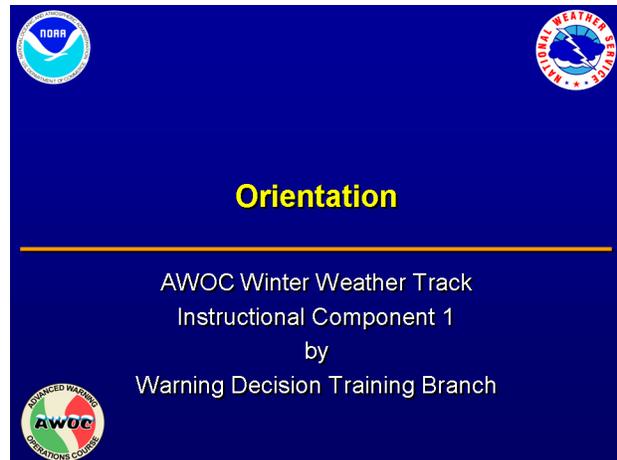

1. Orientation

Instructor Notes: This instructional component is designed to introduce you to the AWOC Winter Weather Track. For the next 20-25 minutes, we're going to be showing you a brand new training course on winter weather developed by partners in the NWS in collaboration with the Warning Decision Training Branch. This is the first comprehensive winter weather warning decision making course for NOAA's NWS.

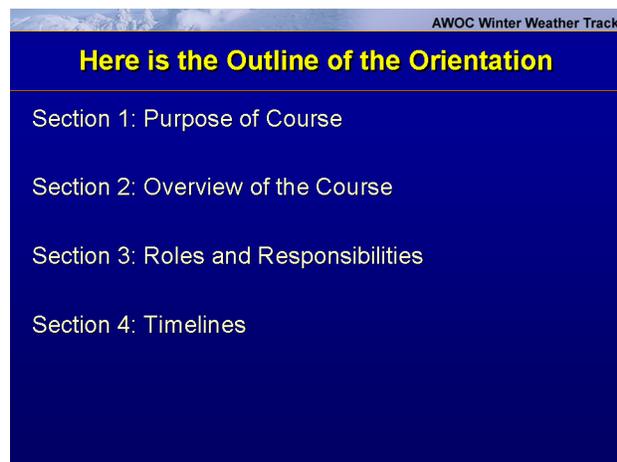
Student Notes:



2. Here is the Outline of the Orientation

Instructor Notes: Section 1 describes the goals of the course such as GPRA goals. Section 2 details the structure of the course, such as Instructional Components (ICs) and objectives. Section 3 describes the roles of the training management team and Section 4 briefly describes the course delivery schedule.

Student Notes:



3. Section 1: Purpose of the Course Why a Winter Weather Track?

Instructor Notes: Recent statistics in 2004 on adverse weather impacts on transportation by the Federal Highway Administration (FHWA) indicate that winter weather dramatically impacts roadway safety. Each year 18% of fatal crashes and 22% of injury crashes occur due to combination of adverse weather (rain, snow, sleet, hail, or fog) and poor pavement conditions. 74% of nation's roads are located in snowy locations (and 70% of the population). Reported economic losses of \$42 billion are from adverse weather from travel delays: 23% (\$10 B) due to fog, snow, and ice, additional road operating costs, and maintenance costs. Nearly 39% of road operating costs can be attributed to winter maintenance annually. Each year, state and local agencies spend over 2.3 billion dollars on snow and ice control operations and an est. \$5 billion to repair roadway infrastructure (Paul Pisano, Lynette Goodwin, and Andrew Stern, 2004: Surface Transportation Safety and Operations: The Impact of Winter within the Context of Climate Change). The image at the right is of Red Cross workers searching for victims buried in cars following heavy snowfall. The picture shows the roof of a car. Location: Buffalo, New York; Photo Date: February, 1977; Photographer: American Red Cross.

Student Notes:

AWOC Winter Weather Track

Section 1: Purpose of the Course Why a Winter Weather Track?

- Winter Weather Impacts on Transportation
 - Nearly 74% of nation's roads are located in snowy regions
 - 7000 deaths/year
 - 1.4 million crashes
 - \$10 billion economic losses

Source: Federal Highway Administration (FHWA) 2004

Buffalo, New York, 1977, Photographer:
American Red Cross



4. Section 1: Why a Winter Weather Track?

Instructor Notes: The impacts on the transportation sector of our nation's commerce are well-known and significant. There have been several recent studies on the impacts of snow on roadway traffic (you will want to see the lesson on societal impacts). The picture shown was taken from the Jan. 26, 1967 snowstorm in Chicago, IL. Picture taken from the Dept. of Streets and Sanitation.

