

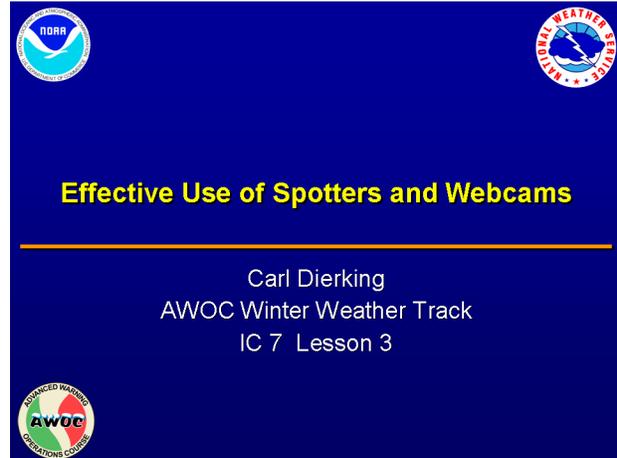
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## 1. IC7.3: Effective Use of Spotters and Webcams

**Instructor Notes:** Welcome to AWOC Winter Weather IC7 - Lesson 3 on the effective use of spotters and webcams. This lesson has 25 slides and should take about 15 minutes.

**Student Notes:**



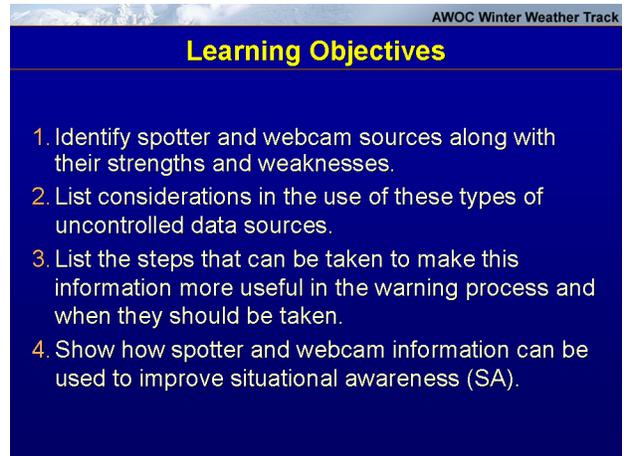
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## 2. Learning Objectives

**Instructor Notes:** There are four learning objectives for this lesson. First, we'll identify different sources of spotter and webcam information that can assist the forecast office in monitoring winter storm progress. Students should be able to identify the strengths and weaknesses of each source. Second, we will list some considerations in the use of these uncontrolled data sources and suggest ways to minimize error in interpretation. Third, we will show examples of what can be done to improve the value and usefulness of these types of data, and discuss when would be the best time to do it. Students should be able to assess the information source and know what steps could be taken to extract more quantitative data from them. Lastly, this lesson will provide examples of how this information has been used to improve SA while monitoring the progress of a winter storm.

**Student Notes:**



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### Learning Objectives

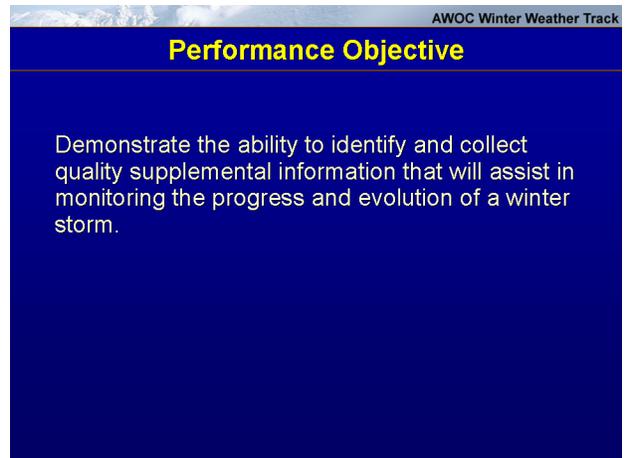
1. Identify spotter and webcam sources along with their strengths and weaknesses.
2. List considerations in the use of these types of uncontrolled data sources.
3. List the steps that can be taken to make this information more useful in the warning process and when they should be taken.
4. Show how spotter and webcam information can be used to improve situational awareness (SA).

