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Six Words That May Confuse You (if you happen to find them)

by Kenny Blumenfeld*

…THIS IS A PARTICULARLY DANGEROUS SITUATION…

If you are a National Weather Service (NWS) employee, a meteorologist with experience between the Rockies and the Appalachians, a severe weather-focused climatologist, a storm chaser, a very enthusiastic storm spotter, a severe weather buff, an extremely dedicated emergency manager, or someone immersed in the "communication" aspect of the weather enterprise—then the preceding phrase needs no further explanation: it's a "PDS tag." If you are anyone else, however, those six words probably mean very little to you.
To some, the phrase, "*This is a particularly dangerous situation,"* is a powerful signifier, indicating an unusually high severe weather threat; the next several hours will be critical. Perhaps more importantly, people familiar with the phrase know where to find it and when to look for it. To those unfamiliar with it, the intended meaning may be lost, as they may not notice it, or, moreover, they may not even have access to it in the first place.

The Storm Prediction Center (SPC) issues several hundred or more Tornado and Severe Thunderstorm Watches each year. A small proportion of these watches are issued under uniquely volatile conditions. In these rare instances, the SPC forecaster may include the phrase, "*This is a particularly dangerous situation,"* and then a couple of adjectives that modify key parts of the watch message. The SPC can issue PDS Tornado or PDS Severe Thunderstorm watches. In this article, I will focus on PDS Tornado watches.

As an example, here is some text from a "regular" tornado watch:

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THE NWS STORM PREDICTION CENTER HAS ISSUED A
TORNADO WATCH FOR PORTIONS OF

NORTHWEST IOWA
WESTERN MINNESOTA
SOUTHEAST NORTH DAKOTA
EASTERN SOUTH DAKOTA

EFFECTIVE THIS WEDNESDAY MORNING AND EVENING FROM 1130 AM
UNTIL
600 PM CDT.

TORNADOES...HAIL TO 3 INCHES IN DIAMETER...THUNDERSTORM
WIND GUSTS
TO 80 MPH...AND DANGEROUS LIGHTNING ARE POSSIBLE IN THESE
AREAS.
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(continued on page 2)

In This Edition

High spring winds overturned several semi trailers near Fairplay, Colo. (Photo by Blake Beyea)

Six Words (continued from page 1)

And here is a PDS Tornado watch:

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THE NWS STORM PREDICTION CENTER HAS ISSUED A
TORNADO WATCH FOR PORTIONS OF

CENTRAL AND EASTERN KANSAS
SOUTHEAST NEBRASKA
NORTHERN OKLAHOMA

EFFECTIVE THIS THURSDAY MORNING AND EVENING FROM 845 AM UNTIL 600
PM CST.

...THIS IS A PARTICULARLY DANGEROUS SITUATION...

DESTRUCTIVE TORNADOES...LARGE HAIL TO 3 INCHES IN DIAMETER...
THUNDERSTORM WIND GUSTS TO 80 MPH...AND DANGEROUS LIGHTNING ARE
POSSIBLE IN THESE AREAS
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In the second case, you see the PDS tag, set apart neatly by ellipses. Also notice that the adjectives “destructive,” and “large,” have been placed before “tornadoes,” and “hail,” respectively. If you are wondering why hail up to 3 inches in diameter is described as “large” in the PDS watch, but not in the regular Tornado Watch, so am I! It’s one of the many oddities with the PDS designator. But let’s start on a positive note.

From a forecasting perspective, PDS tags work quite well. Research by Christenberry and colleagues in 2010 examined 1,901 Tornado watches, of which 151 were PDS [1]. The PDS watches verified as tornado watches with almost twice the frequency of non-PDS tornado watches; only 4% were near or full-misses, compared to 25% for non-PDS watches. In other words, a PDS Tornado watch is a much better predictor of tornado and severe weather occurrence than a “regular” Tornado watch. A few years earlier, Dean and Schaefer obtained similar findings, but also noted that the majority of F2 through F5 tornadoes did not occur in PDS watches (owing to the small proportion of PDS watches, relative to the total number of tornado events), and that less than half of PDS watches contained these “strong” and “violent” tornadoes—both of which could imply some improvements are needed in the identification of PDS-suitable watches [2]. On balance, though, one can infer, legitimately, that the majority of PDS issuances have been justified, irrespective of whether some other PDS situations have been missed.

