Environment and Climate Change Canada | Environnement et Changement climatique Canada

Seasonal Summary

North American Arctic Waters

Summer 2017

By

Canadian Ice Service
Le service canadien des glaces

Canada

Summary over North American Arctic Waters

An early fracture of the southern Beaufort Sea ice and northern Baffin Bay sea ice led to generally above normal ice melt in 2017. Ice melt was 1-2 weeks ahead of normal across most of the Canadian Arctic, with some regions remaining 2-3 weeks ahead of normal through the summer. However, there were a few spots where ice melt was slower than usual. The ice over the Davis Strait and southern Baffin Bay area along the eastern Baffin Island coast prevailed longer than normal

Old ice from the northern Canadian Archipelago began to flow into the Parry Channel in early September which was unusual for that time of year.

Freeze up and new ice formation in the fall was delayed by 1-2 weeks across much of the Canadian Arctic.

The minimum sea ice coverage in early September ranked as the 9th lowest based on our records dating back to 1971.

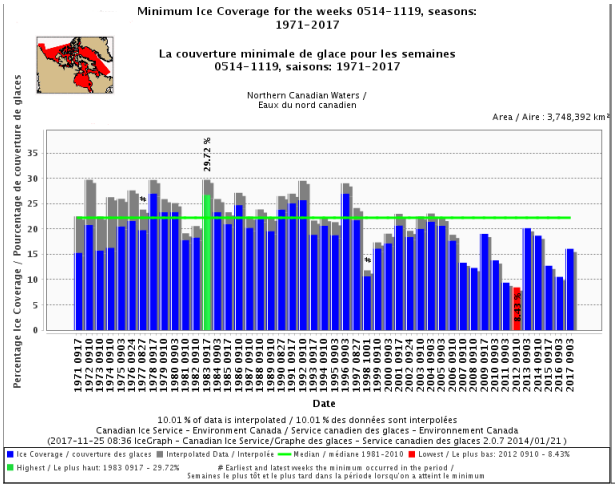

Figure 1: Minimum Ice coverage for Northern Canadian waters in 2017

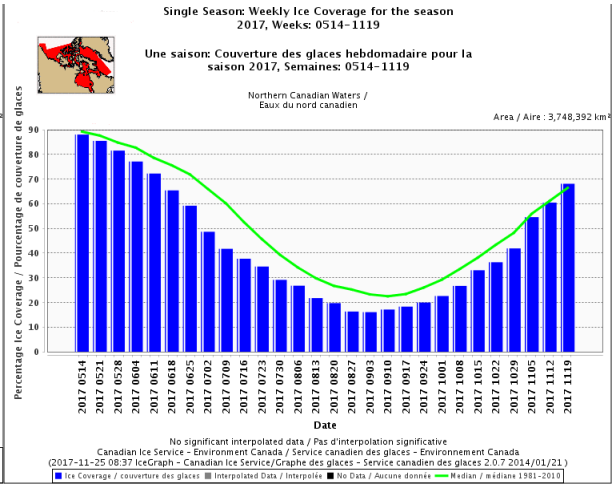

Figure 2: Weekly ice coverage for Northern Canadian waters in 2017

Hudson Bay and the Labrador Coast

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

Surface air temperatures were near normal over most locations except slightly above normal over the majority of Hudson Bay (figure 3).

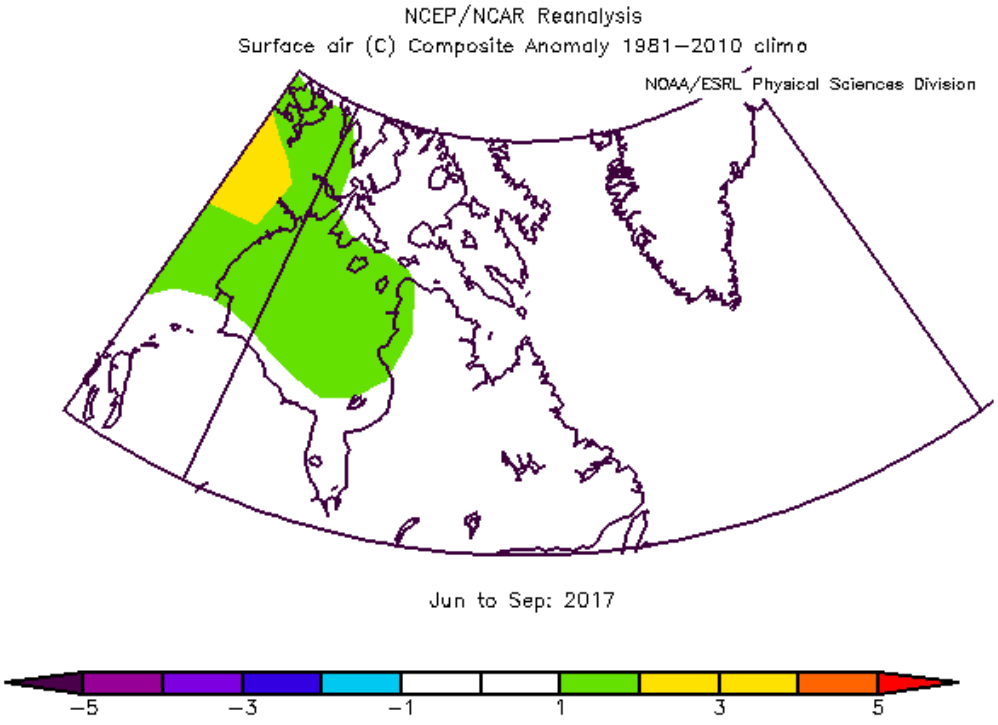

Figure 3: Air temperature anomaly for the Hudson Bay area from June to September

Summary of Ice Conditions:

At the start of June close to very close pack ice conditions were seen across the region, with open water to looser ice coverage in northwestern Hudson Bay, along parts of the southeastern coast of Hudson Bay as well as James Bay. In northwestern Hudson Bay, ice melt through the summer months was generally 1-2 weeks ahead of normal however the Davis Strait area as well as parts of Labrador region were seeing ice melt 1-2 weeks later that normal.

By early August a small area of ice remained in western Hudson Bay, generally near normal for that time of year. As for the Davis Strait area, the ice melt was remained about 2 weeks later than normal. The temperatures over this area were also below normal however this might have been a reflection of the presence of ice in that area. By the end of August ice remained along the Baffin Island Coast in Davis Strait and in southern Foxe Basin. The ice conditions in Foxe Basin were 1-2 weeks earlier than normal where the ice melt in Davis Strait was about 1-2 weeks later than normal.

By the middle of September ice had completely melted over the entire region, which represented close to normal ice conditions.

