

IBW Project

Introduction and Overview





IBW Project



Goals of This Training

- Provide an overview on IBW rationale
- Provide guidelines on application of IBW concepts
- Describe IBW changes after Year 1





IBW Project Intro/Overview



- IBW is a simple, but important change to the existing warning system.
- Part of a gradual evolutionary process to improve usefulness and effectiveness of our severe convective warnings
- At its core; IBW consists of one change (in 2 parts) to designate Risk:
 - addition of a “considerable damage threat” warning tier for significant tornadoes (~EF2-5)
 - addition of concise wording on conditional impacts/risk commensurate with damage threats.
- It should NOT be misrepresented as an evolutionary leap turning the warning system upside down





IBW Project Intro/Overview



- Tags are used in severe thunderstorm and tornado warnings to provide quick information (eventually Common Alert Protocol format) to key partners and customers on type of hazard and potential hazard magnitude.

- Impact statements (commensurate with the damage threat tags) are embedded within warnings to provide end-users with high-intensity cues for especially dangerous situations and provide context for tags. These are meant to be conditional statements (i.e. what may happen IF the hazard impacts people, structures, etc.)

- Pathcasts are required to give specific information on hazard location and timing.

- Use short, concise, easily understandable call-to-action statements.

Companion Tornado Tag	
TORNADO...RADAR INDICATED	Evidence on radar and near storm environment is supportive, but no confirmation.
TORNADO...OBSERVED	Tornado is confirmed by spotters, law enforcement, etc.

Tornado Damage Threat Tag	
No Tag	Use most of the time, when tornado damage possible within the warning polygon. Tornado duration generally expected to be short-lived.
TORNADO DAMAGE THREAT...CONSIDERABLE	Use rarely, when there is radar or other observational evidence that a tornado, capable of producing considerable damage of EF2 or greater is imminent or ongoing. Tornado duration generally expected to be long lived
TORNADO DAMAGE THREAT...CATASTROPHIC	Use exceedingly rarely. Only when there is DIRECT observational evidence that a violent tornado (EF4-5) is striking or about to strike a population footprint . Tornado duration generally expected to be long lived. False alarm rate should be ZERO.

Tornado Tag In Severe Thunderstorm Warnings	
TORNADO...POSSIBLE	A severe thunderstorm has some potential for producing a brief tornado although forecaster confidence is not high enough to issue a Tornado Warning.



IBW Project Intro/Overview



New...

Impact statements adjusted to better communicate consequence-based messaging.

“Catastrophic” tag impact statements scaled back and now equitable in terms of risk to the “considerable” tag.

“Catastrophic” tag now only optionally used when a violent tornado is striking or about to strike a population footprint. Alternately, some offices have used the phrase “This is a tornado emergency for locations along the path of the tornado”.

Large-event venues can now be included in pathcasts to provide warnings for large outdoor gatherings.

Companion Tornado Tag

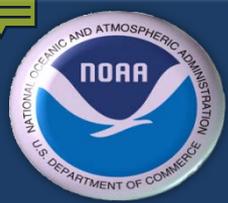
TORNADO...RADAR INDICATED	Evidence on radar and near storm environment is supportive, but no confirmation.
TORNADO...OBSERVED	Tornado is confirmed by spotters, law enforcement, etc.

