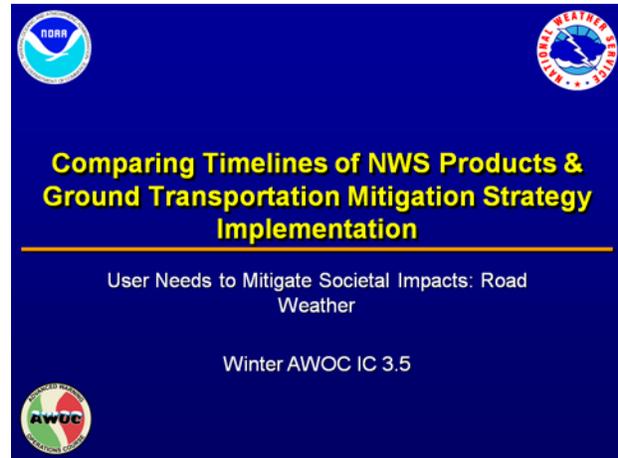

1. Introduction

Instructor Notes: Welcome to the fifth lesson in this Instructional Component. This module presents some example events to show the how NWS products and state & local ground transportation agency mitigation efforts unfold in time relative to the event. This presentation should take approximately 20 minutes. NOTE: Gray speaker notes in italics surrounded by brackets (i.e., [show text]) indicate at what point during the speaker notes specific animations occur.

Student Notes:



2. How Wx Info Fits into the Big Picture

Instructor Notes: This lesson focuses on the end result of both the NWS and DOTs work. Several hypothetical examples are presented to illustrate when various mitigation efforts are implemented during the evolution of an event. [show 1st bullet] This information is presented using an interactive timeline that allows users to view the content linearly or to choose specific times they wish to view. Users can click on the dots on the timeline to view information at a specific time, [change images] or use the left and right arrow keys to go backwards and forward through the timeline. The timeline is further subdivided to illustrate when NWS products are issued relative to these mitigation efforts as well as when the event is ongoing. These timelines are based upon a study by Cambridge Systematics, Inc. for the FHWA (CSI, 2003). [show 2nd bullet] An important point to remember is that, although these timelines show transportation management responses to weather events in the context of when NWS products are issued, you should not assume: All agencies will implement the same procedures during the same meteorological conditions or That we are implying any specific cause and effect relationship between NWS products and DOT mitigation efforts. [show 3rd bullet] As with previous lessons in this IC, all of the learning objectives are available using the objectives tab located in the upper right-hand corner of the module window.

Student Notes:

AWOC Winter Weather Track

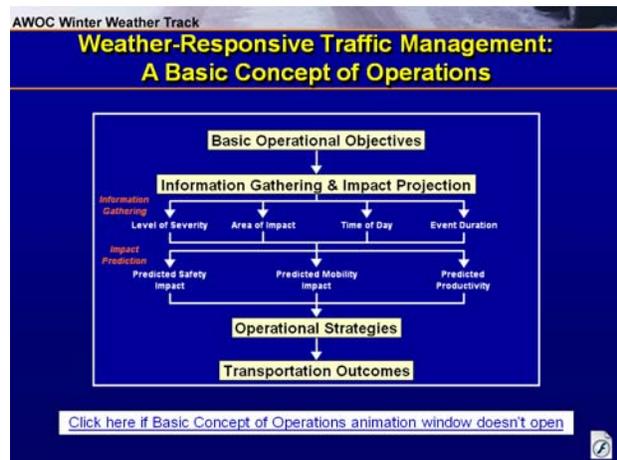
Weather-Responsive Traffic Management: How Weather Information Fits into the Big Picture

- Timelines used to show:
 - Temporal evolution of DOT mitigation efforts
 - How NWS products might fit in
- Timelines do not imply
 - Standard response
 - Cause & effect between NWS & DOTs
- Learning objectives available at tab (upper right-hand corner)

3. A Basic Concept of Operations

Instructor Notes: Before we get into the events, let's present a basic concept of operations of how weather information may fit into the transportation operator's general procedures. The flash movie shown in the window has four different levels: Basic Operational Objectives, Information Gathering and Impact Prediction, Operational Strategies, and Transportation Outcomes (CSI, 2003). Users can explore the details of each level by clicking on the title. There are two point I would like to make about this framework: First, NWS Products & Services are integrated into the surface transportation operator's workflow in the Information Gathering and Impact Prediction phase and The Management Strategies discussed previously are chosen and implemented in the Operational Strategies phase.

