

**NATIONAL WEATHER SERVICE INSTRUCTION 10-330**

**OCTOBER 28, 2014**

**Operations and Services**

**Marine and Coastal Weather Services, NWSPD 10-3**

**OCEAN AND GREAT LAKES ICE SERVICES**

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**NOTICE:** This publication is available at: <http://www.nws.noaa.gov/directives/>

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**OPR:** OS21 (W. Weeks)

**Certified by:** OS21 (M. Tew)

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**SUMMARY OF REVISIONS:** This Instruction supersedes NWSI 10-330, dated October 18, 2012. The following revisions were made:

1. Section 3.2 and 3.2.1: Added paragraphs describing the Sea Ice Outlook as a separate product and including the Mission Connection.
2. Sections 3 – 6: Renumbered.
3. Appendix A: Updated Sea Ice Advisory and Sea Ice Outlook Examples.
4. Appendix A: Added Graphic Product Examples.
5. Updated text for Section 6.1, (formerly 7.1) adding reference to the NDFD.
6. Updated text for Section 6.4 (formerly 7.4), adding “Marine Weather Statements may be issued by each Great Lakes Forecast Office.”
7. 6.4c (formerly 7.4c): Deleted “moderate to” from *moderate to* rapid ice growth.
8. Appendix B: Updated the example of a Great Lakes Ice Outlook.
9. Appendix B. 5: Added the sentence “. The Ice Advisory headline is included in the Ice Outlook at the beginning of the 5 Day Ice Discussion.”
10. Updated the example of a Great Lakes Ice Advisory.

Signed

October 10, 2014

Andrew D. Stern  
Acting Director, Office of Climate,  
Water, and Weather Services

Date

**OCEAN ICE SERVICES  
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**1 Introduction.** This instruction describes the National Weather Service (NWS) Ocean and Great Lakes Ice Services.

**2 Alaskan Sea Ice Services.** Forecasts, analyses, and advisories will be produced routinely throughout the year by Weather Forecast Office (WFO) Anchorage for the sea waters surrounding Alaska. Lake ice and icebergs or glacier ice detached from glaciers and floating in seawater are excluded.

**3 Alaskan Sea Ice Products**

**3.1 Sea Ice Advisory.** A 5 day Sea Ice Advisory text product will be issued three times a week on Mondays, Wednesdays, and Fridays.

**3.1.1 Mission Connection.** The Sea Ice Advisory is an alphanumeric product that provides analysis, forecast, and climatological information pertaining to sea ice in the waters surrounding Alaska. The Sea Ice Advisory is critical for vessels in planning a safe route through waters routinely impacted by sea ice movement. This product is intended to provide information to assist in the protection of life and property and enhance the nation’s economy.

**3.2 Sea Ice Outlook.** The Sea Ice Outlook is issued on the fourth Thursday of every month and covers a one to three month time frame.

**3.2.1 Mission Connection.** The objective of the outlook is to provide a one to three month forecast based on climate patterns. This provides data for long-range planning by commercial, government, and private users.

**3.3 Graphic Products.** Graphic analysis products, including the Ice Analysis, the color Ice Analysis, the Cook Inlet Ice Analysis, and the Sea Surface Temperature Analysis will be issued daily. The Five Day Sea Ice Forecast will be issued Monday, Wednesday and Friday. Graphic products will be consistent with the concurrent text product. In addition, the NWS and the National Ice Center (NIC) should confer on difficult sea ice analyses and forecasts. Products are made available via various means of dissemination such as: the Internet, File Transfer Protocol (ftp) E-Mail, and Marine Radio Facsimile Broadcast.

**3.3.1 Ice Analysis.** A graphical analysis of the sea ice conditions over the waters surrounding Alaska, West from the Kenai Peninsula to 171°E and North to the Bering Sea and Arctic Ocean. This graphic is produced daily in both black and white and full color versions.

**3.3.1.1 Mission Connection.** The Ice Analysis is a graphic depicting sea ice locations, concentrations, and thickness. The Ice Analysis is issued routinely to aid ships navigating the ice-covered waters surrounding Alaska. The information is critical for vessels in planning a safe route through waters routinely impacted by sea ice movement. This product is intended to provide information to assist in the protection of life and property and enhance the nation's economy.

**3.3.1.2 Cook Inlet Ice Analysis.** A detailed graphical analysis, produced daily, of the sea ice conditions over the waters of the Cook Inlet.

**3.3.2 Sea Surface Temperature Analysis.** The analysis, produced daily, is a graphical depiction of sea water temperatures for the areas surrounding Alaska, which includes the latest ice edge.

**3.3.2.1 Mission Connection.** The Sea Surface Temperature Analysis is a graphic depicting sea surface temperature contours for the waters surrounding Alaska. The product is issued routinely to provide sea surface temperature information to vessels operating in the waters around Alaska. It complements the suite of sea ice graphics issued for this region. The Sea Surface Temperature Analysis product is intended to provide information to assist in the protection of life and property and enhance the nation's economy.

**3.3.3 Five Day Sea Ice Forecast.** A graphical 5 day forecast, produced Monday, Wednesday, and Friday, showing expected ice conditions over the waters surrounding Alaska.

**3.3.3.1 Mission Connection.** The Five Day Sea Ice Forecast is a graphic depicting forecast sea ice conditions over the waters surrounding Alaska valid at the day five period. The Five Day Sea Ice Forecast is issued routinely updated when necessary, to aid ships navigating the sea waters surrounding Alaska. The information is critical for vessels in planning a safe route through waters routinely impacted by sea ice movement. This product is intended to provide information to assist in the protection of life and property and enhance the nation's economy.

**4 Marine Weather Statement.** Ice also forms in various bays and coastal areas of the 48 contiguous states. Marine Weather Statements (MWSs) may be used to alert mariners of such conditions in their marine area if, in the forecaster's judgment, they may be hazardous to shipping.

**4.1 Mission Connection.** MWSs provide the public with detailed marine weather information describing non-severe, but potentially hazardous conditions; and to provide information for a variety of conditions not covered by warnings or routine forecasts. WFOs should issue MWSs if, in the forecaster's judgment, ice conditions are forecast to be hazardous to shipping.

**5 Great Lakes Ice Services.** Great Lakes ice services provide lake ice observations, forecasts, outlooks, and advisories during the months in which ice cover on the lakes and their connecting passages impacts shipping; usually between December and April. This instruction describes the NWS Great Lakes Ice Services.