Further evidence of the difference between PDS and non-PDS Tornado watches can be gleaned from a cursory examination of tornado fatality statistics [3]. PDS watches comprise only 7-8% of Tornado watches, but since 2005 (through mid-October 2010), they have accounted for almost 30% of tornado deaths (107 out of 370). If you include deaths not in PDS watches but during events is which at least one PDS watch was issued, the proportion exceeds 50%. In other words, the majority of tornado deaths since 2005 have occurred during the relatively few events having at least one PDS Tornado watch.

So, inside the NWS, the PDS designators function quite well, and SPC forecasters have a good-and-improving sense of when to use them.Outside the NWS, however, the utility of PDS watches has not been examined. As Dean and Schaefer stated, PDS tags are added, “ in order to highlight the unusually high threat level to the media, emergency managers, and general public.” In a much earlier essay, Jack Hales, representing the SPC, wrote that the goal of the enhanced language “was to heighten awareness to the threat of the more violent tornadoes.”[4]

Let us ask then: do PDS watches highlight the unusually high threat level to the media, emergency managers, and the general public? Do they “heighten awareness?” These questions have not been formalized; I think they should be. In the meantime, we can discuss what we have learned in the Twin Cities area of Minnesota and Wisconsin. We’ll start with the media.

In 2008, I was invited to the Chanhassen NWS office (which serves the Twin Cities Metropolitan Area and adjacent portions of southern Minnesota and western Wisconsin) for its annual check-in with local broadcast meteorologists from four major network television affiliates and one public radio station. We had a chance to discuss how each station handles PDS-related information. In short, they don’t, or at least, they didn’t. On television, warnings—not watches—drive programming interruptions and “wall-to-wall” coverage decisions, so on-air time during a major event typically is spent on warning details, place-names, radar analyses and safety tips. The text “crawls” that scroll across

television screens offer little additional help, because those messages are semi-automated from the SPC's "Watch Outline" product, which lists all the affected counties but omits PDS tags. Additionally, stations rightly assign higher priority to severe weather warnings than to watches, and in very "busy" events, the watch text crawls may be removed until the number of warnings comes down. Only the public radio meteorologist felt he had the flexibility to explain PDS watches when they arose.

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A PDS watch may highlight the unusually high threat level to the media, but at least in the case of the Twin Cities area, we may well ask, "and then what happens?" As of 2008, the last time a PDS watch was issued in the area, the answer was "nothing." Perhaps though, we'll get better results with emergency managers.

As luck would have it, in 2009 I was part of a table-top exercise involving the National Weather Service, state troopers, county sheriffs, 911 dispatchers, fire chiefs, utilities managers, Coast Guard officers, municipal disaster preparedness coordinators, as well as liaisons to the elderly, the homeless, English-Second-Language groups, and those with physical and sensory impairments. The purpose was to coordinate fully-integrated communications during a high-end severe weather event. Basically, I was there to discuss how a realistic event might unfold.

Of course, I was compelled to mention that, hopefully, an event capable of the kind of chaos this group wanted to simulate, would be preceded by a PDS Tornado watch. "But how many of you know what a PDS watch is?" I made sure I had everyone's attention, and rephrased the question twice—once merely repeating it, and the second time expanding the acronym to reveal those three vital words.

The answer was seven. With 72 people in the room who epitomize the catchall term "emergency managers," seven knew what a PDS watch was. Of those seven, three knew where to get the information; the other four thought they could get it from the NWS-Chanhassen Web site—wrong! We explained to the participants what a PDS was, why the distinction mattered, where to get the information, and then we asked everyone to tell their colleagues too, so that word may spread. I think it's safe to assume, though, that while some Emergency Managers know about PDS Watches, most do not. This would seem to make highlighting the high threat level to them difficult; how can a PDS tag get their attention if they do not know to look for one and/or do not know where to look?

So, it seems we are 0-for-2, but let's turn to the "general public" for some better news. PDS watches highlight the enhanced risk to the general public, right?

In the Twin Cities area, if the general public uses television to get its weather information, the answer is "no." I have not looked into whether PDS tags make it into "smart phone" applications or opt-in text message services, but I think the null assumption is the safe way to go: Assume the information is not conveyed until demonstrated otherwise. We know that people are relying, increasingly, on information from mobile devices, so getting it right in the techno-realm is going to be important.

What about when the public turns directly to the National Weather Service? Surely the PDS information can be found there!

