

Impact Based Warnings Verification: Results from 2012-14

Richard Wagenmaker and Dr. Greg Mann

National Weather Service Detroit MI

The National Weather Service Impact Based Warnings (IBW) Project began with 5 demonstration offices in 2012, and now includes all of NWS Central Region and portions of the NWS Southern, Eastern and Western Regions. The vast majority of tornado fatalities in the United States result from significant tornadoes with damage rated in the high end of the Enhanced Fujita Scale (EF2-5). As such, societal needs demand warnings that emphasize these high risk/high impact events while minimizing false alarms. The IBW project aims to better communicate risk in warnings, and the purpose of this evaluation is to determine if tornado magnitude can be adequately expressed as part of this process. To best measure warning skill with respect to high end tornadoes, a new verification methodology for tiered warnings was developed which affords evaluation of each tier as well as “near miss” events that indicate degrees of skill. Through the end of 2014, 1741 tornado warnings were examined along with 1040 tornado events to examine relative skill in the use of an Elevated Tier (Considerable Damage Threat Tag) in tornado warnings. Although the sample size is small, the following significant inferences are discussed: 1) Elevated Tier Warnings are strong indicators of tornado occurrence (regardless of tornado magnitude); 2) False Alarms are much more strongly associated with Base Tier Warnings (by volume and percentage); and 3) using “near misses” as part of the evaluation process, skill measures for Elevated Tier Warnings notably exceed those for Base Tier Warnings. It is shown that these results are consistent with findings of Smith et al. (2014) using a relational climatology comparing maximum low level radar-estimated rotational velocity to maximum EF scale tornado damage. Within the IBW framework there appears to be skill distinguishing “meaningful” tornadoes from “small/no” tornadoes – and potential value above that provided by the legacy warning system in terms of providing a basis for communicating risk through expressions of potential tornado magnitude.