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***NATIONAL WEATHER SERVICE INSTRUCTION 10-312***
***July 8, 2003***

***Operations and Services***
***MARINE AND COASTAL WEATHER SERVICE PROGRAM, NWSPD 10-3***

# *GREAT LAKES MARINE SERVICES*

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***SUMMARY OF REVISIONS:*** This directive supersedes NWSI 10-312, dated May 21, 2002. This directive follows a new format; provides expanded guidance on the issuance of gale/storm warnings; includes new policy on the issuance of Nearshore Marine Forecasts throughout the entire year.

Signed June 20, 2003

Gregory A. Mandt Date
Director, Office of Climate,
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# GREAT LAKES MARINE SERVICES

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A. NWS MAFOR Code for the Great Lakes . . . . . A-1
B. Examples of Great Lakes Marine Products . . . . . B-1

1. Introduction. This procedural instruction provides product specifications for the main alphanumeric Great Lakes weather products issued by the National Weather Service (NWS) Weather Forecast Offices (WFOs). Products covered in this instruction should eventually be prepared by automated formatters extracting information from a gridded database. However, in the interim the following Great Lakes weather products will be created using a mixture of traditional preparation methods and product formatters.

2. Open Lake Forecast (product category GLF).

2.1 Mission Connection. The Open Lake Forecast is a text product issued by five primary Great Lake WFOs to state expected weather conditions within their marine forecast area of responsibility through Day 5. The primary offices responsible for issuing the GLF are: WFOs Marquette, MI (MQT); Detroit, MI (DTX); Chicago, IL (LOT); Cleveland, OH (CLE); and Buffalo, NY (BUF). The GLF is used by a variety of marine customers and partners, and is primarily used as a tool for planning purposes to support and promote safe transportation across the Great Lakes.

2.2 Issuance Guidelines.

2.2.1 Creation Software. WFOs should produce the GLF using software formatters requiring little or no post editing. WFOs may use text editors to create the GLF where automated software formatters are not yet available.

2.2.2 Issuance Criteria. The GLF will be issued four times a day with updates as necessary. Forecasters should make the GLF available to customers by the scheduled issuance time, but no earlier than 1 hour before this issuance time. In the communications header, list the issuance time in Universal Time Coordinated (UTC), but in the mass media header, list the valid time in local time. The Regions, as dictated by customer requirements, may require scheduled updates.

Note: In addition to Open Lake Forecast and Nearshore Marine Forecast (NSH) responsibilities, WFO Cleveland produces the following products combining information from all the Great Lakes: Marine Monitoring Message (MARMON), Great Lakes Weather Broadcasts (LAWEB), Great Lakes Storm Summary (GLS), and Great Lakes Marine Alert Message (MAW). WFO Cleveland also maintains the centralized dissemination systems dissemination systems, as discussed in NWSI 10-304.

2.2.3 Issuance Time. Open Lake Forecasts are routinely-scheduled products. Forecasters should make the GLF available to customers no earlier than 1 hour before, or no later than 1 hour after, this scheduled issuance time. WFOs should issue GLFs based on the following:

| **Time Period** | **Scheduled Issuance Times (UTC)** | | | |
|---|---|---|---|---|
| Standard Time | 0300 | 0900 | 1500 | 2100 |
| Daylight Savings | 0200 | 0800 | 1400 | 2000 |

In the GLF, include forecast periods as shown below. Use the day of the week to describe forecast periods for all but the current day. For example, a forecast issued Sunday evening will include: TONIGHT, MONDAY, MONDAY NIGHT, TUESDAY, TUESDAY NIGHT, WEDNESDAY, THURSDAY, and FRIDAY.

**The morning/early afternoon forecast will cover:**

| | |
|---|---|
| Today/This Afternoon (or equivalent) | (Issuance time to 6PM) |
| Tonight | (6PM to 6AM) |
| (Next Day) | (6AM to 6PM) |
| (Next Day) Night | (6PM to 6AM) |
| (Day 3) | (6AM to 6PM) |
| (Day 3) Evening (Optional) | (6PM to 6AM) |
| (Day 4) | (6AM to 6PM) |
| (Day 5) | (6AM to 6PM) |

**The afternoon/evening/late night forecast will cover:**

| | |
|---|---|
| Tonight/Rest of Tonight (or equivalent) | (Issuance time to 6AM) |
| (Next Day) | (6AM to 6PM) |
| (Next Day) Night | (6PM to 6AM) |
| (Day 2) | (6AM to 6PM) |
| (Day 2) Night | (6PM to 6AM) |
| (Day 3) | (6AM to 6PM) |
| (Day 3) Evening (Optional) | (6PM to 6AM) |
| (Day 4) | (6AM to 6PM) |
| (Day 5) | (6AM to 6PM) |

2.2.4 Valid Time. Open Lake Forecasts are valid from the time of issuance until the expiration time.

2.2.5 Product Expiration Time. The GLF product expiration time is not more than 12 hours from the initial issuance.

2.3 Technical Description. Open Lake Forecasts will follow the format and content described in this section.

2.3.1 Mass News Disseminator Broadcast Line. None.

2.3.2 Mass News Disseminator Header. The Open Lake Forecast MND Header is "OPEN LAKE FORECAST FOR [LAKE SUPERIOR, LAKE MICHIGAN, LAKE HURON, LAKE ERIE, or LAKE ONTARIO]".

2.3.3 Content. The GLF includes all required forecast parameters and forecast periods in each marine zone, and follows the format in section 2.4. Based on forecaster discretion, the GLF may be divided into more than two segments (e.g., NORTHERN QUARTER, CENTRAL HALF, and

SOUTHERN QUARTER OF LAKE MICHIGAN). If geographic reference points (or "breakpoints") are used when subdividing the Lake for meteorological forecast purposes, forecasters should ensure they are well known to NWS customers and partners.

Forecasters should include applicable National Marine Sanctuaries, as noted in NWSI 10-302, in the appropriate GLF.

Forecasters may combine periods if, based on forecaster discretion, the weather elements in each are consistent. In addition, forecasters may subdivide the first period of any GLF to account for rapid weather changes.

WFO Detroit-Pontiac forecasters will issue the Lake St. Clair Forecast following the format of the GLF. Exceptions: During the period when NSHs are issued, these forecasters should also include sky conditions and small craft advisories in the Lake St. Clair Forecast.

2.3.4 Synopsis. The synopsis for the GLF should be a concise, understandable description of the significant surface weather features that may cause significant winds and seas over the forecast area during the forecast period. At a minimum, it should identify the strength, trend and movement of each major weather system affecting the area. The synopsis is broadcast over the marine radio; therefore, it should contain complete and grammatically correct sentences. All synopses will be meteorologically consistent with other products issued by the WFO.

2.3.5 Headlines. Use headlines to emphasize weather events likely to have a significant impact on mariners or marine operations. In each headline, indicate the severity of the event in the priority order given below.

The most significant headline generally should stand alone. However, forecasters may use more than one headline to indicate multiple threats or worsening conditions. To maintain a heightened level of awareness, do not include a headline that downgrades a current condition in later periods (e.g., a storm warning in effect today improving to a gale warning tonight). When downgrading to a lower priority headline, WFOs may use more than one headline to clarify a trend.

For example:
...STORM WARNING DISCONTINUED...
...GALE WARNING IN EFFECT...

Except for severe local storm watches, forecasters should not use specific times (e.g., GALE WARNING IN EFFECT AFTER 9AM).

