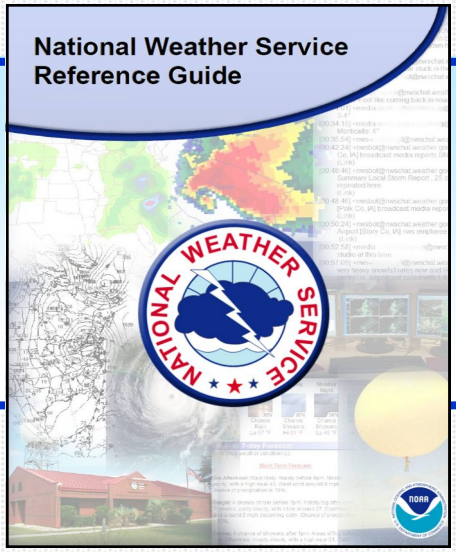

2. Non-Routine Products and Services

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2. Non-Routine Products and Services

One of the primary duties of the NWS forecast office is to highlight the potential for hazardous or dangerous weather conditions in the form of watches, warnings and advisories. This threat for hazardous or dangerous weather then needs to be communicated to the users in an efficient and convenient way. This section describes both the non-routine products issued and the non-routine services provided by the NWS.

Non-routine products and services of the NWS include all non-scheduled, event-driven services. The watch and warning program is one of the most important functions of the NWS. The NWS WFO is staffed 24 hours a day, 365 days a year and is able to shift quickly from routine duties to non-routine duties if conditions warrant.

The watch and warning program is not the only non-routine service provided. On-site or remote decision support services are provided for both weather and non-weather emergencies. Other examples of services include: storm damage surveys, teaching storm spotter training classes and participating in other outreach activities. These are described at length in the next section.

Product Categories

The NWS issues watches, warnings, advisories and statements to highlight the potential for hazardous or dangerous weather conditions. These special products, often referred to as 'headlines,' are issued when the forecaster feels there is sufficient confidence of an event occurring. The NWS warning program uses a multi-tiered concept to increase public awareness and promote proper response to the impending hazard. Generally, the multi-tiered concept conveys certain levels of urgency as described below:

1. **Outlook/Statement:** An outlook or statement is used to indicate that a hazardous weather event may develop but there is still uncertainty. Forecaster confidence of an event occurring is generally greater than 30 percent. This stage is intended to provide those who need it, considerable lead-time to prepare for the possible event.

2. **Watch:** A watch is used when the risk of a hazardous weather event has increased, but its occurrence, location and/or timing is still somewhat uncertain. Forecaster confidence is generally greater than 50 percent. This stage is intended to provide enough lead-time so those who need to set their plans in motion can do so.

3. **Warning/Advisory:** A warning or advisory is used when a hazardous weather event is imminent, or is already occurring. Forecaster confidence is generally greater than 80 percent. A warning is used for conditions that pose a threat to life and property. An advisory is used for less serious conditions that cause significant inconvenience and, if proper precautions are not taken, could pose a threat to life and property. When a warning or advisory is issued, preparations should be completed or rushed to completion.

Short-fuse convective warning philosophy: Generally, to issue a short-fused warning (e.g. Severe Thunderstorm Warning, Tornado Warning or Flash Flood Warning), forecasters prefer to have at least two out of the following three elements satisfied to warrant its issuance; atmospheric conditions support the hazard, radar signatures indicate a hazard or a credible severe weather spotter reports a hazard.

Headline categories: All headlines fall into nine categories: convective, winter weather, tropical, hydrologic, coastal flood, non-precipitation, marine, fire weather and other. A listing of these categories and their associated headlines are shown in the following tables.

Convective

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Severe Thunderstorm Watch	Conditions are favorable for thunderstorms containing 1 inch or larger hail and/or wind gusts of at least 58 mph (50 knots).	2 to 8 hours	SV.A	SELx	Watch County Notification	SPC (updates/ cancellations issued by WFO)
	PDS Severe Thunderstorm Watch	Conditions are favorable for widespread, significant, non-tornadic thunderstorms. Example: convective winds greater than 75mph (65knots). *Note: "PDS" does not appear in the watch headline, but as a special line within the initial watch product.*	2 to 8 hours	SV.A	SELx	Watch County Notification	SPC (updates/ cancellations issued by WFO)
	Tornado Watch	Conditions are favorable for thunderstorms producing tornadoes. Hail and strong winds are also possible.	2 to 8 hours	TO.A	SELx	Watch County Notification	SPC (updates/ cancellations issued by WFO)
	PDS Tornado Watch	Conditions are favorable for thunderstorms producing destructive tornadoes. Hail and strong winds are also possible. Typically issued when there is a likelihood of multiple strong (damage of EF2 or EF3) or violent (damage of EF4 or EF5) tornadoes. *Note: "PDS" does not appear in the watch headline, but as a special line within the initial watch product.*	2 to 8 hours	TO.A	SELx	Watch County Notification	SPC (updates/ cancellations issued by WFO)
Warnings	Severe Thunderstorm Warning	A thunderstorm producing 1 inch or larger hail and/or wind gusts of at least 58 mph (50 knots) is occurring or imminent.	10 to 30 minutes	SV.W	SVR	Severe Weather Statement	Local WFO
	Special Marine Warning	A thunderstorm producing 3/4 inch hail, and/or wind gusts to 34 knots and/or waterspouts. In addition, short duration, non-thunderstorm wind gusts to 34 knots.	30 to 90 minutes	MA.W	SMW	Marine Weather Statement	Local WFO
	Tornado Warning	A tornado has been reported or is highly likely to occur based on Doppler radar signatures.	10 to 30 minutes	TO.W	TOR	Severe Weather Statement	Local WFO
	Tornado Emergency	Added to tornado warning in exceedingly rare situations, when a severe threat to human life and catastrophic damage from a tornado is imminent or ongoing,	10 to 30 minutes	TO.W	TOR	Severe Weather Statement	Local WFO
Advisories	Significant Weather Advisory	Issued under the Special Weather Statement product for strong thunderstorms producing winds between 40 and 57 mph, and/or hail less than 1 inch in diameter, and/or frequent or continuous lightning and/or funnel clouds or cold air funnels.	Up to 1 hour	N/A	SPS	Special Weather Statement	Local WFO

Tropical

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Hurricane Watch	Hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds.	48 hours	HU.A	TCV	Tropical Cyclone Public Advisory and Hurricane Local Statement	NHC/CPHC (Watch), WFO (HLS)
	Tropical Storm Watch	Tropical storm conditions (sustained winds of 39 to 73 mph) are possible within the specified coastal area within 48 hours.	48 hours	TR.A	TCV	Tropical Cyclone Public Advisory and Hurricane Local Statement	NHC/CPHC/ WFO Guam (Watch), WFO (HLS)
	Typhoon Watch	Typhoon conditions (sustained winds of 74 mph or higher) are possible within the specified coastal area within 48 hours (the naming convention changes from hurricane to typhoon west of the international date line in the Pacific Ocean).	48 hours	TY.A	HLS	Tropical Cyclone Public Advisory and Typhoon Local Statement	WFO Guam (Watch), WFO (HLS)
Warnings	Extreme Wind Warning	A landfalling hurricane or typhoon is expected to spread sustained surface winds of 115 mph or greater onshore within one hour. In order to be issued, the NHC, CPHC, or JTWC must designate the storm as a category 3 (115 mph or greater).	1 to 2 hours	EW.W	EWW	Severe Weather Statement	Local WFO
	Hurricane Warning	Hurricane conditions (sustained winds of 74 mph or higher) are expected somewhere within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds.	36 hours	HU.W	TCV	Tropical Cyclone Public Advisory and Hurricane Local Statement	NHC/CPHC (Warning), WFO (HLS)
	Tropical Storm Warning	Tropical storm conditions (sustained winds of 39 to 73 mph) are expected within the specified coastal area within 36 hours in the eastern and central Pacific and Atlantic Basins, 24 hours in the western Pacific.	24 to 36 hours	TR.W	TCV	Tropical Cyclone Public Advisory and Hurricane Local Statement	NHC/CPHC/ WFO Guam (Warning), WFO (HLS)
	Typhoon Warning	Typhoon conditions (sustained winds of 74 mph or higher) are expected within the specified coastal area within 24 hours (the naming convention changes from hurricane to typhoon west of the international date line in the Pacific Ocean).	24 hours	TY.W	HLS	Tropical Cyclone Public Advisory and Typhoon Local Statement	WFO Guam (Warning), WFO (HLS)

Winter Weather

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Blizzard Watch	Possibility of sustained winds or wind gusts above 35 mph causing falling and/or blowing snow to reduce visibilities below 1/4 mile for 3 hours or longer.	12 to 48 hours	BZ.A	WSW	Winter Weather Message	Local WFO
	Lake Effect Snow Watch	Possibility of heavy lake effect snow accumulations, generally more than 6 inches in 12 hours or 8 inches in 24 hours. (Specific criteria vary by office)	12 to 48 hours	LE.A	WSW	Winter Weather Message	Local WFO
	Wind Chill Watch	Possibility of very cold temperatures and brisk winds causing dangerously cold wind chills.	12 to 48 hours	WC.A	WSW	Winter Weather Message	Local WFO
	Winter Storm Watch	Possibility of accumulating snow, sleet, and/or freezing rain causing severe impacts to society and commerce.	12 to 48 hours	WS.A	WSW	Winter Weather Message	Local WFO
Warnings	Blizzard Warning	Sustained winds or frequent gusts above 35 mph causing falling and/or blowing snow to reduce visibilities below 1/4 mile for 3 hours or longer is imminent or occurring.	8 to 36 hours	BZ.W	WSW	Winter Weather Message	Local WFO
	Ice Storm Warning	Heavy ice accumulations of 1/4 inch or greater within 12 hours due to freezing rain are imminent or occurring. (Specific criteria vary by office)	8 to 36 hours	IS.W	WSW	Winter Weather Message	Local WFO
	Lake Effect Snow Warning	Heavy lake effect snow accumulations of generally more than 6 inches in 12 hours or 8 inches in 24 hours are imminent or occurring. (Specific criteria vary by office)	8 to 36 hours	LE.W	WSW	Winter Weather Message	Local WFO
	Wind Chill Warning	Very cold air temperatures and brisk wind causing dangerously cold wind chills is imminent or occurring. Hypothermia, frost bite or death is likely if proper precautions are not taken. (Specific criteria vary by	8 to 36 hours	WC.W	WSW	Winter Weather Message	Local WFO
	Winter Storm Warning	Heavy snow and/or sleet and ice accumulations are imminent or occurring. Society and commerce is expected to be greatly impacted. Precipitation may be accompanied by gusty wind. (Specific criteria vary by office)	8 to 36 hours	WS.W	WSW	Winter Weather Message	Local WFO
Advisories	Freezing Rain Advisory	Ice accumulations less than 1/4 inch within 12 hours due to freezing rain are imminent or occurring. (Specific criteria vary by office)	8 to 24 hours	ZR.Y	WSW	Winter Weather Message	Local WFO
	Lake Effect Snow Advisory	Lake effect snow accumulations generally more than 3 inches within 12 hours are imminent or occurring. (Specific criteria vary by office)	8 to 24 hours	LE.Y	WSW	Winter Weather Message	Local WFO
	Wind Chill Advisory	Cold temperatures and brisk wind causing hazardous wind chills are imminent or occurring. Hypothermia and frost bite are possible if proper precautions are not taken. (Specific criteria vary by office)	8 to 24 hours	WC.Y	WSW	Winter Weather Message	Local WFO
	Winter Weather Advisory	Snow and/or sleet and ice accumulations causing an inconvenience to society and commerce are imminent or occurring. Specific criteria varies greatly per region. (Specific criteria vary by office)	8 to 24 hours	WW.Y	WSW	Winter Weather Message	Local WFO