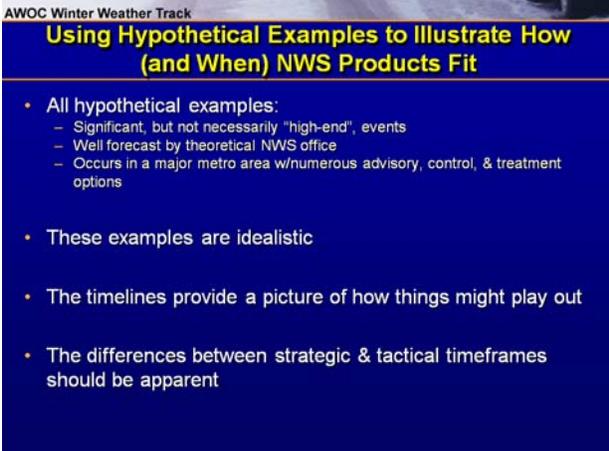
Student Notes:



4. Using Hypothetical Examples

Instructor Notes: During the following examples, the focus isn't on the details of the weather event itself, but on the temporal evolution of DOT mitigation efforts as the event unfolds. [show 1st bullet] For all of these examples, it should be assumed that the events are all significant, but not necessarily high end, events that were well forecast by the theoretical forecast office. Each of the events occur in a major metro area where numerous advisory, control, and treatment strategy options are available to address the events in question. [show 2nd bullet] Realistically, no two events will be the same. The timelines for each event are somewhat idealistic and simplified, [show 3rd bullet] but provide a picture of how a certain type of event might play out in a big picture sense with some details. [show 4th bullet] As the timelines are presented, the differences between the strategic and tactical timeframes should be clear. Additionally, you will see that the timeframe where strategic planning occurs will vary somewhat depending on the type of event, the length of time it takes to prepare for that event, and the event's possible impacts.

Student Notes:



AWOC Winter Weather Track

Using Hypothetical Examples to Illustrate How (and When) NWS Products Fit

- All hypothetical examples:
 - Significant, but not necessarily "high-end", events
 - Well forecast by theoretical NWS office
 - Occurs in a major metro area w/numerous advisory, control, & treatment options
- These examples are idealistic
- The timelines provide a picture of how things might play out
- The differences between strategic & tactical timeframes should be apparent

5. The Three Hypothetical Events

Instructor Notes: The rest of this presentation focuses on three different hypothetical weather events and the associated timelines of DOT mitigation activities. These events are: [show 1st image] A major snow storm, [show 2nd image] A widespread freezing rain/icing event, and [show 3rd image] A dense fog event.

Student Notes:



6. Ex #1: Major Warning-Criteria Snowfall

Instructor Notes: The first sample event is for a major warning-criteria snowfall. [show 1st bullet] For the purpose of this exercise, the snowstorm is part of a low-pressure system located in the central U.S. The primary threat for our area of interest is significant snow totals. [show sub-bullets] Widespread accumulations of 8 inches are expected throughout the metro area, with 16 inches possible in some of the northern suburbs. As the surface low passes and the winds become more northerly, sustained winds should increase to near 20 kts with gusts between 25-35 kts possible during the later portions of the event. As a result, blowing and drifting snow and very low visibilities are possible during the overnight hours. These conditions may hamper the ability of road crews to effectively treat and clear road surfaces. [show 2nd bullet] The snow should start in western portions of the CWA around 3:00 pm on Tuesday afternoon and quickly spread into the metro area. Once the snow starts, it should last for approximately 12 to 18 hours. The snow should exit the eastern portions of the CWA before noon on Wednesday. [show 3rd bullet] Because the accumulations are expected to occur over a long period of time, it's believed that maintenance crews will have sufficient resources to clear and treat roads. Safety concerns are still high due to large accumulation totals and due to the severe overnight conditions.

Student Notes:

AWOC Winter Weather Track

**Example Event #1:
Major Warning-Criteria Snowfall**



- Snowstorm in Central U.S.
 - Widespread 8" forecast, with up to 16" locally possible in northern suburbs
 - Blowing and drifting snow significant threat overnight
- Event duration
 - Start around 3 PM Tuesday afternoon in western suburbs
 - Last approximately 12-18 hours
 - End in eastern suburbs before noon Wednesday
- Low intensities suggest
 - DOTs expect to sufficiently clear, treat roads
 - Overnight conditions may cause severe problems

7. Major Warning-Criteria Snowfall Timeline

Instructor Notes: As you go through the timeline for this event, here are some key points to remember: While the two warning products are both issued after hours, the local transportation managers clearly had a heads up of the weather situation prior to the initial warning. Second, the timing of the first media advisory is significant as to attract the most attention of potential viewers during noon TV & radio broadcasts. Lastly, while not explicitly mentioned in the timeline, some level of coordination is occurring between the transportation, public safety, and emergency management communities and the NWS throughout the event.

