



Northern Exposure

What's New at the Weather Service

by Gary Campbell, Meteorologist In Charge

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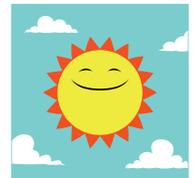
It sure seems like it has been a long winter. We had several significant storms over the winter, each producing blizzard conditions, with high winds, heavy snow, and cold temperatures. With at least two of the storms, numerous road, business, and school closures occurred. During each storm, our snowfall spotters helped us keep abreast of the ever changing conditions here in northern Michigan and allowed us to keep our winter warnings, advisories and forecasts up to date. We thank you for your assistance and dedication.

Over the past several months, our staff has issued graphical short term forecasts and weather story graphics. The short term graphics are designed for you to get a quick look at any significant weather that may affect your area over the next 1 to 3 hours. The weather story graphic gives you a quick look at the most significant

weather that can be expected across northern Michigan over the next week. I think you will find these graphics very useful in planning for your activities. Each of these graphics can be found on our homepage at: <http://www.weather.gov/gaylord/>.

With spring right around the corner, our spring spotter and safety training has started. We hope to see many of you at a spotter class this year. Please check our homepage at: <http://www.weather.gov/gaylord/> and click on the Upcoming SKY-WARN Spotter Talks link to get a list of spotter talks in your area.

That's what is new with us. Please drop us a line if you get a chance. We are always interested in listening to you, our customers, to improve our weather services for Northern Michigan.



Spotters...Critical to the Warning Process

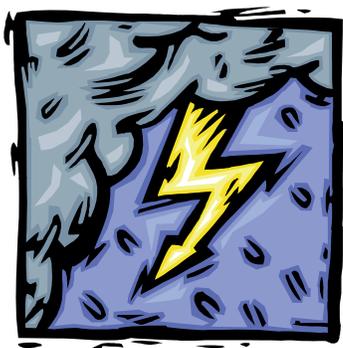
by Jim Keysor, Warning Coordination Meteorologist

The National Weather Service (NWS) relies on volunteer weather spotters to provide real-time weather information when hazardous weather is occurring. While the science of meteorology has moved forward leaps and bounds with the advent of computer models, satellites, and Doppler radar, the role of the human observer is still essential. Although the Doppler radar can tell a forecaster what a storm has the

potential to produce, the spotter is the only one who can provide a ground truth report from the storm area. Severe weather spotters become the eyes and ears of the National Weather Service during busy weather, providing information that assists in the issuance of timely and accurate warnings that may save lives and minimize property damage.

The Gaylord National Weather Service





Spotters...Critical to the Warning Process (cont.)

by Jim Keysor, Warning Coordination Meteorologist

office is responsible for 15,000 square miles of land in Northern Michigan and an additional 14,000 square miles of water. With this large of an area to keep an eye on, you can see how invaluable spotters are to our forecast and warning process.

Most spotter reports still come into the National Weather Service through our spotter telephone line. Telephone is still the recommended way to relay all life threatening information. Spotters may also relay their reports to the NWS through an online spotter reporting system called eSpotter. Registration for this program is free and only takes a few minutes (www.crh.noaa.gov/espotter/). More than 200 people have signed up for eSpotter.

SKYWARN severe weather spotters are required to attend a weather spotter training class at least once every 3 years. These classes are free of charge and are offered in almost every county in Northern Michigan during the spring. The training is led by a National Weather Service employee and last approximately 2 hours.

Spotters are a critical piece to National Weather Service warning operations. We are so appreciative of their service and commitment to the community of Northern Michigan. If you are interested in learning more about our spotter program, please contact our office at 989-731-3384.