In the GLF, use the following headlines, in the priority order given, if appropriate criteria are occurring or forecast to occur:

1. Hurricane Force Wind Warning
2. Storm Warning

3. Gale Warning
4. Heavy Freezing Spray Warning
5. Lakeshore Flood Warning*
6. Tornado Watch
7. Severe Thunderstorm Watch
8. Lakeshore Flood Watch*

* Include headlines for lakeshore events in appropriate NSH forecasts. However, do not headline these events in the GLF.

Based on event significance, forecasters may include advisories for events expected to impact the forecast area such as freezing spray, volcanic ash, restrictions lowering visibilities below 1 NM, or for low water. Do not include small craft advisories in GLFs.

a. Gale Warnings/Storm Warnings. WFOs with marine responsibility for the Great Lakes will issue Warnings when criteria are met for the first twelve (12) hour period, and may issue Warnings for the second and/or third period when forecaster confidence is high. In addition, WFOs may include a headline in the Open Lake Forecast such as "GALE (or STORM) WARNING CONDITIONS EXPECTED MONDAY" for the fourth and fifth periods of the forecast.

Note: Refer to NWSI 10-301, Marine and Coastal Services Abbreviations and Definitions, for gale and/or storm warning definitions.

2.3.6 1-3 Day Forecast Periods. Except as noted below, include forecasts of wind and waves in each discrete forecast period in the GLF. Forecasters should also include forecasts of other weather significantly impacting the marine zone(s) (e.g., ice accretion, precipitation, low visibilities, etc.). Emphasize the most critical conditions.

2.3.7 4-5 Day Forecast Periods. Include wind and wave conditions in each 24 hour period. Otherwise, forecasters should only include the more threatening weather conditions.

2.3.8 GLF - Forecast Parameters

a. Winds. Winds represent predominant conditions about 10 meters above the surface of the water. Give wind direction to eight points of the compass. Avoid such phrases as "N TO NE WINDS". Forecasters may indicate changes with terms such as BECOMING, or by dividing the forecast area into segments. For wind speeds up to 25 knots, use 5 or 10 knot ranges, rounded to the nearest 5 knots. Thereafter, use a single wind speed (e.g., WINDS TO 35 KNOTS).

b. Waves. The forecast wave heights should represent the significant wave height in the forecast area. Forecasters may either use one value or a small range in values.

Do not use terms such as ROUGH and MODERATE or open ended terms such as WAVES GREATER THAN 5 FEET.

Do not forecast waves when ice covers a major part (approximately 80 percent) of the marine zone. When this occurs, add the phrase "WAVES OMITTED FOR MOSTLY ICE COVERED AREAS" directly following the final forecast period. Similarly, append "WAVE HEIGHTS ARE FOR ICE FREE AREAS" when forecasting wave heights across marine zones with less ice coverage.

c. Significant Weather/Visibility. Forecasters should include significant weather posing a hazard to navigation when expected (i.e., fog or heavy precipitation lowering visibilities to 5 NM or less, or thunderstorms). Forecasters may use precipitation probability terms "CHANCE", "OCCASIONAL", etc., as defined in WSOM Chapter C-11/NWSI 10-503. However, forecasters should not include sky cover.

Forecasters may include specific visibility distances based on local or regional guidelines. However, do not use qualitative descriptions such as "VISIBILITY FAIR".

Forecasters should emphasize thunderstorms in GLFs. They may include the phrase "WINDS AND WAVES HIGHER NEAR THUNDERSTORMS" but only with respect to the most significant thunderstorms. If a moderate or high risk of severe weather is indicated for a marine zone, forecasters should use phrases such as "STRONG THUNDERSTORMS ARE POSSIBLE" or "THUNDERSTORMS SOME POSSIBLY SEVERE".

d. Icing. Forecasters should include a headline whenever ice accretion on exposed surfaces is likely. Because ice accumulation rates are ultimately dependent on individual ship characteristics and operating conditions, only use the following terms:

Freezing Spray
Heavy Freezing Spray

e. Air Temperatures. Air temperatures are optional. However, they should only be included if they are forecast to be at or below freezing and if the forecaster considers this information to be significant.

**Note:** In support of the National Digital Forecast Database (NDFD), the following weather elements will be added to the list of GLF Forecast Parameters in the future: ice crystals, ice fog, freezing fog, volcanic ash, and ice coverage weather elements.

2.4 Format. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

```
(WMO ID)(ISSUANCE DATE TIME)
(AWIPS ID)
(AREAL UGC CODE)-(EXPIRATION TIME)-

OPEN LAKE FORECAST FOR (NAME OF GREAT LAKE)
NATIONAL WEATHER SERVICE (CITY)(STATE)
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

(Refer to section 2.4, Areal Descriptor, for inclusion of next line.)
LAKE (NAME) FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE

.SYNOPSIS...TEXT.

...HEADLINE(S) (If needed)...

.PERIOD 1...
.PERIOD 2...
.PERIOD 3...
.PERIOD 4...
.PERIOD 5...
.PERIOD 6 (Optional period for the morning issuance)...
.PERIOD 7 (Optional period for the afternoon issuance)...
.(Day 4)...
.(Day 5)...
(WAVES OMITTED FOR MOSTLY ICE COVERED AREAS.- included in season)

$$
&&STORM (If needed, see section 7)
FORECASTER NAME (OPTIONAL)
```

Figure 1. Open Lake Forecast (GLF) Format

a. Areal Descriptor. To highlight the demarcation between the NSH and GLF, append the phrase "LAKE (NAME) FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE", as noted in Figure 2. Omit this phrase when the NSH is not issued.

2.4.1 GLF - Unscheduled Forecasts. As needed, append either "...UPDATED" or "...CORRECTED" to the product header whenever, respectively, an unscheduled GLF is issued

or when an error in the GLF is corrected. Add a short description of the updated or corrected items just below the areal header to highlight the change.

OPEN LAKE FORECAST FOR (NAME OF GREAT LAKE)**...UPDATED**
NATIONAL WEATHER SERVICE (CITY)(STATE)
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

**REASON FOR UPDATE**

.SYNOPSIS...TEXT.

...HEADLINE(S) (If needed)...

.PERIOD 1...
etc.

Figure 2. Unscheduled Open Lake Forecast (GLF) Format

2.5 Updates, Amendments and Corrections. GLFs will be updated when the on-duty forecast team believes the current forecast is not representative. WFOs will correct GLFs for format and grammatical errors.

In addition to normal update criteria noted in NWSI 10-303, forecasters should update GLFs when a tornado watch has been issued and severe thunderstorms are not in the forecast, or when a severe thunderstorm watch has been issued and thunderstorms are not in the forecast.

3. Coded Marine Forecast (MAFOR; appended to product category GLF).

3.1 Mission Connection. The Coded Marine Forecast (MAFOR) is a text forecast appended to the Open Lake Forecast (GLF). The MAFOR, adapted from WMO code FM-61-IV, is a coded version of the first 24 hours of the GLF providing service to customers and partners of the Great Lakes marine community. No MAFOR is done for Lake St. Clair.

3.2 Issuance Guidelines.

3.2.1 Creation Software. WFOs should produce and append the MAFOR to the GLF using software formatters requiring little or no post editing. WFOs may use text editors to create the MAFOR where automated software formatters are not yet available.

3.2.2 Issuance Criteria. The MAFOR will be appended to every GLF issued four times a day with updates as necessary. Forecasters should make these forecasts available to customers by the scheduled issuance time, but no earlier than 1 hour before this issuance time.