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### 3. Performance Objective

**Instructor Notes:** There is only one performance objective for this lesson and that is to demonstrate the ability to identify and collect quality supplemental information that will help you to monitor the progress and evolution of a winter storm. Not all of these sources of information will be of the same caliber, but when time is critical, it is important to recognize where there are deficiencies and what steps may be taken to minimize those deficiencies.

**Student Notes:**



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### Performance Objective

Demonstrate the ability to identify and collect quality supplemental information that will assist in monitoring the progress and evolution of a winter storm.

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### 4. Spotter Networks

**Instructor Notes:** In this lesson, the term “Spotters” is applied broadly to include more than those individuals officially trained by the NWS. Certainly, the most reliable spotter reports generally come from locally-trained NWS spotters. However, often there are other sources of supplemental information. The media can be active participants in your overall spotter network in addition to their role in the dissemination process. Often members of the general public are concerned enough about evolving weather conditions to call a forecast office and relay information about an event. This group may include emer-

gency personnel or other first responders to a weather induced emergency. All of these different groups compose your spotter network that you can use to supplement an official observation database.

**Student Notes:**

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### Spotter Networks



- NWS trained or “experienced”
- Media
- Emergency personnel and general public

## 5. Trained or Experienced Spotters

**Instructor Notes:** NWS trained spotters are usually the most knowledgeable and accurate providers of supplemental observations. They have been trained in the proper method of measuring winter weather elements, such as visibility, snow and ice accumulations, etc. They should know the critical thresholds and are encouraged to be “pro-active,” promptly reporting when those thresholds are met. In addition, they often welcome requests for report updates. Recruiting and keeping good winter weather spotters requires a special outreach effort. Some offices maintain an extensive snow spotter networks, sending out mailings each year to recruit new volunteers and to confirm the status of their current network. It takes a lot of work, but it can be critical to operations that deal with mesoscale precipitation events.

**Student Notes:**

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### Trained or Experienced Spotters



1. Usually more accurate and knowledgeable.
2. Have been trained in the proper method of measuring winter weather elements, such as visibility, snow, and ice accumulations.
3. Know critical thresholds and are “pro-active”.
4. Can be called upon for report updates.
5. Requires special outreach effort.

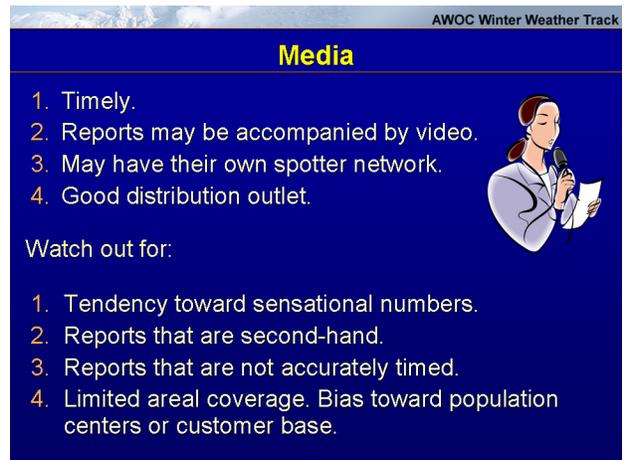
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## 6. Media

**Instructor Notes:** The media is a diverse group that disseminates information through a variety of means, including television, radio, newsprint, and the internet. They are valuable partners in the NWS effort to widely distribute weather forecasts and warnings to the public, but they can also be an important source of information about the progress of a serious event. Information that they collect is usually very timely and may be accompanied by video, photographs, or eyewitness interviews. They may have their own network of reporters or private spotters. Within their dissemination focus, they are an important distribution outlet. When evaluating media reports there are a few things to watch for: a tendency toward sensational numbers, or the perceived need to add attention grabbers to generate interest in the story; reports that are second-hand or relayed through reporters; reports that are not accurately timed; and limited areal coverage which may be biased toward population centers or the location of a customer base.