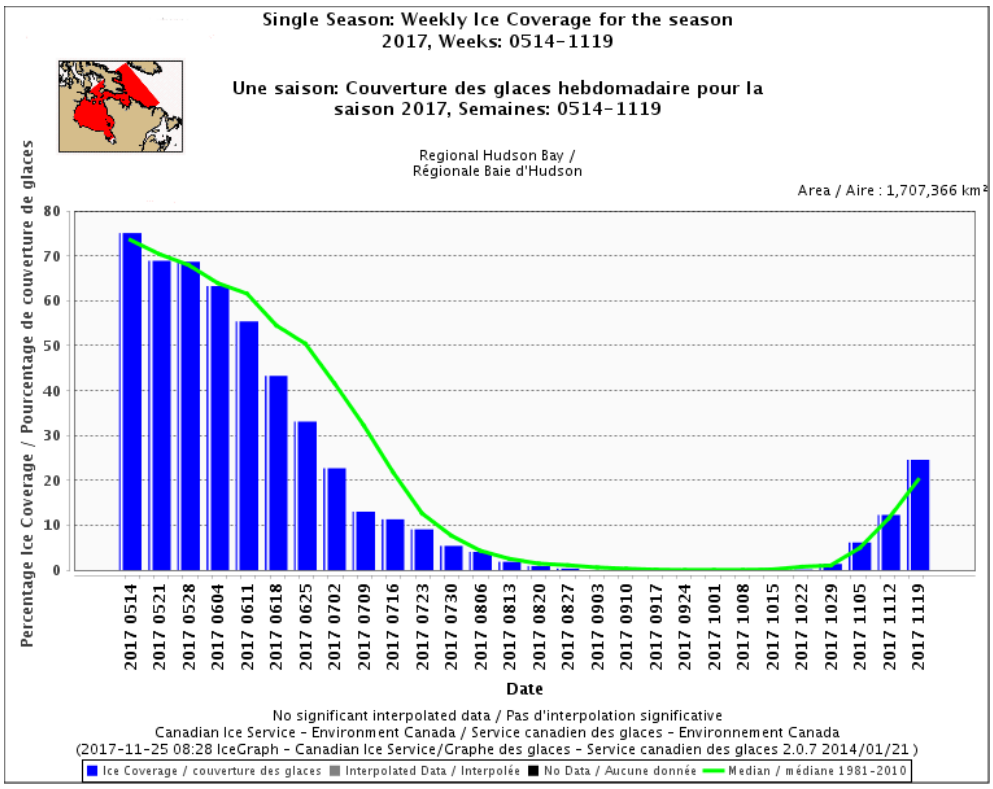

Figure 4: Weekly ice coverage for the Hudson Bay area for the 2017 season

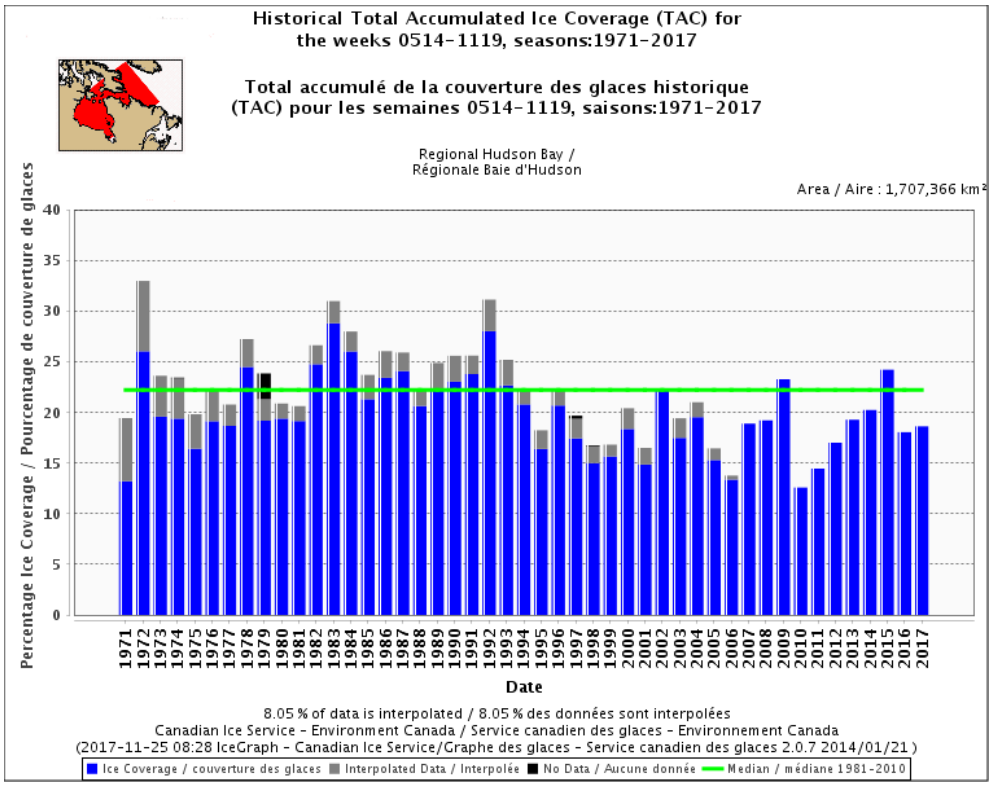

Figure 5: Historical Total Accumulated Ice Coverage for the Hudson Bay area

June Ice Conditions:

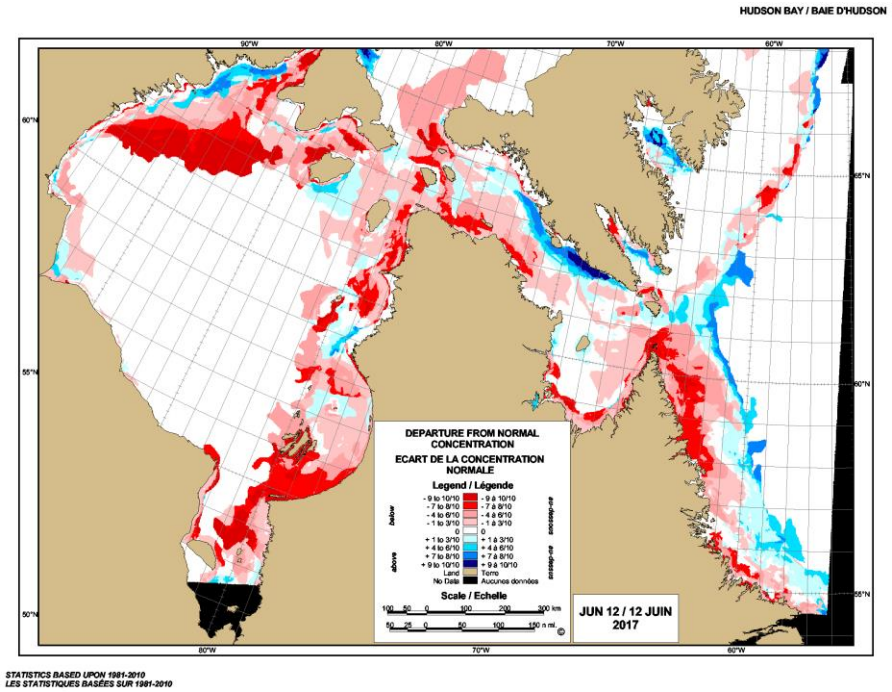

Figure 6: Departure from normal ice concentration for the Hudson Bay area near mid-June

At the start of June, ice within 120 nautical miles of the Labrador coast was mainly close to very close pack first-year ice including a trace of old ice with some areas of fast ice along the coast. Ice in Lake Melville melted fully in the first few days of June. Ice coverage off the Labrador coast was more extensive than the climate normal. By mid-June fast ice continued to fracture and was completely melted by the end of the month. Ice concentrations decreased in the second half of the month with only patches of mostly open drift ice between 55ºN and 56ºN and north of 60ºN along the Labrador coast by the end of the month. This represented unusual ice conditions for this areas at that time of year.

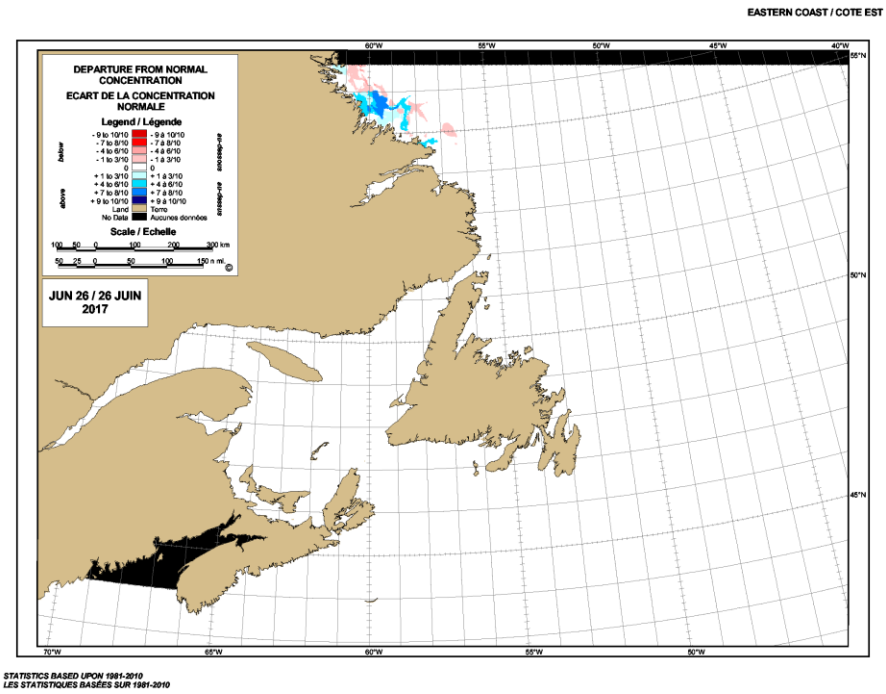

Figure 7: Departure from normal ice concentration for the east coast at the end of June

Fast ice in Frobisher Bay, along the coast of Cumberland Sound, and along southeastern Baffin Island coast diminished in coverage through June. However some fast ice remained in place at the end of the month. The ice concentration in both Frobisher Bay and Cumberland Sound presented a patchwork of great than and lesser than normal ice conditions during the entire month of June. The driving forces were winds and fracturing fast ice. Ice coverage in Davis Strait was slightly greater than normal, especially along the ice edge. The region was close to very close pack first-year ice including a trace of old ice.

Western Hudson Strait and eastern Ungava Bay saw early ice melt with some bergy water areas already present by early June. Throughout the rest of Hudson Strait and Ungava Bay, close to very close pack first-year ice including a trace of old ice persisted. Through the second half of the month ice continued to melt over Hudson Strait and Ungava Bay. By the end of the month most of the Hudson Strait and Ungava Bay were covered with open to very open drift ice with some higher concentrations of ice along the south coast of Ungava Bay. Patches of bergy water developed in western Hudson Strait.

Hudson Bay saw openings in the northwestern and eastern sections by early June which was ahead of climate normal. The rest of the region contained close to very close pack first-year ice. By mid-June ice melt continued over a broader area and covered most of the northern and eastern sections of Hudson Bay including James Bay

with below normal ice concentration. By the end of June, almost the entire Hudson and James Bays area was experiencing ice melt 2 weeks earlier than normal. The exception was southwestern Hudson Bay where ice melt was near normal.