3.2.3 Issuance Time. MAFOR forecasts are routinely-scheduled. WFOs should append the MAFOR to each GLF.

3.2.4 Valid Time. MAFOR forecasts are valid 1 hour after the issuance of the GLF.

3.2.5 Product Expiration Time. The MAFOR forecast expiration time is the same as the GLF.

3.3 Technical Description. MAFOR forecasts will follow the format and content described in this section.

3.3.1 Mass News Disseminator Broadcast Line. None.

3.3.2 Mass News Disseminator Header. The MAFOR will be appended to the Open Lake Forecast, MND Header "OPEN LAKE FORECAST FOR [LAKE SUPERIOR, LAKE MICHIGAN, LAKE HURON, LAKE ERIE, or LAKE ONTARIO]".

3.3.3 Content. Forecasters may issue the MAFOR either for an entire Lake or for a Lake segment. It will reflect the predominant conditions over that area for the 24 hour period.

At the end of the MAFOR, include a range of waves for the 24-hour period. Note wave changes of greater than 5 feet during this period. The final MAFOR group, 2GWvWv, is used only for the MARMON program. As such, include coded wave height forecasts for the first 6 hours only.

3.3.4 GLF - Forecast Parameters

a. Wind (sustained). Use the following for conversion from plain language to the MAFOR code:

   1. Wind Direction: Forecasters should use a single wind direction as given in the plain language forecast. Periodically, since the minimum time period in the MAFOR code is 3 hours, the forecaster may have to show wind shifts with frontal passages using an additional group "9".

   2. Wind Speed: Use the following to convert wind speed, in knots, from the narrative forecast to the MAFOR code:

| Narrative Forecast Value | MAFOR Code |
|---|---|
| Light, less than 10, or 5-10 knots | 0 |
| 5-15, 10-15 knots | 1 |
| 10-20, 15-20 knots | 2 |

| | |
|---|---|
| 15-25, 20-25 knots | 3 |
| 30 knots | 4 |
| 35 knots | 5 GW |
| 45 knots | 6 GW |
| 50-55 knots | 7 SW |
| 60 knots | 8 SW |
| over 60 knots | 9 HFW |

GW = Gale Warning,
SW = Storm Warning,
HFW = Hurricane Force Wind Warning.

b. Forecast Weather. The code used will identify the most significant weather. When precipitation is "categorical" or "likely", the forecaster should include it as the last digit of a main group. However, the forecaster should denote "chance" precipitation as a "9" (occasional) group or in plain language remarks after the numerical text.

3.4 Format. Follow the NWS MAFOR Code for the Great Lakes shown in Appendix A. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

3.4.1 MAFOR - Unscheduled Forecasts. Forecasters should update MAFORS when necessary to ensure consistency with the GLF. In such cases, since these products are subdivided into no less than 3 hour blocks, the MAFOR will be valid from the nearest 3 hour of the new issuance time to the ending valid time of the MAFOR being updated. For example, a MAFOR valid from 16 UTC to 16 UTC amended at or before 1729 UTC would still be valid from 16 UTC. However, this MAFOR amended at 1730 UTC to 2029 UTC would be valid at 19 UTC. In both cases, the MAFOR is valid until 16 UTC. Also, in the update, add the letters AMD following the effective starting time.

3.5 Updates, Amendments and Corrections. MAFOR forecasts will be updated when the forecaster decides the current forecast is no longer representative. WFOs will update MAFORs by adding the letters "AMD" following the effective starting time. WFOs will correct MAFORs for format and grammatical errors by adding the letters "COR" following the effective starting time. **Note:** If a gale or storm warning is in effect, and a severe thunderstorm watch is issued, the severe thunderstorm watch takes precedence and is headlined in a MAFOR update.

4. Nearshore Marine Forecast (product category NSH)

4.1 Mission Connection. The Nearshore Marine Forecast is a text product issued by Great Lake WFOs to state expected weather conditions within their marine forecast area of responsibility through Day 2. The NSH is used by a variety of marine customers and partners,

and is primarily used as a tool for planning purposes to support and promote safe transportation across the Great Lakes.

4.2 Issuance Guidelines.

4.2.1 Creation Software. WFOs should produce the NSH using software formatters requiring little or no post editing. WFOs may use text editors to create the NSH where automated software formatters are not yet available.

4.2.2 Issuance Criteria. The NSH will be issued four times a day with updates as necessary. Forecasters should make the NSH available to customers by the scheduled issuance time, but no earlier than 1 hour before this issuance time. In the communications header, list the issuance time in Universal Time Coordinated (UTC), but in the mass media header, list the valid time in local time. The Regions, as dictated by customer requirements, may require scheduled updates.

The nearshore waters refer to the over water area extending to 5 NM perpendicular from the shore line. Larger bays are also included in the nearshore waters. Forecasters should ensure the NSH is consistent with their adjacent GLF.

Nearshore Marine Forecasts are issued throughout the boating season, typically beginning around April 1 and ending around December 31, dependent on ice conditions on the entrances to each individual Lake. Specific dates are determined by responsible Regions.

If needed, forecasters may include, below period 4 of the last NSH product of the year, a statement such as: ”THIS IS THE LAST (AWIPS ID) ISSUANCE FOR (YEAR). THE (AWIPS ID) WILL AGAIN BE ISSUED AROUND APRIL 1 (YEAR).”

**Note:** During periods of climatological extremes leading to erratic ice coverage patterns (shifting of ice edge, late/early freeze, etc.), and based on customer and/or partner needs, WFOs may issue the NSH throughout the winter to support the NWS mission of protecting life and property on the waters of the Great Lakes.

4.2.3 Issuance Time. Nearshore Marine Forecasts are routinely-scheduled products. WFOs should issue NSHs based on the following:

| **Time Period** | **Scheduled Issuance Times (UTC)** | | | |
|---|---|---|---|---|
| Standard Time | 0400 | 1000 | 1600 | 2200 |
| Daylight Savings | 0300 | 0900 | 1500 | 2100 |

In the NSH, include forecast periods as shown below. Use the day of the week to describe forecast periods for all but the current day. For example, a forecast issued Thursday morning will include: TODAY, TONIGHT, FRIDAY, FRIDAY NIGHT.

**The morning/early afternoon forecast will cover:**

| | |
|---|---|
| Today/This Afternoon (or equivalent) | (Issuance time to 6PM) |
| Tonight | (6PM to 6AM) |
| (Next Day) | (6AM to 6PM) |
| (Next Day) Night | (6PM to 6AM) |

**The afternoon/evening/late night forecast will cover:**

| | |
|---|---|
| Tonight/Rest of Tonight (or equivalent) | (Issuance time to 6AM) |
| (Next Day) | (6AM to 6PM) |
| (Next Day) Night | (6PM to 6AM) |
| (Day 2) | (6AM to 6PM) |

4.2.4 Valid Time. Nearshore Marine Forecasts are valid from the time of issuance until the expiration time.

4.2.5 Product Expiration Time. The NSH product expiration time is not more than 12 hours from the initial issuance.

4.3 Technical Description. Nearshore Marine Forecasts will follow the format and content described in this section.

4.3.1 Mass News Disseminator Broadcast Line. None.

4.3.2 Mass News Disseminator Header. The Nearshore Marine Forecast MND Header is "NEARSHORE MARINE FORECAST".

4.3.3 Content. The NSH includes all required forecast parameters and forecast periods in each marine zone, and follows the format in section 4.4.

Forecasters should include applicable National Marine Sanctuaries, as noted in NWSI 10-302, in the appropriate GLF.

