

# Northwest Weather and Avalanche Center

## Forecast Generation & Short User Guide

(Prepared by Mark Moore, February 11, 2006)

### *I. How we generate mountain weather and avalanche forecasts*

#### Introduction

Forecast staff at the NWAC prepare a variety of forecast products, including a detailed mountain weather forecast as well as three or four public avalanche forecast products. To prepare such products, forecasters need to determine:

- what the current snowpack structure and stability is,
- how the current and recent past weather is affecting this snow stability, and
- how specific future weather will modify this stability/danger

To gain such insights and understanding, NWAC staff essentially must “live the winter”, watching and monitoring the snowpack as it develops from the first snowflake in the fall until it slowly stabilizes and melts in the spring. Only then will forecasters be able to know and understand snowpack structure during its early season development, and to see if weak layers that form when a shallow snowpack exists might affect stability or forecast decisions through a portion or perhaps the entire forecast season. In order to be most effective and reliable, both mountain weather and avalanche forecasts require continuous feedback between the field (forecast verification locations) and the office (where the forecast is prepared and updated).

#### Daily Forecast Routine

On a typical day, NWAC forecasters arrive at the office around 0300-0330 each morning, ready to ingest a wide variety of weather, snowpack and avalanche data from around the Northwest. A common forecast shift might evolve like this:

- 0300-0500
  - Read or listen to previous forecaster’s notes to see what challenges lie ahead as well as insights that might be gained
  - Call up hourly mountain weather data to see what weather is happening now in the mountains; think about local or regional differences, east or west of the Cascade crest, north to south as well as elevation variations
  - View & analyze this weather data to see how it may have impacted the previous snowpack structure described yesterday
  - Integrate this information with forecaster’s own ideas of current snowpack structure, possibly gained from first hand analysis of snowpack on the previous day
  - With a good idea of the current and recent past weather and a general idea of snowpack structure and stability, begin to log and analyze NWS hourly surface weather data, vertical (balloon) sounding information in terms of freezing levels and winds

- View NWS satellite loop to gain quick overview of current and incoming weather events affecting forecast area
- Call up and analyze various NWS weather forecast models through cross sections, soundings, plan views, etc from current time out to 5-7 days (120-168 hours)
- From looking at these models at different levels, write down outline of expected temperatures (freezing/snow levels), winds (pass and free air), precipitation and cloud cover on log sheets
- Gain broad and local perspective in how to write and present weather synopsis and specific forecast parameters
- Consult and coordinate planned forecast with NWS lead and aviation forecasters
- Ensure that remote mountain weather network is continuing to function accurately and reliably; troubleshoot as necessary and enter appropriate remarks if needed for correct interpretation of station data
- 0500-0700
  - Begin to receive new information via phone from field observers (WSDOT and Ski Area avalanche professionals, as well as other personnel who may have new snow stability information) on current weather, current snowpack structure and current snow stability/avalanche danger
  - Verbally disseminate specific mountain weather forecasts to WSDOT, NPS, Ski Areas and other cooperators; discuss snow stability and avalanche danger trends as appropriate
  - Keep NWS forecasters updated on new mountain weather and snowfall information
  - Continue to update current weather picture via NWAC hourly mountain weather telemetry updates, NWS satellite pictures, NWS surface observations
  - Prepare and disseminate mountain weather forecast
- 0700-0900 (0930)
  - Continue to receive new snowpack and weather information from field observers and cooperators
  - Continually update mental picture of current conditions and trends in weather through analyzing hourly weather and satellite data
  - Plot/log incoming weather and snowpack data as appropriate; integrate new information into decision making process
  - Call specific areas for new or more detailed information as appropriate
  - Prepare and disseminate detailed avalanche forecast and public forecast products as indicated by the expected danger level
  - Advise NWS forecasters and public service desk of any warnings issued
  - Continue to monitor remote mountain weather data system and troubleshoot scheduler computer as necessary
- 0930-1100
  - Breakfast and break
  - Finish logging/archiving all weather and snowpack/avalanche data as needed
  - Disseminate critical avalanche information to all regional contacts as necessary to maximize information exchange
  - Make notes in log books for next day, next forecast or next forecaster (if at end of shift)
  - Perform administrative duties including scheduling, budgetary items, web site development and updating, programming of data network stations, respond to data and/or email requests and questions

- Answer phone calls from cooperators, the public and news media
- 1100-1300 (1400 or 1500 during high to extreme danger conditions)
  - Repeat the 0300-0500 process for preparing and transmitting updated mountain weather forecast
  - Reissue public avalanche forecasts as changing weather or avalanche conditions require
  - Verbally update cooperators regarding update or any major changes in expected weather or avalanche conditions
  - Get office ready for following morning forecast shift

## ***II. Short User Guide to NWAC Data and Forecast Products***

There are a variety of ways to most effectively utilize NWAC data and forecast products, probably almost as numerous as there are back country users. Upon using the constantly updated suite of services on this web site, each user will undoubtedly develop his or her preferred methodology for most efficient application of this information. However, whether it is directly on this site or others that pass along the data to interested parties, some general guidelines are suggested.

- Know that weather and avalanche danger forecasts are as specific and accurate as possible, but it is up to you the user to update and interpret them in a safe and objective manner. Too many avalanche accidents occur as a result of human factors. Learn about these human factors and try to make objective rather than subjective decisions about your safety.
- Mountain weather is dynamic and un-forecast changes can and do occur. Be sure to continually be aware and update your own assessment of local conditions, whether it is on the road to your destination or in the snowpack and weather that surrounds you once you enter the back country.
- Check recent data on your favorite site or location before heading out the door. This will provide a last minute check on how the forecast is panning out, and should give you local trends in weather that you can and should apply.

### **Warning:**

Welcome to a world where weather, snowpack and terrain interact to form much of the beauty and sometimes beckoning danger around you. Use care and common sense when using hourly weather data or applying snow stability forecast information. Hourly weather observations provide a historical framework and general guideline to trends in local weather and related snow pack stability. Mountain weather and avalanche forecasts obtained here are an excellent starting point for anticipating the effects of weather on the snowpack and for assessing the potential for avalanches when you go into the back country. But in order to maximize your safety in the back country and minimize your exposure to avalanches, it is very important for you to continuously update your own mental picture of the danger and to create your own local forecast of how the danger is evolving. This situational awareness should include periodic updates of the snowpack layering and stability as you travel, how the effects of current weather may be changing this snowpack and how stability may vary as you move through changing terrain. Remember you are responsible for using and applying any information. Choice not Chance causes most avalanche accidents and it is a fact that the snow pack is highly variable, very dynamic, and snow structure

and related stability can and do change within a few feet and often within a few hours, sometimes dramatically.