Hydrology

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Flash Flood Watch	Rapidly developing and life-threatening flooding is possible due to a hydrologic event (e.g. heavy rain) or dam or levee failure.	6 to 24 hours	FF.A	FFA	Flash Flood Watch	Local WFO
	Flood Watch	**Flood Watch (Areal):** Flooding of land and/ or rivers and streams is possible. **Flood Watch (Forecast Point):** Flooding is possible at a particular point on a river or stream.	6 to 48 hours	FA.A (areal), FL.A (forecast point)	FFA	Flood Watch	Local WFO
Warnings	Flash Flood Warning	A) Flash flooding is reported; and/or B) A dam or levee failure is imminent or occurring; and/or C) A sudden failure of a naturally-caused stream obstruction (including debris slide, avalanche, or ice jam) is imminent or occurring; and/or D) Precipitation capable of causing flash flooding is indicated by radar, rain gages, and/or satellite; and/or E) Precipitation as indicated by radar, rain gages, satellite and/or other guidance is capable of causing debris flows, particularly (but not only) in burn areas; and/or F) Local monitoring and prediction tools indicate flash flooding is likely; and/or G) A hydrologic model indicates flash flooding for locations on small streams.	30 minutes to 2 hours	FF.W	FFW	Flash Flood Statement	Local WFO
	Flash Flood Emergency	In exceedingly rare situations, when a severe threat to human life and catastrophic damage from a flash flood is imminent or ongoing.	30 minutes to 3 hours	FF.W	FFW	Flash Flood Statement	Local WFO
	Flood Warning	Human life and catastrophic damage from a flood is imminent or ongoing.	6 to 12 hours	FA.W (areal), FL.W (forecast point)	FLW	Flood Statement	Local WFO
Advisories	Flood Advisory	**Flood Advisory (Areal/Forecast Point/ Urban and Small Stream):** Issued when flooding is expected to be of inconvenience, but not necessarily life-threatening.	30 minutes to 2 hours	FA.Y	FLS	Flood Statement	Local WFO

Coastal Flood

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Coastal Flood Watch	Inundation of people, buildings and coastal structures on land at locations that, under normal conditions, are above the level of high tide is possible.	12 to 48 hours	CF.A	CFW	Coastal Hazard Message	Local WFO
	Lakeshore Flood Watch	Inundation of land areas along any of the Great Lakes over and above normal lake levels is possible.	12 to 48 hours	LS.A	CFW	Lakeshore Hazard Message	Local WFO
Warnings	Coastal Flood Warning	Inundation of people, buildings and coastal structures on land at locations that, under normal conditions, are above the level of high tide is imminent or occurring.	12 to 24 hours	CF.W	CFW	Coastal Hazard Message	Local WFO
	High Surf Warning	Breaking wave action that results in an especially heightened threat to life and property within the surf zone is imminent or occurring. Specific criteria varies by region. Not issued for the Great Lakes.	12 to 24 hours	SU.W	CFW	Coastal Hazard Message	Local WFO
	Lakeshore Flood Warning	Inundation of land areas along any of the Great Lakes over and above normal lake levels is imminent or occurring.	12 to 24 hours	LS.W	CFW	Lakeshore Hazard Message	Local WFO
Advisories	Coastal Flood Advisory	Minor flooding of coastal areas is possible within 12 hours.	12 hours	CF.Y	CFW	Coastal Hazard Message	Local WFO
	High Surf Advisory	Breaking wave action posing a threat to life and property within the surf zone is imminent or occurring. Specific criteria varies by region. Not issued for the Great Lakes.	12 hours	SU.Y	CFW	Coastal Hazard Message	Local WFO
	Lakeshore Flood Advisory	Minor flooding of lakeshore areas is possible within 12 hours.	12 hours	LS.Y	CFW	Lakeshore Hazard Message	Local WFO

Marine

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Gale Watch	Conditions are favorable for a gale force wind event of sustained winds or frequent gusts of 34 knots (39 mph) to 47 knots (54 mph).	24 to 48 hours	GL.A	MWW	Marine Weather Message	Local WFO
	Hazardous Seas Watch	Conditions are favorable for a hazardous seas event to meet or exceed Hazardous Seas Warning criteria.	24 to 48 hours	SE.A	MWW	Marine Weather Message	Local WFO
	Heavy Freezing Spray Watch	Conditions are favorable for a heavy freezing spray event to meet local Heavy Freezing Spray Warning criteria.	24 to 48 hours	UP.A	MWW	Marine Weather Message	Local WFO
	Hurricane Force Wind Watch	Conditions are favorable for a hurricane force wind event of sustained winds or frequent gusts of 64 knots (74 mph) or greater.	24 to 48 hours	HF.A	MWW	Marine Weather Message	Local WFO
	Storm Watch	Conditions are favorable for a storm force wind event of sustained winds or frequent guest of 48 knots (55 mph) to 63 knots (73 mph).	24 to 48 hours	SR.A	MWW	Marine Weather Message	Local WFO
	Tsunami Watch	Issued to alert emergency management officials and the public of an event which may later impact the watch area. Danger level not yet known -> Stay alert for more info	3 to 6 hours	TS.A	TSU	Tsunami Statement	West Coast/ Alaska and Pacific Tsunami Warning Centers
Warnings	Ashfall Warning	Airborne ash plume resulting in ongoing deposition at the surface. Ashfall may originate directly from a volcanic eruption or from the resuspension (by wind) of a significant amount of relic ash.	12 to 36 hours	MH.W	MWW	Marine Weather Message	Local WFO
	Gale Warning	Sustained surface winds, or frequent gusts, in the range of 34 knots (39 mph) to 47 knots (54 mph) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone.	12 to 36 hours	GL.W	MWW	Marine Weather Message	Local WFO
	Hazardous Seas Warning	Wave heights and/or wave steepness values meeting or exceeding locally defined warning criteria.	12 to 36 hours	SE.W	MWW	Marine Weather Message	Local WFO
	Heavy Freezing Spray Warning	Usually issued for an accumulation of freezing water droplets on a vessel at a rate of 2 cm per hour or greater caused by some appropriate combination of cold water, wind, cold air temperature, and vessel movement. Local criteria may vary.	12 to 36 hours	UP.W	MWW	Marine Weather Message	Local WFO
	Hurricane Force Wind Warning	Sustained winds, or frequent gusts, of 64 knots (74 mph) or greater, either predicted or occurring, and not directly associated with a tropical cyclone.	12 to 36 hours	HF.W	MWW	Marine Weather Message	Local WFO
	Storm Warning	Sustained surface winds, or frequent gusts, in the range of 48 knots (55 mph) to 63 knots (73 mph) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone.	12 to 36 hours	SR.W	MWW	Marine Weather Message	Local WFO
	Tsunami Warning	A potential tsunami with significant, widespread inundation is imminent or expected. Inundating wave possible -> Full evacuation suggested	Less than 3 hours	TS.W	TSU	Tsunami Message	West Coast/ Alaska and Pacific Tsunami Warning Cen-

Marine

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Advisories	Ashfall Advisory	Airborne ash plume resulting in ongoing deposition at the surface. Ashfall may originate directly from a volcanic eruption or from the resuspension (by wind) of a significant amount of relic ash.	12 to 36 hours	MH.Y	MWW	Marine Weather Message	Local WFO
	Brisk Wind Advisory	Sustained wind speeds or frequent gusts of 20 to 33 knots (locally defined) expected for ice-covered waters.	12 to 36 hours	BW.Y	MWW	Marine Weather Message	Local WFO
	Dense Fog Advisory	Widespread or localized fog reducing visibilities to 1 nautical mile or less (regionally or locally defined).	12 to 36 hours	MF.Y	MWW	Marine Weather Message	Local WFO
	Dense Smoke Advisory	Widespread or localized smoke reducing visibilities to 1 nautical mile or less (regionally or locally defined).	12 to 36 hours	MS.Y	MWW	Marine Weather Message	Local WFO
	Freezing Spray Advisory	Light to moderate accumulation of ice is expected on vessels.	12 to 36 hours	UP.Y	MWW	Marine Weather Message	Local WFO
	Low Water Advisory	Water levels are significantly below average and may cause impact to safe marine navigation. The need for this product is locally determined.	12 to 36 hours	LO.Y	MWW	Marine Weather Message	Local WFO
	Small Craft Advisory	Sustained wind speeds or frequent gusts of 20 to 33 knots (locally defined) and/or seas or waves 4 feet and greater (locally defined).	12 to 36 hours	SC.Y	MWW	Marine Weather Message	Local WFO
	Small Craft Advisory for Hazardous Seas	Wind speeds are lower than small craft advisory criteria, yet waves or seas are potentially hazardous due to wave period, steepness, or swell direction. The criteria is locally defined.	12 to 36 hours	SW.Y	MWW	Marine Weather Message	Local WFO
	Small Craft Advisory for Rough Bar	Waves in or near bars are hazardous to mariners due to the interaction of swell, tidal or river currents in relatively shallow water. Threshold criteria are locally defined and are specific to local geographic areas, and are based upon parameters such as wave steepness, wind speed and direction, and local bathymetry.	12 to 36 hours	RB.Y	MWW	Marine Weather Message	Local WFO
	Small Craft Advisory for Winds	When wave heights and/or wave steepness are lower than Small Craft Advisory criteria, yet wind speeds are potentially hazardous.	12 to 36 hours	SI.Y	MWW	Marine Weather Message	Local WFO
	Tsunami Advisory	A potential tsunami which may produce strong currents or waves dangerous to those in or near the water. Strong currents likely -> Stay away from the shore	Less than 3 hours	TS.Y	TSU	Tsunami Message	West Coast/ Alaska and Pacific Tsunami Warning Centers

Non-Precipitation

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Excessive Heat Watch	Conditions are favorable for an excessive heat event to meet or exceed Excessive Heat Warning criteria.	24 to 72 hours	EH.A	NPW	Weather Message	Local WFO
	Freeze Watch	Minimum shelter temperatures below 32°F are possible during the locally defined growing season which poses a threat to plants and crops.	18 to 48 hours	FZ.A	NPW	Weather Message	Local WFO
	Hard Freeze Watch	Minimum shelter temperatures may drop to 28°F or lower during the locally defined growing season which poses an especially high risk to plants and crops.	18 to 48 hours	HZ.A	NPW	Weather Message	Local WFO
	High Wind Watch	Conditions are favorable for sustained winds of at least 40 mph for one hour or longer, or wind gusts of at least 58 mph of any duration.	18 to 48 hours	HW.A	NPW	Weather Message	Local WFO
Warnings	Dust Storm Warning	Widespread or localized blowing dust reducing visibilities to 1/4 mile or less. Sustained winds of 25 mph or greater are usually required.	6 to 24 hours	DS.W	NPW	Weather Message	Local WFO
	Excessive Heat Warning	Heat index values (HI) are forecast to meet or exceed locally defined warning criteria for at least two consecutive days (Typical values: 1) Maximum daytime HI>=105°F north to 110°F south and 2) Minimum nighttime lows >=75°F.) Criteria may vary widely in different parts of the country due to climate variability and the effect of excessive heat on local population.	12 to 48 hours	EH.W	NPW	Weather Message	Local WFO
	Freeze Warning	Minimum shelter temperatures below 32°F are expected during the locally defined growing season which poses a threat to plants and crops.	12 to 36 hours	FZ.W	NPW	Weather Message	Local WFO
	Hard Freeze Warning	Minimum shelter temperatures are expected to drop to 28°F or lower during the locally defined growing season which poses an especially high risk to plants and crops.	12 to 36 hours	HZ.A	NPW	Weather Message	Local WFO
	High Wind Warning	Sustained winds of at least 40 mph for one hour or longer, or wind gusts of at least 58 mph of any duration are expected.	12 to 36 hours	HW.W	NPW	Weather Message	Local WFO
Advisories	Air Stagnation Advisory	Atmospheric conditions stable enough to cause air pollutants to accumulate in a given area. Criteria developed in conjunction with the local or state EPA and the product issued at their request.	12 to 36 hours	AS.Y	NPW	Weather Message	Local WFO
	Ashfall Advisory	Airborne ash plume resulting in ongoing deposition at the surface. Ashfall may originate directly from a volcanic eruption or from the resuspension (by wind) of a significant amount of relic ash.	12 to 36 hours	AF.Y	NPW	Weather Message	Local WFO
	Blowing Dust Advisory	Widespread or localized blowing dust reducing visibilities to one mile or less, but greater than 1/4 mile. Winds of 25 mph or greater are usually required.	12 to 36 hours	DU.Y	NPW	Weather Message	Local WFO