Forecasters may combine periods if, based on forecaster discretion, the weather elements in each are consistent. In addition, forecasters may subdivide the first period of any NSH to account for rapid weather changes.

WFO Detroit-Pontiac forecasters will issue the Lake St. Clair Forecast following the format of the GLF. Exceptions: During the period when NSHs are issued, WFO Detroit-Pontiac forecasters should include sky conditions and small craft advisories in the Lake St. Clair Forecast.

4.3.4 Headlines. Use headlines to emphasize weather events likely to have a significant impact on mariners or marine operations. In each headline, indicate the severity of the event in the priority order given below.

The most significant headline generally should stand alone. However, forecasters may use more than one headline to indicate multiple threats or worsening conditions. To maintain a heightened level of awareness, do not include a headline that downgrades a current condition in later periods (e.g., a storm warning in effect today improving to a gale warning tonight). When downgrading to a lower priority headline, WFOs may use more than one headline to clarify a trend.

For example:
...GALE WARNING DISCONTINUED...
...SMALL CRAFT ADVISORY IN EFFECT...

or,
...SMALL CRAFT ADVISORY DISCONTINUED...

Except for severe local storm watches, forecasters should not use specific times (e.g., GALE WARNING IN EFFECT AFTER 9AM).

In the NSH, use the following headlines, in the priority order given, if appropriate criteria are occurring or forecast to occur:

1. Hurricane Force Wind Warning
2. Storm Warning
3. Gale Warning
4. Heavy Freezing Spray Warning
5. Lakeshore Flood Warning
6. Tornado Watch
7. Severe Thunderstorm Watch
8. Lakeshore Flood Watch

Based on event significance, forecasters may headline ADVISORY events expected to impact the forecast area, such as conditions impacting small craft, high surf, restrictions lowering visibilities below 1 NM, freezing spray, or volcanic ash fallout. In such cases, ADVISORY events will be prioritized <u>between</u> WARNING and WATCH events.

a. Small Craft Advisories. Great Lake WFOs will issue Small Craft Advisories when criteria are met for the first twelve (12) hour period, and may issue Advisories for the second period when forecaster confidence is high. In addition, WFOs may include a headline in the Nearshore Marine Forecast such as “SMALL CRAFT ADVISORY CONDITIONS ARE EXPECTED FRIDAY” for the third and fourth periods of the forecast.

Based on Local or Regional policy, WFOs may use cautionary statements (e.g., SMALL CRAFT SHOULD EXERCISE CAUTION) in situations below SCA criteria..

Note: Refer to NWSI 10-301, Marine and Coastal Services Abbreviations and Definitions, for Regionally-defined small craft advisory issuance criteria, as well as definitions for gale or storm warnings.

b. Gale Warnings/Storm Warnings. WFOs with marine responsibility for the Great Lakes will issue Warnings when criteria are met for the first twelve (12) hour period, and may issue Warnings for the second and/or third period when forecaster confidence is high. In addition, WFOs may include a headline in the NSH such as "GALE (or STORM) WARNING CONDITIONS EXPECTED MONDAY" for the fourth and fifth periods of the forecast.

4.3.5 1-2 Day Forecast Periods. Except as noted below, include forecasts of wind and waves in each discrete forecast period in the NSH. Forecasters should also include forecasts of other weather significantly impacting the marine zone(s) (e.g., sky cover or significant weather, ice accretion, precipitation, low visibilities, etc.). Emphasize the most critical conditions.

4.3.6 3-5 Day Forecast Periods. Do not include an extended forecast in the NSH.

4.3.7 NSH - Forecast Parameters

a. Winds. Winds represent predominant conditions at or near the surface of the water (within 3 meters). Give wind direction to eight points of the compass. Avoid such phrases as "N TO NE WINDS". Forecasters may indicate changes with terms such as BECOMING, or by dividing the forecast area into segments. For wind speeds up to 25 knots, use 5 or 10 knot ranges, rounded to the nearest 5 knots. Thereafter, use a single wind speed (e.g., WINDS TO 35 KNOTS).

Where there is sufficient open water (ice-free seas) to include a sea state forecast, Small Craft Advisories will be issued when appropriate. If sea heights are omitted due to ice coverage, the proper hazard type is Brisk Wind Advisory. The Brisk Wind Advisory should use the same regionally determined wind thresholds as the Small Craft Advisory.

b. Waves. The forecast wave heights should represent the significant wave height in the forecast area. Forecasters may either use one value or a small range in values.

Do not use terms such as ROUGH and MODERATE or open ended terms such as WAVES GREATER THAN 5 FEET.

Do not forecast waves when ice covers a major part (approximately 80 percent) of the marine zone. When this occurs, add the phrase "WAVES OMITTED FOR MOSTLY ICE COVERED AREAS" directly following the final forecast period. Similarly, append "WAVE HEIGHTS ARE FOR ICE FREE AREAS" when forecasting wave heights across marine zones with less ice coverage.

c. Significant Weather/Visibility. Forecasters should include significant weather posing a hazard to navigation when expected (i.e., fog or heavy precipitation lowering visibilities to 5 NM or less, or thunderstorms). Forecasters may use precipitation probability terms "CHANCE", "OCCASIONAL", etc., as defined in WSOM Chapter C-11/NWSI 10-503. However, forecasters should not include sky cover. Forecasters should include sky cover if there is no significant weather forecast.

Forecasters may include specific visibility distances based on local or regional guidelines. However, do not use qualitative descriptions such as “VISIBILITY FAIR”.

Forecasters should emphasize thunderstorms in NSHs. They may include the phrase “WINDS AND WAVES HIGHER NEAR THUNDERSTORMS” but only with respect to the most significant thunderstorms. If a moderate or high risk of severe weather is indicated for a Marine Zone, forecasters should use phrases such as “STRONG THUNDERSTORMS ARE POSSIBLE” or “THUNDERSTORMS SOME POSSIBLY SEVERE”.

d. Icing. Forecasters should include a headline whenever ice accretion on exposed surfaces is likely. Because ice accumulation rates are ultimately dependent on individual ship characteristics and operating conditions, only use the following terms:

Freezing Spray
Heavy Freezing Spray

e. Air Temperatures. Air temperatures are optional. However, they should only be included if they are forecast to be at or below freezing and if the forecaster considers this information to be significant.

f. Miscellaneous information. Based on local requirements, forecasters may include other pertinent information (e.g., water temperatures or water levels) at the end of the forecast.

**Note:** In support of the National Digital Forecast Database (NDFD), the following weather elements will be added to the list of NSH Forecast Parameters in the future: ice crystals, ice fog, freezing fog, volcanic ash, and ice coverage weather elements.

4.4 Format. The following format will be used for the NSH. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

```
(WMO ID)(ISSUANCE DATE TIME)
(AWIPS ID)
NEARSHORE MARINE FORECAST
NATIONAL WEATHER SERVICE (CITY)(STATE)
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

FOR WATERS WITHIN FIVE NAUTICAL MILES OF SHORE ON LAKE (NAME)

(AREAL UGC CODE[S])-(EXPIRATION TIME)-
(FORECAST AREA DESCRIPTOR[S])
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

...HEADLINE(S)... (If needed)

.PERIOD 1...
.PERIOD 2...
.PERIOD 3...
.PERIOD 4...
SEE LAKE (NAME) OPEN LAKE FORECAST FOR DAYS 3 THROUGH 5.

(LAST ISSUANCE STATEMENT) (if needed)
$$

FORECASTER NAME (OPTIONAL)
```

Figure 3. Nearshore Forecast (NSH) Format

4.4.1 NSH - Unscheduled Forecasts. As needed, append either "...UPDATED" or "...CORRECTED" to the product header whenever, respectively, an unscheduled NSH is issued or when an error in the NSH is corrected. Add a short description of the updated or corrected items just below the areal header to highlight the change.