July Ice Conditions:

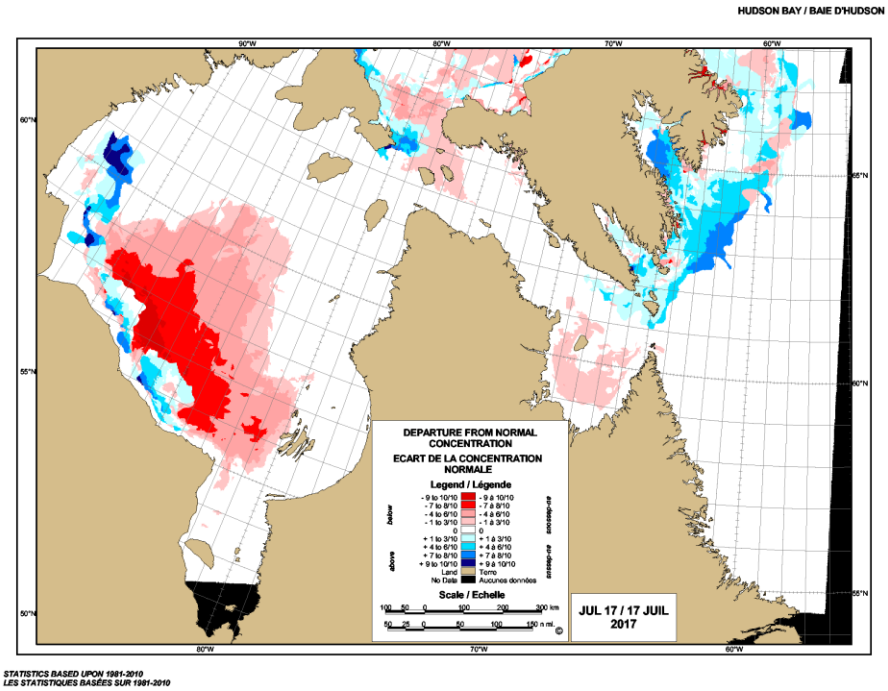

Figure 8: Departure from normal ice concentration for the Hudson Bay area near mid-July

In the first half of July the remaining ice in the Labrador sector melted. By the middle of July, most of Hudson Strait and all of Ungava Bay was bergy water. Only the extreme northwestern and extreme western Hudson Strait had close to very close pack first year ice. A trace of old ice was present in extreme northeastern Hudson Strait.

By the end of July, ice was still present in extreme western and extreme northeastern sections of Hudson Strait. The rest of Hudson Strait was bergy water.

By the end of the month, western Davis Strait was still covered with open drift to close pack ice with a trace of old ice. Some of this ice drifted into extreme northeastern Hudson Strait.

By the middle of July only the southwestern Hudson Bay area had close to very close pack first-year ice. Elsewhere in Hudson and James Bays, open water to ice free conditions prevailed. The south-central section of Hudson Bay had ice melt about 2 weeks earlier than normal however closer to the south-western shore of the bay the ice melt was slightly later than normal. By the end of July, only the western part of Hudson Bay had patches of open to very open drift ice. The melt in this area was slightly later than normal.

August Ice Conditions:

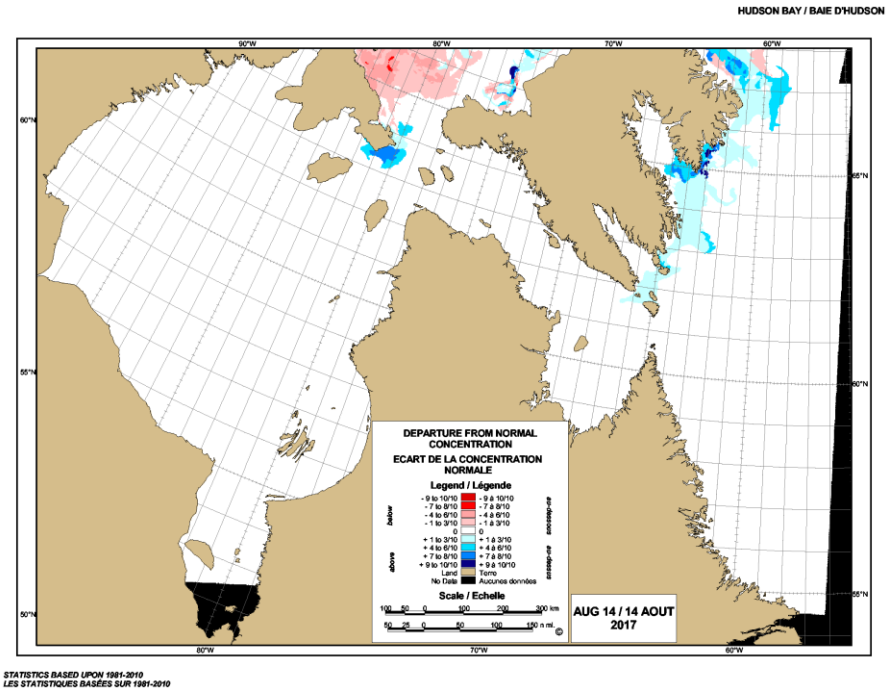

Figure 9: Departure from normal ice concentration for the Hudson Bay area near mid-August

The remaining ice in western Hudson Bay at the start of August finally melted in the first 10 days of the month.

The Labrador coast and most of Hudson Strait had bergy water conditions through the month of August. The exception was the extreme northeastern and extreme western Hudson Strait during the first half of August. Periodic incursions of ice from Davis Strait drifted into the northeastern part of Hudson Strait. Meanwhile ice from southern Foxe Basin moved through Foxe Channel and occasionally covered the area along the eastern coast of Southampton Island during the first three weeks of August

At the start of August Frobisher Bay still had some ice however by mid-month the bay was bergy water. Cumberland Sound also had ice at the beginning of August however most of the sound was bergy water by middle of the month with the exception of the eastern entrance where some first-year ice with a trace of old ice remained until the end of the month. Ice along the Baffin Island coast was open drift to very close pack first-year ice with up to one tenth of old ice. Ice concentrations diminished in the first two weeks of the month. By mid-August, the remaining ice was present from east of the entrance to Frobisher Bay northwards to the Cumberland Peninsula and north of Cape Dyer. The ice was very open drift with patches of very close pack first-year ice with up to one tenth of old ice. By the end of August patches of first-year with up to one tenth of

old ice was still present from the entrance to Cumberland Sound northwards. These ice conditions represented a 1-2 week delay relative to normal.

September Ice Conditions:

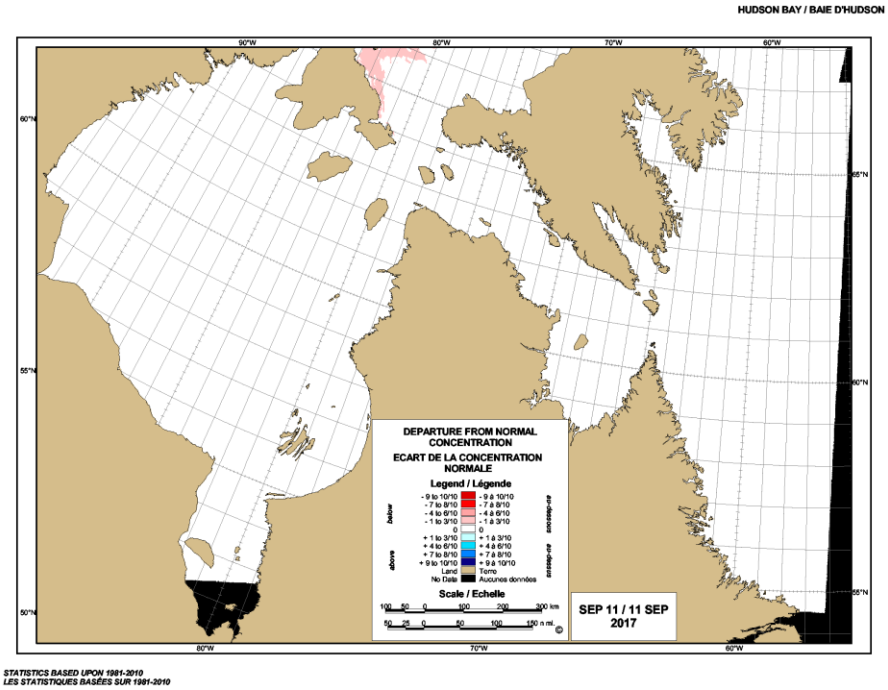

Figure 10: Departure from normal ice concentration for the Hudson Bay area near mid-September

By early in the second week of September the last remnants of ice along the Cumberland Peninsula had melted. Bergy water and ice free conditions were present across the region through to the end of the month.

Eastern Arctic and Canadian Archipelago

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

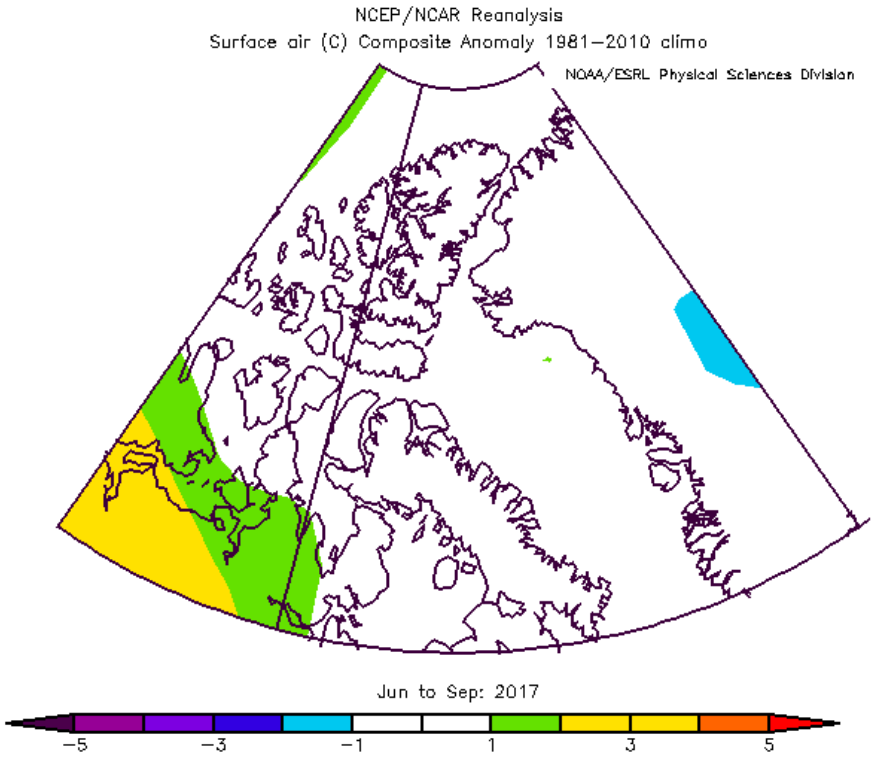

Figure 11: Air temperature anomaly for the Eastern Arctic area from June to September

From June to September, surface air temperatures were near normal over all locations.