Non-Precipitation

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Advisories	Dense Fog Advisory	Widespread or localized fog reducing visibilities to 1/4 mile or less.	12 to 36 hours	FG.Y	NPW	Weather Message	Local WFO
	Dense Smoke Advisory	Widespread or localized smoke reducing visibilities to 1/4 mile or less.	12 to 36 hours	SM.Y	NPW	Weather Message	Local WFO
	Freezing Fog Advisory	Very light ice accumulation resulting from freezing fog (no visibility requirement).	12 to 36 hours	ZF.Y	NPW	Weather Message	Local WFO
	Frost Advisory	Minimum shelter temperature forecast to be 33 to 36°F during the locally defined growing season, on nights with good radiational cooling conditions conducive for frost formation (e.g., light winds and clear skies).	12 to 36 hours	FR.Y	NPW	Weather Message	Local WFO
	Heat Advisory	Heat Index values forecast to meet or exceed locally defined advisory criteria for one to two days (Typical values: 1) Maximum daytime HI>=100°F north to 105°F south 2) Minimum nighttime lows>=75°F). Criteria may vary widely in different parts of the country due to climate variability and the effect of excessive heat on local population.	12 to 36 hours	HT.Y	NPW	Weather Message	Local WFO
	Lake Wind Advisory	Sustained wind speeds of 20 to 29 mph (or locally defined) lasting for 1 hour or longer for regions which have a significant user community. The need for this product is locally determined.	12 to 36 hours	LW.Y	NPW	Weather Message	Local WFO
	Wind Advisory	Sustained wind speeds of 30 to 39 mph lasting for 1 hour or longer or locally defined.	12 to 36 hours	WI.Y	NPW	Weather Message	Local WFO

Fire Weather

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Watches	Fire Weather Watch	A high potential for the development of a locally defined Red Flag Event. Red Flag Event criteria are determined by coordination between WFO personnel and land management users in the WFO fire weather service area.	12 to 96 hours	FW.A	RFW	Fire Weather Message	Local WFO
Warnings	Red Flag Warning	The combination of dry fuels and weather conditions support extreme fire danger and/or fire behavior. These conditions alert land management agencies to the potential for widespread new ignitions or control problems with existing fires, both of which could pose a threat to life and property.	12 to 36 hours	FW.W	RFW	Fire Weather Message	Local WFO

Other

	Headline	Issuance Criteria	Typical Lead Time	VTEC Code	Product ID	Follow-up Product	Issued By
Warnings	Airport Weather Warning	Varies per airport, but some examples include: a. Surface wind gusts >40 knots b. Onset of freezing rain c. Cloud to ground lightning within 5 miles of the airport d. Thunderstorms with >½ inch hail e. Onset of heavy snow	Varies per type of event, but generally as long as possible	N/A	AWW	N/A	Local WFO
Advisory	Airport Weather Advisory	Varies per airport, but some examples include: a. Surface wind gusts >25 knots b. Lightning within 20 miles of the airport	Varies per type of event, but generally as long as possible	N/A	AWW	N/A	Local WFO

Statements

Headline	Primary Use	VTEC Code	Product ID	Issued By
Air Quality Alert	Air quality messages issued by local or state agencies during times of poor air quality that are relayed by the NWS.	N/A	AQA	Local or State Agencies
Coastal Hazard Message	Updates coastal hazards along the coast.	N/A	CFW	Local WFO
Fire Weather Message	Updates Fire Weather Watches and Red Flag Warnings.	N/A	RFW	Local WFO
Flash Flood Statement	Updates Flash Flood Warnings.	N/A	FFS	Local WFO
Flood Statement	Updates areal and river Flood Warnings.	N/A	FLS	Local WFO
Hurricane/Typhoon Local Statements	Relays tropical cyclone information, including valid tropical cyclone watches and warnings to the public, media and local decision makers of potential or actual storm effects due to tropical cyclones.	N/A	HLS	Local WFO
Lakeshore Hazard Message	Updates hydrologic hazards along the lakeshores of the Great Lakes.	N/A	CFW	Local WFO
Marine Weather Message	Updates marine headlines.	N/A	MWW	Local WFO
Public Information Statement	An alphanumeric message used to distribute information regarding hydrometeorological events; public education; National Weather Service (NWS) service changes, limitations or interruptions; and special guidelines for interpreting NWS data.	N/A	PNS	Local WFO
Rangeland/Grassland Fire Danger Statement	A miscellaneous product which provides advisory information on rangeland and/or grassland fire potential or conditions. Land management and NWS personnel establishes the contents, format, frequency of issuance, dissemination, etc.	N/A	RFD	Local WFO
Severe Weather Statement	Updates Severe Thunderstorm Warnings and Tornado Warnings.	N/A	SVS	Local WFO
Special Weather Statement	Issued for ongoing or imminent weather conditions significant enough to warrant special highlighting, but less severe than advisory or warning criteria. Also may be used to highlight possible warning or advisory conditions beyond their normal issuance range.	N/A	SPS	Local WFO
Tsunami Information Statement	Information that an earthquake has occurred, or that a tsunami warning, watch or advisory has been issued for another section of the ocean. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami and to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas.	N/A	TIB	West Coast/ Alaska and Pacific Tsunami Warning Centers
Watch County Notification Message	Cancels, extends the valid time or extends in area portions of one or more convective watches.	N/A	WCN	Local WFO
Weather Message	Updates non-precipitation headlines.	N/A	NPW	Local WFO
Winter Weather Message	Updates winter headlines.	N/A	WSW	Local WFO

Other Non-Routine Products

Product	Primary Use	VTEC Code	Product ID	Issued By
Earthquake Information Report	A statement containing information regarding a local earthquake occurrence.	N/A	EQR	Local WFO
Hazardous Weather Outlook	Issued daily to inform the public, media and emergency managers of the potential for winter weather, fire weather, non-precipitation, convective weather, tropical, marine or flood hazards.	N/A	HWO	Local WFO
Free Text Message	A text message sent by the WFO to indicate an interruption in radar products. The message typically explains why radar products are currently unavailable and, if known, an estimated time the products will return.	N/A	FTM	Local WFO
Mesoscale Convective Discussion	Issued to convey to CONUS WFOs, the public, media and emergency managers the current meteorological reasoning for short term hazardous weather concerns. Issued for severe thunderstorm potential and/or trends, heavy rainfall, heavy snowfall, freezing rain, blizzards, and convective outlook upgrades.	N/A	MCD	SPC
Post Tropical Cyclone Report	Provides ta record of peak tropical cyclone conditions. This data are then used to formulate other post-event reports, news articles and historical records.	N/A	PSH	Local WFO
Preliminary Local Storm Report	Issued to provide the Storm Prediction Center (SPC), adjacent WFOs, the public, media and emergency managers with reported observations of hazardous weather events.	N/A	LSR	Local WFO
Record Event Report	A statement of the new record and the previous record it broke. Climatologically significant elements such as high and low temperatures, and extreme precipitation may be included in a record event report.	N/A	RER	Local WFO
Short Term Forecast	A means of communicating plain language forecasts of short term weather and appropriate hydrological conditions within 6 hours of issuance. Examples include: to discuss the evolution of convective and stratiform precipitation, winter weather, tropical cyclone landfall events, marine events, fog, significant winds, blowing dust and extreme temperatures (excessive heat or cold).	N/A	NOW	Local WFO
Tropical Cyclone Position Estimate	Issued every two hours when tropical cyclone is visible on radar.	N/A	TC.E	NHC/CPHC/WFO Guam
Administrative Message	Issued by local, state, or federal agencies and relayed by the National Weather Service as a means of quickly accessing the Emergency Alert System for non-meteorological emergencies. Note: Child Abduction Emergency is not relayed by the NWS in all states.	N/A	ADR	Local, State, or Federal Agencies but relayed by WFO
Avalanche Watch		N/A	AVA	
Avalanche Warning		N/A	AVW	
Child Abduction Emergency		N/A	CAE	
Civil Danger Warning		N/A	CDW	
Civil Emergency Message		N/A	CEM	
Earthquake Warning		N/A	EQW	
Evacuation Immediate		N/A	EVI	
Fire Warning		N/A	FRW	
Hazardous Materials Warning		N/A	HMW	
Local Area Emergency		N/A	LAE	
Law Enforcement Warning		N/A	LEW	
Nuclear Power Plant Warning		N/A	NUW	
Radiological Hazard Warning		N/A	RHW	
Shelter In Place Warning		N/A	SPW	
911 Telephone Outage Emergency		N/A	TOE	
Volcano Warning		N/A	VOW	

Extreme Weather Wording

NWS meteorologists from the local WFOs on up to the Storm Prediction Center (SPC) are trained to recognize when particularly dangerous storms are likely in an event. When this happens, watches and warnings for the extreme situations need to stand out from other watches and warnings, and their wording needs to be enhanced so that everyone quickly recognizes the urgency of the situation.

Tornado Emergency

A Tornado Emergency is enhanced wording embedded in a tornado warning or follow-up message during significant tornado occurrences in highly populated areas. A Tornado Emergency generally means that significant, widespread damage is expected with a large, strong to violent tornado.

It is hoped that the rare use of this phrase will illicit quick and decisive action on the part of the general public and decision-makers. The term was first used during the May 3, 1999 tornado outbreak that spawned the Moore F5 tornado just south of Oklahoma City, Oklahoma.

Below is an abbreviated example.

```
SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE JACKSON MS
1203 PM CDT SAT APR 24 2010
...A TORNADO WARNING REMAINS IN EFFECT UNTIL 1230 PM CDT FOR CENTRAL
YAZOO COUNTY...
...THIS IS A TORNADO EMERGENCY FOR THE WARNED AREA...
AT 1203 PM CDT...NATIONAL WEATHER SERVICE METEOROLOGISTS AND STORM
SPOTTERS WERE TRACKING A LARGE AND EXTREMELY DANGEROUS WEDGE
TORNADO.  THIS TORNADO WAS LOCATED 6 MILES NORTH OF SATARTIA MOVING
NORTHEAST AT 60 MPH.
```

Flash Flood Emergency

A Flash Flood Emergency is enhanced wording embedded in follow-up messages issued after an initial flash flood warning during significant, severe, flooding occurrences in local or widespread situations. A Flash Flood Emergency generally means that significant, local or widespread damage is expected.

The enhanced wording involves the use of the phrase “Flash Flood Emergency” within the FFS. It is hoped that the rare use of this phrase will illicit quick and decisive action on the part of the general public and decision-makers.

An abbreviated example follows.

```
...A FLASH FLOOD WARNING REMAINS IN EFFECT UNTIL 530 PM CDT FOR
ANDERSON COUNTY...

.A FLASH FLOOD EMERGENCY FOR ANDERSON COUNTY...

AT 200 PM CDT...TRAINED WEATHER SPOTTERS AND PUBLIC REPORTED
WIDESPREAD FLOODING OVER ANDERSON COUNTY. KNOWN WATER RESCUES ARE
ONGOING WEST OF GARNETT. EMERGENCY CREWS ARE UNABLE TO FIND A ROUTE
FROM WESTPHALIA TO GARNETT. NUMEROUS PAVED AND GRAVEL ROADS HAVE
BEEN REPORTED TO BE UNDER WATER ACROSS THE COUNTY....SEVERAL AREAS 1
TO 2 FEET DEEP. MEASURED STORM TOTAL PRECIPITATION AMOUNTS RANGE
FROM 14 TO 16 INCHES OF RAINFALL DURING THE PAST THREE DAYS. WITH
```

Verification and Performance Goals

A marked shift in the way performance was managed within the federal government occurred during the Clinton administration through the 1993 passing of the Government Performance and Results Act (GPRA). GPRA addressed a broad range of concerns about government accountability and performance. Essentially, it requires government executives to focus on defining missions, setting goals, measuring performance and reporting accomplishments. This shifted management's focus away from measuring "inputs" or how much work was being done to measuring "outputs" or results. Unlike other reforms that are primarily Executive Branch initiatives, GPRA is statutory; its performance measurement requirements are law.