## 6 Great Lakes Products

**6.1 Great Lakes Ice Outlook.** During the ice season, WFO Cleveland will issue a 5 day ice forecast / advisory product on Monday, Wednesday, and Friday of each week between 4 and 5 p.m. local time. It will have a detailed ice discussion with a description of the formation, deterioration, coverage and movement of the ice fields, including a general description of the impact expected on shipping, shipping channels and access to ports. The ice outlook will also include a summary of the maximum forecast winds and wind direction for points on each lake for the next 60 hours as well as forecast high and low temperatures for selected port cities for the next 5 days. Supplemental data will include normal temperatures, accumulated freezing degree days, and observed ice conditions. Links will be provided to correlate graphical forecasts as well as supporting graphics from the Great Lakes Environmental Laboratories. All forecast data should be pulled from the National Digital Forecast Database to ensure consistency.

**6.1.1 Mission Connection.** The Great Lakes Ice Outlooks are alphanumeric products that provide analysis, forecast, and climatological information pertaining to ice in the waters of the Great Lakes. They are critical for vessels in planning a safe route through waters routinely impacted by ice movement. These products are intended to provide information to assist in the protection of life and property and enhance the nation's economy.

## 6.2 Freeze-up Outlooks

**6.2.1 Great Lakes Freeze-Up Outlook.** For Lakes above Lake Ontario, WFO Cleveland will issue a freeze-up outlook during the first and third week of each month from November through December depending on existing ice conditions. It will indicate whether ice conditions will occur earlier, later, or about the normal times over the Lakes, and should be consistent with the 30 and 90 day outlooks of the NIC. Include in the Outlook supporting data, such as selected water temperatures from water intakes and from National Oceanic and Atmospheric Administration (NOAA) data buoys.

**6.2.2 Outlook for Freeze-up on the St. Lawrence River.** WFO Buffalo will issue an outlook for freeze-up on the St. Lawrence River at Massena, NY, during the first and third week of each month from November through December depending on existing ice conditions. It may be issued at other times if, in the forecaster's judgment, conditions significantly differ from the current outlook. The outlook should be consistent with 30 and 90 day outlooks of the NIC. Other ice products are normally not needed for Lake Ontario and the St. Lawrence River because the Welland Canal and the river usually close in December.

**6.3 Great Lakes Break-up Outlook for the Opening of Navigation.** WFO Cleveland will issue this outlook once in the spring on or before March 15. Include a summary of current ice thicknesses and a listing of dates when shipping is expected to be able to navigate an area without icebreaker assistance across all the Lakes.

**6.4 Ice Advisories.** Forecasters will use the headline “Ice Advisory” in the ice forecast when, in their judgment, conditions are expected that could cause changes adversely affecting ships already underway or trapping ships that are not yet underway. MWSs may be issued by each Great Lakes forecast office including the headline “Ice Advisory in effect...” to relay information in support of the ice advisory. Guidelines for the Ice Advisory headlines are:

- a. Sustained winds of 25 knots (KT) or greater for a minimum of 12 hours. (These conditions are a concern because of the strong ice pressures that they generate).
- b. The likelihood of rapid ice drifts closing active shipping areas. Rapid ice drift is defined as a drift speed of greater than 10 nautical miles (nm) per day for freely moving ice.
- c. A drop in temperatures which will result in rapid ice growth.

**6.4.1 Mission Connection.** The Ice Advisory is an alphanumeric product that provides current and forecast information pertaining to ice in the waters of the Great Lakes. The Ice Advisory is critical for vessels in planning a safe route through waters routinely impacted by lake ice movement. This product is intended to provide information to assist in the protection of life and property and enhance the nation’s economy.

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**1 Examples of Alaskan Ice Products**

**1.1 Example of Alaskan Sea Ice Advisory**

FZAK80 PAFC 172334  
ICEAFC

SEA ICE ADVISORY FOR WESTERN AND ARCTIC ALASKAN COASTAL WATERS  
NATIONAL WEATHER SERVICE ANCHORAGE ALASKA  
234 PM AKST FRIDAY 17 JANUARY 2014

FORECAST VALID...WEDNESDAY 22 JANUARY 2014

ANALYSIS CONFIDENCE...MODERATE TO HIGH.

SYNOPSIS...A LOW SOUTH OF NUNIVAK ISLAND WILL DISSIPATE NEAR SAINT MATTHEW ISLAND SUNDAY. ANOTHER LOW WILL MOVE OVER THE SOUTHEAST BERING SEA MONDAY...DISSIPATING IN THE NORTHERN BERING SEA LATE TUESDAY. A FINAL LOW IS EXPECTED TO MOVE INTO THE SOUTHERN BERING SEA WEDNESDAY.

-ARCTIC OCEAN-  
-BEAUFORT SEA-  
-CHUKCHI SEA-  
PKZ245-FLAXMAN ISLAND TO DEMARCATION POINT-  
PKZ240-CAPE HALKETT TO FLAXMAN ISLAND-  
PKZ235-POINT FRANKLIN TO CAPE HALKETT-

PKZ230-CAPE BEAUFORT TO POINT FRANKLIN-  
PKZ225-CAPE THOMPSON TO CAPE BEAUFORT-  
PKZ220-WALES TO CAPE THOMPSON-  
PKZ215-KOTZEBUE SOUND-  
PKZ200-NORTON SOUND-

ICE COVERED.

-BERING SEA-  
PKZ210-DALL POINT TO WALES-  
PKZ181-NORTH AND WEST OF NUNIVAK ISLAND-  
PKZ180-KUSKOKWIM DELTA AND ETOLIN STRAIT-  
PKZ160-BRISTOL BAY-

THE ICE EDGE LIES FROM 25NM SOUTH OF EGEGIK TO 58.5N 162.5W TO 58.9N 168.5W TO 60.1N 172.2W TO 60.0N 173.3W TO 61.3N 179.9W AND CONTINUES ALONG THE BERING SEA COAST OF RUSSIA. THE ICE EDGE IS 1 TO 7 TENTHS YOUNG...NEW AND FIRST YEAR THIN ICE MAINLY IN STRIPS.