Storm Based Warnings...Narrowing It Down

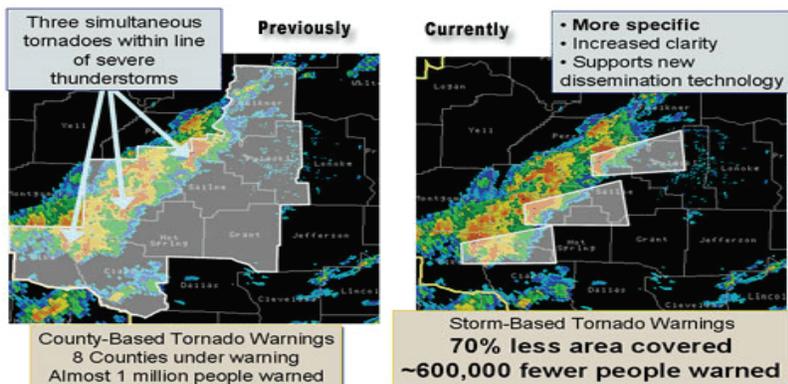
by Jim Keysor, Warning Coordination Meteorologist

In October of 2007, we began issuing more geographically specific warnings for tornadoes, severe thunderstorms, floods, and marine hazards. The new "storm-based warnings" allow forecasters to pinpoint the specific area where the threats are highest, reducing the area warned by as much as 70 percent when compared to the old county-by-county system.

warned area by as much as 70 percent, which equates to more than \$100 million in savings to the public," said Vice Admiral Lautenbacher, undersecretary of commerce for oceans and atmosphere, and NOAA administrator. "The real bottom line is that this will potentially save more lives. Eliminating areas needlessly warned builds confidence that you do indeed need to take action when a warning is issued."

"By focusing the threat, we can reduce the

Why Storm-Based Warnings?



Storm-based warnings are displayed graphically and are extremely adaptable to cell phones, PDAs, and the Web. The Emergency Alert System is geared toward counties and NOAA Weather Radio All Hazards still alarm if there is a warning anywhere in the county. Text and audio messages will provide more specific information about where in the county the storm is, and the direction the storm is moving. Storm-based warnings will reference landmarks such as highways, shopping centers, and parks, and will use directional delimiters to indicate county location.

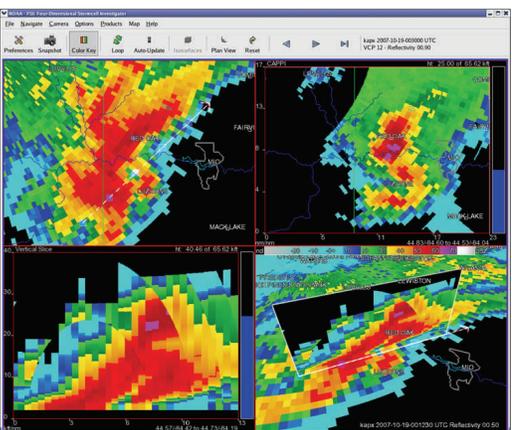
Four Dimensions...A New Way to View the Beast

By Bruce Smith, Science and Operations Officer

Starting this summer, meteorologists at NWS Gaylord will utilize a new tool to help them issue timely and accurate radar-based Severe Thunderstorm and Tornado Warnings. The new tool, called the Four-Dimensional Storm Investigator (FSI), will allow forecasters to more rapidly examine such important thunderstorm structure characteristics as storm tilt, storm height, hail likelihood, and storm rotation.

There are four main components within FSI, they include: 1) the Plan Position Indicator, 2) the Constant Altitude Plan Position Indicator, 3) the Vertical Dynamic Cross Section, and 4) the 3-Dimensional Flier. When displayed, each FSI component will be viewable within a quadrant of a single computer screen.

The figures below (utilizing archived radar data) show how FSI would have depicted the EF2 tornado near Luzerne, Michigan, just as it touched down on October 18, 2007. Figure 1. Reflectivity data on FSI. The upper left quad shows low level reflectivity, including a Bounded Weak Echo Region (BWER).



The upper right quad shows reflectivity at 25,000 ft (high hail potential). The lower left quad shows storm tilt utilizing a cross section. The lower right quad shows the reflectivity

cross section relative to other storms in the area.

