very open to close pack old, thick first-year, new and grey ice. The only exception was the extreme northern section of

the sound where mostly open water conditions prevailed. A general circulation from the southeast during the last week caused the ice to drift into the northwestern and northern parts of Larsen Sound with open to very open drift old and thick first-year ice at the end of the month. All the new and grey ice either had melted or was destroyed due to wind and mild temperatures.

At the end of the first week of September, most of Peel Sound was open water. The only remaining area with ice was the northern third of the sound where close to very close pack old and thick first-year ice. By the end of the second week, the ice edge was a little farther south but still remained in the northern third with close to very close pack ice while some very open drift old ice was present in the southern third. The rest of the sound was open water. A continued migration of ice towards the south so that the northern half had very close pack old and some thick first-year ice along the eastern side while the western side was a mix of open water and very open drift old ice. The southern half was open water. By the end of the month, the northern and central part of Peel Sound was generally open water with a few strips of old ice in the extreme northern section. As for the rest of Peel Sound, some ice from northern Larsen Sound made it into this area. A mix of open water and very open drift old ice.

M'Clintock Channel's ice started to loosen during the first week of September, particularly in the southern and central sections. By the end of the week, open drift to close pack old and thick first-year ice covered most of the southern and central sections while the north continued to have very close pack old and thick first-year ice. During the second week, a general drift towards the west caused a compression of the ice. At mid-month, the eastern section of the channel, mostly near the western side of Prince of Wales Island, had a mix of open water to very close pack new ice including a trace of old ice while the rest of the channel was covered with mostly very close pack old and thick first-year ice. During the third week, the circulation shifted and caused the ice pack to drift back towards the east. The general distribution of the ice at the end of third week was mostly close to very close pack old and thick first-year ice except along the southwestern coast of Prince of Wales Island where open water to close drift new ice with up to 1 tenth old ice prevailed. A significant change in wind direction and intensity caused the pack ice to shift northwards. The area was also well above normal in terms of temperatures. By the end of the month, very close pack old and thick first-year ice along the western coast of Prince of Wales Island extending into the central part of M'Clintock Channel. Elsewhere in the channel, a mix of open water with open to very open drift old and thick first-year ice.

The southwestern and northeastern parts of Viscount Melville Sound were covered with a mix of very open drift to close pack old, thick first-year and new ice at the end of the first week of September. The rest of the area had very close pack old and thick first-year ice. Calmer winds and colder temperatures promoted new ice growth during the second week. The southwestern and northeastern sections had close to very close pack new and grey ice including up to 1 tenth old ice at mid-month. Meanwhile, the rest of the sound was covered with very close pack old and thick first-year ice including some new and grey ice between the floes. During the latter part of September, a moderate to strong southerly circulation brought in warm temperatures and caused the new and grey ice to melt or be destroyed. The area northwest of Victoria Island had open water, which was very unusual for this time of year. Normally, the area should be covered

with very close pack old and thick first-year ice. The rest of the sound was very close pack old with some thick first-year ice.

During the first half of September, the ice north of Banks Island in M'Clure Strait lifted off the shore. By mid-month, the coastal area north of Banks Island had very close pack new ice including a trace of old ice while the rest of M'Clure Strait was covered with very close pack old and some thick first-year ice. As occurred in Viscount Melville Sound, a warm, southerly circulation during the second half of September caused most of the new ice to melt. By the end of the month, a mix of open water with areas of open to very open drift old and thick first-year ice along the northern coast of Banks Island and the extreme southeastern section of M'Clure Strait. Elsewhere, very close pack old with some thick first-year ice.

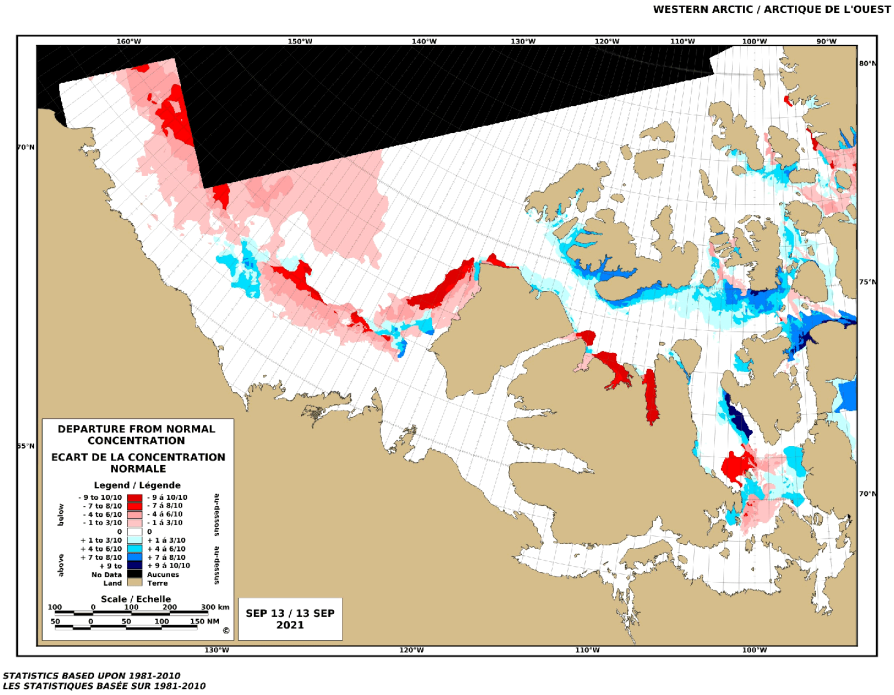

Figure 30: Departure from normal ice concentration for the Western Arctic area September 13th, 2021