FORECAST THROUGH WEDNESDAY...NORTHERLY TO NORTHEASTERLY FLOW WILL PERSIST OVER MUCH OF THE CENTRAL BERING SEA THROUGH EARLY NEXT WEEK...WHILE EASTERLY TO SOUTHERLY FLOW WILL PERSIST ALONG MUCH OF THE ALASKAN WEST COAST FROM THE YUKON DELTA DOWN THROUGH BRISTOL BAY THROUGH EARLY NEXT WEEK. THE ICE EDGE IS EXPECTED TO ADVANCE TO THE SOUTH 30 TO 45 NM THROUGH WEDNESDAY IN THE CENTRAL BERING SEA...WHILE THE ICE EDGE FROM SOUTH OF NUNIVAK ISLAND OVER TO BRISTOL BAY IS EXPECTED TO SHIFT TO THE NORTHWEST 10 TO 20 NM THROUGH WEDNESDAY.

-COOK INLET-  
PKZ130-WEST OF BARREN ISLANDS INCLUDING KAMISHAK BAY-  
PKZ139-COOK INLET KALGIN ISLAND TO POINT BEDE-  
PKZ140-COOK INLET NORTH OF KALGIN ISLAND-  
PKZ141-KACHEMAK BAY-

SYNOPSIS FOR COOK INLET...A SERIES OF LOWS WILL PASS OVER THE NORTHERN GULF OF ALASKA THROUGH WEDNESDAY.

THE ICE EDGE LIES ACROSS THE INLET FROM THE EAST FORELAND DOWN NEAR THE NORTH COAST OF KALGIN ISLAND. THE ICE EDGE IS MAINLY 1 TO 4 TENTHS NEW ICE IN STRIPS.

COOK INLET FORECAST THROUGH WEDNESDAY...RELATIVELY WARM WILL PERSIST THROUGH WEDNESDAY...ALLOWING SEA ICE TO DECREASE IN THICKNESS AND CONCENTRATION. EXPECT THE OVERALL ICE EDGE TO SHIFT NORTH OF THE FORELANDS BY WEDNESDAY.



BLEGATT 2014  
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## 1.2 Example of Alaskan Sea Ice Outlook

FZAK30 PAFC 222357  
ICOAFC

SEA ICE OUTLOOK FOR WESTERN AND ARCTIC ALASKAN COASTAL WATERS  
NATIONAL WEATHER SERVICE ANCHORAGE ALASKA  
400 PM AKDT THURSDAY 22 MAY 2014

SUMMER 2014 SEA ICE OUTLOOK

...BERING SEA...

SEA ICE RETREAT IS WELL UNDER WAY IN THE BERING SEA. THE ALASKA WEST COAST IS SEA ICE FREE UP TO THE YUKON DELTA AND MINIMAL SEA ICE REMAINS IN NORTON SOUND NEAR SHORE AND SOUTH OF SAINT LAWRENCE ISLAND. SHOREFAST ICE IN THE BERING SEA IS CONTINUING TO DESTABILIZE AND IS DEVELOPING MELT PONDS. THE ALASKA WEST COAST NEAR NOME IS EXPECTED TO BE OPEN BY THE SECOND WEEK IN JUNE. THE AREA FROM SAINT LAWRENCE TO THE BERING STRAIT SHOULD SEE ICE CONCENTRATIONS LESS THAN 3 TENTHS BY THE FIRST WEEK IN JUNE...AND THE BERING STRAIT IS EXPECTED TO BE SEA ICE FREE BETWEEN THE 15TH AND 20TH OF JUNE.

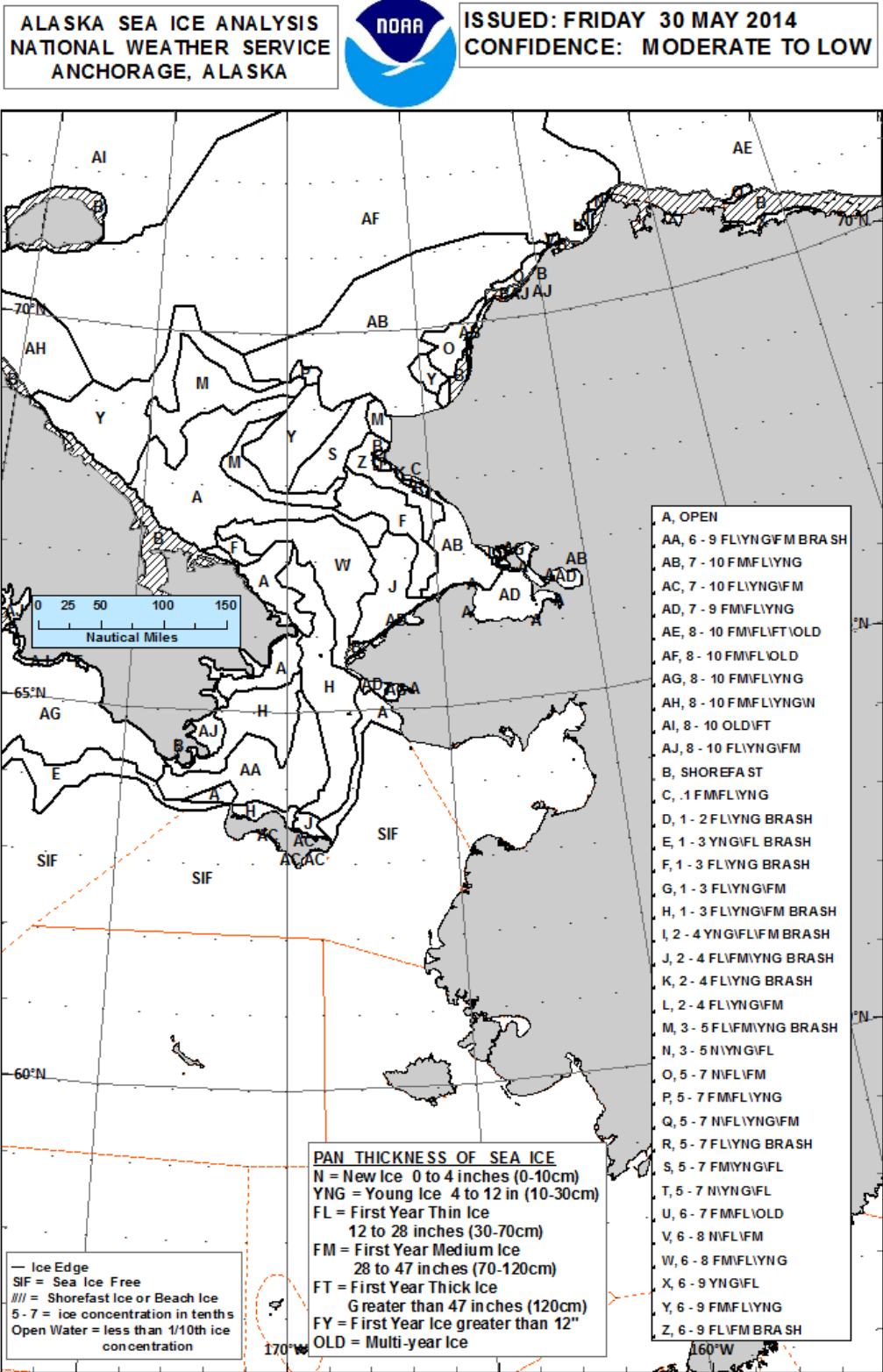
...CHUKCHI SEA...