Summary of Ice Conditions:

At the beginning of June the ice melt in northern Baffin Bay had already started and conditions were mainly bergy water.

Through the summer season the eastern arctic ice melt was roughly 2 weeks ahead of the climate normal. However there were a few areas where the ice melt was lagging climatology. In particular the area along the eastern shore of Baffin Island as well as Eureka Sound, Norwegian Bay and Jones Sound. The overall minimum ice coverage was lower than the climate normal and similar to ice coverages over the last decade.

Lancaster Sound saw an early breakup and melt of sea ice. However by mid-summer ice from Barrow Strait invaded Lancaster Sound.

Ice conditions in early June in central and southern Baffin Bay were very close pack first-year ice with up to a tenth of old ice. In the archipelago, ice remained consolidated. A trace of old ice was present through much of the Eastern Arctic. At the end of the melt season, ice remained in the waterways of Ellesmere Island, in Nares Strait, in southern Prince Regent Inlet, Gulf of Boothia and Committee Bay, and patches of ice lingered around the Cumberland Peninsula and Home Bay on along the eastern coast of Baffin Island.

Foxe Basin saw slightly early melt in the northwestern section of the region. Ice melt remained 1-2 weeks ahead of normal with full ice melt by early September with the exception of some ice that drifted in from Fury and Hecla Strait.

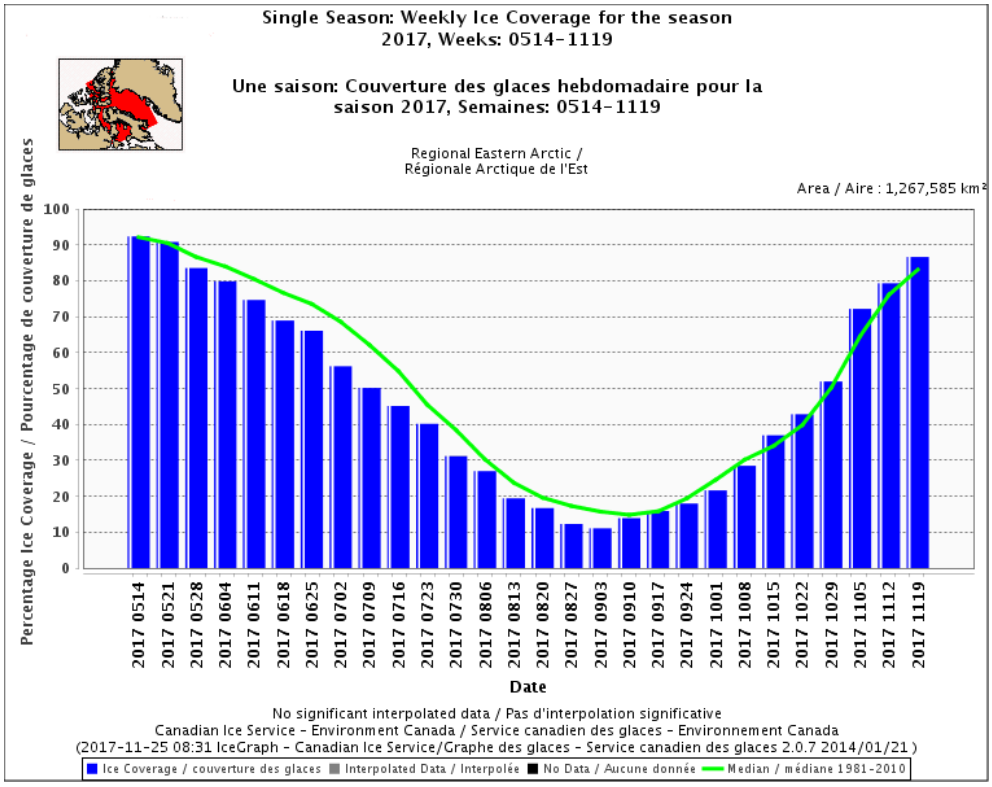

Figure 12: Weekly ice coverage for the Eastern Arctic area for the 2017 season

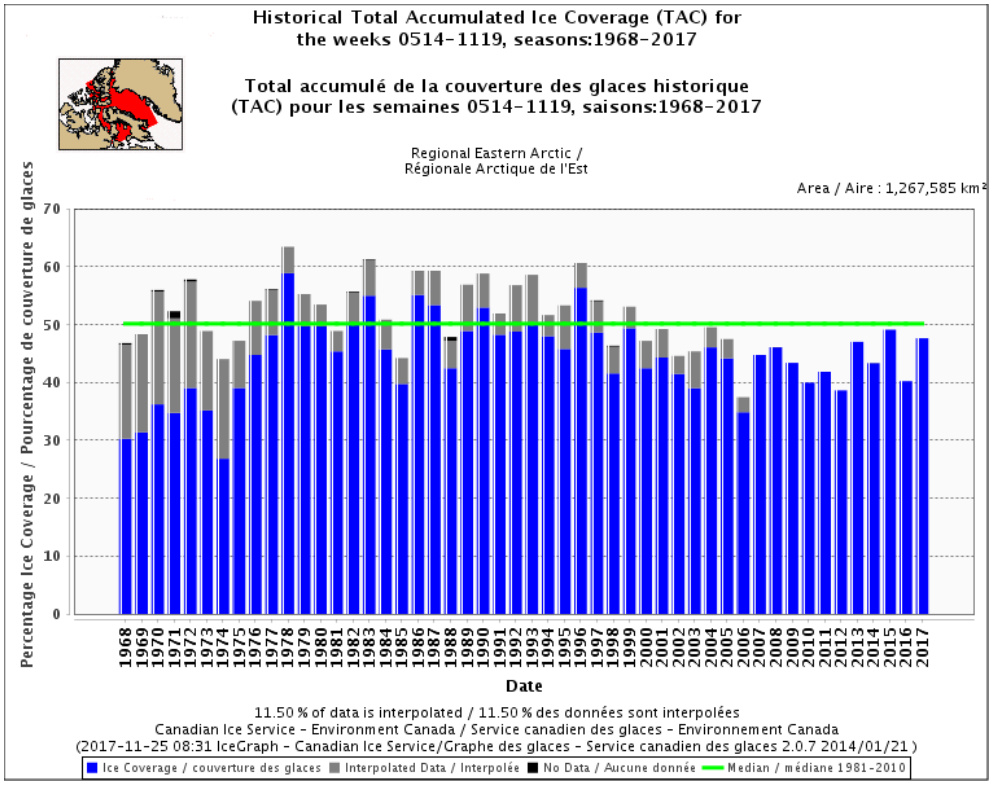

Figure 13: Historical Total Accumulated Ice Coverage for Eastern Arctic area

June Ice Conditions:

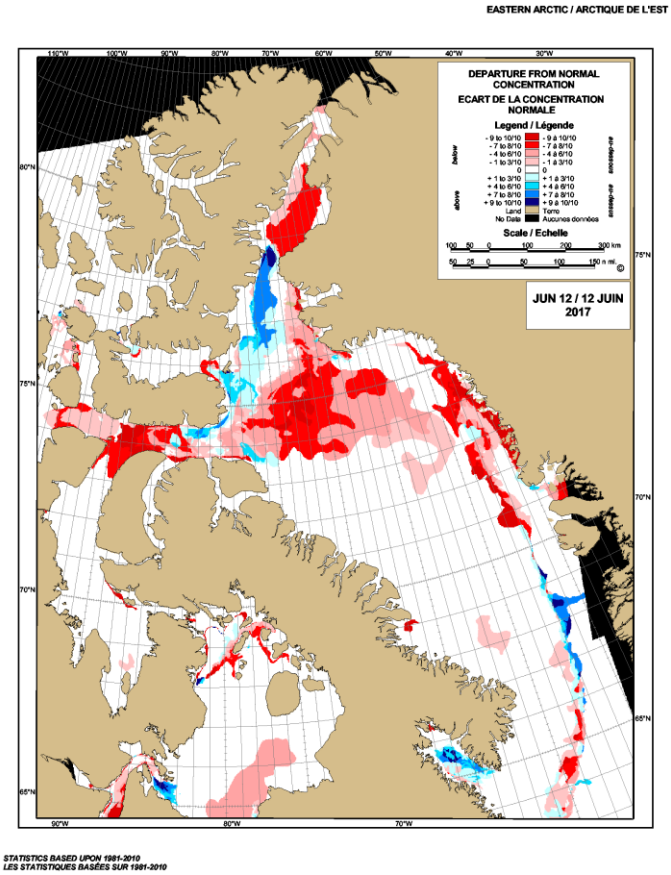

Figure 14: Departure from normal ice concentration for the Eastern Arctic area near mid-June

At the beginning of June, large areas of bergy water and very open drift first-year ice with a trace of old ice were present in western Lancaster Sound and the northern section of Baffin Bay. Significantly below normal ice conditions were seen over the winter period in these locations. However due to a lack of an ice bridge in Nares Strait, a continuous flow of mostly old ice drifted into the extreme northwestern part of Baffin Bay.

Foxe Basin saw early breakup in the northwestern portion of the basin. By mid-month areas in the southern portion of the basin became close pack first-year ice as ice began to melt.