Student Notes:

8. Ex #2: Widespread Freezing Rain/Ice

Instructor Notes: The second sample event is for a widespread freezing rain event. [show 1st bullet] For the purpose of this exercise, the freezing rain is part of a low-pressure system moving up the East Coast of the U.S. A large arctic high is in place over the Northeast. Although the warm advection ahead of the low should displace the high, there should still be significant shallow cold air at the surface in some areas for several

Warning Decision Training Branch

hours after rain starts falling. [show 2nd bullet] The primary threat for this event will be the accumulation of ice. The freezing rain is expected to begin around 5 am, Monday morning and last for approximately 3 to 6 hours. Ice accumulations of one-tenth to one-quarter of an inch are likely. Some areas could see between one-quarter to one-half of an inch of ice. The freezing rain should impact most, if not all, of the metro area. [show 3rd bullet] In this region, ice storms occur infrequently (once every few years) with minor icing events occurring approximately once or twice a year. A widespread freezing precipitation event will stretch available personnel resources thin and result in significant travel problems.

Student Notes:

AWOC Winter Weather Track

Example Event #2: Widespread Freezing Rain/Ice



This temperature profile, with a warm wedge of air aloft, suggests the likelihood of freezing rain or possibly sleet.

Graphic from Albany NWS WFO

Photo from DoT/TIWA

Photo from ITT

- Freezing rain along U.S. East Coast
 - Shallow cold air at surface underneath area of light-to-moderate rainfall
 - 1/10-1/4" of ice likely, 1/4-1/2" possible in some areas
 - Surface temperatures should rise above freezing by late morning
- Event duration
 - Start around 5 am Monday morning
 - Last for approximately 3-6 hours
 - Change over to rain by noon
- Area's experience with icing events
 - Minor events occur annually with infrequent (once every few years) ice storms
 - Widespread event will stretch resources thin & cause significant travel problems

9. Freezing Rain/Icing Event Timeline

Instructor Notes: Here are some important points to remember: Monday morning events can be especially problematic as many workers are off for the weekend and the general public tends to pay less attention to weather information. The Winter Storm Warning and DOT public notification are both issued in time for media deadlines to get on major news broadcasts. Traffic management personnel are mobilized about 2 hours prior to the forecast onset of precipitation to get them in place before conditions deteriorate. Road crews continue treating roads several hours after the rain stops to mitigate the ice that still remains on secondary roadways.

Student Notes:

10. Ex #3: Widespread Dense Fog

Instructor Notes: The third sample event is for an occurrence of dense fog in a major metropolitan area. [show 1st bullet] For the purpose of this exercise, this metro area experiences high levels of congestion and has a limited number of alternate routes because of a major water body and other geographic constraints. This constraint could be applied to numerous metro areas in a variety of locations, including the East, West, or Gulf Coast regions of the U.S. as well as the larger cities along the Great Lakes. [show 2nd bullet] The forecast is for the dense fog to occur during the early morning hours and peak during the middle of the morning peak period. The fog may be accompanied by drizzle or light rain that may make road surfaces slippery. Fortunately, surface temperatures are forecast to remain well above freezing for the metro area, so there's no threat of ice forming on any roads, overpasses, or bridges. The dense fog should dissipate by mid-to-late morning throughout the metro area, resulting in normal driving conditions.

Student Notes:

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Example Event #3: Widespread Dense Fog



- Dense fog in major metropolitan area
 - Metro area experiences significant rush hour congestion
 - Physical geography limits number of alternate routes
 - Light drizzle also possible, but no threat of ice
- Event duration
 - Starts in early morning hours prior to morning peak period
 - Should burn off by mid-to-late morning

11. Widespread Fog Timeline

Instructor Notes: For this third timeline, here are some key points to remember: Dense fog events usually require less time to mitigate than most other types of significant weather. Areas that regularly experience fog or other low visibility events will likely have some mitigation mechanisms in place that can be implemented quickly. Remember that low visibility events usually result in increased accident rates because the driver speed variance increases as visibilities drop, especially when visibilities are below a quarter-mile. U.S. DoT statistics suggest that fatality crashes occur at a higher frequency during low visibility events than during other adverse weather events (Goodwin, 2003).