Student Notes:

AWOC Winter Weather Track

Section 1: Why a Winter Weather Track?

- Winter Weather Impacts on Transportation (cont.)
 - Freeway speed and traffic volume reduced by 16-30%
 - 23% of travel time delays
 - Increased operating and maintenance costs (nearly 39% of road operating costs can be attributed to winter maintenance annually)



Chicago, IL, Jan. 26, 1967, Photographer: Dept. of Streets and Sanitation

5. Section 1: Why a Winter Weather Track?

Instructor Notes: Adverse winter weather impacts sectors of the economy in many ways, most notably with increased gas and electric consumption and inflated costs to heat businesses and homes. Over \$3 trillion of the nation’s annual economy is now directly affected by weather events (Freedman, 2003). With the change of the energy industry to a “no storage” model, energy availability is always “on the edge” and flirting with crisis in consumption and availability. Costs associated with snow removal industry are tied mostly to amounts and duration, which are linked to people hours. Also, property losses from winter storms can be significant, esp. with big snowstorms (March 2003, Denver Colorado \$93 M) or ice storms (98 NE/Canada Ice Storm, \$1.4 B USD, \$3 B in Canada). When businesses close due to adverse weather, the local economies are affected. Insurance losses associated with one major winter storm can cost up to \$6 billion (Kunkel et al, 99).

Student Notes:

AWOC Winter Weather Track

Section 1: Why a Winter Weather Track?

- Impacts on Public
 - No energy reserves
 - Heating costs
 - Snow-removal costs
 - Closures
 - Insurance losses



Courtesy Department of Sanitation, New York City





6. Rapidly Escalating Societal Demands

Instructor Notes: More impacts on society from winter weather include the change in the energy industry to a no storage model. Missed forecasts can lead to rolling blackouts due to consumer demand plus required reserves exceeding capacity available. This example from February 2006 in Colorado was taken from the Denver Post.

Student Notes:

AWOC Winter Weather Track

Rapidly Escalating Societal Demands

- Energy Industry has changed in just the past 10 years
- Has evolved to a "No Storage" model

7. Rapidly Escalating Societal Demands

Instructor Notes: Note the critical outages occurred on Saturday morning around 9-10 am.

Student Notes:

AWOC Winter Weather Track

Rapidly Escalating Societal Demands

Critical outages

As power plants across Colorado failed, were offline for maintenance or were unable to start on request on Friday, Feb. 17, and Saturday, Feb. 18, Xcel Energy found itself short 400 megawatts of electricity and close to initiating rolling blackouts. Here are some of the critical outages.

Time	Location	Capacity	Notes
Friday, 12:38 a.m.	HADDON	400 megawatts	400 megawatts of capacity were lost.
Friday, 3:38 a.m.	JURISA	300 megawatts	300 megawatts of capacity were lost.
Friday, 7:56 a.m.	BRUSH	150 megawatts	150 megawatts of capacity were lost.
Friday, 11:54 a.m.	PLATTEVILLE	200 megawatts	200 megawatts of capacity were lost.
Saturday, 12:35 a.m.	ROUNDER	100 megawatts	100 megawatts of capacity were lost.
Saturday, 4:07 a.m.	FOOT MOUNTAIN	200 megawatts	200 megawatts of capacity were lost.
Saturday, 5:28 a.m.	FOOT MOUNTAIN	200 megawatts	200 megawatts of capacity were lost.
Saturday, 5:35 a.m.	GOLDEN	400 megawatts	400 megawatts of capacity were lost.
Saturday, 9:40 a.m.	GOLDEN	400 megawatts	400 megawatts of capacity were lost.

8. Section 1: Why a Winter Weather Track?

Instructor Notes: Winter weather affects our children, and slick roads can cause devastating accidents. All schools have a specific plan of action to mitigate winter weather impacts. Most schools do not close during the day because there is no one home to pick

them up. Schools make their decisions on when to close usually 1-2 hours before buses are scheduled to leave which, in many districts is around 6 A.M. local time. School superintendents meet with local transportation officials and make a decision using direct observations, the current weather forecasts (from TV and internet), and what other districts are doing. There are other variables to the decision making process when events occur that are “unexpected” (such as a “rush-hour” storm).

Student Notes:

AWOC Winter Weather Track

Section 1: Why a Winter Weather Track?

- Impacts on Schools



Image Source: Tulsa Union Public Schools

9. So, What are the Goals of the Course?

Instructor Notes: With all of these societal impacts it is clear that winter weather is an important priority for training. The course that WDTB has helped develop is composed of the latest science, technology, and human factors associated with winter weather warning decision making.