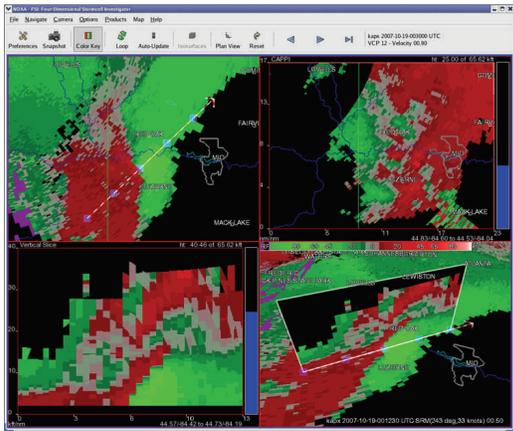


Figure 2. Storm Relative Velocity data on FSI. The upper left quad shows the strong low level circulation associated with the tornado (green shows inbound velocity, and red shows outbound velocity). The upper right quad shows velocity at 25,000 ft (storm top divergence). The lower left quad shows velocity utilizing a cross section (the circulation extends to 10,000 feet). The lower right quad shows the velocity cross section relative to other storms in the area.

The Luzerne EF2 tornado had winds estimated at 115 mph. It was on the ground for approximately 12 miles, with a maximum width of approximately 1/2 mile. This tornado damaged or destroyed at least 16 structures, and uprooted tens of thousands of trees. Meteorologists at NWS Gaylord are being trained to use FSI this spring, to help give them the best opportunity for success when issuing warnings this summer for storms like the one which impacted the Luzerne and Mio areas last October.





2007-2008 Winter Storm Wrap-Up

by Jeff Zoltowski, Storm Verification Program Leader

Winters are always – always - interesting in Northern Michigan. Our first winter storm was fairly innocuous; lake effect snow dumped about six inches worth on Good Hart and Pellston in Emmet County on Thanksgiving weekend. But a lot of our storms affected more people than that. We were busy at the end of November, and again in mid to late December. Then came the surprising early January thaw, but not to worry, because the snow machine kicked in with a vengeance by the mid part of the month, and continued off and on through February. March ended up unusually quiet; it was chilly, but not much in the way of snow.

One thing notable about the winter was the relative lack of lake effect snow. Instead, most of our snow came from various storm systems passing through the region. That will be a blessing in some respects, as the above-normal precipitation through most of the winter will help lake levels recover on the Great Lakes as that snow melts away.

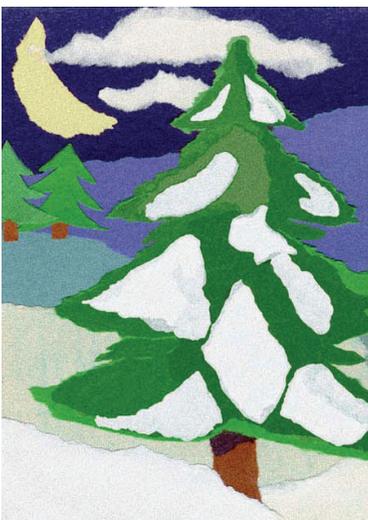
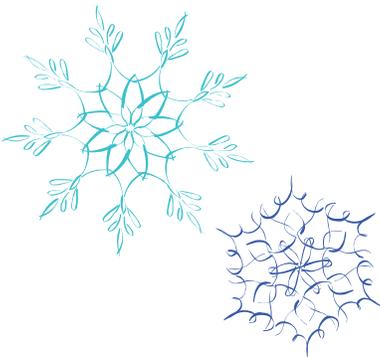
As of late March, your National Weather Service office in Gaylord had issued winter storm warnings in advance of **94 percent** of all warning-criteria winter weather events. This exactly meets station and national goals for the winter. We had an average lead time, from warning issuance to meeting warning-criteria, of **16.3 hours**. **This is the best in the history of our office!**

The National Weather Service sincerely thanks all of our spotters and volunteer observers for your observations during the winter. ***Your reports contribute greatly our success!***

Some of our more significant storms of the season:

December 1st -3rd: Moisture surged into Michigan from the south, producing intense snowfall during the night of the 1st. Snowfall amounts of six to eleven inches were widespread across Northern Lower Michigan, while Hessel and Drummond Island saw eight to twelve inches thanks to southeast winds off of Lake Huron. As that system departed, lake effect snow and windy conditions cranked up on the night of the 2nd and into the 3rd.