Tornado Damage Threat Tag

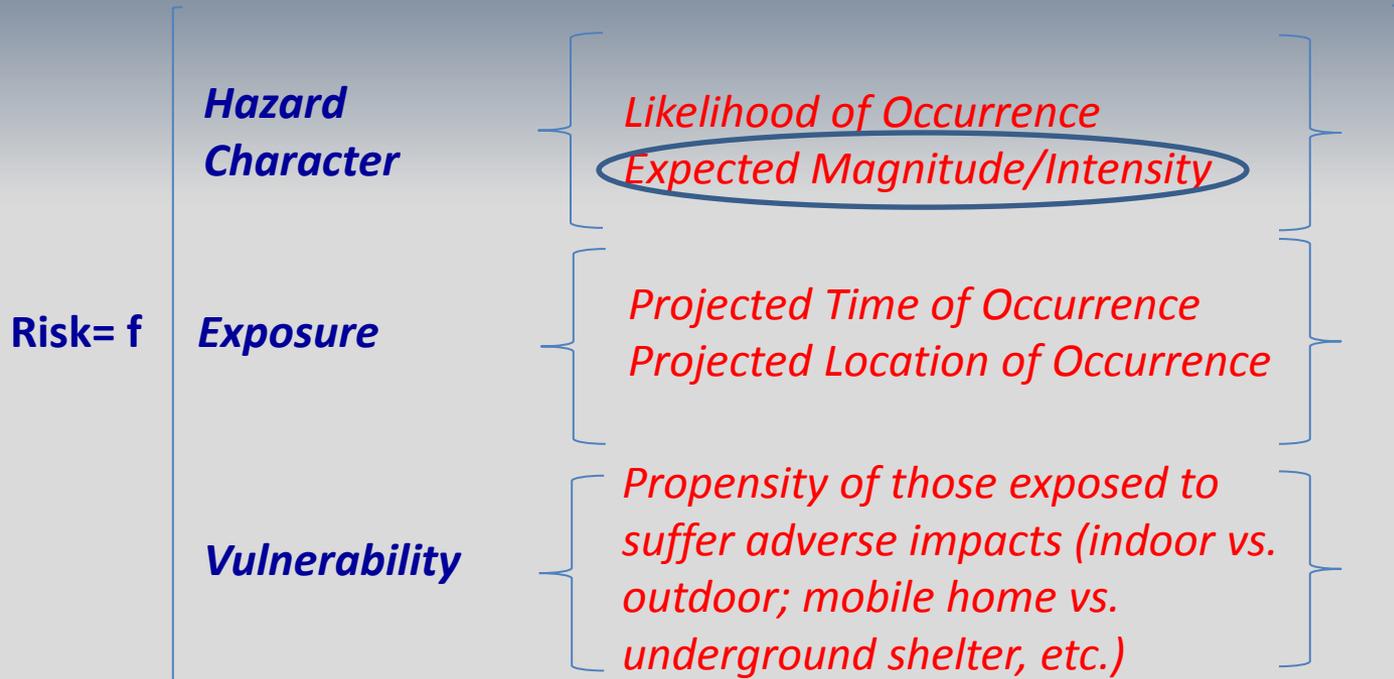
No Tag	Use most of the time, when tornado damage possible within the warning polygon. Tornado duration generally expected to be short-lived.
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Tornado Tag In Severe Thunderstorm Warnings

TORNADO...POSSIBLE	A severe thunderstorm has some potential for producing a brief tornado although forecaster confidence is not high enough to issue a Tornado Warning.
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IBW Project Rationale



Rationale 1: Tornadoes are like any other hazard and require expressions of predicted magnitude to establish risk and elicit the most appropriate actions.



IBW Project Rationale



Risk = f [Hazard Character; Exposure; Vulnerability]

Rationale 1: Tornadoes are like any other hazard and require expressions of predicted magnitude to establish risk and elicit the most appropriate actions.

- Outside of IBW, tornadoes are the only hazard whereby NWS does not include an expected magnitude as part of the warning message.
- What if we issued a flood warning for the Red River in Fargo, but refused to say how high above flood stage the river would get ?
- What if we told ATC at O'Hare there would be fog, but refused to give them a predicted visibility ?
- IBW fills a critical gap in NWS tornado warnings by describing all necessary hazard characteristics for proper risk assessments.