For more information on NWS performance measures, please refer to NOAA's NWS Chief Financial Officer web page at the following URL: http://www.weather.gov/cfo/program_planning/program_planning.htm.

Verification goals through fiscal year 2016:

GPRA Metric \ FY Goals	2011	2012	2013	2014	2015	2016
Tornado Warnings Lead Time (min)	12	13	13	13	13	14
Tornado Warnings Accuracy (POD) (%)	70	72	72	72	72	73
Tornado Warnings False Alarm Ratio (FAR)(%)	72	74	74	74	74	73
Flash Flood Warnings Lead Time (min)	38	38	39	39	39	40
Flash Flood Warnings Accuracy (POD) (%)	72	72	73	73	73	74
Marine Wind Speed Forecast Accuracy (POD) (%)	69	70	70	70	71	71
Marine Wave Height Forecast Accuracy (POD) (%)	74	75	75	75	76	76
Winter Storm Warnings Lead Time (hrs)	16	16	16	17	17	18
Winter Storm Warnings Accuracy (POD) (%)	91	91	91	91	91	91
48-Hour Hurricane Forecast Track (miles)	87	84	81	77	74	71
48-Hour Hurricane Forecast Intensity (kts)	13	12	12	12	12	12
Aviation Forecast IFR Accuracy (POD) (%)	66	67	68	69	69	70
Aviation Forecast IFR False Alarm Ration (FAR) (%)	41	40	39	38	38	37

POD = Probability of Detection $\frac{\text{\# of Warned Events}}{\text{Total \# of Events}}$	FAR = False Alarm Ratio $\frac{\text{\# of Warnings NOT Verified}}{\text{Total \# of Warnings}}$

Impact-Based Decision Support Services

The NWS has an uncompromising commitment to public safety and works closely with public safety officials to ensure they understand the information provided in our products relating to hazardous weather. The area of impact based decision-support (sometimes referred to as IDSS) is an ever-changing regime of the NWS and will continue to be an important service provided by the NWS. These services are highly tied to emerging technologies and are constantly changing as current technology is refined or new technology is developed. The Incident Meteorologist or IMET is a key component of IDSS. The NWS sends IMETs or other forecasters to Incident Command Posts, Area Command and Emergency Operations Centers to work hand-in-hand with emergency personnel. If direct contact is not an option, there are a number of ways the NWS can communicate weather information and forecasts to public safety officials and emergency personnel, such as recorded multimedia briefings and virtual live briefings.

WCMs develop partnerships and link to local and state communications systems for the automated sharing of critical data. WCMs explore resource sharing with local Amateur Radio Emergency Services (ARES) and Radio Amateur Civil Emergency Service (RACES) amateur radio clubs. WCMs also promote existing dissemination systems including NOAA Weather Radio (NWR) All Hazards, Emergency Alert System (EAS), Emergency Managers Weather Information Network (EMWIN), NOAA Weather Wire Service (NWWS) and FEMA's National Warning System (NAWAS). The NWS works with its partners to reach new segments of the population by expanding innovative dissemination methods. This includes EMWIN retransmission, internet websites and non-NWS operated personal communication systems, such as pagers and cell phones.

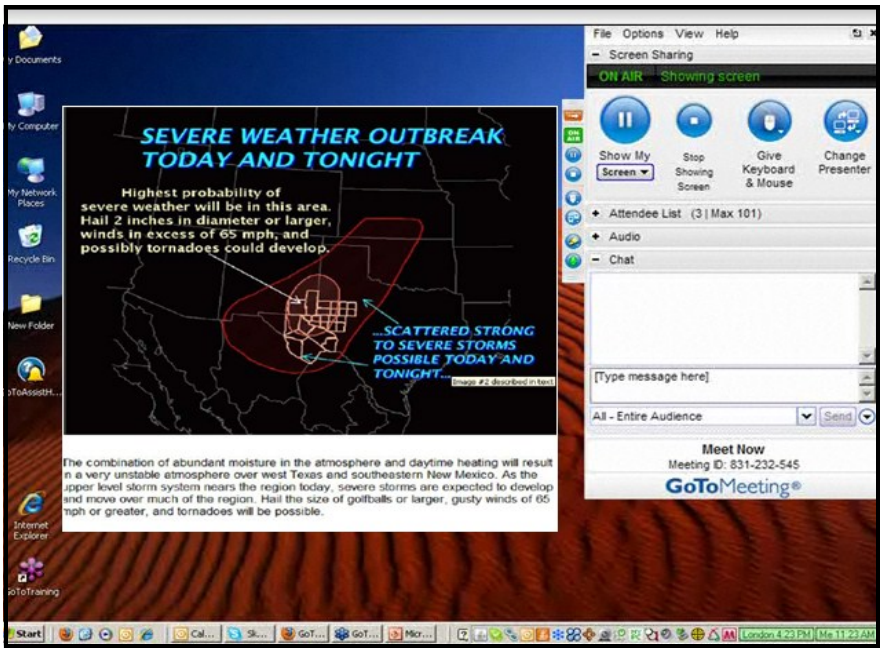
A few of the IDSS utilities are listed on the following pages.

On Site at the Incident

An IMET is always prepared to serve on an incident, especially during the normal fire season. Availability of the IMET will be determined by the local MIC and the IMET. In any given year, NOAA trains 10 to 15 new IMETs. To become an IMET, NWS meteorologists must complete a thorough training program, which includes course work, field training and attending the IMET Workshop. The IMET gives weather briefings to emergency personnel, including fire crews. IMETs are responsible for maintaining a weather watch, issuing weather alerts, conducting media interviews, providing briefings for the general public and assisting with fire investigations.

On Site at the Emergency Operations Center (EOC)

Information sharing between the NWS and members of the hazards community is critical for an effective warning program. WCMs promote the expansion of dissemination and communication systems. NWS offices work with state, tribal, and local officials, non-government organizations, the media and the private sector, to provide weather, water and climate information to assist those building disaster resistant communities. EOC activation for major events may require the presence of personnel from one or more NWS offices. Staffing duration could range from as little as 12 hours, to as much as several days or even a couple weeks.

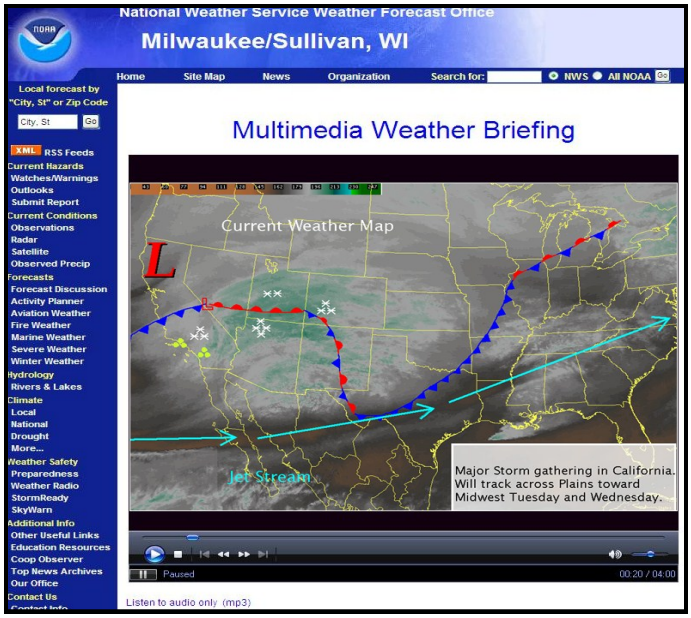


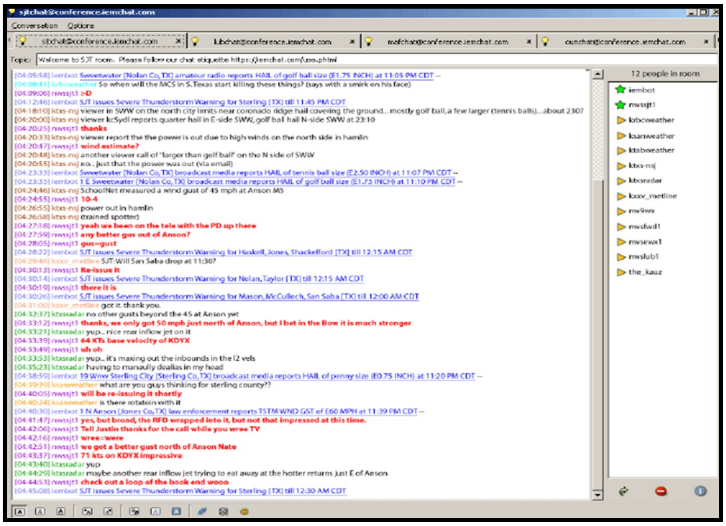
Virtual Live Briefing

Web conferencing tools allow the NWS to meet online rather than in a conference room. It is the easiest and most cost-effective way to organize and attend online meetings. Patented technology enables users to view any application running on a PC in real time. With the flexibility to meet in person or online, less travel is required. For most virtual tools, attendees can join meetings in seconds, without having to set up video feeds or webcams. Most allow for easy sharing of keyboard and mouse control or switch presenters.

Recorded Multimedia Briefing

The Multimedia Weather Briefing (MWB) is an internet-accessible multimedia file that provides information concerning hazardous weather events. The MWB offers a combined visual/auditory platform for supporting the planning activities of emergency response partners, tribal officials, and other key users, as well as the general public. MWB can be used to convey expected timing, location, reasoning and impacts associated with upcoming hazardous weather events, impending or current drought conditions, climate and hydrologic outlooks, etc. The purpose of the MWB is to serve as a decision assistance tool that can be used by emergency managers, first responders and other key decision makers. The briefings also serve as a means of conveying probabilities and other uncertainty information.





Chat/Instant Message Software

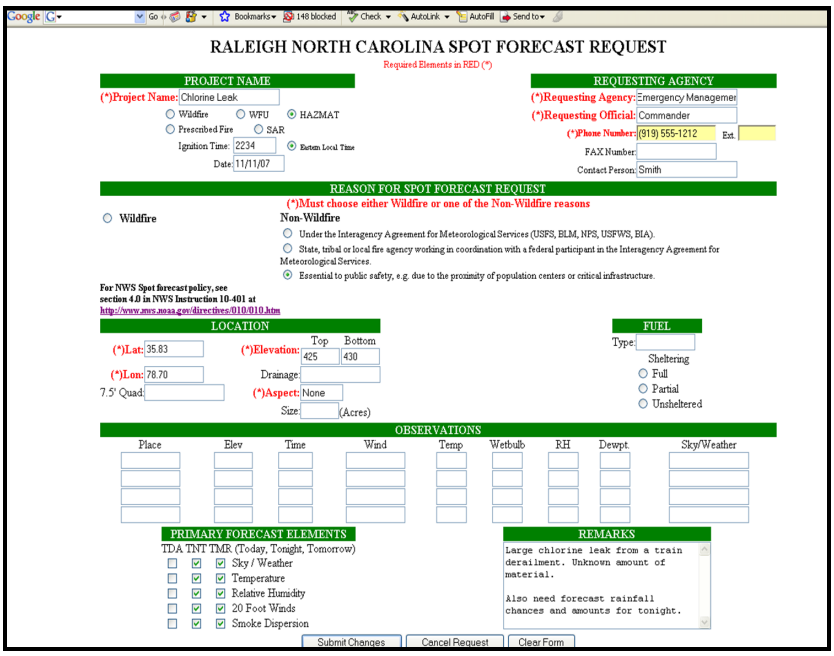
NWSChat is a tool developed as a means of direct communication between the NWS office and media, emergency managers, DNR and other specific partner organizations. The goal of NWSChat is for the users to pass on important information about current weather situations. The NWS office can provide information to the partners in chat that may be useful, but will not be specifically worded in a warning or other public product. Warnings and other products issued by the office are also automatically piped into the chat for quick viewing. More information on Page 92.