January 29th – 30th, and February 9th – 11th: The twin blizzards. These storms were eerily similar. Both featured low pressure systems rapidly strengthening to our north and northeast, as they moved away from the region. Both produced relatively little snow on the front end, when the systems were weaker. However, as they pulled away, northwest winds became very strong, pulling brutally cold air into the region. Temperatures struggled to reach zero during the daytime hours. System snow and lake effect snow, when combined with the winds, produced very dangerous conditions across the north. Blizzard conditions were most widespread in Chippewa County in both events, but occurred at times across all of the snowbelts. Many highways were closed during these storms, including US-2 west of St Ignace, due to whiteout conditions and drifting snow.



2007-2008 Winter Season Recap

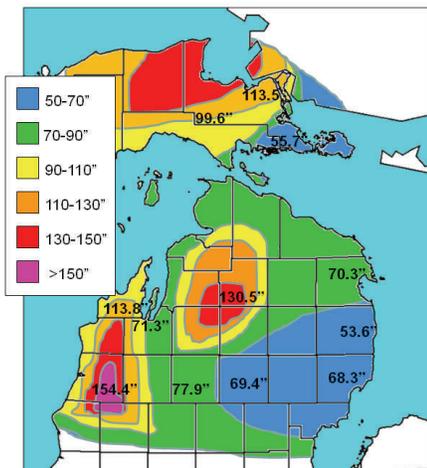
By Kevin Sullivan, Climate Program Leader

The winter of 2007-2008 saw slightly above average snowfall and near to slightly above normal temperatures. The highest snowfall totals were observed in 3 distinct areas. The first area was in eastern Manistee and Benzie counties, extending northward into Leelanau County. The second area was centered around Otsego, Kalkaska, Crawford, and Antrim counties. Finally, the third area was across northern Chippewa County. These areas all saw over 130 inches of snow during the winter. Most areas in Northern Michigan finished the winter with above normal snowfall with some exceptions. One of these exceptions was in Traverse City, where the area finished the winter about 10 inches below normal. However, the overall tendency this winter in Northern Michigan was for slightly above normal snowfall.

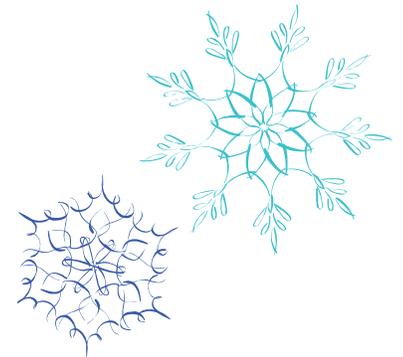
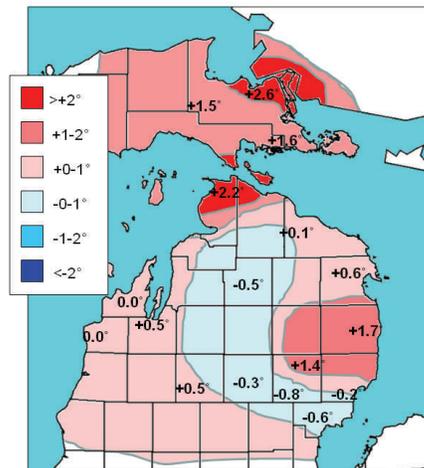
With regard to temperatures, slightly below normal temperatures were seen across interior portions of Northern Lower Michigan, stretching southward into the Saginaw Bay region. Areas around the tip of the mitt, and northward into Eastern Upper Michigan were about 1 to 2 degrees above normal for the winter. The same was true for some areas in Northeast Lower Michigan. The overall tendency for the past winter in Northern Michigan was for near to slightly above normal temperatures.



**Total Winter Snowfall
November 2007 through February 2008**



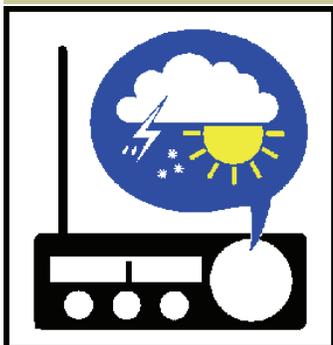
**Temperature Departures From Normal
November through February**



	SSM	HTL	APN	TVC*	GLR*
Total Snowfall (in)	113.5	69.4	70.3	71.3	130.5
Departure from normal	+6.2	+14.1	+3.9	-11.5	+10.4

Snowfall information is for December, January, and February.