SHOREFAST ICE ALONG THE ALASKA WEST COAST FROM CAPE LISBURNE TO POINT BARROW IS EXPECTED TO BE OPEN BY THE END OF JUNE...FROM CAPE KRUSENSTERN TO POINT HOPE BY THE END OF JUNE. THE SHIPPING LANE FROM CAPE LISBURNE TO WAINWRIGHT IS EXPECTED TO BE OPEN BY THE SECOND WEEK IN JULY...AND THE SHIPPING LANE FROM PEARD BAY TO CAPE HALKETT AROUND THE FIRST WEEK IN AUGUST. THE PRUDHOE BAY AND CAMDEN BAY SHIPPING LANES ARE EXPECTED TO OPEN AROUND LATE AUGUST. KOTZEBUE SOUND SHOULD SEE ICE CONCENTRATIONS LESS THAN 3 TENTHS BY JUNE 20TH AND SHOULD BE OPEN BY JUNE 25TH. THE AREA FROM WALES TO POINT HOPE WEST TO 170W IS EXPECTED TO HAVE SEA ICE CONCENTRATIONS LESS THAN 3 TENTHS BY JUNE 15TH AND OPEN BY JUNE 25TH. POINT HOPE TO ICY CAPE OVER TO 170W SHOULD SEE ICE CONCENTRATIONS LESS THAN 3 TENTHS BETWEEN JULY 1ST AND 5TH...AND SHOULD BE OPEN BY THE SECOND WEEK IN JULY. ICY CAPE TO BARROW OVER TO 170W IS EXPECTED TO HAVE LESS THAN 3 TENTHS ICE COVERAGE BY JULY 25TH AND SHOULD BE OPEN BY THE END OF JULY.