Spot Forecast Request

Site-specific (spot) forecasts are issued by WFOs in support of wildfire management and natural resource management. These forecasts aid the land management and fire control agencies in protecting life and property during wildland fires, hazardous fuels reduction and rehabilitation and restoration of natural resources. Spot forecasts are also issued for hazardous materials incidents and other threats to public safety.

For more information on requesting a spot forecast, see Page 34.

While NWS can provide support to public safety officials for special events, more specialized services are available from America's private weather industry, such as customized consulting services organized and packaged to help make decisions about how to plan and run the event.



These are just a few of the national or federal agencies the NWS partners with during incidents, such as wild fires, chemical spills and hazardous weather.

Federal Emergency Management Agency
www.fema.gov

US Department of Agriculture/Forest Service
www.fs.fed.us

US Department of Interior
Bureau of Land Management
www.id.blm.gov

National Interagency Fire Center
www.nifc.gov

International Association of Emergency Managers
www.iaem.com

Bureau of Indian Affairs
www.bia.gov/

US Environmental Protection Agency
www.epa.gov/

US Geological Survey
www.usgs.gov

National Park Service
www.nps.gov

US Bureau of Reclamation
www.usbr.gov

American Red Cross
www.redcross.org

USDA Natural Resources Conservation Service
www.id.nrcs.usda.gov

US Army Corps of Engineers
www.usace.army.mil

Incident Response Example from WFO Raleigh, NC

1. Emergency Management/Responder requests weather assistance

2. Senior Forecaster helps to determine if off-site or on-site response is necessary based upon magnitude

3. If on-site support is required:
   Incident Support Meteorologist is contacted and dispatched to scene with on-scene dispatched equipment

4. Senior Forecaster will schedule relief personnel for deployments > 12 hours

5. If off-site support is required:
   Local forecast staff will initiate off-site support duties

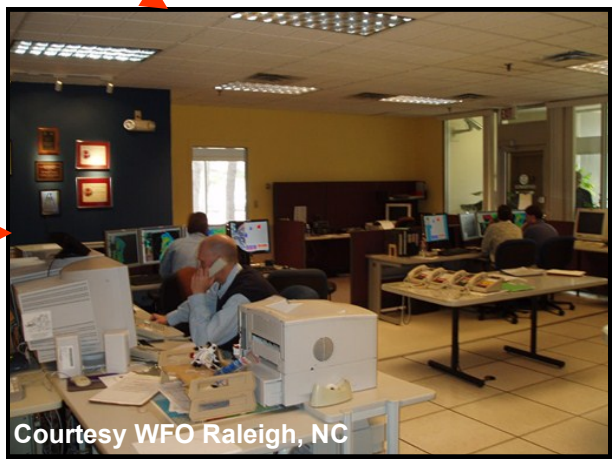
6. Senior Forecaster may call in additional staff if necessary

Courtesy Associated Press

Emergency Response Personnel

Courtesy WFO Raleigh, NC

NWS Weather Forecast Office


Courtesy WFO Raleigh, NC

Requesting a Spot Forecast

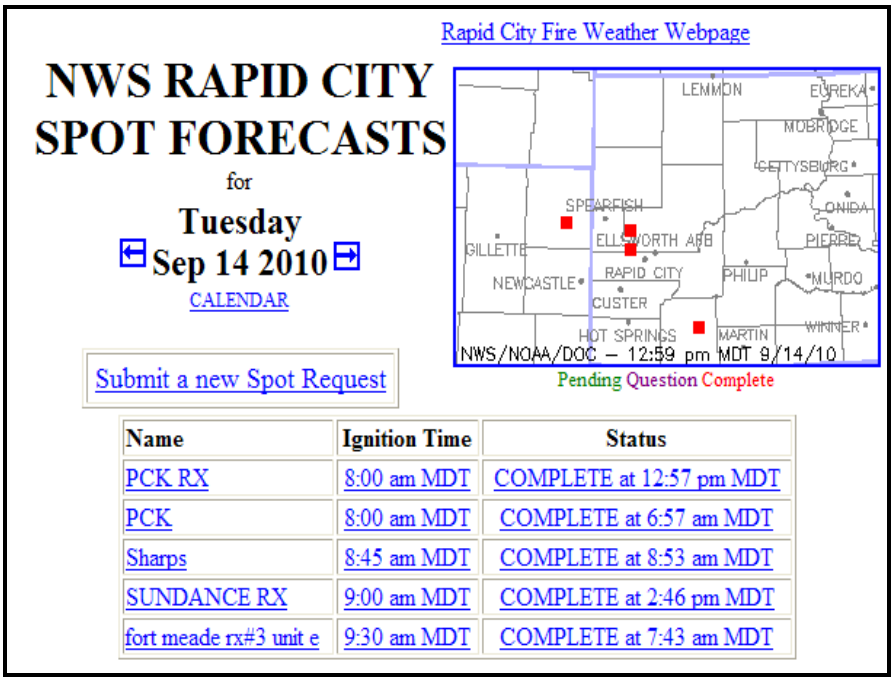
The NWS Spot Forecast Request and Dissemination System provides users from authorized agencies a way to request fire weather spot forecasts from the NWS. The spot forecasts center around a daily spot forecast "monitor" page that shows all the spot forecast requests for a particular office on a particular day. The main spot forecast page updates every minute and shows the location and status of any spot forecasts that have already been requested for that day. You can view these other forecasts, as well as request a new spot forecast of your own.

Nearly all Weather Forecast Offices websites (www.weather.gov) have a link to a fire weather page. Fire weather pages are a great place to start.

Example: To request a spot forecast for a location in the Rapid City, SD forecast area, follow the link:

http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=unr

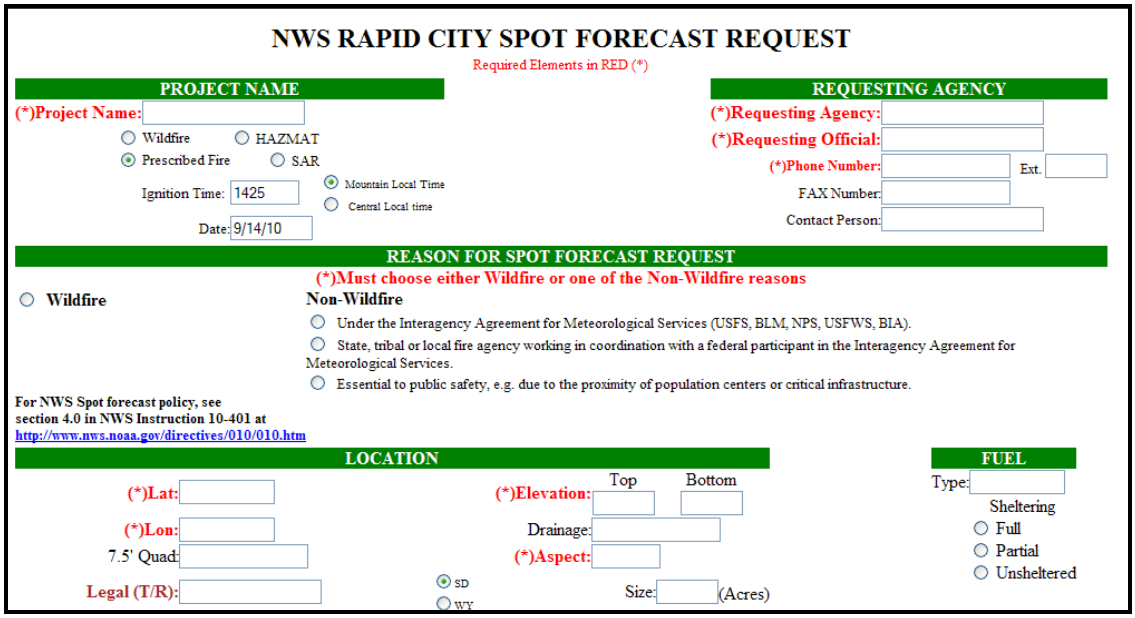
→ in this example "unr" is the site ID for WFO Rapid City...it can be replaced with any office ID.



Each request has its own webpage where all the information about that request is displayed, including maps, information about the request and the forecast. Sensitive information about the request (such as phone numbers or names of contact persons) is NOT visible by everyone, but only on the computer that made the original request and NWS computers.

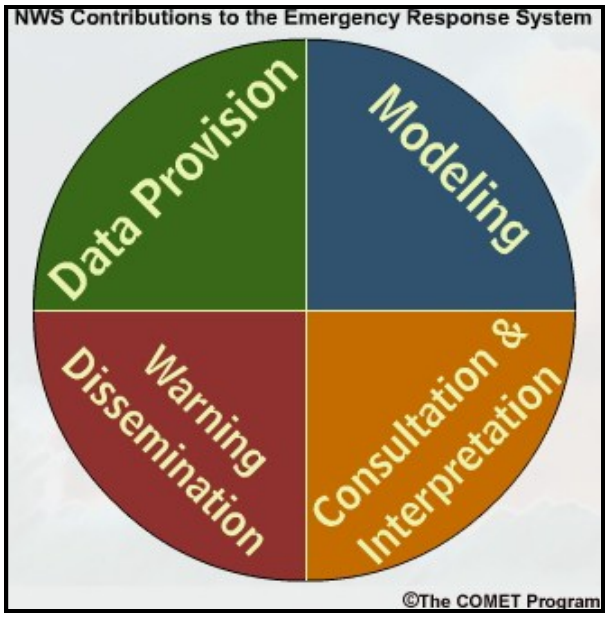
To view the webpage for any forecast, go to the main spot forecast webpage, click either on the name of the forecast listing or the dot on the map. This page will also automatically update every minute so that when new information becomes available, it can be seen immediately.

The image to the right is an example of the form filled out to request a spot forecast. The elements highlighted in red are required to complete your spot forecast.



NWS Support During Hazardous Materials Emergencies

The NWS is the primary provider of weather information to emergency responders and other government agencies including observations, forecasts and warnings, model data and model interpretation. To enhance and protect public safety, WFOs work closely with decision makers and provide appropriate weather-related information. Threats such as terrorist incidents and accidental hazardous materials releases make dispersion modeling an important area of service and support for the NWS. Our meteorological expertise, wide range of observing systems, modeling capabilities and public alert capabilities are critical contributions to both local and national emergency response efforts.