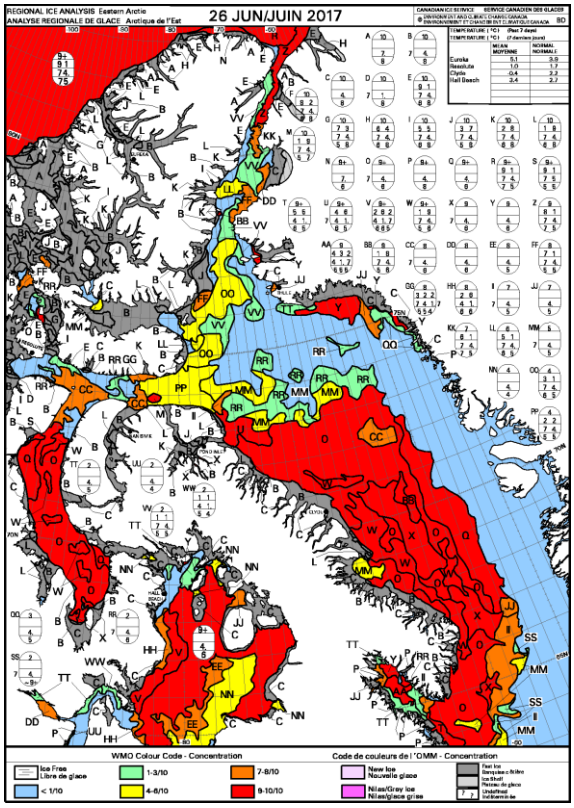

Figure 15: Eastern Regional ice chart near the end of June 2017

Ice melt progressed through June however the early melt of ice in the northern section of Baffin Bay meant that ice melt was 2-3 weeks ahead of the normal throughout the month. Areas of open drift first-year ice with up to 2 tenths old ice persisted during the entire month in eastern Lancaster Sound. Ice coverage eroded from the north and east in Baffin Bay with below normal ice concentrations in northeastern Baffin Bay with normal coverage closer to Baffin Island. The exception was the extreme northwestern Baffin Bay area where higher than normal ice from Nares Strait caused the delay of the bergy water route into Lancaster Sound.

Fast ice remained in place through the month along Baffin Island, Ellesmere Island, and the Greenland coast.

July Ice Conditions:

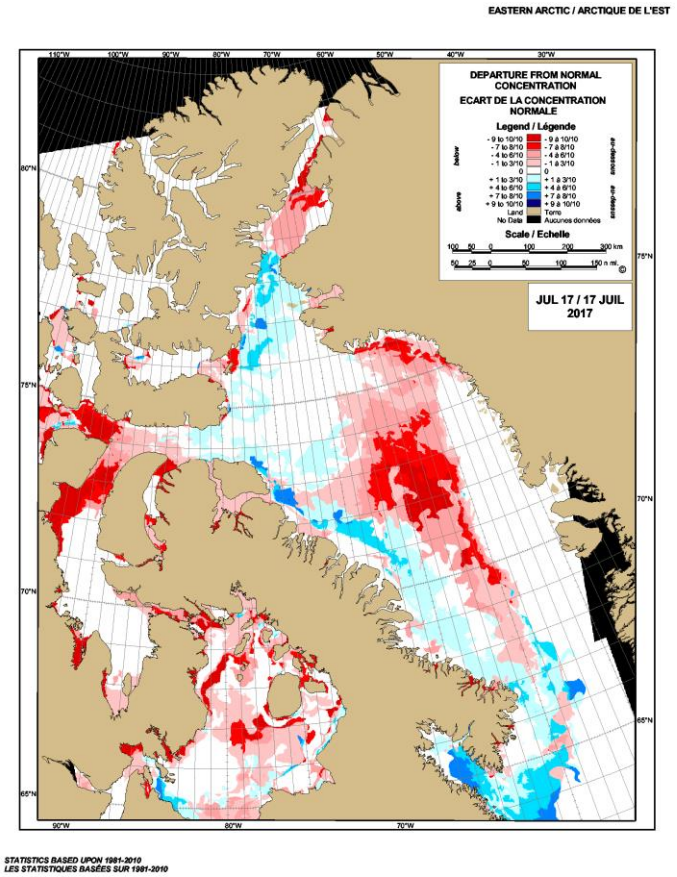

Figure 16: Departure from normal ice concentration for the Eastern Arctic area near mid-July

A patchwork of above and below normal ice concentration characterized conditions in mid-July. Less than normal ice was observed in central Baffin Bay, Foxe Basin, Lancaster Sound/Barrow Strait and most of Prince Regent Inlet. Above normal ice concentrations ran from Smith Sound southward along the eastern shore of Baffin Island

Well below normal ice coverage continued through July with ice melt remaining 2-3 weeks ahead of normal. In the first half of the month fast ice in Barrow Strait, Admiralty Inlet as well as Navy Board and Pond Inlets and along parts of northern Baffin Island fractured. Soon after mid-July, Jones Sound's consolidated ice had fractured.

In Baffin Bay ice continued to diminish in coverage from the north and east with ice present within 40 nautical miles of the eastern Baffin Island coast by the end of the month with bergy water elsewhere. The bergy water route into Lancaster from Baffin Bay finally opened during the third week of July. For the most part, ice along the Baffin Island coast was more extensive than usual.

By the end of the month most of the fast ice south of 77ºN had fractured except in Home Bay where some fast ice persisted. The only ice in Baffin Bay remained close pack to open drift ice near the Baffin Island coast. This ice was more expansive in coverage than is usual for that time of the year.

Lancaster Sound eventually became mainly bergy water by mid-July however ice from Barrow Strait began drifting eastward into western Lancaster Sound during the last week of July.

Ice in Prince Regent Inlet and the Gulf of Boothia diminished from close to very close pack first-year ice with a trace of old ice early in the month to a mixture of bergy water and areas of close to very close pack ice, mostly in the eastern section, by the end of the month. These conditions were ahead of normal in terms of ice melt. Ice in the Committee Bay area remained close to very close pack with the exception of Pelly Bay where mainly open water conditions prevailed since the middle of July.

Foxe Basin saw a continuation of the ice melt than began in June in the northwestern and southeastern sections. Most fast ice over the northern islands and Fury and Hecla Strait was completely fractured by the third week of the month. By the end of the month areas of close to very close pack first-year ice remained in the northeastern, eastern and southwestern sections. Open water was present in the northwestern and south-central sections of the basin.

Parts of Eureka Sound had fractured by the end of July.

August Ice Conditions:

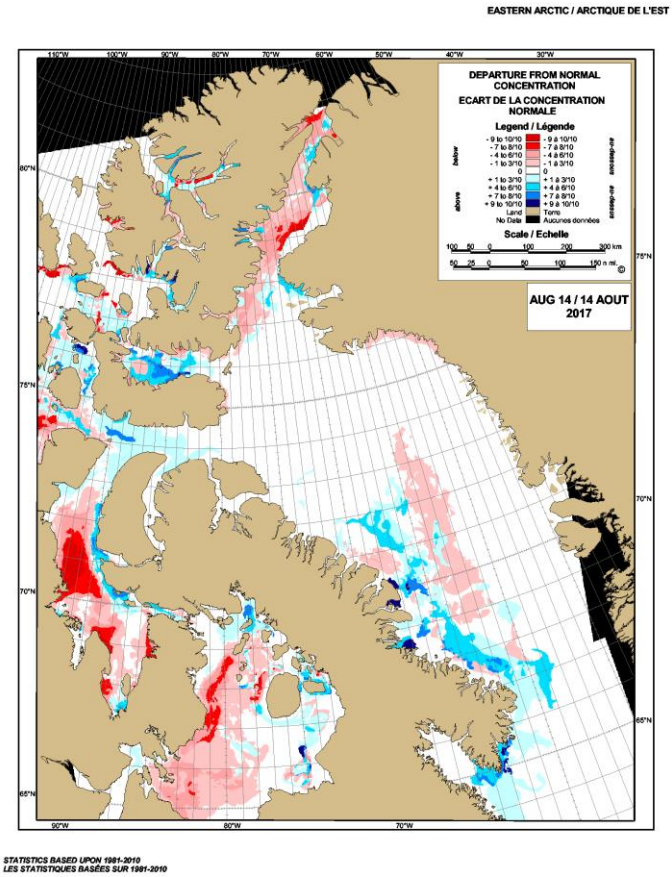

Figure 17: Departure from normal ice concentration for the Eastern Arctic area near mid-August

The remaining fast ice in Eureka Sound fractured during the second week of August. The fast ice in Norwegian Bay fractured entirely by mid-August. During the second half of August, conditions loosened somewhat however significant areas of very close back first-year and old ice persisted by the end of the month.

Close to very close pack old ice flowing from the Lincoln Sea to Nares Strait slowed somewhat as the landing edge neared 76ºN during the first half of August. However the second part of the month saw the leading edge reach the eastern Devon Island coast and eastern Jones Sound. Ice from Barrow Strait continued to drift into Lancaster Sound during the first week three of August however by the end of the month mostly bergy water prevailed with only a few patches of ice remaining

In the first half of the month ice concentrations in Prince Regent Inlet remained stable with very open drift first-year and old ice due to an influx from eastern Barrow Strait/western Lancaster Sound area. By the end of the month most of the ice melted except in the southern section. The Gulf of Boothia saw a mixture of close pack to very open drift first-year ice with a trace of old ice, mainly in Committee Bay. In the second

half of the month ice in Committee Bay diminished to very open drift with some patches of close pack ice first-year with a trace of old ice.