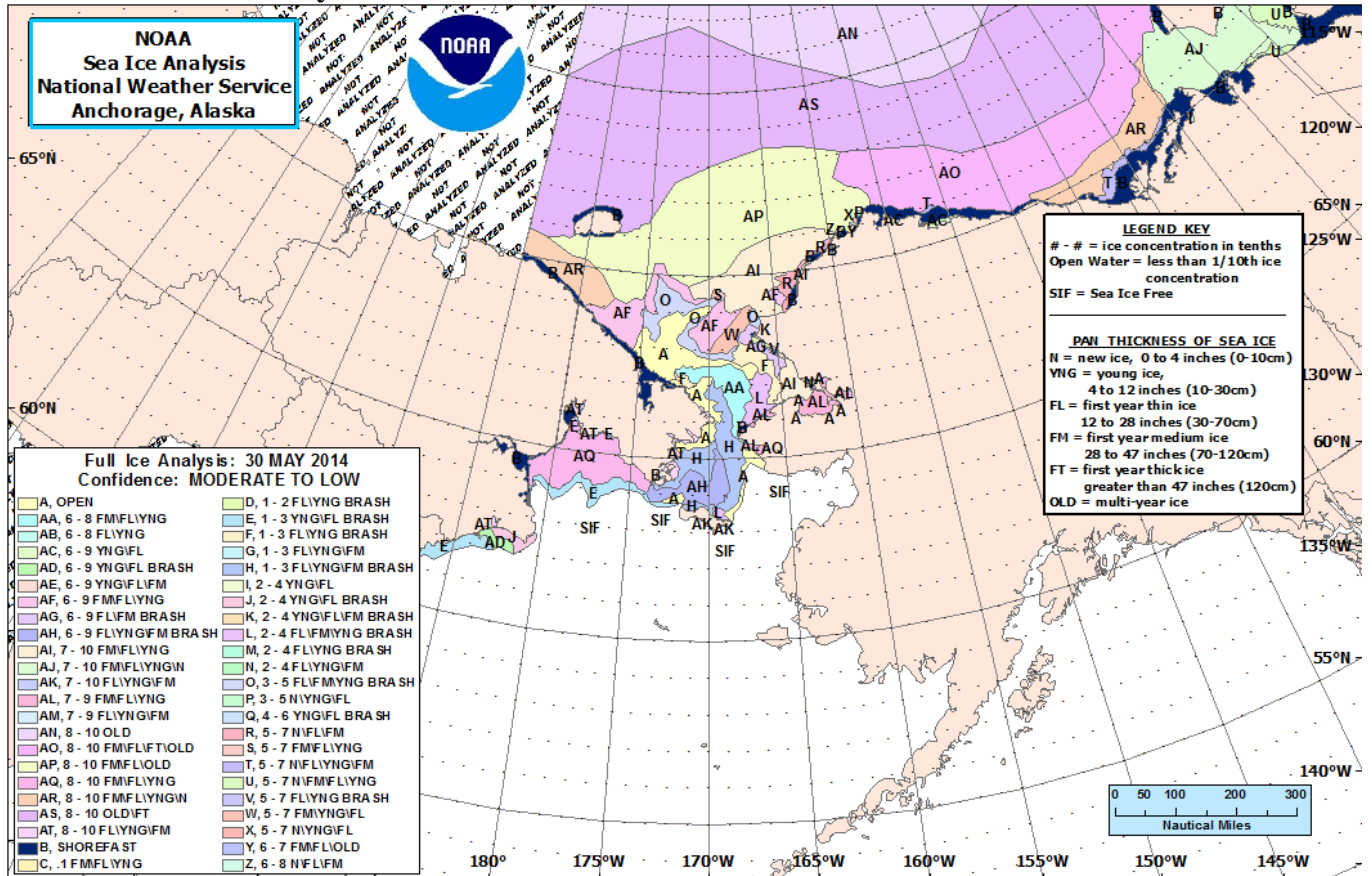
\$\$

1.3 Graphic Products

1.3.1 Black and White Analysis



1.3.2 Full Color Analysis

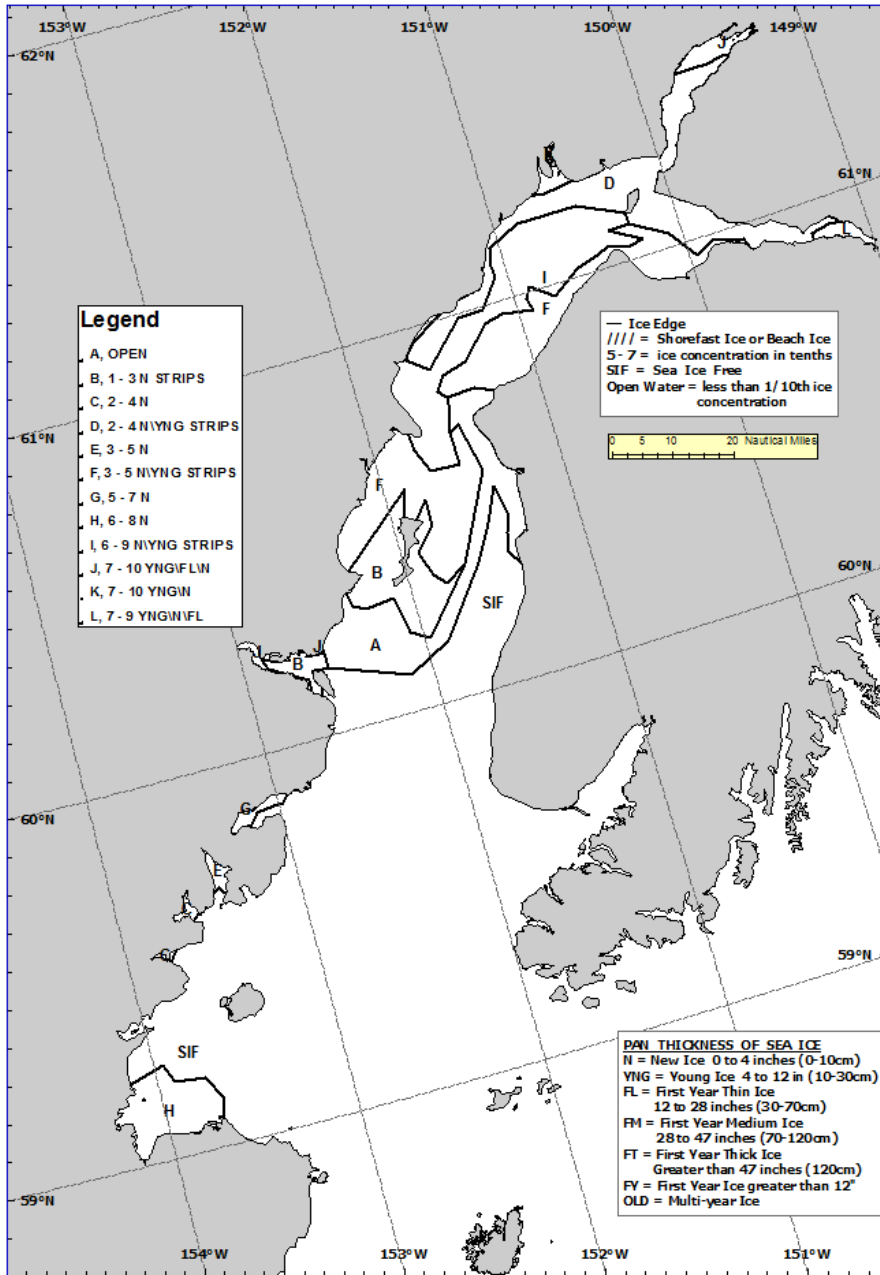


1.3.3 Cook Inlet Analysis

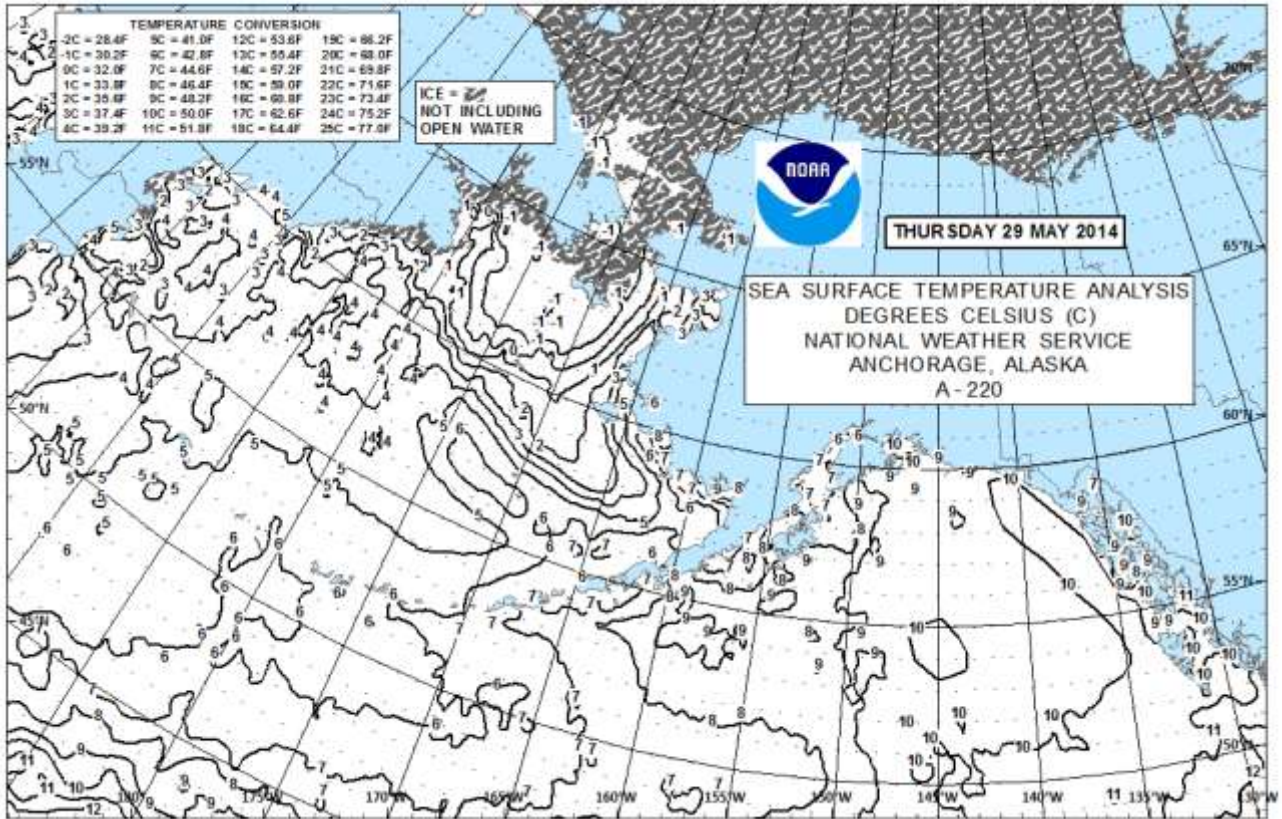
COOK INLET SEA ICE ANALYSIS  
 NATIONAL WEATHER SERVICE  
 ANCHORAGE, ALASKA



ISSUED: MONDAY  
 3 MARCH 2014  
 CONFIDENCE: MODERATE



### 1.3.4 Sea Surface Temperature Analysis

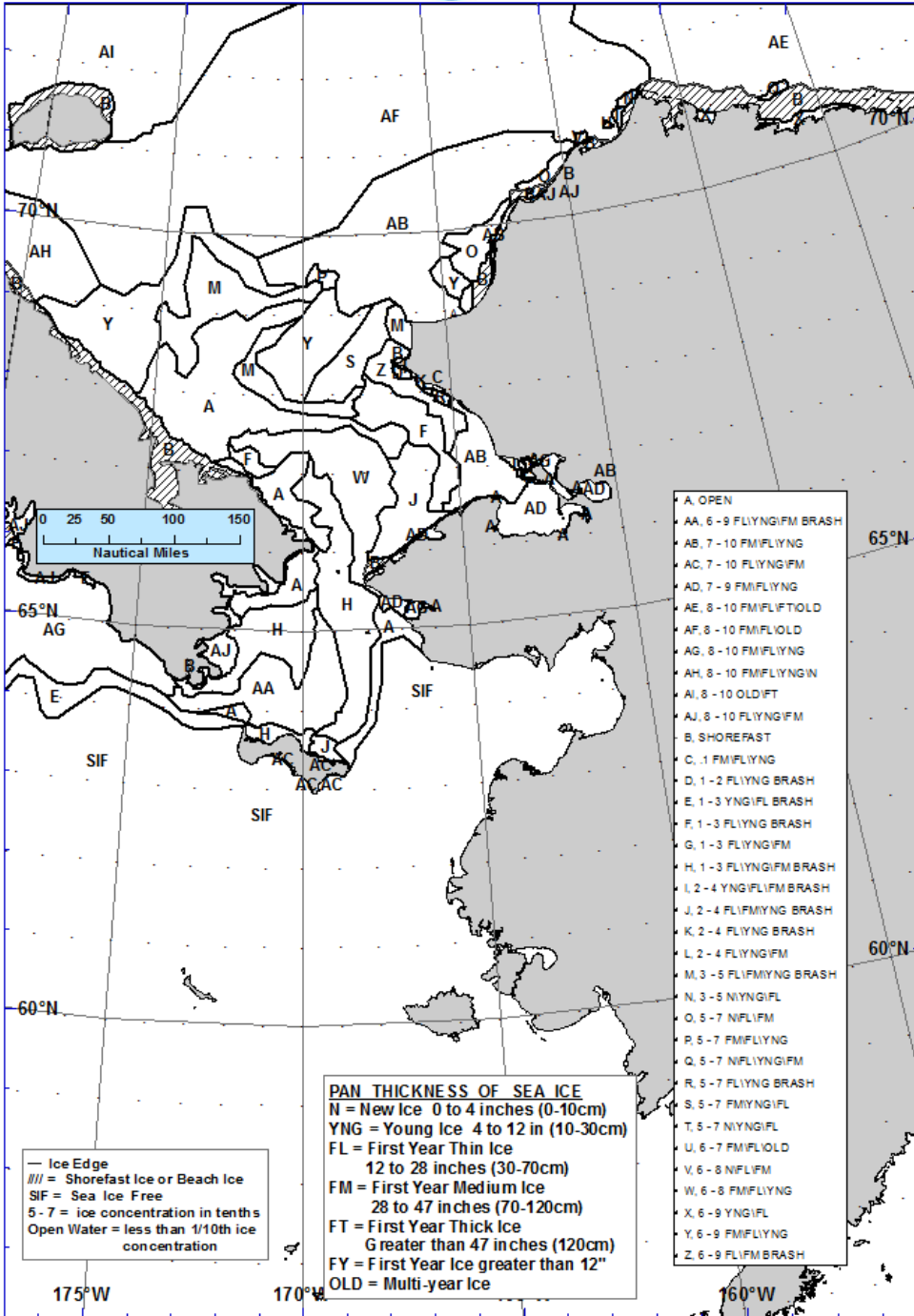


1.3.5 Five Day Sea Ice Forecast

ALASKA 5 DAY SEA ICE FORECAST  
 NATIONAL WEATHER SERVICE  
 ANCHORAGE, ALASKA



ISSUED: FRIDAY 30 MAY 2014  
 FORECAST VALID: WEDNESDAY  
 4 JUNE 2014



**2 Marine Weather Statement Example**

FZUS73 KDTX 072113  
MWSDTX  
LHZ421-070300-

MARINE WEATHER STATEMENT  
NATIONAL WEATHER SERVICE DETROIT/PONTIAC MI  
413 PM EST SUN 7 JAN 2001

...SEA ICE RAPIDLY DEVELOPING IN SAGINAW BAY...

A FRIGID ARCTIC HIGH ARRIVED A DAY EARLIER THAN EXPECTED ACROSS LAKE HURON. TEMPERATURES BELOW ZERO HAVE CAUSED EXTENSIVE ICE GROWTH AROUND BAY CITY ACCORDING TO THE UNITED STATES COAST GUARD HINDERING SHIPPING INTO THAT PORT. SHIPPERS IN THE BAY CITY AREA SHOULD BE ALERT AND CONTACT THE COAST GUARD FOR ASSISTANCE AND INSTRUCTIONS.