Student Notes:

12. Using the NWS LMS to Learn More

Instructor Notes: Forecasting details for these different events is outside the scope of this lesson. However, there is lots of training available in the NWS Learning Center on these topics. For example, say you are interested in learning more about winter weather forecasting. To access a list of all these courses, just follow these steps once you have logged into the NWS Learning Center: [cue link in main page content] Click on the “Training and Development Catalog” link in the main content window [cue link in navigation panel] or you can use the navigation button on the left-hand-side of the window, and [change image] Click on the “Winter Weather” link under “Topics – NWS Courses” (should be the last link in that list). [change image] For winter weather, there are dozens of choices available. Each listing should provide a brief synopsis to indicate what the course is about and assist you in determining if the training meets your needs. [change image] In addition to the main listings of courses by topic, you can also search the LMS for more specific training. [cue search type box] When using the search feature, I recommend using the “Exact Phrase” option to reduce the number of extraneous courses that are returned.

Student Notes:

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On-Line Training Resources Related to Forecasting These Meteorological Phenomena

Search

Your Search section allows you to search for on-line, I.T., and other all types of training available within the NOAA Learning Center. You can also search by keyword. The number of search results will be increased as new courses are added.

Using the Search Tool

Using the search tool is quite easy, but some basic definitions may be of use, at this point.

Search for Courses, Classes, & I.T. Sessions

Search Courses

Search Classes

Search I.T. Sessions

I.T. Session Start Date

I.T. Session End Date

Search Type:

- The “Search for Courses, Classes, & I.T. Sessions” Box - Enter keywords for the search in this box.
- Course - An online, web-based training course.
- Class - A class is essentially the same thing as a course, except that it may contain multiple modules within it. For all practical purposes, you can consider a Course and Class the same type of training.
- I.T. Session - This is an “Instructor Led Training” session. Usually this is a residence or teletraining course. You can limit the I.T. search by date range.

Search Type: You can allow the search to use “Any Words” or “Exact Phrase” entered in the keyword box. The “Exact Phrase” search is more restrictive, requiring the keyword text to be exactly as entered in the box in order to return that item in the search results.

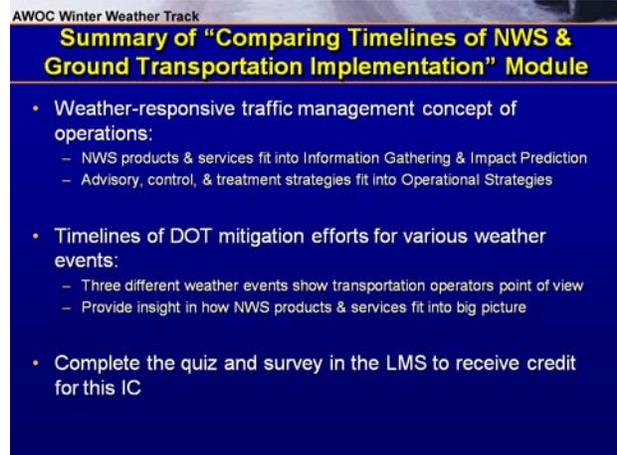
13. Summary

Instructor Notes: In summary, this lesson focused on two topics. [show 1st bullet] First, a brief concept of operations was provided for how surface transportation managers might work to mitigate the impacts of a significant weather event. In this framework, NWS products & services would fit in the Information Gathering and Impact Prediction step. The advisory, control, and treatment management strategies discussed previously fall in the Operational Strategies step. [show 2nd bullet] Next, several examples of different weather events were presented to show how DOT mitigation efforts might unfold in time during a significant weather event. Issuance of several NWS products were included in these timelines so that forecasters can see how their products fit into the big picture from the transportation operator’s point of view. [show 3rd bullet] You have completed the content for Winter AWOC IC 3.5. To receive credit in the NWS Learning

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Center, you need to take the quiz and fill out the survey evaluation in the LMS. I recommend that you complete both of these steps as soon as possible and prior to starting the next IC in Winter AWOC.

Student Notes:



AWOC Winter Weather Track

Summary of "Comparing Timelines of NWS & Ground Transportation Implementation" Module

- Weather-responsive traffic management concept of operations:
 - NWS products & services fit into Information Gathering & Impact Prediction
 - Advisory, control, & treatment strategies fit into Operational Strategies
- Timelines of DOT mitigation efforts for various weather events:
 - Three different weather events show transportation operators point of view
 - Provide insight in how NWS products & services fit into big picture
- Complete the quiz and survey in the LMS to receive credit for this IC