Student Notes:

AWOC Winter Weather Track

So, What are the Goals of the Course?

The Purpose Of AWOC

“To provide training to all warning forecasters on winter weather warning decision making principles”



10. We Use These Metrics to Report Our Performance to the Public and to Congress

Instructor Notes: 7 of the 14 GPRA goals which are reported to Congress and the White House are warning related. The 2006 GPRA goals for winter weather are POD= 90%, and Lead time = 15 hours. As a whole the NWS is very close to these goals. However, these goals are bulk measures and are conservative in nature, according to Dr. Uccellini. For example, they do not reflect our stretch goals, or what the public expects. User expectations are increasing with each event. In a memo from NWS director DL Johnson last year, he stated the reason for AWOC was very important because of the relationship to the warning GPRA goals. This memo sent an important message: “AWOC training is directly tied to skills necessary to perform our mission.”

Student Notes:

AWOC Winter Weather Track

We Use These Metrics to Report Our Performance to the Public and to Congress

**NWS National Performance Measures
FY 2003 – FY 2009**

Performance Measure	Actual 2003	Goals					
		2004	2005	2006	2007	2008	2009
Tornado Warnings - Accuracy (%)	79	72	73	75	75	76	76
Tornado Warnings - False Alarm Rate (%)	76	70	69	68	68	68	67
Tornado Warnings - Lead Time (Min)	13	12	13	14	15	15	16
Flash Flood Warnings - Accuracy (%)	89	88	89	90	90	90	91
Flash Flood Warnings - Lead Time (Min)	41	50	53	56	58	58	59
Winter Storm Warnings - Accuracy (%)	90	89	90	90	90	90	91
Winter Storm Warnings - Lead Time (Hours)	14	14	15	15	15	15	16
Hurricane Track Forecasts (48 Hours)	107	129	128	128	126	126	125
Aviation Forecasts (Ceiling & Visibility) - Accuracy (%)	48	46	46	48	50	52	55
Aviation Forecasts - (Ceiling & Visibility) False Alarm Rate (%)	64	70	68	68	67	66	65
U.S. Seasonal Temperature - Skill	17	21	22	22	23	23	24
Precipitation Forecast - Day-1 Threat Score (%)	29	25	27	28	29	28	29
Marine Wind Speed Forecasts - Accuracy (%)	57	57	60	63	66	68	69
Marine Wave Height Forecasts - Accuracy (%)	71	69	72	75	78	80	81

11. Section 1: Purpose of Course (cont.)

Instructor Notes: Since winter weather impacts transportation goals, we need to consider the components of surface weather such as the onset of precipitation (frozen and freezing) in the course goals.

Student Notes:

AWOC Winter Weather Track

Section 1: Purpose of Course (cont.)

- The training is also directly related to NOAA Commerce and Transportation Goals
 - Surface Weather Program
 - Accuracy of onset of event (frozen and freezing precip)
 - 0-6 hrs period: 85%
 - Aviation Program

		2005	2006	2007	2008	2009
Aviation Forecasts (Ceiling & Visibility) - Accuracy (%)	48	46	48	48	50	52
Aviation Forecasts - (Ceiling & Visibility)	64	70	68	68	67	66
False Alarm Rate (%)						



12. Section 2 : Overview of the AWWT

Instructor Notes: This is what we are going to talk about in section 2. But first, a bit about how we got here. The initial needs and training priorities were determined from the NSTEP Winter Program Team. WDTB then assessed priorities from the field to help determine what training topics should be addressed in the AWOC Winter Track.

Student Notes:

AWOC Winter Weather Track

Section 2 : Overview of the AWWT

- Collaborative Development Process
- What's in the Course?

13. Partnerships

Instructor Notes: We enlisted a volunteer team of 25 Subject Matter Experts (SMEs) for direct content development and/or review. This collaboration was a new way of doing business but proved very exciting and productive.

Student Notes:



14. Section 2: Here is the AWWT

Instructor Notes: The intended audience is forecasters with winter weather warning responsibilities. The pre-requisites are DLOC. The deliverables are 21 hours of on-line content, printed materials, and a WES case.