(WMO ID)(ISSUANCE DATE TIME)
(AWIPS ID)

NEARSHORE MARINE FORECAST**...UPDATED (**or **...CORRECTED)**
NATIONAL WEATHER SERVICE (CITY)(STATE)
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

FOR WATERS WITHIN FIVE NAUTICAL MILES OF SHORE ON LAKE (NAME)

(AREAL UGC CODE[S])-(EXPIRATION TIME)-
(FORECAST AREA DESCRIPTOR[S])
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

**REASON FOR UPDATE (**or **CORRECTION)**

...HEADLINE(S)... (If needed)

Figure 4. Unscheduled Nearshore Forecast (NSH) Format

4.5 Updates, Amendments and Corrections. NSHs will be updated when the on-duty forecast team believes the current forecast is not representative. WFOs will correct NSHs for format and grammatical errors.

In addition to normal update criteria noted in NWSI 10-303, forecasters should update NSHs when a tornado watch has been issued and severe thunderstorms are not in the forecast, or when a severe thunderstorm watch has been issued and thunderstorms are not in the forecast.

5. Great Lakes Storm Summary - (GLSCLE). WFO Cleveland will produce a GLS covering all of the Great Lakes whenever storm or hurricane force winds are observed on any of the Great Lakes and are expected to continue for 6 hours or more. Forecasters should update these summaries every three hours until the storm conditions have ended. Do not include Lake St. Clair as a separate entity in the GLS.

The format for the GLSCLE can be seen in Figure 5 below. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

(WMO ID)(ISSUANCE DATE TIME)
(AWIPS ID)

SPECIAL GREAT LAKES MARINE STORM SUMMARY
NATIONAL WEATHER SERVICE CLEVELAND OH
(VALID TIME) AM/PM (LOCAL TIME ZONE)(DAY)(DATE)

A...STORM LOCATION
(Text to include the latitude and longitude of the low pressure system center causing the storm force winds and its relation to a known location)

B...STORM MOVEMENT
(Text to include direction and speed, in knots, of the low pressure system)

C...HIGHEST REPORTED SUSTAINED WINDS OVER THE LAST 3 HOURS
LAKE LAT LONG LOCATION DIR/SPD GUST
(Text to include latest reports from all Great Lakes)

D...STORM INTENSITY/TREND
(Text to include the central pressure of the low in inches, and millibars, and the expected trend over the next 3 hours.)

E...CURRENT WARNINGS
(Text to include all gale, storm, or hurricane force wind warnings in effect for any of the Great Lakes)

F...REMARKS...(Text to include longer term expectations of the storm system and when the next GLS should be issued.)

Figure 5. Great Lakes Storm Summary (GLS) Format

6. Great Lakes Marine Alert Message (MAW). WFO Cleveland will compile and transmit a MAW whenever storm force or greater winds are included in any portion of any GLF. The WFO issuing the GLF will indicate such winds by including **&&STORM** on the line after the termination symbol following the extended forecast. WFO Cleveland should produce the MAW

no later than 30 minutes after such an indicator is detected. The MAW follows the format as shown in Appendix B. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

7. Marine Monitoring Message (MARMON). MARMON is an automated product issued by WFO Cleveland which compares Great Lakes observations with the appropriate MAFORs, highlights significant discrepancies, and forwards these to the responsible WFO. The MARMON follows the format as shown in Appendix B. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language. WFO Cleveland should coordinate MARMON program changes with the other WFOs responsible of Great Lakes services.

8. Great Lakes Weather Broadcasts (LAWEB). The LAWEB is an automated round-up of all Great Lakes weather observations distributed every 3 hours by WFO Cleveland. The LAWEB follows the format as shown in Appendix B. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange, Extensible Markup Language, Wireless Markup Language and HyperText Markup Language.

APPENDIX A - NWS MAFOR Code for the Great Lakes

# *NWS MAFOR Code for the Great Lakes*

## MAFOR $YYG_1G_1$ (Name of Lake[a]) (Watches/Warnings[b]) $1GDFmW_1$[c] (Precipitation[d]) (Ice Coverage[e]) (Wave Forecast[f]) $2GWv_1Wv_2$[g]

| MAFOR $YYG_1G_1$ (Name of Lake[a]) (Watch/Warnings Headline[b]) $1GDFmW_1$[c] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Keyword (Indicating Marine Forecast) | Day of the Month | Time Forecast Period Begins (UTC) | Solidus | Name of Lake [a] | Watch/ Warning Headline [b] | @ | Forecast Period | Wind Direction | Wind Speed | Forecast Weather |
| **MAFOR** | **YY** | **$G_1$ $G_1$** | **/** | **XXXX** | **Plain Language** | **1** | **G** | **D** | **Fm** | **$W_1$** |

| (Precipitation[d]) (Ice Coverage[e]) (Wave Forecast[f]) $2GWv_1Wv_2$[g] | | | | | |
|---|---|---|---|---|---|
| Precipitation[d] | Ice Coverage[e] | Wave Forecast[f] (feet) | @ | Forecast Period | Wave Height Range (feet) |
| **Plain Language** | **Plain Language** | **Plain Language** | **2** | **G** | **$Wv_1Wv_2$** |

| G - Forecast Period | D - Wind Direction | Fm - Wind Speed | $W_1$ - Forecast Weather |
|---|---|---|---|
| 0 - Conditions at the beginning of the forecast period<br>1 - Valid for 3 hours<br>2 - Valid for 6 hours<br>3 - Valid for 9 hours<br>4 - Valid for 12 hours<br>5 - Valid for 18 hours<br>6 - Valid for 24 hours<br>9 - Occasional | 0 - Calm<br>1 - Northeast<br>2 - East<br>3 - Southeast<br>4 - South<br>5 - Southwest<br>6 - West<br>7 - Northwest<br>8 - North<br>9 - Variable | 0 - 5 to 10 Knots<br>1 - 10 to 15 Knots<br>2 - 10 to 20 Knots<br>3 - 15 to 25 Knots<br>4 - 20 to 30 Knots<br>5 - 35 to 40 Knots<br>6 - 40 to 45 Knots<br>7 - 50 to 55 Knots<br>8 - 56 to 63 Knots<br>9 - over 60 Knots | 0 - Moderate or Good Visibility (VSBY) more than 3 nautical miles (n mi)<br>1 - Risk of accumulation of ice on superstructure (Temp 23°to 32°F)<br>2 - Strong risk of accumulation of ice on superstructure (Temp below 23°F)<br>3 - Mist (VSBY 5/8 to 3 n mi)<br>4 - Fog (VSBY < 5/8 n mi)<br>5* - Drizzle<br>6* - Rain<br>7* - Snow or Rain/Snow mix<br>8* - Squally weather with or without showers<br>9* - Thunderstorms<br>* - precipitation group is only included if there is a ≥70% probability of occurrence |

[a] - MAFORS are issued for Lakes Superior, Michigan, Huron, Erie, and Ontario.
[b] - Only one headline is allowed. Headlines are included for Gale and Storm warnings, and Severe Thunderstorm Watches. Note that if a Gale or Storm Warning is in effect and a Severe Thunderstorm Watch is issued then the Severe Thunderstorm Watch takes precedence and is headlined.
[c] - The 1 group may be repeated as many times as necessary to describe changes in wind and weather conditions expected in a given area during a 24-hr fcst period.
[d] - Precipitation is included only if there is a 50% or greater chance of occurrence.
[e] - Ice coverage is included as appropriate. If ice coverage is included then wave height information is omitted.
[f] - Forecast wave height range for valid period of MAFOR (24 hours).
[g] - Coded wave height forecast for first 6 hours only.