Ice in Baffin Bay along the Baffin Island coast diminished to close pack to very open drift first-year ice with up to one tenth of old ice south of 73ºN by mid-month. By the end of the month, areas of open to very open drift ice prevailed along the Baffin Island coast south of 70ºN. Foxe Basin saw continued ice melt at 1-2 weeks ahead of the climatological normal. By mid-month open drift first-year ice remained in the north-central, eastern and southwestern sections. By the end of the month only a few patches of very open drift first-year ice remained in the northeastern, eastern and southwestern sections. Very open drift first year ice with a trace of old ice drifted from Fury and Hecla Strait into the extreme northwestern section of Foxe Basin.

September Ice Conditions:

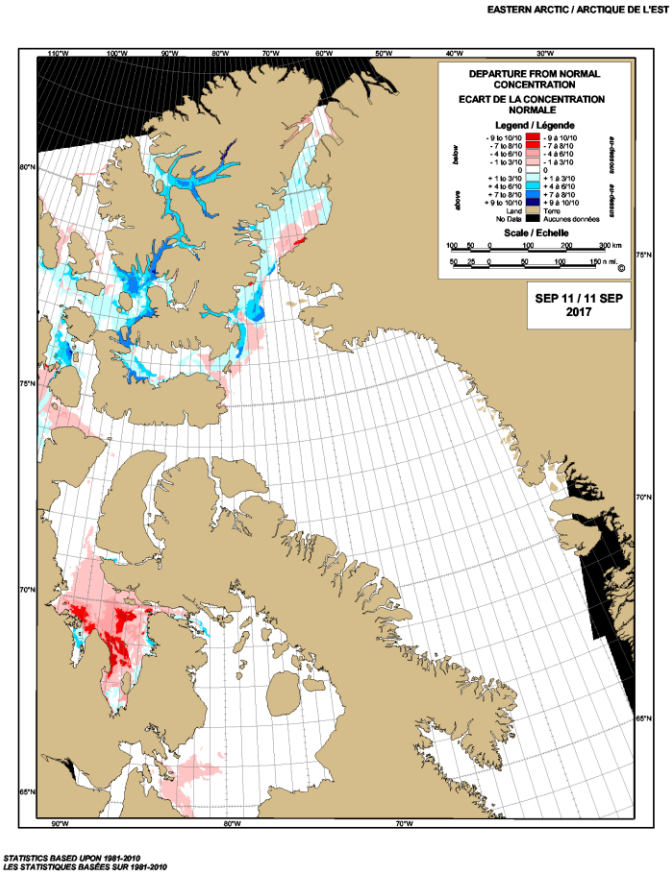

Figure 18: Departure from normal ice concentration for the Eastern Arctic area near mid-September

At the beginning of September areas of close to very close pack first-year ice and old ice persisted in Eureka Sound. New ice also began to form. By the end of the month very close pack first-year ice and old ice covered the area. At no time did the sound clear to mainly bergy water conditions this year.

Norwegian Bay had mostly close to very close pack first-year ice and old ice with new ice forming by mid-September. By the end of the month, grey ice grew between the first-year ice and old ice floes. Some coastal fast ice was forming by the end of the month.

Bergy water conditions in Wellington Channel and Hell Gate Strait allowed old ice to begin to flow into Lancaster Sound and Jones Sound from the northern regions of the Canadian Arctic Archipelago by mid-month.

The ice in Committee Bay never melted completely by the end of the month. Open drift to close pack first-year ice with a trace of old ice remained mostly in the eastern section of the bay. Small zones of very open drift first-year ice including a trace of old ice drifted into Fury and Hecla Strait.

The remaining ice in Foxe Basin melted fully in the first week of the month. Ice free conditions were seen through the month except for a few strips of first-year ice with a trace of old ice moving through Fury and Hecla Strait into extreme northwestern Foxe Basin by mid-month.

Western Arctic

Summer Ice Conditions and Fall Freeze-up

Summer Temperatures: June to September

From June to September, surface air temperatures were above normal over most locations except near normal over the central and northern part of the western Arctic Archipelago.

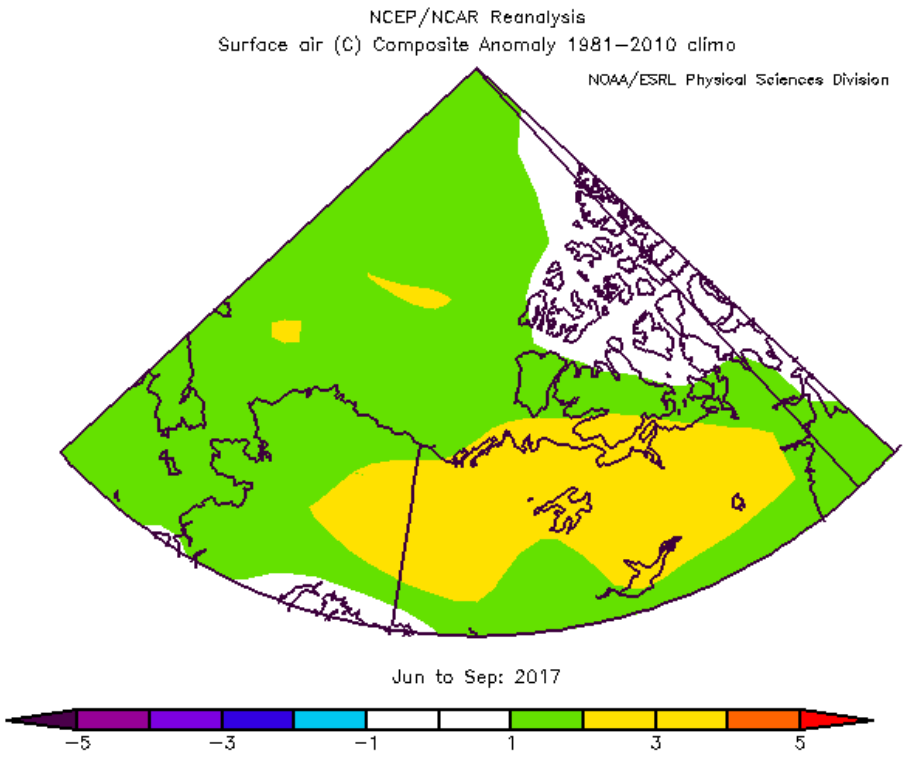

Figure 19: Air temperature anomaly for the Western Arctic area from June to September

Summary of Ice Conditions:

The southern Beaufort Sea saw a very early sea ice breakup (6 weeks ahead of normal) with open water already present in the region by the start of June. Throughout the summer coverage remained below normal in the Beaufort Sea. Throughout the western Canadian Arctic the minimum sea ice coverage was reached in late September and ranked in the lowest 8 coverages in the climate record.

In early June, consolidated ice was present across the Archipelago with predominantly first-year ice and old ice over areas south of the Queen Elizabeth Islands and old ice in areas to the north. Significantly less old ice was present in a vast area of the Beaufort Sea whereas an area from M'Clure Strait, Viscount Melville Sound, McClintock Channel and Larsen Sound had areas with great than normal old ice.

The southern Northwest Passage had less than 10% ice coverage from mid-July through to early October.

As the melt season progressed, much of the Parry Channel saw ice melt which was earlier than normal. Because of this, old ice from the northern Archipelago drifted into the Parry Channel.

Freeze up began in northern regions in the second half of September with ice growth delayed by 2 weeks across much of the region.