Student Notes:

AWOC Winter Weather Track

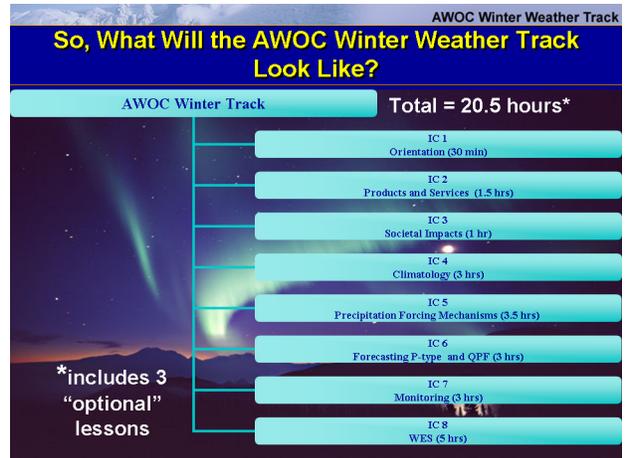
Section 2: Here is the AWWT

- Intended Audience
 - NOAA/NWS Forecasters with Winter Weather Warning Responsibility
 - WFOs/National Centers (HPC, SPC)
- Pre-requisites
 - DLOC or WSR-88D Ops Course Graduate
- Deliverables
 - Approx. 20 hours of instructional online courses on the LMS
 - Printed materials with binder (slides and notes)
 - Optional materials (job sheets, software applications, online courses)
 - Winter Weather WES Version (WES6.0ww)

15. So, What Will the AWOC Winter Weather Track Look Like?

Instructor Notes: This begins Section 2 of the Orientation. This is how the course breaks down into individual instructional components. 25 Subject Matter Experts in Winter Weather have collaborated with WDTB in developing these ICs. It amounts to about 21 hours of instruction. That includes all 31 lessons. There are 3 lessons that are optional (topographic forcing, using CPC products, and LES). That reduces the length of instruction to 19 hours.

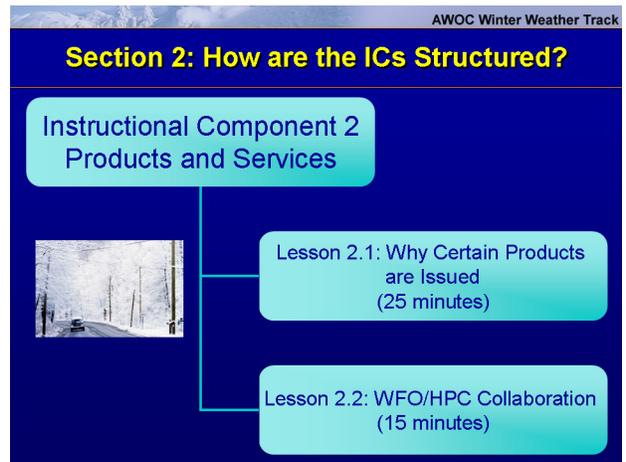
Student Notes:



16. Section 2: How are the ICs Structured?

Instructor Notes: There are multiple lessons within each IC, usually intended to be completed sequentially. Each lesson is about 15 to 30 minutes. After completing each IC, the student will need to take an exam in the LMS that addresses the learning objectives of the IC.

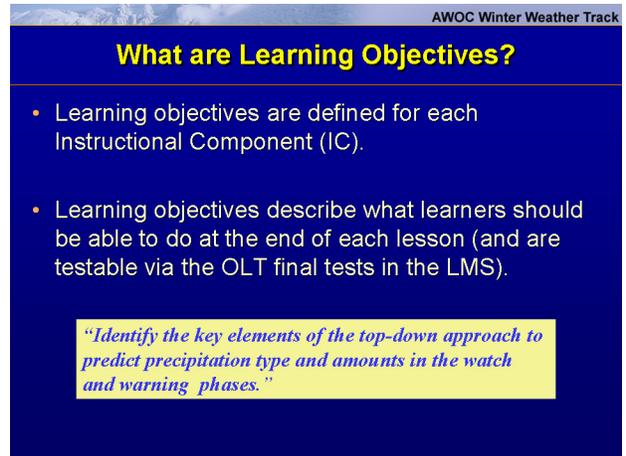
Student Notes:



17. What are Learning Objectives?

Instructor Notes: Learning objectives are defined and described in the ICs for each lesson.

Student Notes:



AWOC Winter Weather Track

What are Learning Objectives?