**Student Notes:**



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### Media

1. Timely.
2. Reports may be accompanied by video.
3. May have their own spotter network.
4. Good distribution outlet.

Watch out for:

1. Tendency toward sensational numbers.
2. Reports that are second-hand.
3. Reports that are not accurately timed.
4. Limited areal coverage. Bias toward population centers or customer base.



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## 7. Emergency Personnel and General Public

**Instructor Notes:** Reports from the general public are helpful to fill gaps in the observation network. Often individuals concerned enough to call for information about the event will also be able to relay local information about the impacts of the storm and effectiveness of the warning. It can be difficult to assess the accuracy of these reports, but there are some things to watch for, including: rough estimates rather than measurements (poor visibilities, drifting, and other factors can sometimes result in misleading conclusions); reports that are not accurately timed (i.e. start of snow accumulation); reports that include conditions prior to the event (i.e. snow already on the ground); and locations that are not specific.

**Student Notes:**

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### Emergency Personnel and General Public

1. Can help fill gaps in observation network.
2. Can provide direct feedback on storm impacts and warning effectiveness.



Watch out for:

1. Rough estimates rather than measurements.
2. Reports that are not accurately timed. (accumulations from when to when?)
3. Reports that include conditions prior to the event (Snow already on the ground?)
4. Locations that are not specific.

## 8. Mitigating Report Errors

**Instructor Notes:** Whenever a report is received from an unknown source, try to glean as many of the important details as possible to mitigate errors in interpretation. Make sure you have the basic “Who...what...when...where...and how” of the report. Try to determine who took the report. Was it observed by the individual directly or was it second-hand? Ask what conditions existed at the start of the event (for example, was snow already on the ground? Determine when the event started and, if applicable, when it ended. Make sure the location is as specific as possible, and if in doubt ask where the report was taken. Ask if the report was measured or estimated. How was it determined?

**Student Notes:**

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### Mitigating Report Errors



Who...What...When...Where...How...

1. Determine if report is direct or second-hand (who).
2. Ask what conditions existed at the start of the event, such as snow already on the ground (what).
3. Ask for the beginning and ending times (when).
4. Determine the specific location (where).
5. Ask if the report was measured or estimated. Request measurements where possible (how).

## 9. Response Question #1

**Instructor Notes:** Take a moment to complete this response question.

**Student Notes:**

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## 10. Webcam Data Sources

**Instructor Notes:** A relatively new source of supplemental observations comes from the rapidly expanding network of internet web cameras. Webcam data can be provided by a variety of sources that include: NWS, other government agencies, commercial, and personal or privately-owned. Each source will have differences in accessibility, image quality, size, update frequency, and, of course, importance to the event.

**Student Notes:**

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### Webcam Data Sources



- NWS
- Other government agencies
- Commercial
- Personal

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## 11. NWS Webcams

**Instructor Notes:** There are a few webcams owned, or maintained cooperatively, by the NWS. These are the most flexible cameras to work with since they can be configured to meet the needs of the forecast office. If necessary, the distribution of the images can be controlled. However, the sparsity of the network may not provide adequate coverage for an event.

**Student Notes:**

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### NWS Webcams

1. Most flexible – can be configured to meet needs
2. Distribution of images can be controlled
3. Sparse network

Downtown Juneau looking N - NWS owned  
(<http://paa1.arh.noaa.gov/cams.php>)



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## 12. Other Government Webcams

**Instructor Notes:** A growing number of other government agencies at the national, state, and municipal level are offering internet webcam imagery. For example, National and State Parks often provide webcam views of some of their more popular scenic sites; the FAA in Alaska provides webcam images of airports and frequently navigated routes; Highway Departments provide views of important transportation routes; and cities may offer a webcam view of a well-known part of town to encourage visitors. Some of these sources may have restrictions on their use, and some may require agreements for special use of the images. However, most agencies are more than willing to cooperate with the NWS on the use of their data.