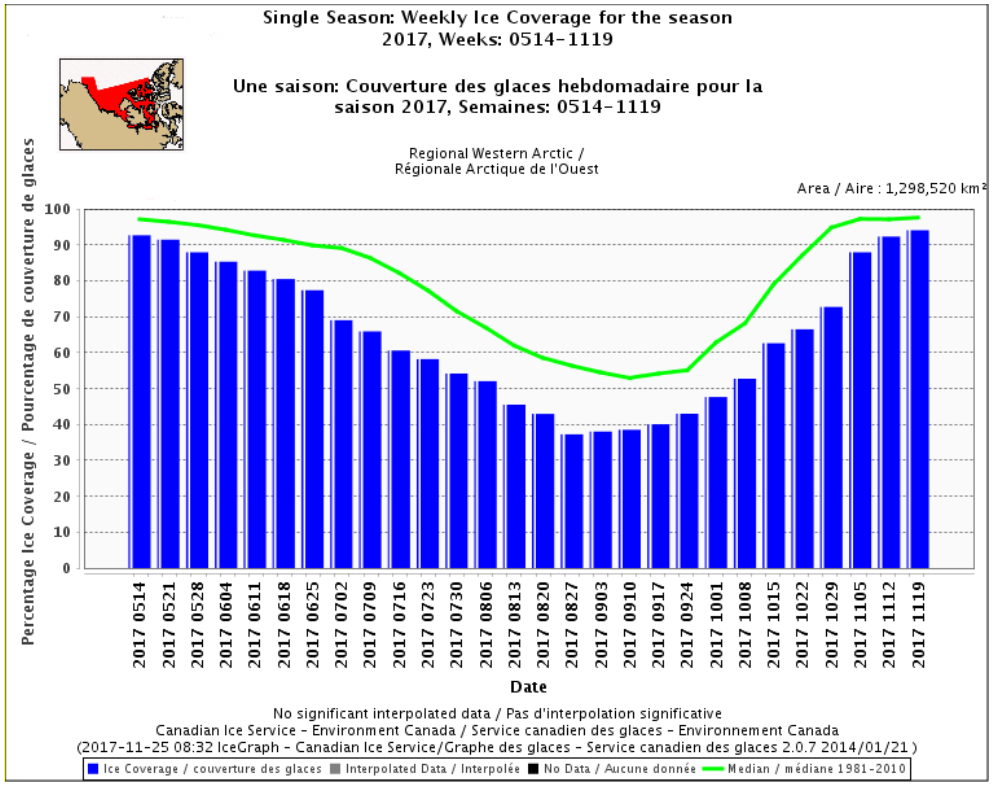

Figure 20: Weekly ice coverage for Western Arctic area for the 2017 season

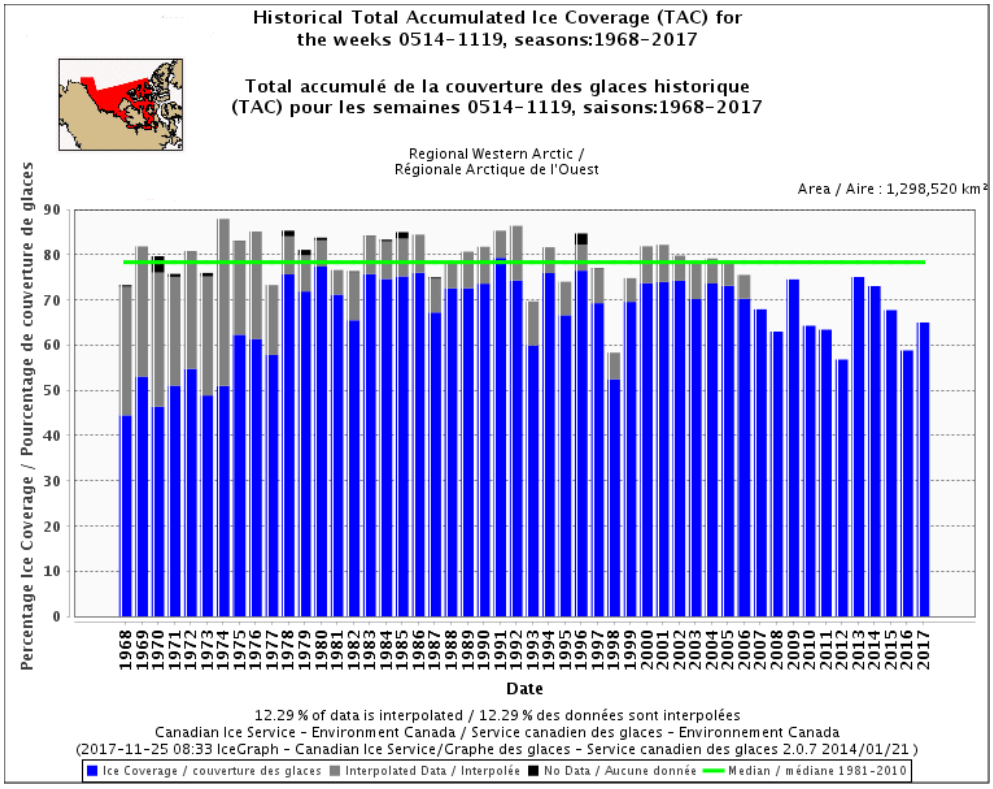

Figure 21: Historical Total Accumulated Ice Coverage for Western Arctic area

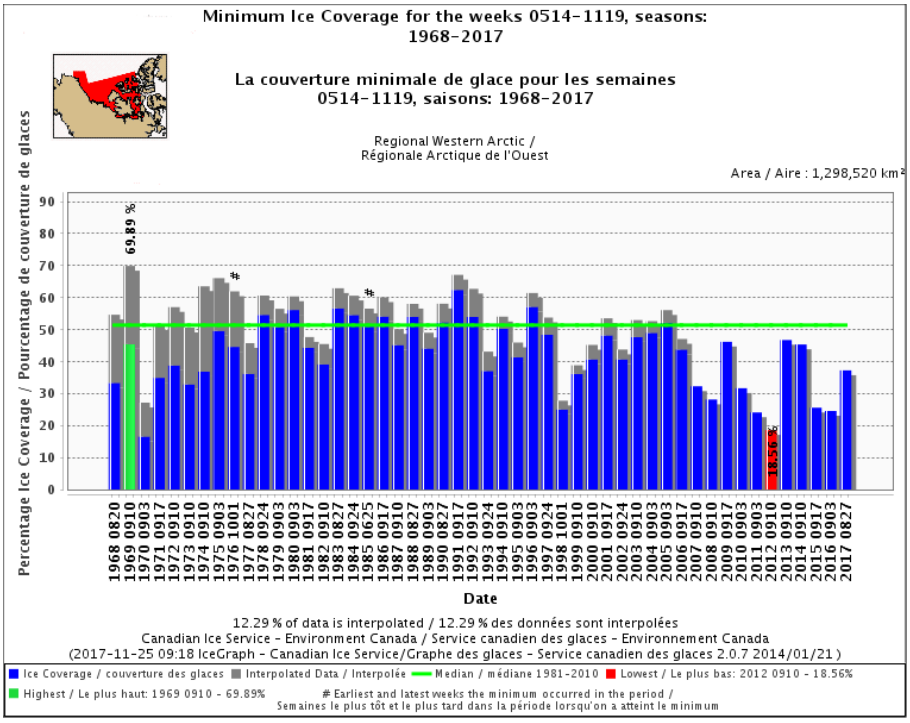

Figure 22: Minimum Ice Coverage for the Western Arctic area, 1971-2017

June Ice Conditions:

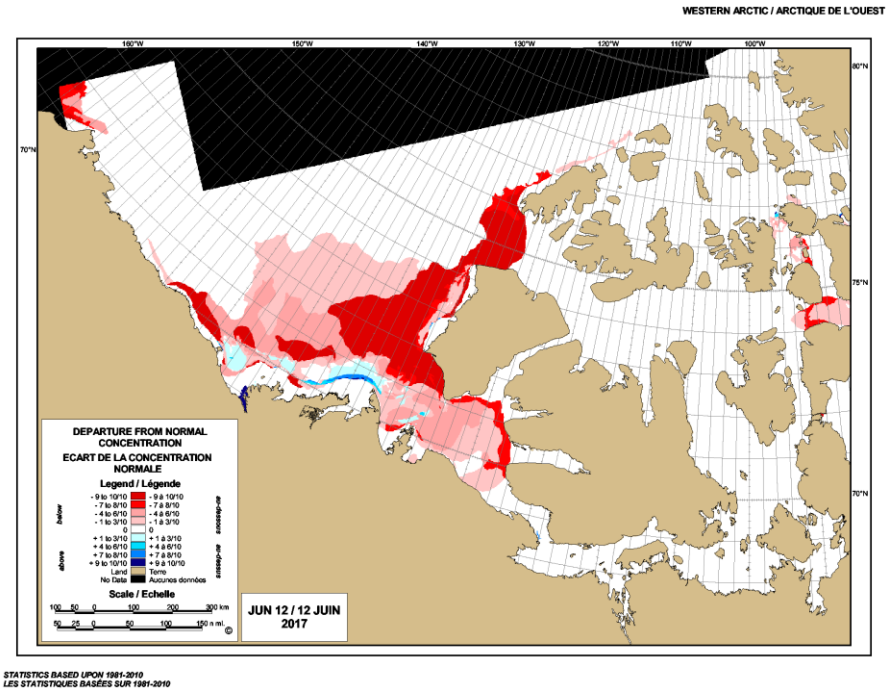

Figure 23: Departure from normal ice concentration for the Western Arctic area near mid-June

Areas of open water were already present over the southeastern Beaufort Sea at the beginning of June and persisted until the end of June, well below the climate normal of ice coverage through the month (6 weeks ahead of normal).

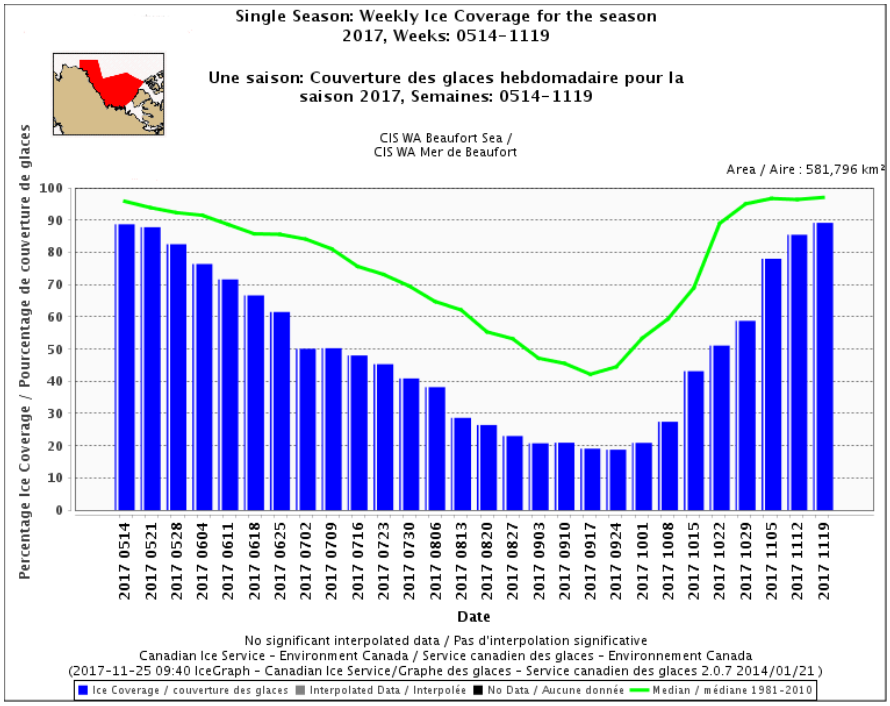

Figure 24: Ice coverage Beaufort Sea 2017 – early breakup and lower coverages

Consolidated old ice was present in the Queen Elizabeth Island Mainly first-year ice and old ice in the Parry Channel as well as McClintock Channel. Consolidated first-year ice prevailed over most of Queen Maud Gulf.