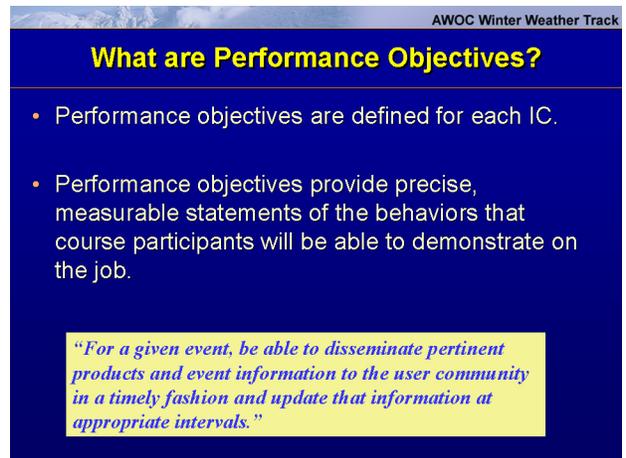
- Learning objectives are defined for each Instructional Component (IC).
- Learning objectives describe what learners should be able to do at the end of each lesson (and are testable via the OLT final tests in the LMS).

"Identify the key elements of the top-down approach to predict precipitation type and amounts in the watch and warning phases."

18. What are Performance Objectives?

Instructor Notes: IC performance objectives are similar to the learning objectives and are defined for each lesson. Many of performance objectives will be included in IC 8, the Weather Event Simulator (WES) instructional case for the course. Facilitators should evaluate how well students can master specific performance objectives for each IC. After the entire course has been completed, students will be evaluated on the extent of training transfer of the performance objectives, to help determine behavioral changes. This is part of the level-3 training evaluation process.

Student Notes:



AWOC Winter Weather Track

What are Performance Objectives?

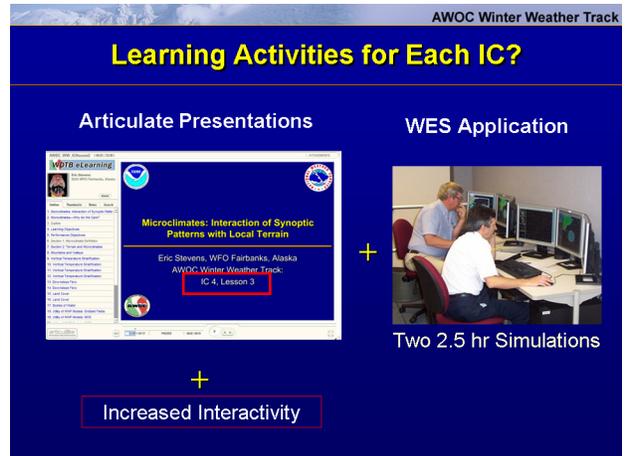
- Performance objectives are defined for each IC.
- Performance objectives provide precise, measurable statements of the behaviors that course participants will be able to demonstrate on the job.

"For a given event, be able to disseminate pertinent products and event information to the user community in a timely fashion and update that information at appropriate intervals."

19. Learning Activities for Each IC?

Instructor Notes: Articulates are a way you can play a PowerPoint presentation and hear the author deliver the speaker notes. Note, you can start and stop the Articulates (it remembers where you left off). In addition, we have lots of increased inter activity and of course, the WES simulations.

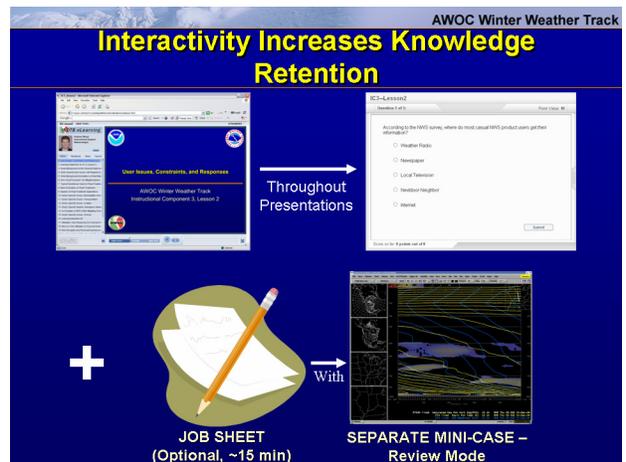
Student Notes:



20. Interactivity Increases Knowledge Retention

Instructor Notes: Most articulate presentations will contain increased interactivity with quiz questions, and some modules will have short 15 minute optional job sheets along with mini-case data that are separate from the primary Simulation case.

Student Notes:



21. What are Job Sheets?

Instructor Notes: The job sheets will take 10-15 minutes to run through and we'll look at an example on the next slide. We are producing job sheets for those ICs that examine AWIPS case data in the warning process. You will not need to run the WES in simulator mode. Since these will be for case review mode, all that will be required is setting the clock to the desired event time. We plan on having just one model run, a few satellite images, surface observations, and radar imagery for one event. Thus, case size will be small, and even more importantly, many lesson job sheets can be applied to the same event. So the number of cases will be fewer than the number of job sheets. The goal is to have the job sheet case data loaded on your WES machines by the time the Winter

Warning Decision Training Branch

Weather AWOC training modules are released. We will have answer sheets available online.