* Observed and normal precipitation data for Traverse City and Gaylord are compiled from cooperative observers.



NOAA Weather Radio...Growing Every Year

by Jim Keysor, Warning Coordination Meteorologist

There are over 985 NOAA Weather Radio All Hazards (NWR) stations operating in the United States, Puerto Rico, the Virgin Islands, and U.S. pacific territories. The National Weather Service operates 28 NWR stations serving Michigan. Currently, nine are located in or near Upper Michigan and serve the Upper Peninsula. Twenty are currently located in, or directly adjacent to, the Lower Peninsula and serve Lower Michigan.

The National Weather Service, through the help of local partnerships in Michigan, has established a new NOAA Weather Radio All Hazards station during the past year near the community of Good Hart in Emmet County. This new station covers the tip of the Mitt in Michigan, north through the Straits of Mackinac. Additional NOAA Weather Radio All Hazards stations are being installed near Crystal Falls, Marenisco, and Copper Harbor.

Locations and frequencies of the All Hazards NOAA Weather Radio stations serving Michigan are listed to left.

Adrian.....	162.450	MHz
Angola, Indiana.....	162.425	MHz
Alpena.....	162.550	MHz
Copper harbor.....	162.500	MHz
Crystal Falls.....	162.475	MHz
Detroit.....	162.550	MHz
Escanaba.....	162.500	MHz
Flint.....	162.475	MHz
Gaylord.....	162.500	MHz
Good Hart.....	162.475	MHz
Grand Rapids.....	162.550	MHz
Hesperia.....	162.550	MHz
Houghton.....	162.400	MHz
Laporte, Indiana.....	162.500	MHz
Manistique.....	162.525	MHz
Marenisco.....	162.550	MHz
Marquette.....	162.550	MHz
Mount Pleasant.....	162.525	MHz
Newberry.....	162.450	MHz
Onondaga.....	162.400	MHz
Oshtemo.....	162.475	MHz
Park Falls, WI.....	162.500	MHz
Sandusky.....	162.450	MHz
Sault Ste Marie.....	162.550	MHz
Sister Bay, WI.....	162.425	MHz
South Bend, Indiana.....	162.400	MHz
Traverse City.....	162.400	MHz
West Branch.....	162.450	MHz
West Olive.....	162.425	MHz
Wolf Lake.....	162.425	MHz

Overall, NOAA Weather Radio All Hazards covers about 95 percent of the population of the United States. In Michigan...NOAA Weather Radio All Hazards also covers over 95 percent of the

NOAA Weather Radio All Hazards makes a terrific gift for boaters, travelers and other outdoor enthusiasts. To learn more about these units, call our office or visit our webpage at www.weather.gov/gaylord.

Upper Air Program...The Sky's the Limit

by Mike Cellitti, Upper Air Program Leader

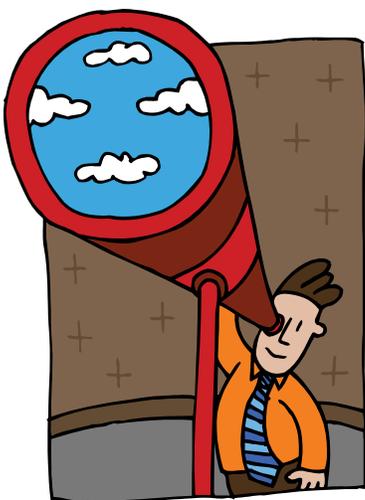
The National Weather Service forecast office in Gaylord, MI continues to be designated as 1 of 69 upper air stations in the continental United States, and 1 of 92 stations in North America.

upper air release, you can observe a launch from Passenheim Rd. adjacent to our office, or for a more in-depth look, you can call ahead and schedule a tour.