THIS STATEMENT WILL BE UPDATED AT 10 PM EST TONIGHT.  
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**1 Great Lakes Ice Outlook**

FZUS81 KCLE 282249  
ICELIO

GREAT LAKES ICE OUTLOOK  
NATIONAL WEATHER SERVICE CLEVELAND OHIO  
448 PM EST FRI FEB 28 2014

ACTIVE WATCHES...WARNINGS...AND ADVISORIES ON THE GREAT LAKES CAN BE FOUND AT...[WWW.CRH.NOAA.GOV/GREATLAKES/?C=HAZ&L=GL&P=A](http://WWW.CRH.NOAA.GOV/GREATLAKES/?C=HAZ&L=GL&P=A)

**5 DAY ICE DISCUSSION...**

MODERATE ICE GROWTH IS EXPECTED TO CONTINUE THROUGH EARLY NEXT WEEK ACROSS ALL OF THE GREAT LAKES AS UNSEASONABLY COLD ARCTIC HIGH PRESSURE REMAINS IN PLACE ACROSS THE NORTHERN STATES. TEMPERATURES WILL AVERAGE 10 TO 30 DEGREES BELOW NORMAL WITH NIGHT TIME LOW TEMPERATURES WELL BELOW ZERO AT TIMES. THE COLDEST AIR WILL BEGIN TO SHIFT EAST OF THE GREAT LAKES BY MID WEEK NEXT WEEK.

LITTLE OPEN WATER WILL EXIST EXCEPT ON LAKE MICHIGAN AND LAKE ONTARIO. ANY NAVIGATION ELSEWHERE WILL REQUIRE ICE BREAKER ASSISTANCE. ANY ICE BREAKING TRACKS WILL EXPERIENCE RAPID REFREEZING.

THE GREAT LAKES ICE ANALYSIS PRODUCTS CAN BE FOUND AT:  
[WWW.NATICE.NOAA.GOV/PRODUCTS/GREAT\\_LAKES.HTML](http://WWW.NATICE.NOAA.GOV/PRODUCTS/GREAT_LAKES.HTML)  
AND  
[WWW.GLERL.NOAA.GOV/DATA/ICE/#CURRENTCONDITIONS](http://WWW.GLERL.NOAA.GOV/DATA/ICE/#CURRENTCONDITIONS)

TEMPERATURE FORECASTS FOR SELECTED CITIES (LOW HIGH EACH DAY)):



LOCATION	03/01	03/02	03/03	03/04	03/05	03/06
DULUTH	-14 -2	-26 3	-22 6	-9 12	-2 17	7 23
MARQUETTE	0 6	-10 7	-8 8	-5 13	1 19	11 25
GREEN BAY	5 14	-4 9	-9 11	-6 16	1 21	9 29
MILWAUKEE	16 21	10 17	5 16	4 19	9 23	16 30
CHICAGO	20 25	12 20	7 17	4 19	9 25	16 33
MUSKEGON	11 25	6 14	2 13	-3 17	5 21	13 31
ALPENA	8 18	-3 11	-4 9	-5 15	2 18	9 28
DETROIT	13 32	11 17	7 16	2 20	6 23	13 29
TOLEDO	15 32	12 18	8 16	-1 22	5 30	14 30
CLEVELAND	16 34	15 19	11 17	4 20	8 29	18 32
BUFFALO	5 36	17 18	7 15	5 15	8 24	12 28

A FULL GRAPHICAL FORECAST OF GREAT LAKES FORECAST TEMPERATURES CAN BE FOUND AT:

[WWW.CRH.NOAA.GOV/GREATLAKES/?C=MAP&L=GL&P=A&M=TE](http://WWW.CRH.NOAA.GOV/GREATLAKES/?C=MAP&L=GL&P=A&M=TE).

MAXIMUM FORECAST WIND AT EACH SITE FOR THE 12 HOUR FCST PERIOD:

LOCATION	TONIGHT	SATURDAY	SAT NGT	SUNDAY	SUN NGT
WEST SUPERIOR	310/10	300/10	300/10	290/10	250/16
MID SUPERIOR	210/16	320/16	320/14	300/10	270/16
EAST SUPERIOR	200/18	310/18	320/18	300/10	280/14
NORTH MICHIGAN	200/16	330/16	320/16	360/10	320/06
SOUTH MICHIGAN	180/16	320/16	330/16	010/10	070/08
NORTH HURON	160/12	300/12	310/14	310/12	310/08
MID HURON	160/12	170/12	290/10	340/12	340/08
SOUTH HURON	140/14	180/10	230/10	360/15	340/10
WEST ERIE	140/10	200/10	240/10	350/14	020/10
EAST ERIE	110/06	180/06	230/12	340/12	360/06
CENTRAL ONTARIO	150/16	170/16	190/14	310/20	340/10

A FULL GRAPHICAL FORECAST OF FORECAST WINDS ON THE GREAT LAKES CAN BE FOUND AT...[WWW.CRH.NOAA.GOV/GREATLAKES/?C=MAP&L=GL&P=A&M=WS](http://WWW.CRH.NOAA.GOV/GREATLAKES/?C=MAP&L=GL&P=A&M=WS).

ICE OBSERVATIONS BASED ON U.S. COAST GUARD REPORTS

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THE COAST GUARD AT DULUTH REPORTED 100 PERCENT COVERAGE WITH A THICKNESS OF 28 INCHES.

THE COAST GUARD CUTTER KATMAI BAY IN THE LOWER SAINT MARYS RIVER REPORTED 90 PERCENT COVERAGE OF ICE FROM PT. AUX FRENES TO SWEETS POINT WITH 18 INCH THICKNESS.

FREEZING DEGREE DAY ACCUMULATIONS AT SELECTED STATIONS COMPARED TO NORMAL CALCULATED ON FRI MAY 23:

LOCATION	DATE	NORMAL	CURRENT
DULUTH, MN	FEB 27	1689	2467
MARQUETTE, MI	FEB 27	1468	2178
SAU_S_MAR, MI	FEB 27	1183	1884
GREENBAY, WI	FEB 27	1136	1910
MILWAUKEE, WI	FEB 27	616	1281
CHICAGO, IL	FEB 27	498	1171
MUSKEGON, MI	FEB 27	389	877
ALPENA, MI	FEB 27	924	1678
DETROIT, MI	FEB 27	383	998
TOLEDO, OH	FEB 27	387	1027
CLEVELAND, OH	FEB 27	194	604
BUFFALO, NY	FEB 27	512	961

NORMAL TEMPS FOR SELECTED LOCATIONS AROUND THE GREAT LAKES FOR FRI FEBRUARY 28:

LOCATION	HIGH	LOW
DULUTH, MN	30	12
MARQUETTE, MI	30	14
GREENBAY, WI	30	12
MILWAUKEE, WI	38	23
CHICAGO, IL	42	25
MUSKEGON, MI	38	23
ALPENA, MI	30	12
DETROIT, MI	41	24
TOLEDO, OH	42	24
CLEVELAND, OH	42	26
BUFFALO, NY	38	23

NOTE THAT ALL WEB SITES SHOULD BE ENTERED IN YOUR BROWSER LOWER CASE.