**Student Notes:**

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### Other Government Webcams

1. Sources include:
  - FAA/NPS/NFS/BLM (US)
  - State (Transportation, Parks)
  - Municipalities
2. May have restrictions on use
3. May require agreements (MOU) for special use of the images

Mt. St. Helens (USFS)



<http://www.fs.fed.us/sp2/volk/anc/am/ashish/>

Teton Pass, WY (WYDOT)



<http://www.wyeroad.info/>

Sitka Airport, AK (FAA)



<http://akweathercams.faa.gov/index.php>

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## 13. Commercial/Personal Webcams

**Instructor Notes:** The most abundant source of webcam data comes from commercial or privately-owned sources. Some webcam providers may be willing to consider suggestions that would add value to their images and increase their popularity. Often, permission is required for special use of the images, or to get access to restricted images. In one example, WFO Juneau became aware of restricted webcam data that a cell provider had located on several mountain top cell towers. After being contacted, the company was more than happy to make these images available to the local office, and even installed snow stakes at some of the sites. Finally, be sure to credit the source whenever using an image publicly.

Student Notes:

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### Commercial/Personal Webcams

1. Provider may consider suggestions for making webcam images more useable
2. May require permission for use
3. Credit the provider

<b>Flag Island, MN</b>  <a href="http://www.yahooey.com">http://www.yahooey.com</a>	<b>Lagoon Park, Farmington, UT</b>  <a href="http://groups.msn.com/farmingtonstar/home.mshtml">http://groups.msn.com/farmingtonstar/home.mshtml</a>	<b>Huntington Woods, MI</b>  <a href="http://www.pleasantweather.com">http://www.pleasantweather.com</a>
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## 14. Assess Data Potential of Webcam View

**Instructor Notes:** Webcam data can provide quantifiable information for monitoring storm progress when changes are compared with visible references. Make assessments of the data potential of each image source before the winter storm season begins. Webcams can be made more objective by: (1) installing visible references in the camera view; (2) locating and measuring permanent objects for estimates; (3) making reference images on a clear day with annotated distances and heights; (4) noting close-up objects that can be used to observe accumulations; and (5) animating images for rates and trends.

Student Notes:

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### Assess Data Potential of Webcam View

Webcam data can provide quantifiable information for monitoring storm progress when changes are compared with visible references. Assessment of the data potential should be done before the start of the winter storm season. Webcams can be made more objective by...

1. Installing visible references in the camera view
2. Locating and measuring objects for estimates
3. Annotating reference "clear day" images with distances and heights
4. Identifying close-up objects to observe accumulations
5. Animating images for rates and trends

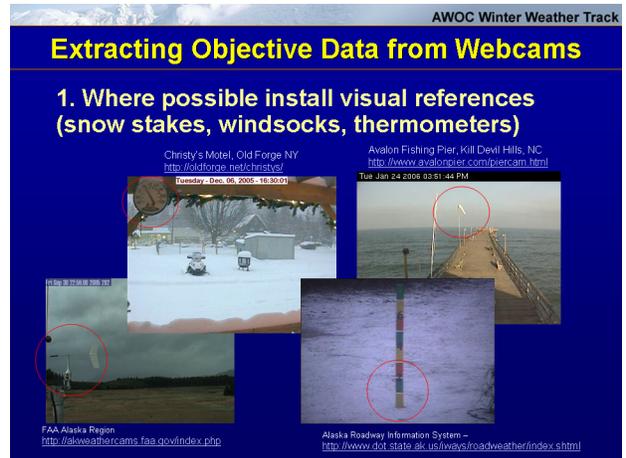
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## 15. Extracting Objective Data from Webcams

**Instructor Notes:** Whenever possible, in critical locations, install or note existing visual references that can be viewed in the image, such as snow stakes, windsocks, thermometers, etc. Often webcam owners will consider enhancements that would make their cameras more popular.

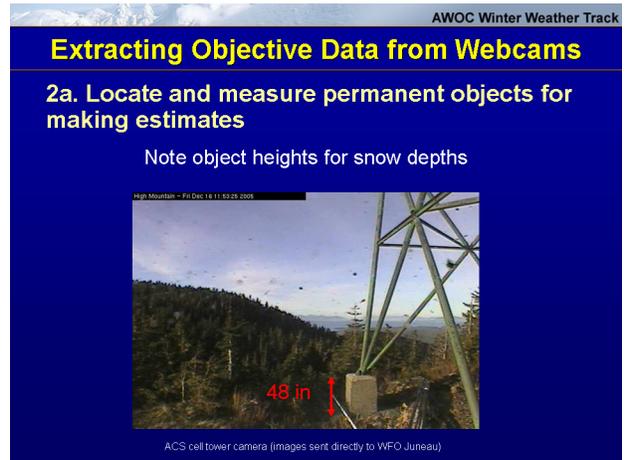
Student Notes:



## 16. Extracting Objective Data from Webcams

**Instructor Notes:** During a preseason assessment, locate and note permanent objects that could be used as references to estimate changes. For example, the height of prominent objects can provide information about snow depth. If possible, visit the site and make accurate measurements.