Two upper air observations are conducted simultaneously by each station every day of the year, centered around 7am and 7pm EDT, or 6am and 6pm EST. Each flight consists of a radiosonde instrument package suspended below a 6 foot wide balloon filled with hydrogen. As the radiosonde is carried aloft, sensors measure atmospheric conditions, such as pressure, relative humidity, temperatures, and winds. The radiosonde then transmits these measurements to a ground receiver. The information is compiled and applied to many different operations such as computer-based weather prediction models and local severe storm, aviation, and marine forecasts. Upper air data is essential to weather research. If you are interested in watching an

The new Radiosonde Replacement System (RRS), installed in August 2007, incorporates a state of the art Global Positioning System (GPS) tracking antenna, a 1680 MHz radiosonde, and a Microsoft Windows-based workstation that receives, processes, and transmits upper air data collected from the radiosondes. It offers increased data resolution, improved data accuracy, and the ability to track the balloon overhead. In addition, the workstation is more interactive and allows a high degree of control over the data products that are generated and transmitted.

For more information about the RRS or other information about the upper air program, check out the NWS Upper Air Observations Program at <http://www.ua.nws.noaa.gov>.



See Data “NOW”

by Keith Berger, Observing Programs Leader

In our day and age, information dissemination has made leaps and bounds. Since the dawn of the internet and 24 hour cable news channels, sharing information has become instantaneous and our culture has become accustomed to receiving data within minutes as opposed to days. Climate and weather data are now no different.

Many of our users, from Agriculture to Energy Producers, need up to the minute information not only about what's going to happen tomorrow, but what happened yesterday. Agricultural operations can now make same day irrigation decisions based on recent rainfall and energy producers can allocate resources accordingly based on overnight temperatures.

With the NWS cooperative program (a network of volunteer citizen observers), which is the backbone of the nation's climate, much of our data was not available until weeks after the fact, when observation forms processed through quality control. Now, however, with many COOPs transmitting their data daily via computer or telephone systems, this information can be provided to customer's minutes after the readings were taken!

There is a database, created through a partnership of the NWS, Regional Climate Centers and developers in academia that parses the information through the daily transmissions and makes it available through the internet. For internal (NWS) uses, the database is known as xmACIS. For external use, a simplified version has

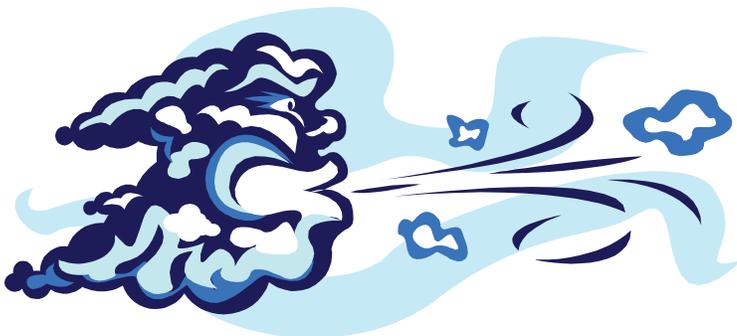
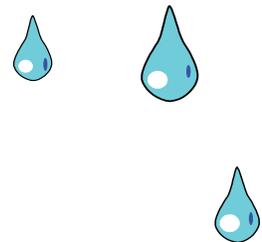
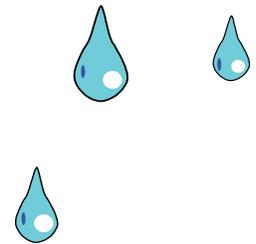
been developed and is available through our internet site, called NOWData.

NOWData has become the source of choice for climate information for many customers, from the media to hobby weather watchers. Using NOWData, one can keep track of seasonal temperatures, rainfall, snowfall, etc., and it is updated daily as you send your observations! With NOWData, local newspapers can publish the latest preliminary seasonal snowfall values, including what fell last night. Whereas, with the old process, much of this data wasn't available until June.

To access NOWData, check out the “Climate” section of our webpage (about two thirds down in the left hand menu), click “Local”, and then click on the “NOWData” tab. The direct URL is: <http://www.weather.gov/climate/xmacis.php?wfo=apx>

If you notice missing data for some locations...keep in mind that this data is taken by volunteers...and some of these stations are located at businesses only open Monday through Friday. In many instances, the data gaps are filled in after the monthly forms process through the quality control process (about a 3 month lag).

To those Cooperative Observers who perform this service, please accept our heartfelt thanks. For those who don't, but would like to...contact me at the office and we'll go through what it takes to get you set up.