IBW Project Rationale



- Rationale 2: “Societal Needs” demand tornado warnings that emphasize high impact events – i.e. those most likely to do serious harm. If we are serious about reducing tornado deaths – this is where evolving warnings should begin.
- 13% of tornadoes in CR are EF2-5; 262 fatalities (97%)-2008-12
- 87% of tornadoes in CR are EF0-1 ; 7 fatalities (3%) - and all are from EF1
- All tornadoes are NOT the same ! Treating all tornadoes as one-size-fits-all, the existing system (by pure volume of warnings) may encourage a particular response to warnings for weak tornadoes and false alarms - at the expense of more urgent responsiveness to warnings for large, more life-threatening tornadoes.
- This is a flaw in the current warning paradigm – and one that leaves the public more exposed to dangers of high-end tornadoes than they should be.





IBW Project Rationale

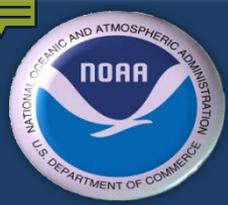


Rationale 3: Clear and credible risk communication is necessary for people to take immediate protective action.

Key findings from NWS Service Assessments and 2013 NIST Joplin Report:

- High-intensity cues (risk signals) prompt people to take action; outside of IBW, there are few mechanisms to elevate threats in NWS tornado warnings.
- Most seek confirmation from additional sources before seeking shelter. Thus, consistency of message is important. Conflicting or incomplete information delays sheltering actions.
- Most identify local siren systems as first source of warning; but, "*perceptions*" exist that "sirens go off all the time and nothing happens". (Joplin/Smithville/etc.).
- Existing dissemination systems not fully compatible with storm-based warning polygons; can cause confusion over threat location when there are multiple polygons.





IBW Project Application



Considerable Damage Threat Tag (TOR only)

- The intent of IBW is to warn for high-impact events rather than try to predict actual storm impacts. The primary IBW tool to alert for high-impact tornadoes is the “considerable” damage threat tag.
- As warning forecasters , your target range for the “considerable” tag are EF2-5 tornadoes. This is also where enhanced, conditional, impact statements kick in to provide needed high-intensity cues for end-users and partners.
- Radar signatures are the primary method for distinguishing between significant tornadoes and small tornadoes.
- Recent research and 2012-13 IBW results indicate relative skill in distinguishing significant tornadoes from others.