Student Notes:

AWOC Winter Weather Track

What are Job Sheets?

- Application with 10 mini-cases on WES
 - Case Study Mode
- One job sheet per lesson (IC 5-7)
- Several job sheets can be applied to each case
- Jobs sheets/case data shipped with Articulate lessons 1st week of June



22. Job Sheets—An Example

Instructor Notes: This is an example of one of the job sheets for AWOC Winter Weather Track.

Student Notes:

AWOC Winter Weather Track

Job Sheets—An Example

Winter Weather AWOC IC 5 Lesson 1
Job Sheet

IC 5 Lesson 1 Performance Objectives

- 1) What grid resolution to examine Q vectors within AWIPS
- 2) How to recognize jets, fronts, troughs, and ridges on a topographic map
 - i. How to use topographic maps to observe short waves
 - ii. How to use topographic maps to recognize convectively created "velocity maxima"
- 3) Understand how upper level potential vorticity can impact the low-level wind fields

Case Review Maps Procedures and Questions

On your WES machine, load the case 2004Mar15_FFD localization, and set the clock to 15 March 2004, 12:00 UTC.

A. On the Regional map scale, load a GFS 50 500mb Height V_u , V_{500} , then answer the following questions:

- 1) Where are the QG assumptions valid and invalid (location detail such as "see them Missouri" would suffice)? Explain why.
- 2) What does the change in V_{500} in the loop say about the development of the system?

B. Load GFS 50 Cross Section with Θ_{500} , Q vectors, Q_{500} , and Q_2 at 5 layers: 850-700 mb (or 800-800 mb), 600-500 mb, and 400-300 mb. Answer the following questions:

- 1) Focusing on each layer, where is the upward forcing located? If there is no upward forcing, answer "None".

23. Sample Quiz Question

Instructor Notes: Based on field input, several scenarios are presented in IC 2 lesson 1 to help you decide what winter weather products to issue. These scenarios are examples of increased interactivity in the lessons.

Student Notes:

AWOC Winter Weather Track

Sample Quiz Question

- A complex winter storm event is expected to produce 8" of snow in the northern part of your CWA, 1-2" of sleet and 4 inches of snow in central part of your CWA, and ½" of ice in the southern part of your CWA. Winds are expected to be 10 to 20 mph across the north with some local blowing snow.
- What product (s) should be issued?
- A) Three separate warnings – Heavy Snow Warning north, Winter Storm warning central, and Ice Storm Warning south
- B) Two separate warnings – Winter Storm Warning north and central, and Ice Storm Warning south.
- C) Single Winter Storm Warning for the entire CWA

Winter Weather Product Quiz

24. Winter Simulation Case

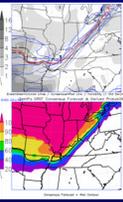
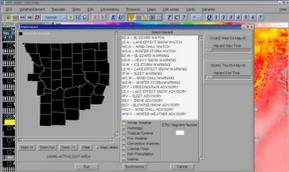
Instructor Notes: The WES case will be delivered with multiple DVDs by early July. The version will include support for GFE/GHG for issuing warnings. We will have multiple simulation examples complete with performance objectives and evaluation criteria for 2 CWAs. As with the previous AWOC Course, feel free to select your own local cases for a winter weather simulation. New with this simulation are GFE and SREF imagery. As always, WESSL will play a role in the simulation.

Student Notes:

AWOC Winter Weather Track

Winter Simulation Case

- Early July DVD delivery
 - Multiple simulations
 - 2 localizations
 - SREF, WESSL
- Can use your own local case
- Utilize GFE*

* Special Spring WES release

25. How Difficult are the Lessons?

Instructor Notes: Some concepts may be review for some, but new for others.

Student Notes:

AWOC Winter Weather Track

How Difficult are the Lessons?

- Advanced Warning Operations Course

AWOC Winter Weather Track

Baldwin Scheme Logic

```

graph TD
    A[Coldest T in a saturated layer < -4°C] -- YES --> D[Snow]
    A -- NO --> B[Area of Tw warmer than -4°C < 3000 deg m?]
    B -- YES --> D
    B -- NO --> C[Lowest layer T < -4°C?]
    C -- YES --> D
    C -- NO --> E[Snow]
    
```

- Coldest T in a saturated layer < -4°C

AND

- Area of Tw warmer than -4°C < 3000 deg m, then P-type = snow

26. Section 3: What is Your Responsibility?

Instructor Notes: This is the recommended course of action for students in AWOC.