New Hydro Forecast Service on the Rifle River

by John Boris, Hydrology Program Leader

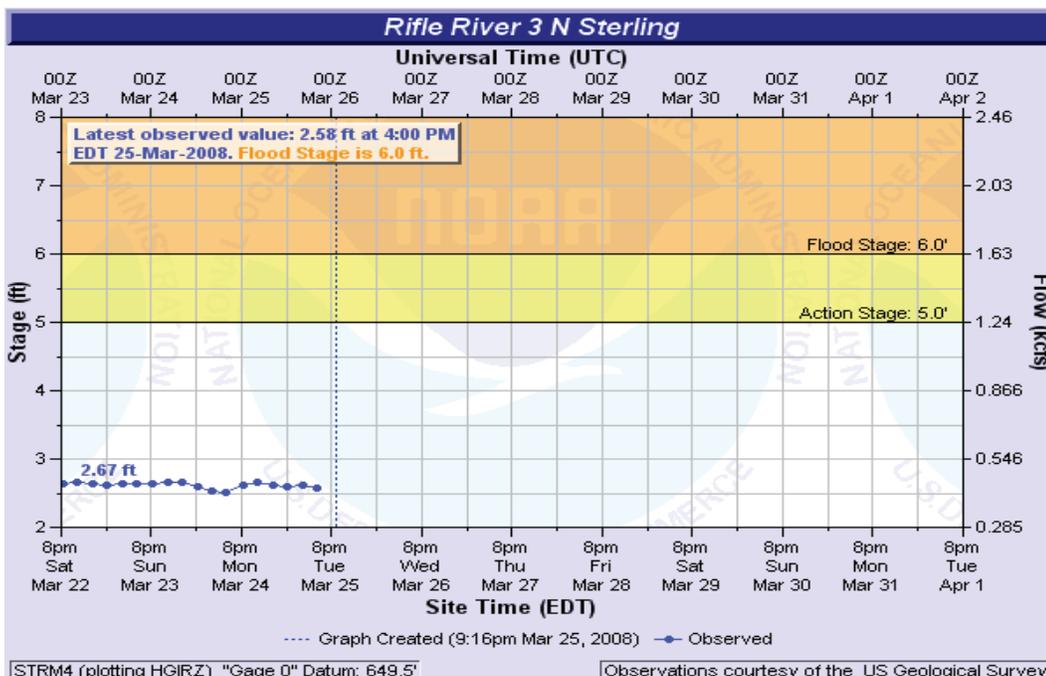
The National Weather Service has initiated new hydrologic forecast and warning service on the Rifle River near Sterling in Arenac County. This new forecast point was established on November 27, 2007, with a flood stage of 6 feet. The NWS defines flood stage as the level at which flooding begins to cause damage to property along a defined section of a river.

