

**Storm Elin**  
**Marine Storm Report**  
Marine Unit

Report Date: 25 August 2025

Report Time: 13:36 UTC

## Storm Overview

**Dates:** 2023-12-21, 2023-12-22

**Description:** Pre-Christmas storm affecting western and southern areas.

**Peak Winds:** 90+ km/h

**Areas Affected:** West Coast, Southwest

## Marine Observations Summary

### Data Sources

- **Buoy 62091** (M1 Buoy (Retired)): 53.47°N, 5.42°W - West Coast
- **Buoy 62092** (M2 Buoy): 53.48°N, 5.42°W - West Coast
- **Buoy 62093** (M3 Buoy): 51.22°N, 6.70°W - South Coast
- **Buoy 62094** (M4 Buoy): 51.69°N, 6.70°W - South Coast
- **Buoy 62095** (M5 Buoy): 53.06°N, 7.90°W - West Coast

### Peak Conditions Observed

- **Maximum Wind Speed:** 16.9 m/s (61.0 km/h) at Buoy 62091

- **Maximum Significant Wave Height (Hm0):** 10.2 m at Buoy 62093
- **Maximum Wave Height (Hmax):** 15.8 m at Buoy 62093
- **Minimum Pressure:** 997.2 hPa at Buoy 62093
- **Temperature Range:** 9.5°C (Buoy 62091) to 13.2°C (Buoy 62091)
- **Total Observations:** 914 records from 5 stations (QC good data only)

## Station-by-Station Analysis

### Buoy 62091 - M1 Buoy (Retired)

- **Location:** 53.47°N, 5.42°W
- **Region:** West Coast
- **Peak Wind Speed:** 16.9 m/s (61.0 km/h)
- **Peak Significant Wave Height (Hm0):** 3.3 m
- **Peak Maximum Wave Height (Hmax):** 5.2 m
- **Minimum Pressure:** 1001.7 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 168 records (QC good data only)

### Buoy 62092 - M2 Buoy

- **Location:** 53.48°N, 5.42°W
- **Region:** West Coast
- **Peak Wind Speed:** 16.6 m/s (59.9 km/h)
- **Peak Significant Wave Height (Hm0):** 7.7 m
- **Peak Maximum Wave Height (Hmax):** 13.1 m
- **Minimum Pressure:** 1011.6 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 194 records (QC good data only)

### Buoy 62093 - M3 Buoy

- **Location:** 51.22°N, 6.70°W
- **Region:** South Coast
- **Peak Wind Speed:** 16.3 m/s (58.9 km/h)
- **Peak Significant Wave Height (Hm0):** 10.2 m
- **Peak Maximum Wave Height (Hmax):** 15.8 m
- **Minimum Pressure:** 997.2 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 188 records (QC good data only)

### Buoy 62094 - M4 Buoy

- **Location:** 51.69°N, 6.70°W
- **Region:** South Coast
- **Peak Wind Speed:** 15.1 m/s (54.4 km/h)
- **Peak Significant Wave Height (Hm0):** 3.9 m
- **Peak Maximum Wave Height (Hmax):** 6.2 m
- **Minimum Pressure:** 1009.0 hPa

- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 182 records (QC good data only)

## Buoy 62095 - M5 Buoy

- **Location:** 53.06°N, 7.90°W
- **Region:** West Coast
- **Peak Wind Speed:** 15.6 m/s (56.3 km/h)
- **Peak Significant Wave Height (Hm0):** 8.9 m
- **Peak Maximum Wave Height (Hmax):** 15.3 m
- **Minimum Pressure:** 1002.4 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 182 records (QC good data only)

## Meteorological Analysis

### Wind Analysis

The storm produced maximum sustained winds of **16.9 m/s** (61.0 km/h), representing significant marine weather conditions. Wind speeds of this magnitude pose considerable risks to marine operations and coastal areas.

#### Wind Categories:

- Force 7 (Strong Gale): 13.9-17.1 m/s (50-61 km/h)
- Force 8 (Gale): 17.2-20.7 m/s (62-74 km/h)
- Force 9 (Strong Gale): 20.8-24.4 m/s (75-88 km/h)
- Force 10+ (Storm): >24.5 m/s (>88 km/h)

### Wave Analysis

**Significant Wave Heights (Hm0):** Peak values reached **10.2 m**, representing **very high** sea states according to the World Meteorological Organization classification.

**Maximum Wave Heights (Hmax):** Individual wave heights peaked at **15.8 m**. Note: Hmax values represent individual wave heights and are not used for sea state classification.