Note: The MAFOR code is not an exact duplicate of the plain-language forecast issued in the Open Lake Forecasts issued for each lake. Mariners should refer to the Open Lake Forecast product for the complete forecast.

# APPENDIX B - Examples of Great Lakes Marine Products

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1. Open Lakes and Coded Marine Forecasts . . . . . B-1

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1. Open Lakes and Coded Marine Forecasts.

FZUS63 KMQT 220750
GLFLS
LSZ260-221400-

OPEN LAKE FORECAST FOR LAKE SUPERIOR
NATIONAL WEATHER SERVICE MARQUETTE MI
350 AM EDT TUE APR 22 2003

LAKE SUPERIOR FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE

.SYNOPSIS...LOW PRES OF 29.6 INCHES OVER QUEBEC WILL DEEPEN TO 29.4 INCHES OVER NORTHERN NEW ENGLAND WED. HIGH PRES OF 30.3 INCHES OVER WESTERN ONTARIO WILL BUILD OVER THE UPPER GREAT LAKES TODAY AND WED...THEN WEAKEN TO 30.0 INCHES AS IT EXPANDS INTO THE LOWER GREAT LAKES THU AND FRI.

WEST HALF

.TODAY...N WIND 15 TO 25 KT DECREASING TO 10 TO 20 KT EARLY AND BACKING NW LATE IN THE AFTERNOON. WAVES 4 TO 7 FT SUBSIDING TO 2 TO 4 FT.
.TONIGHT...NW WIND 5 TO 15 KT BECOMING VARIABLE 5 TO 10 KT. WAVES 1 TO 3 FT.
.WED...VARIABLE WIND 10 KT OR LESS. WAVES CALM TO 2 FT.

.WED NIGHT...VARIABLE WIND 10 KT OR LESS. WAVES CALM TO 2 FT.
.THU...VARIABLE WIND 10 KT OR LESS BECOMING NE 5 TO 10 KT EARLY IN THE AFTERNOON. WAVES CALM TO 2 FT.
.FRI...NE WIND 10 TO 15 KT. WAVES 1 TO 3 FT.
.SAT...NE WIND 10 TO 15 KT DECREASING TO 5 TO 10 KT EARLY IN THE AFTERNOON. WAVES SUBSIDING TO CALM TO 2 FT.

EAST HALF

.TODAY...N WIND TO 30 KT DECREASING TO 15 TO 25 KT AND BACKING NW LATE IN THE AFTERNOON. WAVES 7 TO 10 FT SUBSIDING TO 4 TO 7 FT.
.TONIGHT...NW WIND 10 TO 20 KT DECREASING TO 5 TO 10 KT AFTER MIDNIGHT. WAVES 4 TO 6 FT SUBSIDING TO 1 TO 3 FT.
.WED...NW WIND 5 TO 15 KT. WAVES 2 TO 4 FT SUBSIDING TO 1 TO 3 FT.
.WED NIGHT...NW WIND 5 TO 15 KT BECOMING VARIABLE AFTER MIDNIGHT. WAVES 1 TO 3 FT.
.THU...VARIABLE WIND 10 KT OR LESS BECOMING NE 5 TO 10 KT EARLY IN THE AFTERNOON. WAVES CALM TO 2 FT.
.FRI...NE WIND 5 TO 15 KT. WAVES 1 TO 3 FT.
.SAT...E WIND 5 TO 10 KT VEERING SE EARLY IN THE AFTERNOON. WAVES CALM TO 2 FT.

NOTE...WAVE HEIGHT FORECASTS ARE FOR ICE FREE AREAS.

$$

LSZ261-221400-
MAFOR 2209/
SUPERIOR WEST 1/2 11830 12820 12710 13900 WAVES 2 TO 7 FEET SUBSIDING TO 1 TO 3 FEET TONIGHT. 210407 210306. WAVE HEIGHTS ARE FOR ICE FREE AREAS.

SUPERIOR EAST 1/2 11840 12830 12720 12710 11700 WAVES 7 TO 10 FEET SUBSIDING TO 1 TO 6 FEET TONIGHT. 210710 210609. WAVE HEIGHTS ARE FOR ICE FREE AREAS.

$$

VOSS

FZUS61 KBUF 220756
GLFLO
LOZ060-221400-

FORECAST FOR LAKE ONTARIO
NATIONAL WEATHER SERVICE BUFFALO NY
350 AM EDT TUE APR 22 2003

LAKE ONTARIO FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE

.SYNOPSIS...A 29.6 INCH LOW PRESSURE SYSTEM OVER QUEBEC THIS MORNING WILL SLOWLY PULL AWAY TO THE EAST DURING THE COURSE OF TODAY WHILE A 30.2 INCH HIGH OVER HUDSON BAY WILL EXTEND SOUTH ACROSS THE GREAT LAKES REGION. BY WEDNESDAY...A 30.1 INCH RIDGE WILL EXTEND FROM HUDSON BAY SOUTHWARD ACROSS THE GREAT LAKES TO THE GULF OF MEXICO. THIS RIDGE WILL GENERALLY REMAIN IN PLACE THROUGH THURSDAY...THEN A 29.5 INCH LOW OVER THE CENTRAL PLAINS WILL MOVE TO THE EAST ACROSS THE TENNESSEE VALLEY.

.TODAY...SOUTHWEST WINDS 10 TO 15 KNOTS BECOMING WEST. OCCASIONAL SHOWERS. WAVES 1 TO 3 FEET.
.TONIGHT...NORTHWEST WIND 10 TO 20 KNOTS. RAIN AND SNOW SHOWERS LIKELY. WAVES 2 TO 4 FEET.
.WEDNESDAY...NORTHWEST WIND 15 TO 20 KNOTS. SNOW SHOWERS LIKELY IN THE MORNING THEN SCATTERED RAIN SHOWERS AND SNOW SHOWERS IN THE AFTERNOON. WAVES 3 TO 5 FEET.
.WEDNESDAY NIGHT...NORTHWEST WIND 10 TO 15 KNOTS. WAVES 2 TO 4 FEET.
.THURSDAY...WEST WIND 10 TO 15 KNOTS. WAVES 1 TO 3 FEET.
.FRIDAY...VARIABLE WINDS 5 TO 10 KNOTS. WAVES 1 TO 2 FEET.
.SATURDAY...EAST WIND 10 TO 15 KNOTS. CHANCE OF RAIN. WAVES 1 TO 3 FEET.

$$

LOZ061-221400-
MAFOR 2209/
ONTARIO 12516 13616 13720 19727. WAVES 1 TO 3 FEET TODAY AND 2 TO 4 FEET TONIGHT. 220103.

$$

RSH

FZUS63 KMQT 210727
GLFLS
LSZ260-211400-

OPEN LAKES FORECAST FOR LAKE SUPERIOR
NATIONAL WEATHER SERVICE MARQUETTE MI
327 AM EDT FRI JUL 21 2000

LAKE SUPERIOR FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE

.SYNOPSIS...HIGH PRESSURE OF 30.1 INCHES OVER THE DAKOTAS WILL BUILD EAST...REACHING LAKE SUPERIOR BY TONIGHT AND REMAINING ANCHORED OVER THE WESTERN GREAT LAKES THROUGH SUN MORNING. A STRONG LOW WILL MOVE IN FROM THE NORTHWEST MON.