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**2 St. Lawrence Freeze Update Outlook**

FZUS81 KBUF 172041  
ICEFBO

ST. LAWRENCE FREEZE UPDATE OUTLOOK  
NATIONAL WEATHER SERVICE BUFFALO NY  
341 PM EST SAT DEC 17 2011

THE DATE OF THE FIRST FREEZE UP OF THE ST. LAWRENCE RIVER NEAR  
MASSENA NEW YORK IS FORECAST TO BE JANUARY 7TH 2012.

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**3 Great Lakes Freeze Up Outlook**

FZUS81 KCLE 012055 RRA  
ICEFBO

GREAT LAKES FREEZE UP OUTLOOK  
NATIONAL WEATHER SERVICE CLEVELAND OH  
400 PM EST WED 1 NOV 2000

FREEZE UP IN THE BAYS AND HARBORS AROUND LAKE SUPERIOR AND  
NORTHERN LAKE MICHIGAN WILL OCCUR A LITTLE EARLIER THAN NORMAL  
THIS YEAR. FREEZE UP AROUND SOUTHERN LAKE MICHIGAN AND NORTHERN  
LAKE HURON WILL OCCUR AROUND THE NORMAL TIMES WHILE FREEZE UP  
AROUND LAKE ERIE AND SOUTHERN LAKE HURON IS EXPECTED TO BE LATER  
THAN NORMAL THIS WINTER.

THE THIRTY DAY OUTLOOK FOR NOVEMBER IS FOR TEMPERATURES TO  
AVERAGE BELOW NORMAL AROUND THE LAKES REGION.

ANNUAL HARBOR WATER TEMPERATURES COMPARED TO PREVIOUS YEARS:

	2000	1999	1998	1997	1996	1995	1994
DULUTH	46	42	45	46	48	46	43
SAULT STE. MARIE	48	48	46	46	50	46	44
CHICAGO	50	53	54	50	NA	NA	NA
MUSKEGON	54	54	56	47	56	52	48
ALPENA	51	49	51	47	49	45	44
DETROIT	54	52	55	50	54	51	46
CLEVELAND	61	59	61	55	57	53	52
BUFFALO	55	57	57	54	55	50	49

ANNUAL WATER TEMPERATURES FOR THE MID LAKE AREAS AS RECEIVED FROM  
NOAA DATA BUOYS COMPARED TO PREVIOUS YEARS:

	2000	1999	1998	1997	1996
LAKE SUPERIOR					
WEST	44	42	43	45	45
NORTH CENTRAL	43	43	44	44	42
EAST	43	46	44	45	44
LAKE MICHIGAN					
NORTH	50	53	54	54	51
SOUTH	55	52	55	54	48
LAKE HURON					
NORTH	49	51	50	49	49
SOUTH	52	50	53	50	50
LAKE ERIE					
WEST	55	NA	60	54	55

GARNET NOV 2000

#### 4 Great Lakes Ice Outlook for the Opening of Navigation

FZUS81 KCLE 052055 RRA  
ICEFBO

GREAT LAKES BREAK-UP OUTLOOK  
NATIONAL WEATHER SERVICE CLEVELAND OH  
400 PM EST MON 5 MAR 2001

THE FOLLOWING ARE THE LATEST ANNUAL ICE THICKNESS REPORTS:

DULUTH	13 INCHES
MARQUETTE	12 INCHES
WHITEFISH BAY	15 INCHES
ST. MARYS RIVER	14-20 INCHES
GREEN BAY	
ESCANABA	30 INCHES, REMAINDER OF BAY NO REPORTS
STRAITS MACKINAC	12 INCHES
SAGINAW BAY	8 INCHES
LAKE ST. CLAIR	6-8 INCHES
WESTERN LAKE ERIE	6-10 INCHES
BUFFALO	20 INCHES

FOLLOWING ARE EXPECTED DATES WHEN ICE CONDITIONS BECOME SUCH THAT HIGH POWERED VESSELS CAN TRANSIT WITHOUT ICEBREAKERS:

DULUTH	APRIL 20
MARQUETTE	APRIL 12
WHITEFISH BAY	APRIL 16
ST. MARYS RIVER	APRIL 13
GREEN BAY	
ESCANABA	APRIL 7
REMAINDER OF BAY	APRIL 10
STRAITS OF MACKINAC	APRIL 8
GRAND TRAVERSE BAY	MARCH 20
SAGINAW BAY	MARCH 31
SOUTHERN LAKE HURON	MARCH 25
LAKE ST. CLAIR	MARCH 28
WESTERN LAKE ERIE	MARCH 31
BUFFALO	APRIL 22

BROWN MAR 2001

**5 Great Lakes Ice Advisory.** The Ice Advisory headline is included in the Ice Outlook at the beginning of the 5 Day Ice Discussion.

FZUS81 KCLE 282249  
ICELIO

GREAT LAKES ICE OUTLOOK  
NATIONAL WEATHER SERVICE CLEVELAND OHIO  
445 PM EST FRI DEC 21 2013

ACTIVE WATCHES...WARNINGS...AND ADVISORIES ON THE GREAT LAKES CAN BE FOUND AT...[WWW.CRH.NOAA.GOV/GREATLAKES/?C=HAZ&L=GL&P=A](http://WWW.CRH.NOAA.GOV/GREATLAKES/?C=HAZ&L=GL&P=A)

5 DAY ICE DISCUSSION...

...AN ICE ADVISORY HAS BEEN ISSUED FOR LAKE SUPERIOR AND NORTHERN LAKE MICHIGAN FOR SATURDAY THROUGH MONDAY...

...AN ICE ADVISORY HAS BEEN ISSUED FOR BAYS AND HARBORS ON SOUTHERN LAKE MICHIGAN... LAKE HURON AND LAKE ERIE FOR SUNDAY AND MONDAY...

ARCTIC AIR WILL SPREAD ACROSS THE GREAT LAKES FROM NORTHWEST TO SOUTHEAST THIS WEEKEND...*remainder of ice outlook*

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