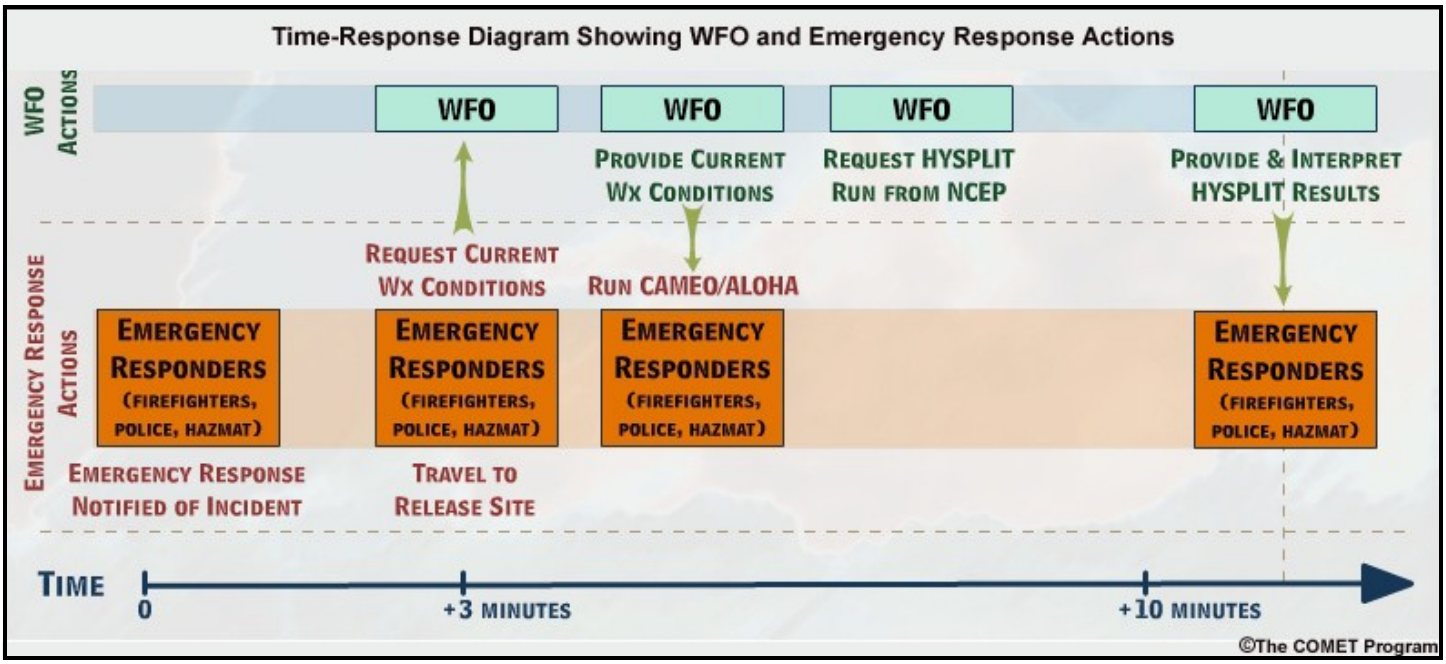
Specifically, when small-scale hazardous release events occur, forecasters can provide weather information to local emergency responders, who can then add this information to their own computer-based dispersion models. NWS information may include forecaster assessments of winds and other meteorological parameters near the release location and estimates of how meteorological conditions might change.

For medium or large-scale events, NWS knowledge of how the meteorological conditions on different scales vary over time, and of how local effects can impact the situation, will be invaluable. The NWS can also extend our support using powerful tools such as NOAA's HYSPLIT transport and dispersion model.

Types of NWS support

- Provide observations or estimates of wind speed and direction, or other factors such as stability class or relative humidity for small or large atmospheric releases. This support can be accomplished remotely (i.e. phone calls, live virtual meetings, e-mail, etc) or by sending an NWS meteorologist to the site.

- In the event of a large atmospheric release (horizontal extent usually >6 miles) lasting more than an hour of some chemical, biological or radioactive contaminant, an emergency manager, first responder or government official may call the WFO and request atmospheric transport and dispersion (plume) information.



In order for the NWS to run its plume dispersion model (HYSPLIT), the following information is needed:

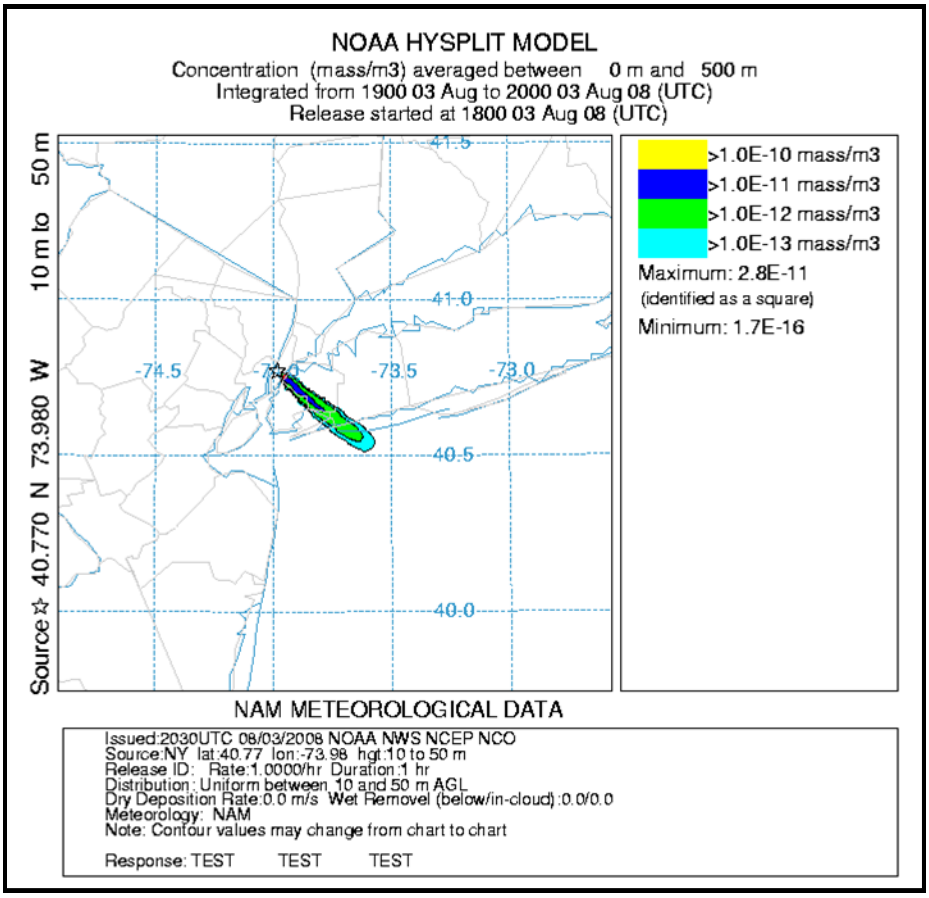
- Specific release location (latitude and longitude)
- Size and/or height of release
- Start and end time of release
- Type of contaminant (if known)
- An identifier for the incident which is mutually agreed upon by both the requestor and the NWS meteorologist
- How the output will be sent to the requestor (e-mail attachment, fax, FTP, etc.)
- Format of output - individual and looping GIF images, kmz files (Google Earth©), Postscript files (ideal for detailed printing), Geographical Information System (GIS) shapefiles in compressed tape archive (TAR) format.

Model results from HYSPLIT will usually be available to the user within about 10 to 15 minutes of submitting the model run. The issuance of severe weather warnings may have a higher priority than a request for a HYSPLIT plume forecast.

Additional information about NWS support and HYSPLIT can be found in this NWS Directive document: http://www.nws.noaa.gov/directives/sym/pd01005018curr.pdf

- The emergency manager, first responder, or government official may also request the broadcast of an emergency message, concerning the plume, on the NWS's NOAA Weather Radio All Hazards network. Please refer to the HAZCollect section in this guidebook for details.

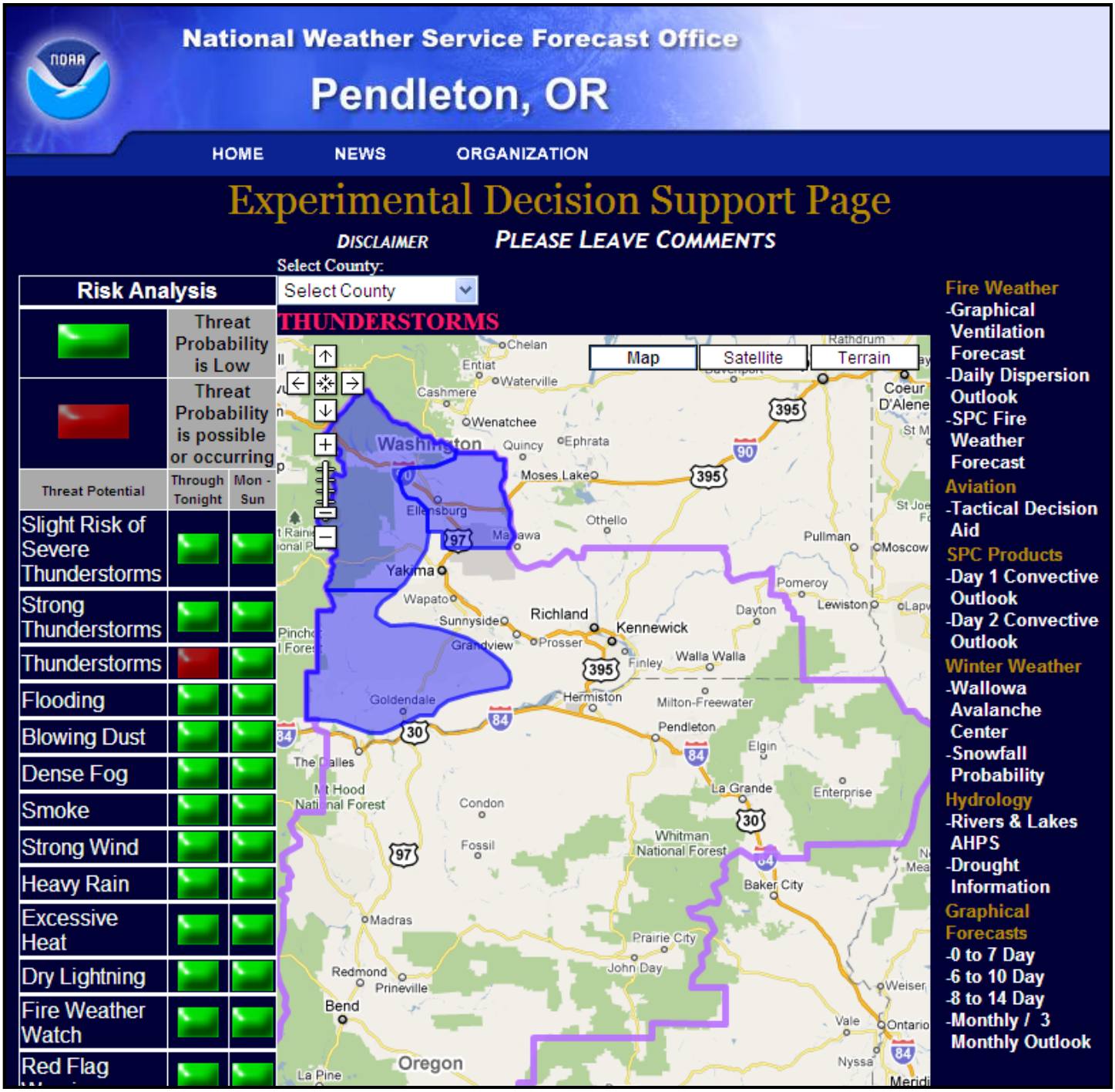
Atmospheric transport and dispersion information provided by the NWS will consist of HYSPLIT (NOAA/Air Resources Laboratory Hybrid Single-Particle Lagrangian Integrated Trajectory) model output in graphical format. Below is a sample dispersion output.



Experimental Decision Support Webpage

http://www.wrh.noaa.gov/pdt/decision_maker/index.php

While not yet in every office, specialized decision support web pages are becoming more popular at local forecast offices. These pages provide specific information on types of hazards that may affect the forecast area.



Integrated Warning Team

The Integrated Warning Team (IWT) is a relatively new concept within the NWS and is gaining popularity through more offices.

The IWT is a concept in which the agencies making up the team (Emergency Managers, Broadcast Media, and National Weather Service) view themselves as part of something bigger than any individual agency alone. This means each member agency should develop their severe weather plans and operations in ways which create synergy within the team. For example, do the messages communicated by various IWT agencies conflict with each other, or do they support and enhance each other? Communication conflicts could manifest themselves as things such as disparate community siren policies or varying degrees of threat emphasis from media outlets and NWS.

Local WFOs organize IWT workshops across a region or state. These workshops bring together IWT members from the local county warning area, as well as social scientists. A key aspect of IWT workshops has been the integration of societal research findings into IWT operations and planning.

The IWT follows concepts promoted through the Weather & Society Integrated Studies (WAS*IS) program, which is a movement that is changing the weather enterprise by integrating social science into meteorological research and practice in comprehensive and sustained methods. The WAS*IS program coordinates practitioners, researchers, and stakeholders around the world to build new relationships and to use new tools and concepts for more effective socio-economic applications and evaluations of weather information and products.

Over 100 participants gathered at Mahoney State Park, near Omaha, NE, for the two-day Integrated Warning Team workshop in September 2009. Emergency managers, broadcast meteorologists and NWS meteorologists and researchers learned how to work better together during times of severe weather.