WEST HALF

...STORM FORCE WINDS POSSIBLE MON...

.TODAY...W WIND 10 TO 15 KT. WAVES 3 FT. SCATTERED MORNING SHOWERS TAPERING OFF TO PATCHY AFTERNOON DRIZZLE.
.TONIGHT AND SAT...NW WINDS 5 TO 10 KT. WAVES 2 FT.
.SAT NIGHT...VARIABLE WIND TO 10 KT. WAVES CALM.
.SUN...SW WINDS INCREASING 15 TO 20 KNOTS. WAVES BUILDING TO 4 FT.
.MON...NW WINDS 55 KT BY AFTERNOON. WAVES 15 FT BY LATE AFTERNOON.
.TUE...NW WINDS 60 KT. WAVES 18 FT. SHOWERS AND THUNDERSTORMS POSSIBLE.

EAST HALF

.TODAY...W WIND 5 TO 10 KT INCREASING TO 15 TO 20 KT THIS AFTERNOON. WAVES 3 FT BUILDING TO 5 FT THIS AFTERNOON. SCATTERED MORNING SHOWERS TAPERING OFF TO PATCHY AFTERNOON DRIZZLE.
.TONIGHT AND SAT...NW WIND 10 TO 15 KT. WAVES SUBSIDING TO 3 FT.
.SAT NIGHT...NW WIND 5 TO 10 KT. WAVES 2 FT.
.SUN THROUGH MON...WINDS BECOMING SW 15 TO 20 KT. WAVES BUILDING TO 5 FT.
.TUE...SW WINDS 35 KNOTS. WAVES BUILDING TO 12 FT BY LATE TUESDAY. SHOWERS AND THUNDERSTORMS POSSIBLE.
$$
&&STORM

LSZ261-211400-
MAFOR 2109/

SUPERIOR WEST ½ 14610 14700 SCATTERED MORNING SHOWERS TAPERING TO PATCHY AFTERNOON DRIZZLE. WAVES 1 TO 3 FEET. 220103.
SUPERIOR EAST ½ 12600 12620 14710 SCATTERED MORNING SHOWERS TAPERING TO PATCHY AFTERNOON DRIZZLE. WAVES 3 TO 5 FEET. 210203 210305.
$$

FZUS63 KDTX 061323
GLFSC
LCZ460-062000-

LAKE ST CLAIR FORECAST
NATIONAL WEATHER SERVICE DETROIT/PONTIAC MI
925 AM EDT THU JUL 6 2000

.SYNOPSIS...A RIDGE OF HIGH PRESSURE WILL DOMINATE THE GREAT LAKES THROUGH THE PERIOD. THE CENTER OF THIS RIDGE...30.3 INCHES...WILL CROSS LAKE HURON FRI NIGHT BECOMING STATIONARY JUST EAST OF THE LAKE THROUGH THE WEEKEND.

.THIS AFTERNOON...NE WIND 10 KNOTS OR LESS. PARTLY CLOUDY. WAVES 1 FT OR LESS.
.TONIGHT THROUGH FRI NIGHT...N WIND KNOTS. CLEAR. WAVES 1 FT.
.SAT THROUGH MONDAY...WINDS CALM. WAVES LESS THAN 1 FT.
$$
KEYES

2. <u>Nearshore Forecasts</u>:

FZUS53 KMKX 220222
NSHMKE

NEARSHORE MARINE FORECAST
NATIONAL WEATHER SERVICE MILWAUKEE/SULLIVAN WI
930 PM CDT MON APR 21 2003

FOR WATERS WITHIN 5 NAUTICAL MILES OF THE SHORE ON LAKE MICHIGAN

LMZ643>646-220940-
SHEBOYGAN TO WINTHROP HARBOR IL-
930 PM CDT MON APR 21 2003

...SMALL CRAFT ADVISORY IN EFFECT...

.TONIGHT...NORTHWEST WIND 15 TO 25 KNOTS BECOMING NORTH. CLOUDY...THEN BECOMING PARTLY CLOUDY TOWARD MORNING. WAVES 2 FEET BUILDING TO 2 TO 4 FEET BY MORNING.
.TUESDAY...NORTH TO NORTHEAST WIND 15 TO 25 KNOTS EARLY....THEN NORTHEAST 10 TO 20 KNOTS. MOSTLY SUNNY. WAVES 3 TO 4 FEET.
.TUESDAY NIGHT...NORTH WINDS 10 TO 15 KNOTS. CLEAR. WAVES 2 TO 4 FEET.
.WEDNESDAY...NORTH WIND AROUND 10 KNOTS. PARTLY CLOUDY. WAVES 1 TO 3 FEET.
$$
SEE LAKE MICHIGAN OPEN LAKE FORECAST FOR THURSDAY THROUGH SATURDAY.

HENTZ

3. Great Lakes Storm Summary:

FZUS71 KCLE 022133
GLSCLE

SPECIAL GREAT LAKES MARINE STORM REPORT
NATIONAL WEATHER SERVICE CLEVELAND OH
1030 AM EST SUN JAN 16 2000

STORM REPORT NUMBER 3...1030 AM EST JAN 16

A...STORM LOCATION
STRONG STORM 45.2 N 74.4 W (NEAR OTTAWA)

B...STORM MOVEMENT
LOW MOVING NE 20 KT

C...HIGHEST REPORTED SUSTAINED WINDS OVER THE LAST 3 HOURS
AS OF 10AM EST/9AM CST

| LAKE | LAT | LON | LOCATION | DIR/SPD | GUST |
|---|---|---|---|---|---|
| SUPERIOR | 4655 | 8738 | MARQUETTE CG MI | 330/50 | 65 |
| MICHIGAN | 4375 | 8769 | SHEBOYGAN BRKWTR WI | 330/40 | 50 |
| HURON | 4472 | 8327 | STURGEON PT MI | 280/35 | 45 |
| | 4374 | 8173 | GODERICH ONT | 340/30 | 39 |
| ST CLAIR | 4230 | 8270 | BELLE RIVER ONT | 320/23 | |
| ERIE | 4255 | 8005 | LONG POINT ONT | 240/30 | |
| ONTARIO | 4322 | 7922 | PORT WELLER ONT | 210/20 | |

4380 7690 CANADIAN BUOY 270/23

D...STORM INTENSITY TREND
LITTLE CHANGE NEXT 3 HOURS

E...CURRENT WARNINGS
LAKE SUPERIOR...WARNING - STORM
LAKE HURON...WARNING - STORM
LAKE MICHIGAN...WARNING - GALE

F...REMARKS
NEXT STORM REPORT WILL BE ISSUED BY WFO CLEVELAND AT 1:30 PM EST.
$$
GARNET

4. Great Lakes Marine Alert Message:

FZUS61 KCLE 170230
MAWCLE

GREAT LAKES MARINE WEATHER BROADCAST
NATIONAL WEATHER SERVICE CLEVELAND OH
1029 PM EDT WED APR 16 2003

ALERT...STORM FORCE WINDS (48 KNOTS OR GREATER) ARE POSSIBLE IN
LAKE(S):