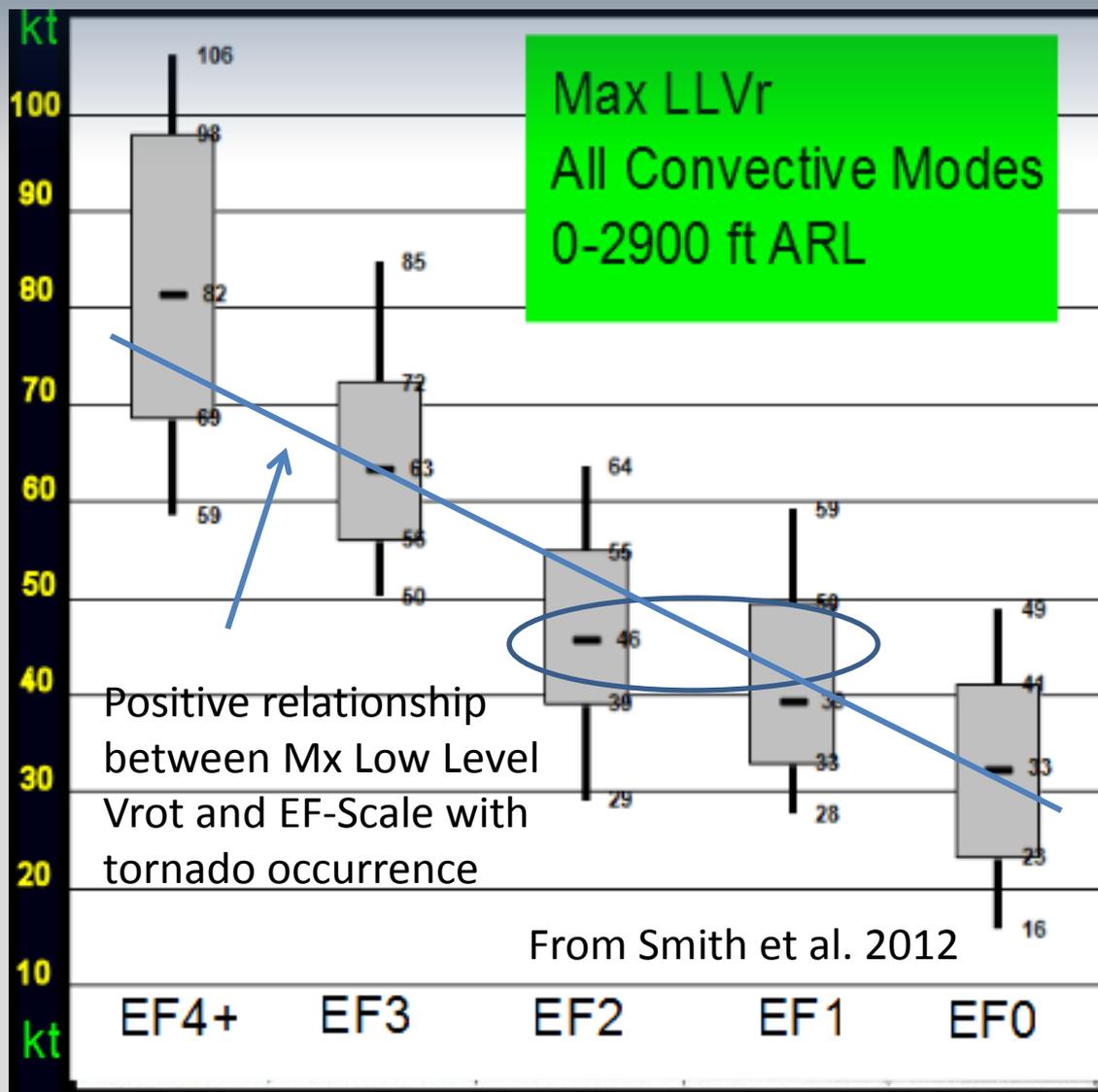
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Studies by Smith et. al. 2012, and others, provide tools for distinguishing significant tornadoes from smaller ones.

We are not trying to ‘pinpoint’ tornado intensity by EF scale – just “ring the bell” a little louder for more significant tornado events (generally EF2+).

There is overlap in max LLVr associated with high end EF1 and low end EF2 – so forecaster judgment and consideration of near storm environment are key parts of the decision-making process.





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IBW Demonstration Verification Statistics 2012-13

- **32% of all warnings with no tag resulted in a tornado (68% FAR).**
- **74% of all warnings with a “considerable” tag resulted in a tornado (26% FAR)**
- **65% of all warnings with a “considerable” tag resulted in a EF1+ tornado**
- **49% of all warnings with a “considerable” tag resulted in a EF2+ tornado**

This implies....

- 1. The “considerable” damage threat tag can be used as an indicator of confidence that a tornado will occur.**
- 2. The NWS tornado warning “false alarms” are primarily associated with attempts to warn for low-end tornadoes.**

* Demo verification was conducted April 1, 2012 through December 31, 2013.

There were 823 Tornado Warnings issued (including SVS upgrades and downgrades for damage threat indicators)

There were 465 tornado events (** as defined by the IBW project) and 85 EF2-5 tornado events.

** Only one tornado is allowed to verify each polygon warning for the demonstration.



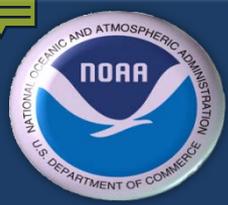


IBW Project Application



Catastrophic Damage Threat Tag (TOR only)

- The “tornado emergency” has been in the forecaster toolbox for 15 years (via NWS Directive). In the IBW framework its tag is the “catastrophic” damage threat tag.
- Its use should be exceedingly rare, and only when a **confirmed violent (EF4-5) tornado** is striking or about to strike a population footprint. The false alarm rate should be zero. And is generally associated with long-track tornadoes.
- In the IBW framework, the “considerable” damage threat tag is designed to serve a similar purpose, and provides a good ***radar or observationally-based alternative*** to the “tornado emergency”.
- For 2014, the impact statement associated with the “catastrophic” tag has been scaled back to match that of the “considerable” tag based on social science research on how people respond to extreme wording.