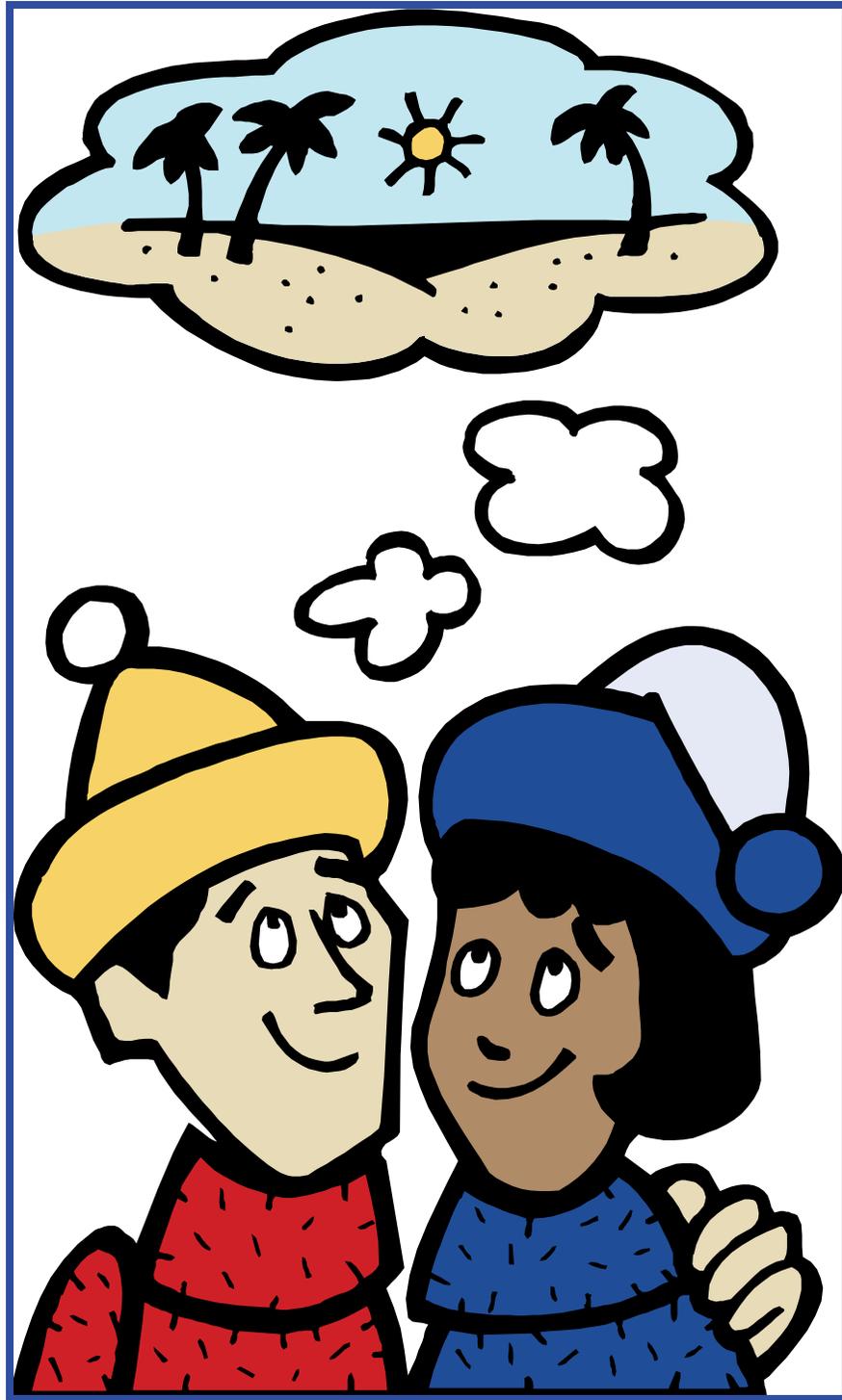
The location that will serve as the observational basis for this forecast point is the United States Geological Survey (USGS) river gaging station located on the downstream side of the Melita Road bridge near White's Canoe Livery...about 3 miles north of Sterling. The stretch of river for which forecasts and warnings will be valid will extend from the Rifle River and River View campgrounds (located about one mile upstream from the gage location) to the Grove Street Road bridge approximately 5 miles downstream from the gage. Flood waters are expected to begin impacting the campgrounds at river stages above 6 feet.

During the warm season (April through

October), daily forecasts of river stage out through the next five days will be issued by the National Weather Service, which we hope will be of benefit to recreational river users. During the fall and winter months, forecasts will be issued only during times of expected high water. Flood Warnings will be issued year round whenever the river threatens to rise above flood stage.

Current and forecast conditions for the Rifle River near Sterling, as well as other gaging locations around northern Michigan, can be accessed from the "Rivers & Lakes AHPS" section of our web page (<http://www.crh.noaa.gov/ahps2/index.php?wfo=apx>). Simply click on a gaging location on the map to get the latest information for that site.





National Weather Service Gaylord, Michigan

8800 Passenheim Road
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Phone: 989-731-3384
For Spotter Report: 800-MI-STORM (800-647-8676)
Fax: 989-731-0682

www.weather.gov/gaylord



“Saving Lives and Property”

National Weather Service Mission Statement

"The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."

NWS Gaylord, Michigan Vision

"Lead in developing innovative ways to improve the quality of weather services to our customers and set a standard of excellence for products and services unique to Northern Michigan."

**National Weather Service
8800 Passenheim Road
Gaylord, Michigan 49735**