SUPERIOR
MICHIGAN

SEE THE LATEST OPEN LAKES FORECAST.
$$

5. Great Lakes Weather Broadcast:

SXUS20 KCLE 071002
OMRGL2

GREAT LAKES MARINE WEATHER BROADCAST
NATIONAL WEATHER SERVICE CLEVELAND OH
459 AM EST WED MAR 7 2001

WIND SPEED IN KNOTS..WAVE HEIGHT IN FEET..VISIBILITY IN MILES
F=FOG H=HAZE R=RAIN S=SNOW L=DRIZZLE T=THUNDERSTORM D=DUST
Z=FREEZING LAKE

| ST.CLAIR | 0400 EST | | | | 0300 EST | | | |
|---|---|---|---|---|---|---|---|---|
| STATION | WIND | GUST | WAVE | VSBY/WX | WIND | GUST | WAVE | VSBY/WX |

| LAKE ERIE | 0400 EST | | | | 0300 EST | | | |
|---|---|---|---|---|---|---|---|---|
| STATION | WIND | GUST | WAVE | VSBY/WX | WIND | GUST | WAVE | VSBY/WX |
| Dunkirk Beach NY | 240/11 | 11 | | | 240/11 | 12 | | |
| Clevlnd Lakeft AP OH | 310/15 | | | | 320/16 | | | |
| Lorain Lighthouse | MMM/MM | 0 | | | | | | |
| South Bass Island O | 320/15 | 16 | | | 320/17 | 19 | | |
| Fairport Lighthouse | MMM/MM | 0 | | | | | | |
| Rondeau ONT | 320/ 8 | | | | 320/ 9 | | | |
| Long Point ONT | 290/13 | | | | 320/16 | | | |
| London ONT | 330/ 8 | | | | 310/ 8 | | | |

| LAKE ONTARIO | 0400 EST | | | | 0300 EST | | | |
|---|---|---|---|---|---|---|---|---|
| STATION | WIND | GUST | WAVE | VSBY/WX | WIND | GUST | WAVE | VSBY/WX |
| Galloo Island NY | 360/16 | 20 | | | 020/14 | 17 | | |
| Burlinton Pier ONT | 250/ 4 | | | | 240/ 4 | | | |
| Cobourg ONT | 340/ 3 | | | | 360/ 3 | | | |
| Trenton ONT | 320/ 3 | | | | 330/ 4 | | | |
| Point Petre ONT | 350/10 | | | | 360/10 | | | |

...BUOY & SHIP OBSERVATIONS, 0400 EST...

| LAT | LON | LOCATION | WIND | GUST | WAVE | VSBY/WX |
|---|---|---|---|---|---|---|
| 43.8 | 76.9 | 11 WSW Main Duck Island | 340/14 | 16 | 01 | 3/F |

$$

6. <u>Marine Monitoring Message (MARMON)</u>:

NOUS71 KCLE 211355
ADAGLM

GREAT LAKES MONITORING MESSAGE
NATIONAL WEATHER SERVICE CLEVELAND OH
954 AM EDT MON APR 21 2003 (1354 UTC 04/21/03)

Message(s) for Lake Superior

WFPM4 "Whitefish Point MI"

1400Z 4/21/3

Wind speed observed at calm
MAFOR forecast: to 30 knots (code 4) occasionally to 35/40 (code 5)
(The observed wind direction was 300 degrees.)

AFOS product: ARBOMRAPS. The OMR-type observation is shown here:

WFPM4 3000/ PK WND 08 WHITEFISH POINT

---

Plain language forecast for this lake:

LSZ260-211400-

OPEN LAKE FORECAST FOR LAKE SUPERIOR
NATIONAL WEATHER SERVICE MARQUETTE MI
400 AM EDT MON APR 21 2003

LAKE SUPERIOR FORECAST BEYOND FIVE NAUTICAL MILES FROM SHORE

.SYNOPSIS...LOW PRES OF 29.5 INCHES OVER LAKE SUPERIOR WILL MOVE TO WESTERN QUEBEC TONIGHT. HIGH PRES OF 30.2 INCHES WILL SPREAD OVER THE WESTERN GREAT LAKES TUE. THIS HIGH WILL REMAIN OVER THE GREAT LAKES WED THROUGH FRI...AS 29.5 INCH LOW PRES DEVELOPS OVER THE CENTRAL PLAINS. A LOW PRES TROUGH OF 29.8 INCHES WILL ALSO FORM OVER THE CANADIAN HIGH PLAINS THU AND FRI.

WEST HALF

...GALE WARNING IN EFFECT...

.TODAY...N WIND TO 30 KT INCREASING TO 35 KT GALES EARLY. RAIN AND SNOW LIKELY...DIMINISHING TO SCATTERED RAIN AND SNOW SHOWERS THIS AFTERNOON. WAVES 5 TO 8 FT BUILDING TO 8 TO 12 FT.
.TONIGHT...N WIND TO 30 KT DECREASING TO 15 TO 25 KT AFTER MIDNIGHT. WAVES SUBSIDING TO 5 TO 8 FT.
.TUE...N WIND 15 TO 25 KT BACKING NW AND DECREASING TO 10 TO 20 KT. WAVES SUBSIDING TO 2 TO 4 FT.
.TUE NIGHT...W WIND 10 TO 20 KT VEERING N 5 TO 15 KT. WAVES SUBSIDING TO 1 TO 3 FT.
.WED THROUGH FRI...VARIABLE WIND 10 KT OR LESS. WAVES CALM TO 2 FT.

EAST HALF

...GALE WARNING IN EFFECT...

.TODAY...W WIND 15 TO 25 KT EARLY...VEERING TO N GALES TO 35 KT THIS MORNING. RAIN AND SNOW LIKELY. WAVES 4 TO 6 FT BUILDING TO 8 TO 12 FT.
.TONIGHT...N GALES TO 35 KT DECREASING TO WIND TO 30 KT BY MIDNIGHT. SCATTERED RAIN AND SNOW SHOWERS IN THE EVENING. WAVES SUBSIDING TO 7 TO 10 FT.
.TUE...N WIND DECREASING TO 15 TO 25 KT. WAVES SUBSIDING TO 4 TO 7 FT.
.TUE NIGHT...N WIND 15 TO 25 KT DECREASING TO 10 TO 20 KT. WAVES SUBSIDING TO 3 TO 5 FT.
.WED...N WIND 10 TO 20 KT BACKING NW 5 TO 15 KT. WAVES SUBSIDING TO 1 TO 3 FT.
.THU...N WIND 5 TO 10 KT. WAVES CALM TO 2 FT.
.FRI...N WIND 5 TO 10 KT BACKING NW. WAVES CALM TO 2 FT.

NOTE...WAVE HEIGHT FORECASTS ARE FOR ICE FREE AREAS.

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MAFOR 2109/
SUPERIOR WEST 1/2...GALE WARNING IN EFFECT...11847 12857 11850 12840 12830 SCATTERED RAIN AND SNOW SHOWERS THIS AFTERNOON. WAVES 5 TO 8 FEET BUILDING TO 8 TO 12 FEET TODAY...THEN SUBSIDING TO 5 TO 8 FEET TONIGHT. 210508 210710. WAVE HEIGHTS ARE FOR ICE FREE AREAS.

SUPERIOR EAST 1/2...GALE WARNING IN EFFECT...11637 19530 11747 19757 12857 12850 12840 SCATTERED RAIN AND SNOW SHOWERS THIS EVENING. WAVES 4 TO 6 FEET BUILDING TO 7 TO 12 FEET TODAY. 210406 210609. WAVE HEIGHTS ARE FOR ICE FREE AREAS.

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