**Wave Height Relationship:** The Hmax/Hm0 ratio was **1.54**, within normal range (1.3-1.8).

#### Sea State Classification (Hm0):

- Rough: 2.5-4.0 m
- Very Rough: 4.0-6.0 m
- High: 6.0-9.0 m
- Very High: 9.0-14.0 m
- Phenomenal: >14.0 m

#### Wave Height Definitions:

- **Hm0 (Significant Wave Height):** Average height of the highest one-third of waves
- **Hmax (Maximum Wave Height):** Highest individual wave recorded during the period

## Quality Control Summary

Total Records: 914

### QC Status Distribution:

- Good Data (QC=1): 914 records (100.0%)
- Adjusted Data (QC=5): 0 records (0.0%)
- Failed QC (QC=4): 0 records (0.0%)
- Missing Data (QC=9): 0 records (0.0%)
- No QC (QC=0): 0 records (0.0%)

## Data Visualization

!Storm Overview

*Figure 1: Marine meteorological analysis showing wind speed, wave height, atmospheric pressure, air temperature, wind direction, and wave period during Storm Elin.*

## Technical Notes

### QC Methods Applied

- **Manual QC:** Visual inspection and expert validation
- **Automatic QC:** Range checks, spike detection, and flat-line identification

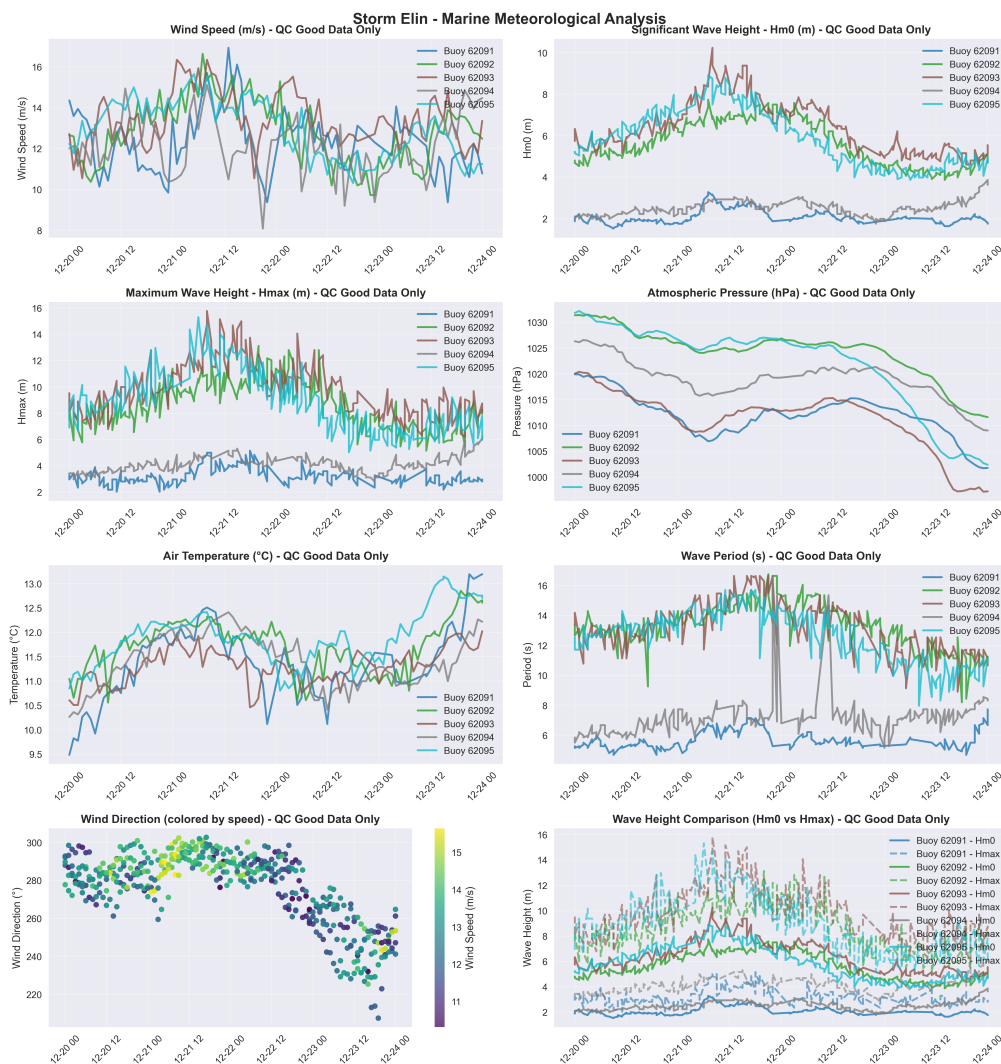
### Data Quality Indicators

- 0: No QC performed
- 1: QC performed, data OK
- 4: QC performed, raw data not OK and not adjusted
- 5: QC performed, raw data not OK but value adjusted/interpolated
- 6: QC performed, data OK (Datawell Hmax sensor specific)
- 9: Data missing

---

*Report generated by Marine Storm Analysis System Data source: Irish Marine Data Buoy Network Quality controlled data from Met Éireann marine observations*

## Marine Meteorological Analysis



**Figure 1:** Marine meteorological observations during Storm Elin. Eight-panel analysis showing wind speed, significant wave height (Hm0), maximum wave height (Hmax), atmospheric pressure, air temperature, wave period, wind direction patterns, and comparative wave heights across the Irish Marine Data Buoy Network. Quality-controlled data only.