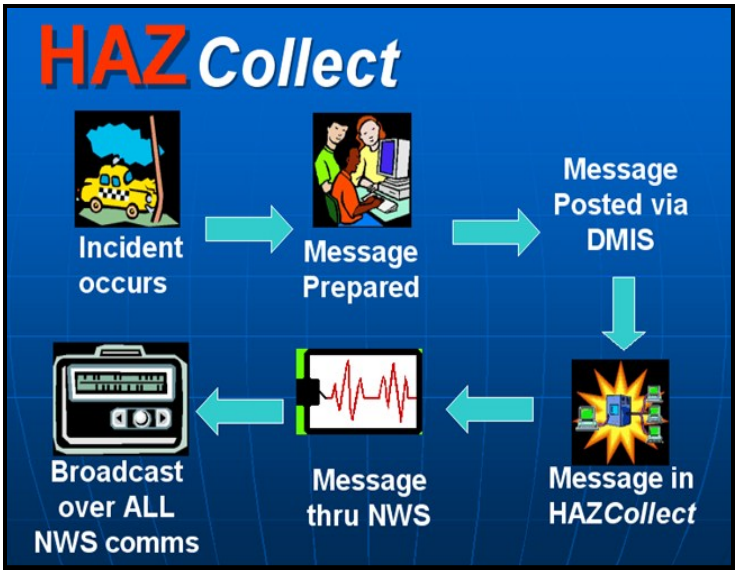
HAZCollect

The NWS offers its NOAA Weather Radio (NWR) All Hazards network to government officials with public warning authority for the broadcast of non-weather emergency messages when seconds count to save lives. Specific information and instructions from emergency service sources gets out quickly when time counts.

Getting A Warning Onto NWR

- **Most common dissemination system**: Current NWS systems address non-weather emergency messages (e.g., chemical spills, AMBER alerts and radiological events), but they must be manually transcribed by NWS staff. While currently operational, these messages are prone to processing delays and human error. In some areas, emergency managers manually create the text messages and then proceed to call or fax their local weather forecast offices. These messages that are currently created are subject to typographical and grammatical errors when further transcribed and composed upon reporting to the weather forecast office personnel.

- **New (as of 2009) All Hazards Emergency Message Collection Service (HAZCollect):** The HAZCollect service provides an automated capability to streamline the creation, authentication, collection and dissemination of non-weather emergency messages in a quick and secure fashion. The HAZCollect service is a comprehensive solution for the centralized collection and efficient distribution of Non-Weather Emergency Messages (NWEMs) to the NWS dissemination infrastructure, the Emergency Alert System (EAS) and other national systems. The image below illustrates the process utilizing HAZCollect. Disaster Management Interoperability Services (DMIS) and DMIS Tools are provided by FEMA at no charge to public safety organizations. This basic toolset supports dynamic collaboration among organizations working together to manage the consequences of an incident. They enable rapid alerting, including public alerts via the NWS HAZCollect service, sharing a map-centric common operating picture and logistics "conversations" regarding specific resource needs.



The use of HAZCollect is optional. Local public warning officials can still use the manual method (telephone or fax) of forwarding a non-weather emergency message to their local NWS office, either as a primary method or as a backup to HAZCollect.

Advantages of HAZCollect

HAZCollect was designed to quickly and efficiently gather all NWEMs and forward them to the appropriate local WFO for nearly instant broadcast on the appropriate NWR transmitter that covers the area of the emergency. Furthermore, human-induced errors and delays are eliminated, which ultimately leads to an accurate and timely, tone-alerted, NWEM on the NWS's NOAA Weather Radio stations. Once the NWEM is within the HazCollect service, the automatic, tone-alerted broadcast of this message can not be stopped.

Do I have to use DMIS? Yes, you have to use DMIS in order to forward a NWEM to HazCollect. NWS and FEMA anticipate several third-party applications (software products) will become available to author NWEM messages. These applications are expected to be CAP-compliant and interoperable with the DM-Open Platform for Emergency Network and DMIS. It is not known when they will become available on the commercial market.

Registering for DMIS

For DMIS registration and training information, go to this web site: http://www.fema.gov/about/programs/disastermanagement. Click on the DMIS Tools link in the left-hand menu or in the "Public Safety Officials" section. In the "More about DMIS Tools" section, click on the "Get DMIS Tools / Register" link.

Registering for HAZCollect

Contact the WCM at your local WFO. For HAZCollect registration and training information, go to this website: http://www.weather.gov/os/hazcollect/index.shtml. You want to click on the "For Government" link for registration and the "Training" link. You must complete and pass an on-line, HAZCollect training course in order to be approved to use the HAZCollect service.

Message Types

ADR	Administrative/Follow-up Message	**LEW**	Law Enforcement Warning
CAE**	Child Abduction Emergency	**CDW**	Civil Danger Warning
LAE	Local Area Emergency	**CEM**	Civil Emergency Message
TOE	911 Telephone Outage Emergency	**EQW**	Earthquake Warning
AVA	Avalanche Watch	**AVR**	Avalanche Warning
NUW	Nuclear Power Plant Warning	**EVI**	Evacuation Immediate
RHW	Radiological Hazard Warning	**FRW**	Fire Warning
SPW	Shelter-in-Place Warning	**HMW**	Hazardous Materials Warning
VOW	Volcano Warning	**DMO***	Demonstration Message
NIC*	National Information Center	**NPT***	National Periodic Test
NMN*	Network Message Notification	**RMT***	Required Monthly Test
RWT*	Required Weekly Test		

* These codes are used for administrative, demonstration or testing purposes.

** In some states, the State EAS plan does not allow for broadcast of CAEs on NWR

Additional Resources:

http://www.weather.gov/directives/sym/pd01017008curr.pdf

http://www.crh.noaa.gov/images/mkx/pdf/hazcollect/HazCollect_brochure.pdf

http://www.nws.noaa.gov/ops2/ops24/hazcollect.htm

RFC products are broadly grouped into three categories: (1) forecast products, (2) support/guidance products, (3) data products.

Deterministic Hydrologic Forecast (RVF): RFCs use the deterministic hydrologic forecast product to provide routine and event-driven hydrologic forecasts. Information provided in this product includes short-term hydrologic forecasts and river ice forecasts. The RVF is a guidance product from the RFC, but the official forecasts/warnings are issued only by local NWS WFOs.

NWS Damage Surveys

The damage survey is an important duty of the NWS. However, damage surveys are also conducted by Emergency Management and Tribal officials. Damage surveys enhance verification, which helps to improve warning services. The results are also used to document the event for legal purposes (*Storm Data*).

NWS data requirements include obtaining all available records that define the impact, extent, timing and intensity of significant natural hazard episodes such as floods, tropical cyclones, extra-tropical cyclones, tornadoes and other severe convective events, katabatic winds and tsunamis.

On-site inspections of damage areas, if needed, are usually done the same day of the event or the next available day. Debris clean-up can be accomplished rather quickly following an event and crucial evidence needed to differentiate between tornado and straight-line wind damage can be lost forever.

Usually, the decision on the need for a NWS survey will be made by the management of the WFO. In their absence, the Senior Forecaster will make the decision. Each situation is different; consequently, professional judgment must be exercised before sending someone out on a damage survey. The person who conducts the survey may be any staff member, as long as that individual, as a minimum, is familiar with the EF-scale and have completed appropriate training. The WCM is ultimately responsible for assigning an EF-rating to a tornado for *Storm Data* purposes.

Situations That Require a Damage Survey

1. All tornadoes suspected of producing EF2, EF3, EF4, EF5 damage
2. Any event resulting in considerable local media coverage
3. Any event resulting in national media attention
4. Any event that results in injuries, deaths or significant property damage
5. Conflicting/questionable reports making it difficult to remotely determine if it was a tornado or downburst wind event
6. There are several tornado reports and the emergency manager is on vacation

Situations That May Require a Damage Survey

1. Any tornado suspected of producing EF0 or EF1 damage. (If damage is light, an emergency manager may be able to conduct the survey)
2. Any event that would provide scientific evidence that meteorologists would find useful
3. Personal request from an emergency manager

Situations That Normally Would Not Require a Damage Survey

1. Event with minimal damage and/or little media coverage
2. Event with minimal impact requiring a one-way travel time of more than 1 hour
3. When documenting the event can be accomplished via email or by phone

GPS units, laptops with mapping software, digital cameras, various maps of the damage area with names of all roads, pencils, pens, notepaper, name/phone number of emergency manager of the affected county or Tribal nation, and the telephone number of that county's Sheriff Department (911 center) are items often used on a damage survey.

While on a damage survey, it is important to note GPS coordinates, take pictures, talk to people to get beginning and ending times of event (i.e. ask people for the time the trees came down or when the strongest winds occurred), determine extent and severity of damage, get names, telephone numbers and comments of eye-witnesses, sketch out the damage area on a map (perhaps showing which way the trees and debris were oriented).

Additionally, if time allows, close-up pictures of the base and top of failed walls, sub-floors, roof trusses, and anchoring devices should be taken. This evidence will help determine how well-built a structure was, and ultimately the EF-rating of the tornado.

Tornado or Straight-Line Winds

In some cases, damage surveys are needed to differentiate between damaging wind and tornado events. There are several questions NWS meteorologists need to answer to determine whether the damage occurred as a result of straight-line winds or a tornado.

Did radar indicate the presence of rotation?	
	Yes, then it may be either damaging winds or a tornado. Often the radar detects circulations not indicative of tornadoes because the atmosphere is a chaotic place and the air is always mixing. On any given day, circulations are present on radar. Unless the rotation is very strong, it is usually a clue that leads to inconclusive results.
	No, then it could be implied straight-line winds occurred unless other evidence provides reasonable doubt. Most tornadoes produce at least some rotation signatures on radar.
Is the damage arranged in a pattern or is it chaotic and strewn in different directions?	
	If the debris is aligned in one direction or diverges, it is a clear indicator of straight-line winds or a downburst.
	If the debris is strewn in all directions, or it concentrated in converging lines; or crops exhibit a herringbone pattern, then a tornado is most likely the cause.
Do witness accounts confirm this finding?	
	Often, people describe the sound of a tornado like a freight train.
	One resident may describe the wind blowing from one direction while another may describe it blowing in the opposite direction.

On-line, easy-to-use, damage survey guidelines can be found here:
http://www.crh.noaa.gov/arx/?n=stormdamage

Rating the Tornado Damage

Once it is determined a tornado indeed caused the damage, NWS meteorologists need to assign a strength rating. In 1971, Dr. Ted Fujita developed the Fujita Scale (F-Scale) as a method of rating the intensity of tornadoes. This method allowed meteorologists to assign a strength rating to tornadoes as they occur, zero to five, with five being the strongest. This method was widely accepted by meteorologists and engineers for more than 3 decades. However, limitations of this system were well known. For example, this method did not take into account the strength of a structure struck by the tornado, and it offered little guidance of how to deal with differing structures and comparing damage from one indicator versus another.

To combat this problem, the Enhanced Fujita rating system (EF-Scale) was proposed by the Wind Science and Engineering Center of Texas Tech University in 2006. A panel of public meteorologists, private meteorologists, academic meteorologists and wind engineers all contributed to the development of the scale. This EF-Scale allows meteorologists to gauge the severity of damage by using 28 different damage indicators (DI). These DIs, ranging from small barns or farm outbuildings, to one and two story residences, to strip malls, electrical transmission lines and even free-standing towers and trees can be easily identified in the field and assigned a wind speed based on the degree of damage (DoD) associated with that DI. That wind speed then corresponds to an EF-Scale rating.

Scale	Wind speed		Relative frequency	Potential damage	Descriptions based on F-Scale
	mph	km/h			
EF0	65–85	105–137	53.5%	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.	
EF1	86–110	138–178	31.6%	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	
EF2	111–135	179–218	10.7%	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
EF3	136–165	219–266	3.4%	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.	
EF4	166–200	267–322	0.7%	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
EF5	>200	>322	<0.1%	Extreme damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.	