Student Notes:

AWOC Winter Weather Track

Section 3: What is Your Responsibility?

1. Meet with your SOO and review your assigned learning path	√
2. Meet with your SOO (and MIC) to plan an effective course of completion	√
3. Complete required lessons in ICs 1-7 (including surveys and tests)	√
4. Complete associated job sheets	√
5. Complete IC 8 (winter weather WES simulation)	√
6. Apply learning with real on-job performance	√

27. What Do Facilitators Do to Help AWOC?

Instructor Notes: Facilitators are your helpers and they will help with the training – and make sure the training is performance based. Training can be a risky path unless we have some guidance.

Student Notes:

AWOC Winter Weather Track

What Do Facilitators Do to Help AWOC?

- Make the learning easier
 - Meet with each forecaster to determine needs/goals
 - Assign Winter AWOC learning paths
 - Set up a training completion schedule




28. Facilitator and Learning Management System

Instructor Notes: Facilitators must perform certain duties in the LMS including: Assigning a Learning Path, Marking User Defined Tasks Complete, and Completing the AWOC Track. There are Job Sheets on these tasks on the WDTB Web site. It is important to note that if you are facilitating the Winter Track, you need to be a Facility Instructor in the LMS. If you need help with this send a message to awochelp@wdtb.noaa.gov.

Student Notes:

AWOC Winter Weather Track

Facilitator and Learning Management System

- LMS Duties
(See Job Sheets in "LMS Resources" links below)
 - NOTE: Must be "Facility Instructor" in LMS.
 - 1. Assign a Learning Path (NWS AWOC FY06 Winter Weather Track)
 - 2. Mark User Defined Tasks Complete (Simulations)
 - 3. "Complete" the Track
- LMS Resources
 - AWOC Documents Page: <http://wdtb.noaa.gov/courses/awoc/documents.html>
 - LMS Support Page: <http://wdtb.noaa.gov/LMS/index.asp>
- LMS URL: <http://doc.learn.com/noaa/nws>

29. AWOC winter development plans

Instructor Notes: We've created 3 development plans in the LMS. The first one is for students already in the middle of AWOC winter. We only ask that if they've taken IC2.1 already, they'll need to take it again because of radical changes to winter weather warning policy. The middle plan is for those that haven't taken winter AWOC yet and would like to start and DLOC graduates from this year. The third plan is for students interested in taking the lessons that have major changes. Note IC2.1 in there again.

Warning Decision Training Branch

Student Notes:

AWOC Winter Weather Track		
AWOC winter development plans		
Development Plan in the LMS	Target audience	notes
WDTB AWOC Winter FY08	➤ Forecasters in the middle of AWOC winter 2008	➤ IC's 1-8 v 2007
WDTB AWOC Winter FY09	➤ Forecasters that have not taken AWOC winter ➤ DLOC 2008/2009 graduates	➤ IC's 1-8
WDTB AWOC Winter updates only 2008-2009	➤ Forecasters having taken AWOC winter previously	➤ IC's 2.1, 3, 5.1

30. LMS front page

Instructor Notes: One way you may find your development plan after logging into your LMS account by selecting 'My training plan'.

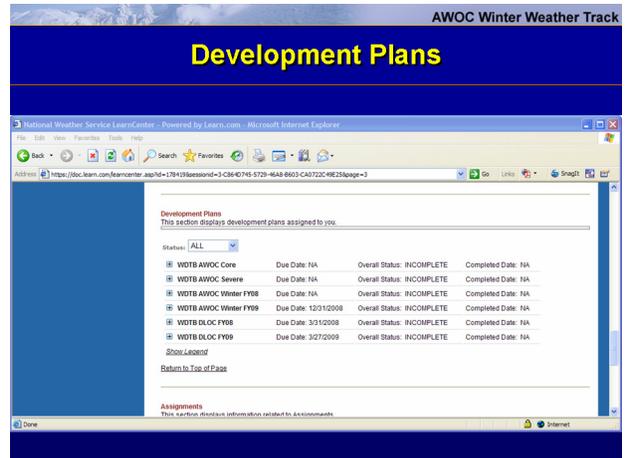
Student Notes:

The screenshot shows the LMS front page with a navigation menu on the left containing 'MY TRAINING PLAN', 'MY TRANSCRIPT', and 'TRAINING & DEVELOPMENT CATALOG'. A red arrow points to the 'MY TRAINING PLAN' link. A system update notice is displayed in the center, and a 'Welcome to the Commerce Learning Center' message is at the bottom.