Amundsen Gulf was consolidated for only a short period during the winter hence the clearing of the gulf had started about 2-3 weeks earlier than normal. Fracture of consolidated first-year ice with a trace of old ice along the coastal area of Amundsen Gulf and along the coast from Paulatuk to near Barter Island began during the last week of June. By the end of June small fractures began in the consolidated ice in Victoria Strait and Coronation Gulf while ice melt continued in the southeastern Beaufort Sea and Amundsen Gulf.

July Ice Conditions:

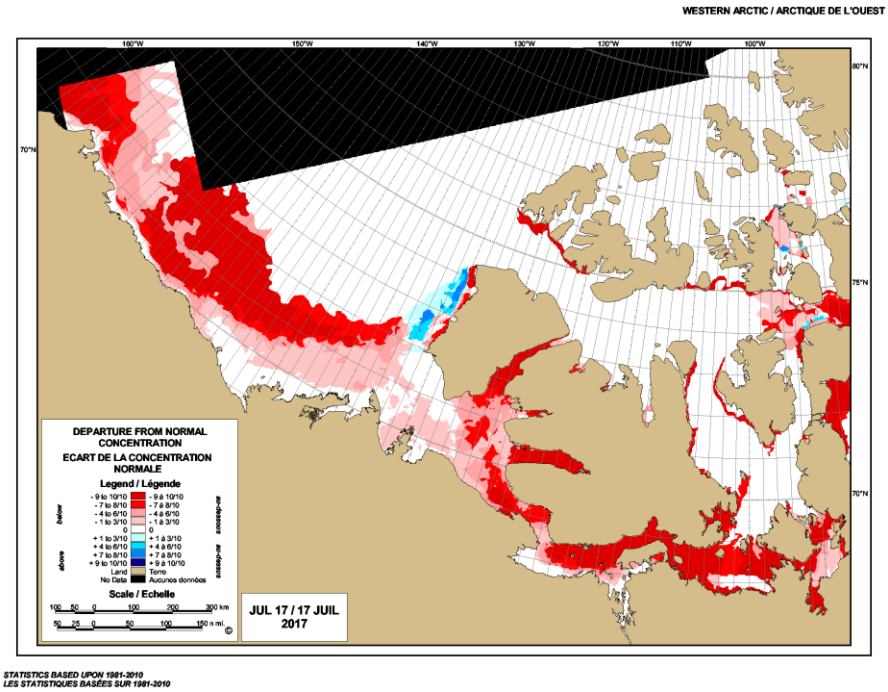

Figure 25: Departure from normal ice concentration for the Western Arctic area near mid-July

The remainder of consolidated ice from Barter Island to Point Barrow as well as Queen Maud Gulf fractured during the first half of July. Open water conditions prevailed from western Queen Maud to Barter Island by mid-July. Consolidated ice from M'Clure Strait to Barrow Strait, McClintock Channel, Larsen and Peel Sounds fractured around the middle of July. Through mid-July ice melted faster than the climate normal through the southern Amundsen Gulf all the way to Queen Maud Gulf.

During the second half of July, looser ice pack conditions developed in the western Beaufort.

By the end of the month open water was present from King William Island to west of Point Barrow except for a few areas of very open drift first-year ice with a trace of old ice east of Point Barrow.

August Ice Conditions:

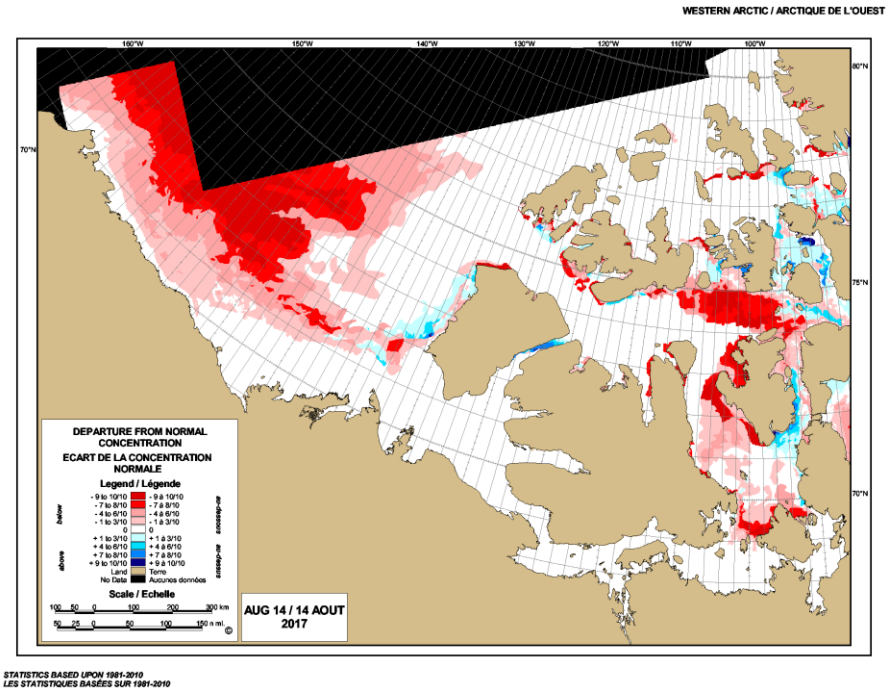

Figure 26: Departure from normal ice concentration for the Western Arctic area near mid-August

Ice concentrations continued to diminish during August especially in the western Beaufort Sea. The consolidated ice around the Queen Elizabeth Islands began to fracture in the southeastern section during the first week of August. Open water developed in portions of Barrow Strait, south of Bathurst Island.

In the first half of August ice concentrations rapidly diminished in the western Beaufort with mainly open water west of 145ºW and south of 76ºN. Open water conditions from the coastal area of Alaska eastward to Queen Maud Gulf.

The balance of the consolidated ice fractured around the Queen Elizabeth Islands by the end of August.

During the second half of August ice concentrations continued to diminish with open water areas developed in the eastern Parry Channel area. Because of the open water conditions, old ice from the Queen Elizabeth Islands began flooding through Byam Martin Channel into the Parry Channel.

Over the Beaufort Sea, large areas of open water existed west of 140ºW while close pack to very close pack old ice remained present west and north of Banks Island, M'Clure Strait, Viscount Melville Sound and the Queen Elizabeth Islands.

September Ice Conditions:

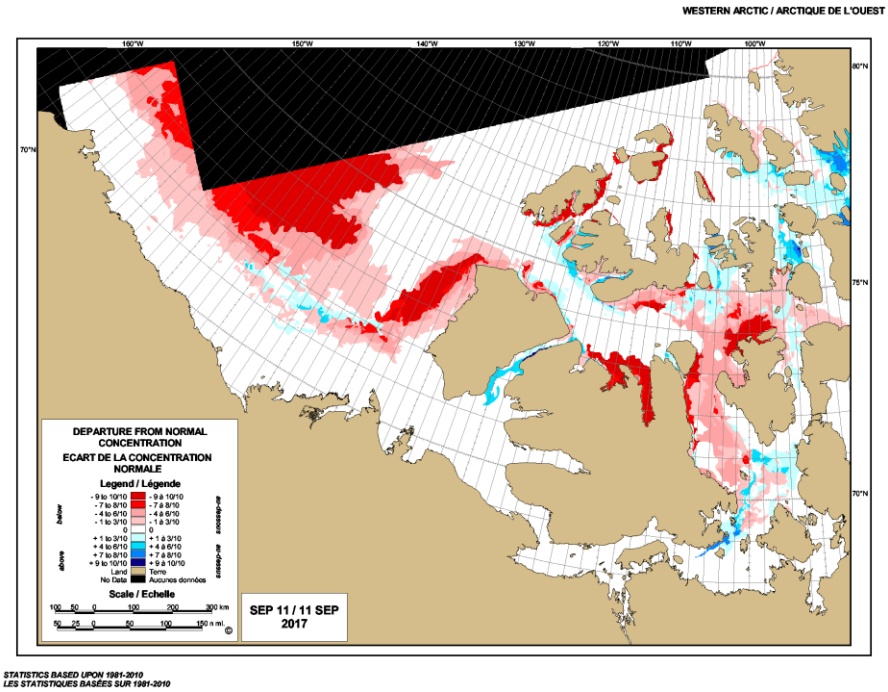

Figure 27: Departure from normal ice concentration for the Western Arctic area near mid-September

During the first two weeks of September little ice remained through the southern waterways of the Northwest Passage from Point Barrow to northern Peel Sound. However the Larsen Sound and Victoria Strait area never cleared out during the 2017 summer melt season. Parry Channel contained open drift to close pack old ice which was pushing through Byam Martin Channel from the north. Open water was present up to 77ºN in the western Beaufort Sea and the area west of Banks Island.

The second half of September saw a slowing of the retreat of ice as temperatures began to cool which caused the stabilization of the ice situation. Old ice continued to drift southward from Byam Martin Channel into eastern Viscount Melville Sound and western Barrow Strait.

The Beaufort Sea saw its seasonal ice coverage minimum near 18.7%, the eighth lowest coverage on record. This minimum occurred near the end of the month, before the production of new ice began in the northern Beaufort Sea.

New ice started to appear over the northern Beaufort Sea and Queen Elizabeth Islands during the second and third weeks of September and spread southward to Parry Channel by the end of the month.