A best practice during a damage survey is to find as many DIs as possible to support a particular rating, however, there must be at least two DIs indicating the same DoD/wind range in order to classify a tornado at a particular rating (EF0 through EF5). The purpose of the new rating system was to make it easier for meteorologists to classify tornadoes and to limit the inconsistency of ratings. One requirement before this new system was implemented was to ensure the damage associated with a given tornado on the EF-Scale corresponds to the same level on the F-Scale to maintain consistency between the two databases.

More information about the EF-Scale can be found at: http://www.spc.noaa.gov/efscale/ and http://www.depts.ttu.edu/weweb/EFScale.pdf

For all tornadoes suspected of producing greater than EF3 damage, a special Quick Response Team (QRT) may be dispatched by NWS Headquarters. Damage survey results from the QRT are shared with the affected WFO; however, the QRT damage survey is independent of the any damage survey conducted by the WFO staff.

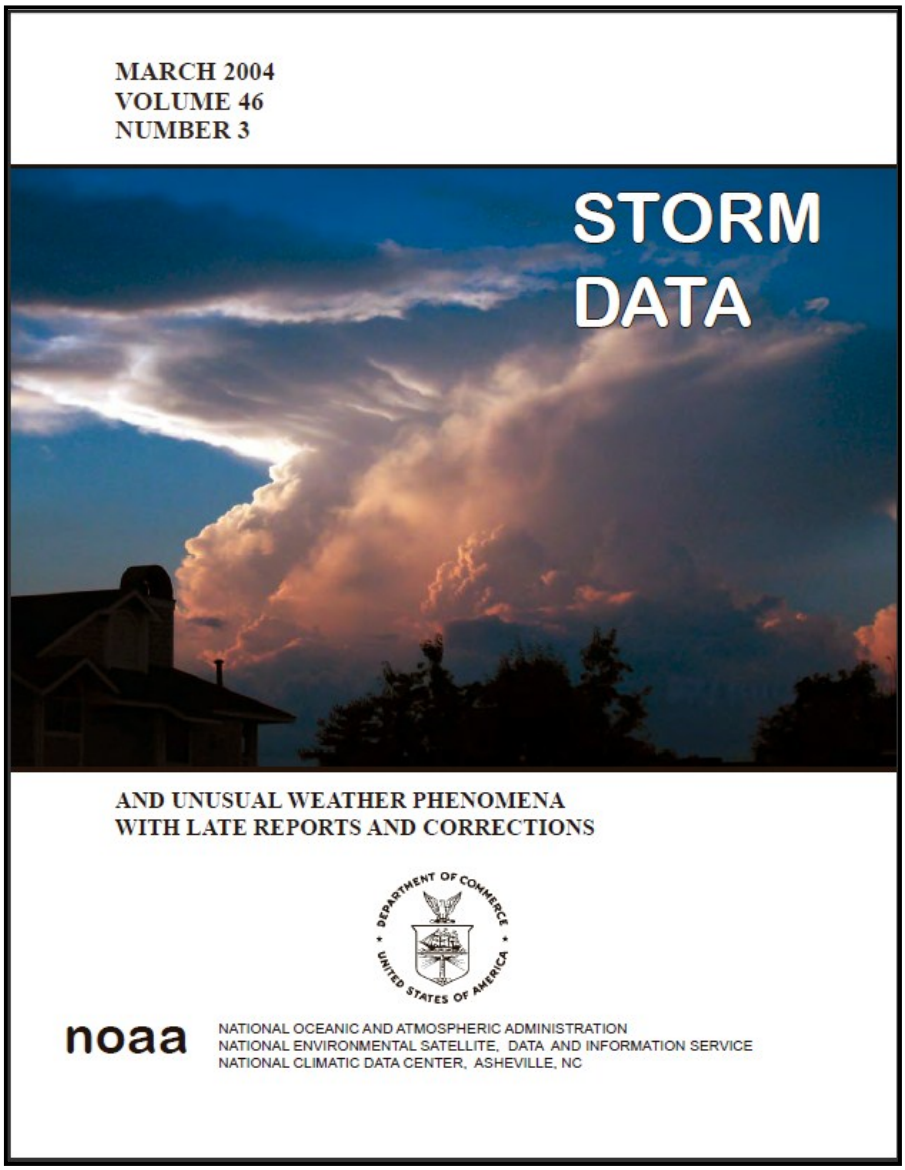
Damage Loss Estimates

WFOs also conduct damage surveys to help estimate the monetary damage associated with severe weather. For all flood or flash flood events, a damage estimate is required for the publication of *Storm Data*. Each WCM is responsible for formulating a damage estimate by using any means at their disposal. For example, emergency management estimates, news reports, FEMA and USDA estimates and insurance claims are the most common sources for these numbers. However, some damage may not be reported to these sources; therefore, damage estimates could be considerably below actual values. Insurance industry studies suggest that the loss estimates in Storm Data are typically underestimates. Formulating a damage estimate is a very subjective process and can vary from office to office. However, a guideline for assigning monetary losses to various damaged objects is provided in the NWS Directive 10-1605 on Storm Data Preparation at http://www.nws.noaa.gov/directives/sym/pd01016005curr.pdf. Each NWS regional headquarters is ultimately responsible for these WFO estimates.

Flooding in Rock Springs, WI, in June 2008.

Storm Data

Overview: *Storm Data* is an official monthly publication of NOAA. The *Storm Data* publication contains a chronological listing, by state, of the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage and/or disruption to commerce. In addition, it is a partial record of significant meteorological events, including rare and unusual phenomena that generate media attention, as well as record maximum or minimum temperatures or precipitation that occurs in connection with another event.



Source of information: Much of the information appearing in *Storm Data* is provided by or gathered from sources outside the NWS, such as the media, law enforcement officials, fire fighters, other government or first-responder agencies, amateur radio operators, private companies and other individuals. Additionally, storm information is generated internally by NWS meteorologists, and storm damage surveys are conducted.

Accuracy of information: To improve the quality of this information, the NWS conducts free severe weather spotter training classes each year. Attendees are instructed on how to properly identify severe weather phenomena and format their reports in order to minimize mistakes.

An effort is made to use the best available information, but because of time and resource constraints, information from various spotter groups may be unverified by the NWS. Therefore, when using information from *Storm Data*, users should be cautious as the NWS does not guarantee the accuracy or validity of the information. Furthermore, when it is apparent information appearing in *Storm Data* originated from a source outside the NWS (credit is provided), *Storm Data* users requiring additional information should contact that source directly. In most cases, NWS employees will not have the knowledge to respond to such requests. In cases of legal proceedings, Federal regulations generally prohibit NWS employees from appearing as witnesses in litigation not involving the United States Government.

Compiler of Storm Data information at local NWS office: The person who gathers storm reports and compiles them into the monthly *Storm Data* contribution for that office is normally the WCM or their designee. However, the WCM is responsible for reviewing and certifying each month's *Storm Data* contribution.

***Storm Data* archiving agency:** The National Climatic Data Center (NCDC) is the official custodian of NWS weather records including *Storm Data*. The NWS submits the monthly reports to NWS Headquarters approximately 60 days after the end of the data month. NWSHQ collects all of the data files from the 123 WFOs. The NWSHQ then uses several algorithms to convert the *Storm Data* files into an integrated database. The NCDC receives a copy of this database approximately 75-90 days after the end of the month in question. A publication and archive are produced and the online Storm Events Database is then updated within 90-120 days after the end of the month. If you need an official copy of a

Storm Data publication for legal purposes, contact NCDC at www.ncdc.noaa.gov or at 1-828-271-4800.

Some NWS offices also have a partial archive of past *Storm Data* monthly publications (considered unofficial) on their web sites. Contact the WCM at your local NWS office to find out where this information is found on their web site.

Example of a *Storm Data* entry:

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
OHIO, Northwest									
Van Wert County									
3.6 NE Willshire to 6.6 E Scott	**10**	**1515EST 1543EST**	**21.6**	**880**	**2**	**17**	**30M**		**Tornado (F4)**

This picture is from the back seats of the Twin Cinemas. Cars from the parking lot are shown in the front rows of the cinema and where the projection screen had been. Photo courtesy of Paul Van Dyke.

This tornado touched down in the southwest corner of Van Wert County about 4 miles northeast of Willshire and moved northeast across the western portion of the city of Van Wert, and then crossed U.S. 30 and continued northeast before exiting the county about 7 miles east of Scott. NWS ground and aerial surveys showed the tornado quickly intensified to F4 about 5 miles southwest of the city of Van Wert near Zook road, where a 75 year old male was killed in his home. The tornado continued moving northeast as an F4 into the city of Van Wert, were it hit the Twin Cinemas and the Vision Industrial Park. At this point the tornado was about one half mile wide. 60 persons watching a movie in the cinemas, mostly children, took shelter before the tornado hit, with only minor injuries. Vehicles from the parking lot were thrown into the seats where the children had been sitting. An 18 year old male driving past the cinemas was thrown from his vehicle and killed. The tornado then destroyed five industries in the Vision Industrial Park, before moving north of U.S. 30, producing F4 damage to additional businesses and homes. The tornado weakened to F3 as it moved northeast and crossed into Paulding county. 164 homes were damaged in Van Wert county, and 43 were totally destroyed. 27 businesses sustained damage, with 5 totally destroyed in Vision Park. Three county engineer buildings were destroyed, with one house used by a township. Total damage in Van Wert county was near 30 million dollars. M18VE, M75PH

Information Requests

Requests for Weather Data: Government agency and private party requests for weather data related to various types of accidents may go directly to any NWS office. In the interest of expediting service, the NWS office receiving the request may provide uncertified copies of weather information, which are a matter of public record (e.g., surface observations, forecasts and warnings) if readily available on-site. As an alternative, copies of official records are available within three to four days after the product valid time directly from the archives using the following URL: http://hurricane.ncdc.noaa.gov/pls/plhas/has.dsselect

Requests for Certified Weather Data: Nearly all of the information generated by the NWS is archived at NCDC. Please contact NCDC for official, certified copies (factor in a turn-around time). In general, NCDC information is free to .gov, .us, .edu, and .mil domains.

National Climatic Data Center
151 Patton Avenue
Asheville, North Carolina 28801-5001
Telephone No. (828) 271-4800
Email: ncdc.info@noaa.gov

Service of Subpoena: Under DOC regulations, NWS employees cannot produce records or testify in litigation not involving the government without the consent of NOAA's Office of General Counsel. NWS employees will accept a subpoena from the person serving the subpoena, since the delivering person has no authority to withdraw the subpoena. The NWS General Counsel's Office will usually send a letter informing the attorney/law firm about NOAA's procedures and policies and direct them to NCDC and/or the NWS listing of private certified consulting meteorologists for expert witness testimony.

Requests for Interpretation of Weather Data: Generally, state rules of evidence permit the admission of NWS certified records without authenticating testimony from an NWS employee. When interpretation of the records is required, a private meteorologist can interpret NWS records for the court. The NWS maintains a listing of private, certified meteorologists who can be retained to provide expert testimony. See http://www.weather.gov/im/dirintro.htm. The list is provided for informational purposes, with no express or implied endorsement.

Requests for Sunrise-Sunset Data: The U.S. Naval Observatory takes observations and generates sunrise and sunset data. The NWS is not the custodian of such data and cannot certify or authenticate such data. Contact information: U.S. Naval Observatory, ATTN: Code AA, 3450 Massachusetts Ave. N.W., Washington, D.C. 20392-5420. For more information: http://www.usno.navy.mil/USNO/astronomical-applications/data-services

Finding Rain, Snow, and Temperature Information on a WFO Website: You can quickly find weather data on each WFO's Climate (local) page. On the Climate (local) page, click on the tab entitled NOWData. Click on the appropriate parameter in order to retrieve data from official cooperative sites. Contact your local WFO for assistance. Data found in NOWData can be used by Emergency Management to determine if observed snowfall meets or exceeds FEMA's guidelines used in the disaster declaration process. FEMA's snow policy can be found at: http://www.fema.gov/government/grant/pa/9523_1.shtm