31. Development Plans

Instructor Notes: Then go to the bottom where you'll see all the development plans for which you've been assigned. If you don't see the one you want, get with your training officer and have him assign it.

Student Notes:



32. Course Completion Requirements

Instructor Notes: Every student registered in the AWWT are required to complete at least 28 lessons (note: 3 lessons are optional).

Student Notes:



33. Section 4: Timelines AWOC Winter Wx Delivery Schedule

Instructor Notes: Students can complete the AWWT course through the end of the calendar year, at which point we begin to make course updates.

Student Notes:

AWOC Winter Weather Track

Section 4: Timelines
AWOC Winter Wx Delivery Schedule

S O N D J F M A M J J

Forecasters Complete Winter Weather ICs

Development for FY10 version

2008-09 Season

34. Who Can Help?

Instructor Notes: We have designed a potential very rewarding learning experience for all participants in the AWOC Winter Wx Track. It is an exciting course that encompasses critical elements in the winter weather decision making process. Success will depend on how well the entire training team (trainers, students, facilitators, and management) work together in achieving the goals of the course. We do provide a number of options to help alleviate potential problems in executing this course. Take advantage of these mechanisms to make the learning easier and enjoy the course. “

Student Notes:

AWOC Winter Weather Track

Who Can Help?

- WDTB (LMS problems, etc.)
 - 405-325-3190 (Linda Curtis, ASA)
 - 405-325-2997 (Brad)
 - 405-325-3004 (Jim)
- awochelp@wdtb.noaa.gov
 - “How does this module work?”
- icwinter6@wdtb.noaa.gov
 - “I’ve got a question about this nomogram on IC6”
- WDTB.NOAA.GOV

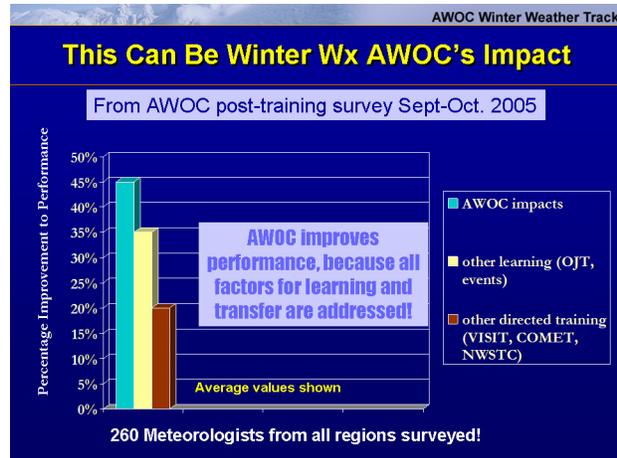
National Weather Service
Warning Decision Training Branch

Site Map News Organization

35. This Can Be Winter Wx AWOC’s Impact

Instructor Notes: This survey results were from 260 NOAA NWS employees, including 30 MICs and 30 SOOs. The post-training survey indicated that performance improvement was significant, but only because all factors for learning were addressed, including involving management in the process. We are aiming for even highest performance improvement in the winter AWOC course.

Student Notes:



36. Summary

Instructor Notes: We are committed to providing a rewarding learning experience for all participants in the AWOC Winter Weather Course. But, success in terms of how well it will be accepted and applied depends a lot on you. The developers of this course encourage all members of the entire training community to help provide support for learning and application of these very important learning concepts.

Student Notes:

AWOC Winter Weather Track

Summary

- AWOC will provide an excellent opportunity for improvement in warning performance
- But...

Success Depends on All of Us!

37. References

Instructor Notes: References from this session include: Federal Highway Administration (FHWA), 2005: Road Weather Management Program (web site, <http://ops.fhwa.dot.gov/weather/>). Paul Pisano, Lynette Goodwin, and Andrew Stern, 2004: Surface Transportation Safety and Operations: The Impact of Winter within the Context of Climate Change. Kenneth Kunkel, Roger Pielke Jr., and Stanley Changnon, 1999: Temporal Fluctuations in Weather and Climate Extremes That Cause Economic and Human Health Impacts: A Review, Bulletin of the American Meteorological Society. Freedman, D.H., cited 2003: Pinpoint Weather. Technology Review. [Available online at

Warning Decision Training Branch

<http://www.technologyreview.com/articles/freedman0603.asp>] Denver Post Newspaper
(<http://www.denverpost.com/archives>)

Student Notes:

AWOC Winter Weather Track

References

- Federal Highway Administration (FHWA), 2005: Road Weather Management Program (web site, <http://ops.fhwa.dot.gov/weather/>).
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