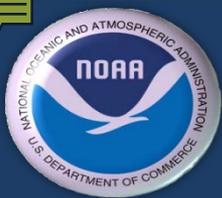


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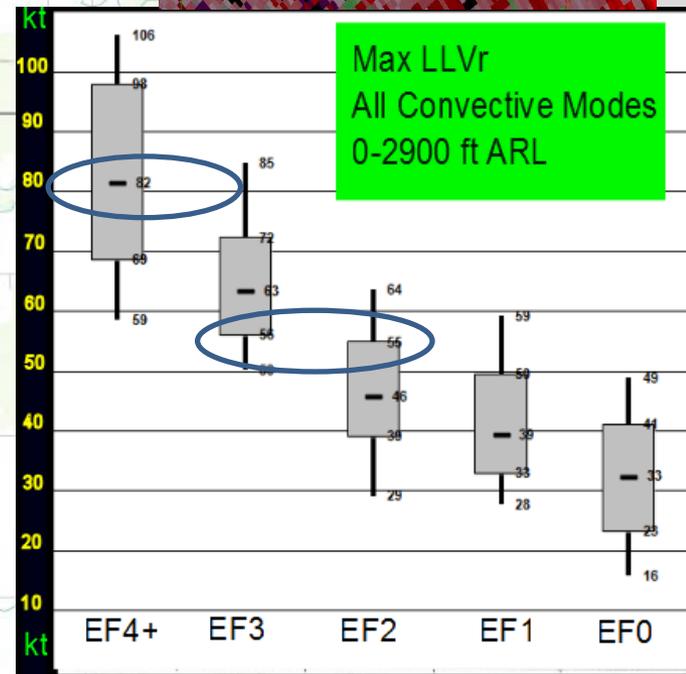
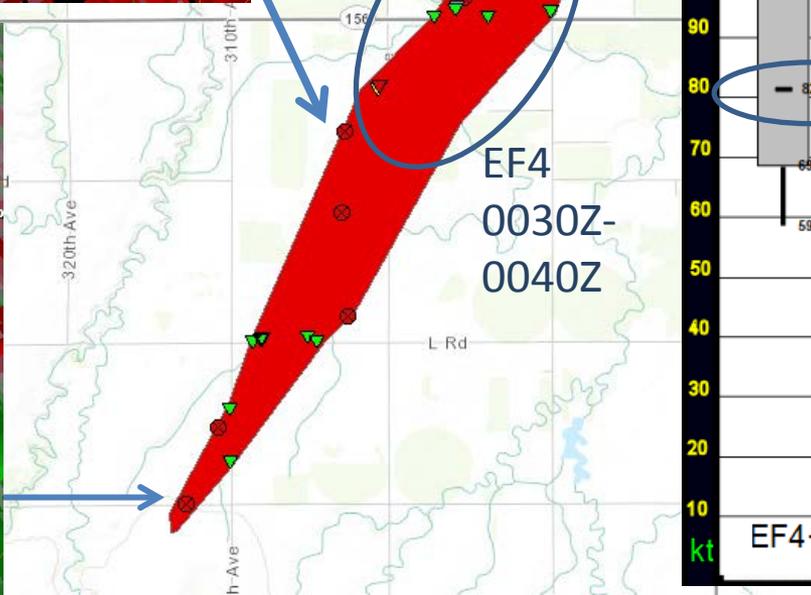
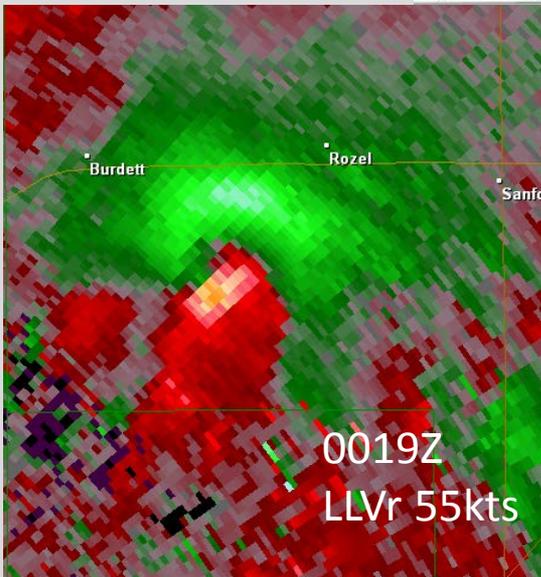
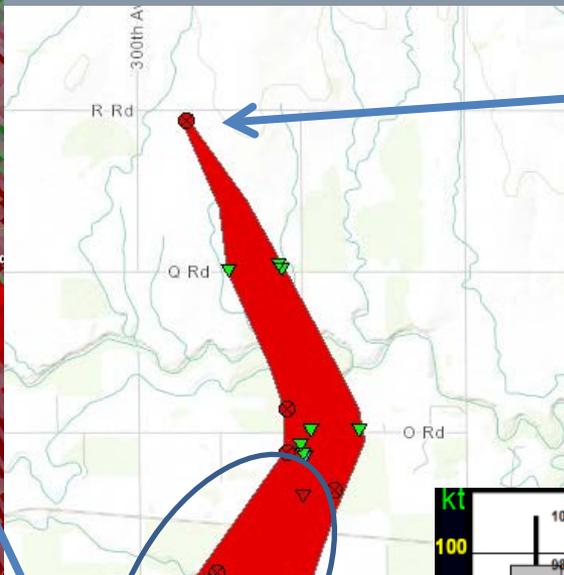
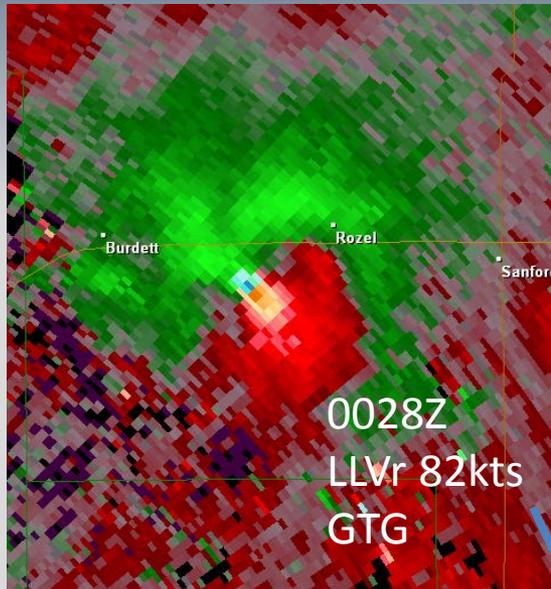


Tornado Possible Tag (SVR only)

- Used in severe thunderstorm warnings. Has also been in the forecaster toolbox for many years (equivalent to “brief tornadoes can and do occur in severe thunderstorms”).
- Usage is optional (even in Tornado Watches).
- Designed for situations where a severe thunderstorm has some potential for producing a small tornado although forecaster confidence is not high enough to issue a Tornado Warning...
- Including when potential for tornado occurrence may be below the temporal or spatial resolution of the radar.



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IBW Project Conclusion



- **Use every available resource to gather information, then let the information at hand guide use of the tags**
- **Warnings are only one tool for distributing life-saving information!**

**It's all about telling people
what we know,
enabling them to take action
to save lives!**



IBW Project 2014



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Questions?