Student Notes:



## 17. Extracting Objective Data from Webcams

**Instructor Notes:** Where wind is a concern, look for moveable objects, such as flags, trees, or smoke, that can be used for estimating wind characteristics. Here is an example of a webcam in Rochester, NY that looks over Lake Ontario with a flag in the foreground. In one image it is possible to estimate wind and sea conditions. The Beaufort scale for land offers a helpful description of the amount of movement to expect at certain speeds, although some motion (such as moving tree branches) may require a fairly high sampling rate.

Student Notes:

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### Extracting Objective Data from Webcams

**2b. Moving objects may help with wind estimates (flags, trees, smoke, etc)**

USGC Station, Rochester, NY

**Beaufort Scale (on land)**

- Calm - Smoke rises vertically
- Light - Wind direction shown by smoke drift
- 8-12 mph - Extends light flag
- 13-18 mph - Small branches are moved
- 19-24 mph - Crested wavelets form on inland waters
- 25-31 - Large tree branches in motion

## 18. Extracting Objective Data from Webcams

**Instructor Notes:** Save clear weather examples of each image and annotate object distances for estimating visibility or heights for estimating snow depths. Make sure these images are easy to access and compare with the real-time data. In this example, as snow moves into downtown Juneau, you can watch the visibility decrease to less than 1 mile and the snow intensity changes from light to moderate.

Student Notes:

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### Extracting Objective Data from Webcams

**3. Make annotated reference images.**

Note object distances for visibilities, especially  $\frac{1}{2}$  mi (moderate snow) and  $\frac{1}{4}$  mi (heavy snow)

Downtown Juneau looking NW - NWS owned (<http://psk.erh.noaa.gov/cams.php>)

## 19. Extracting Objective Data from Webcams

**Instructor Notes:** Examine exposed objects close to the camera which may provide clues about precipitation type. In this example, it is easy to conclude that the precipitation type had changed from snow on the left, to rain on the right, as the snow and ice disappears from nearby structures.

**Student Notes:**

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### Extracting Objective Data from Webcams

4. Accumulation on objects close to the camera may provide information about precipitation type.



ACS remote camera (images sent directly to WFO Juneau)

## 20. Extracting Objective Data from Webcams

**Instructor Notes:** Animate or compare images over time to determine rates or trends. This comparison can also be very helpful in determining when conditions were the most significant. In this example, during a “lake effect” snow event in New York, notice how the snow depth increased over 6 inches in 3 hours, rising from 1.4 feet to over 2 feet between 2 and 5 pm.

**Student Notes:**

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### Extracting Objective Data from Webcams

5. Animate or compare images for rates and trends



Tug Hill, NY ([www.NorthernChateau.com](http://www.NorthernChateau.com))

## 21. Response Question #2

**Instructor Notes:** Take a moment to complete this quiz question.

**Student Notes:**

## 22. Tools for Maintaining SA

**Instructor Notes:** There are a number of tools available that offer easy access to a webcam image network identified for your area of concern. Some are already being used at National Weather Service offices. This is one example of a web server based “image gallery” that helps maintain SA by collecting images and providing thumbnail overviews of the latest available. Quick access to animation or higher resolution images is available by clicking on the thumbnail or the image name.

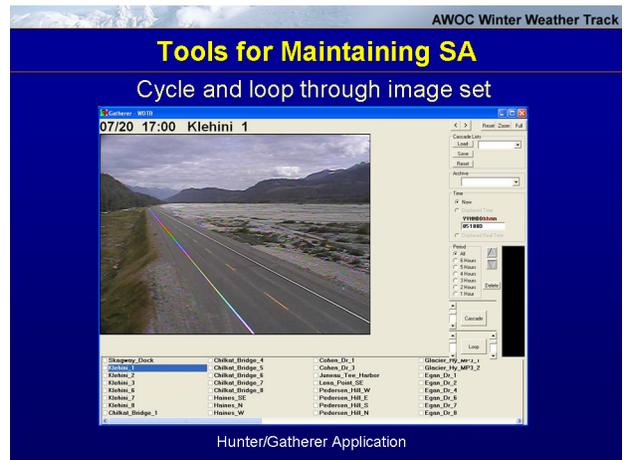
**Student Notes:**



## 23. Tools for Maintaining SA

**Instructor Notes:** Another example of a tool for maintaining SA is the “Hunter/Gatherer” application which is designed to run on a PC. This tool will continually collect a set of images and sequentially display the most recent for each site in the large viewing window. Looping and archiving options are also available.

**Student Notes:**



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## 24. Conclusions

**Instructor Notes:** In conclusion, these are the main points to take away from this presentation. 1. Non-standard data sources from spotters and webcams can be a valuable supplement to monitoring system evolution by filling the gaps in the operational observation network. 2. The accuracy and value of the information will vary with the source. 3. Steps can be taken to improve the quality and quantitative value of the information. To be most effective, these steps should be completed before the start of the winter season. 4. Spotter reports and webcam monitoring can help maintain good SA.

**Student Notes:**

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### Conclusions

1. Non-standard data sources from spotters and webcams can be a valuable supplement to monitoring system evolution.
2. The accuracy and value of the information value will vary with the source.
3. Steps can be taken to improve the quality and quantitative value of the information. To be most effective these steps should be completed before the winter season.
4. Spotter reports and webcam monitoring can help maintain good SA.

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## 25. References

**Instructor Notes:** Here is a list of references cited in this lesson.

**Student Notes:**

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### References

- [National SKYWARN home page](#)
- [Link to Hunter/Gatherer](#)
- [Link to WebGallery application \(PHP\)](#)
- [Links to webcam sources used in this presentation](#)
  - <http://pajk.arh.noaa.gov/cams.php>
  - <http://akweathercams.faa.gov/index.php>
  - <http://www.dot.state.ak.us/iways/roadweather/>
  - <http://www.wyroad.info/>
  - <http://www.fs.fed.us/gpnl/volcanocams/msh/>
  - <http://www.instacam.com/>
  - <http://www.NorthernChateau.com>
  - <http://www.yahoey.com>
  - <http://groups.msn.com/farmingtonstar/home.msnw>
  - <http://www.pleasantweather.com>

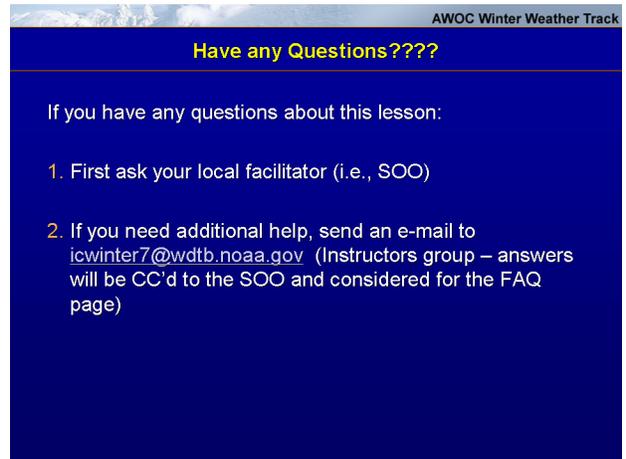
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## 26. Have any Questions????

**Instructor Notes:** If you have any questions about this lesson, first ask your local AWOC facilitator. If you need additional help, send an E-mail to the address provided. When we answer, we will CC your local facilitator and may consider your question for our FAQ page.

**Student Notes:**



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### Have any Questions????

If you have any questions about this lesson:

1. First ask your local facilitator (i.e., SOO)
2. If you need additional help, send an e-mail to [icwinter7@wdtb.noaa.gov](mailto:icwinter7@wdtb.noaa.gov) (Instructors group – answers will be CC'd to the SOO and considered for the FAQ page)