Ah, no.

Local NWS forecast office Web pages have clickable maps that can unlock the text for all valid weather hazards, *except* for severe weather watches. When someone clicks on a Tornado Watch link, they do not get the sort of message shown earlier; instead, they get the Watch Outline product—the same product that prevents media outlets from scrolling PDS information. Even the robotic voices of the National Weather Service, featured on "all-hazards" NOAA Weather Radio, often neglect PDS information. If you happen to be in a PDS watch, the only reliable way to find out from the National Weather Service, is to go to the originating source—the Storm Prediction Center. On their Web page, under "watches," one can find PDS tags in all their glory (assuming a PDS watch is valid).

I'm not sure, however, how or why a casual user would end up on the SPC's website, and I am even less sure about whether a PDS tag would get that person's attention anyway. If it did, the user would have to be very curious and determined to obtain any follow-up information. Limited information is provided in SPC's online FAQ [5] and, incredibly, PDS Watches are ignored completely in the National Weather Service's own Severe Weather Awareness materials, including the section on watches and warnings![6a,b] Moreover, successful education campaigns have trained the public to believe that all severe weather is "dangerous," and that tornadoes, especially, are "particularly dangerous." Additionally, call-to-action statements associated with Tornado and Severe Thunderstorm warnings often contain phrases like, "this a

(continued on page 11)

Extreme Weather and Society: An Integrated Perspective

by Rebecca E. Morss* and Olga V. Wilhelmi**

Each year, extreme weather events cause substantial damage, death, and disruption throughout the world. Extreme, hazardous weather has always influenced humans and the environment, to the extent that it has permeated human culture. Yet despite significant hazard mitigation efforts and scientific and technological advances, losses from hazardous weather continue to accrue, as do weather-related disasters. People, property, and ecosystems remain vulnerable to extreme weather, and in many situations vulnerability is increasing. Further, recent research suggests that some types of extreme weather are becoming more prevalent, and this trend is expected to continue with anthropogenic climate change; some of the most severe impacts of climate change may be experienced through changes in extremes. Consequently, extreme weather is often in the news, and its impacts are of increasing interest to scientists, policy makers, and members of the public.

Concerns about recent disastrous weather events, along with concerns about climatic changes in hazardous weather, have led to a rapidly growing literature on extreme weather. This literature is diverse, including theoretical, applied, and popular work from natural and social science, health, public policy, and interdisciplinary perspectives. Because extreme weather impacts result from interactions between physical and human systems, an integrated approach with a range of expertise is needed to fully understand extreme weather events. In this brief article, we review some major aspects of extreme weather events from an integrated hydrometeorological-societal perspective, and we provide recommendations on critical gaps in knowledge and practice for improving outcomes of extreme weather. A more extensive review and more detailed information can be found in an upcoming article in *Annual Review of Environment and Resources* (to appear in fall 2011), available from the authors, and in references therein.

Weather can be defined as extreme from multiple perspectives, for example, climatologically (as weather conditions that are rare, e.g., exceed a certain threshold) or societally (as weather events that lead to significant negative impacts). Here we consider extreme weather events as integrated physical-societal phenomena in their broader hydrometeorological, societal, and policy context. Commonly discussed types of extreme weather include heat and cold waves, heavy precipitation and flooding, anomalously low precipitation and drought, tropical and extratropical storms, and severe weather. Sometimes, related hazards such as landslides and wildfires are also included. Although individual extreme weather events are often considered separately, these phenomena occur within a larger physical and societal context and thus are frequently interconnected.

Estimates of the impacts of extreme weather vary depending on what outcomes are included, the data sources, and how the data is analyzed. However, a number of recent studies have found that impacts are significant and that economic losses from extreme weather have grown over the last few decades. The major impacts that are typically discussed are deaths, injuries, and property damage. But extreme weather can have a variety of other human, social, and environmental impacts that are poorly measured and often underestimated. Considering these other impacts can be especially important in developing countries where monetized losses do not fully represent many of the negative impacts experienced. Further, shocks created by extreme weather can severely hamper development efforts, which can then make developing country populations even more vulnerable in the future. While negative impacts of extreme weather are most frequently discussed, extreme weather can also be beneficial, for example, when tropical cyclones serve as a source of rainfall. Extreme weather can also redistribute losses and gains among people.

The societal and environmental impacts of extreme weather depend on how the weather conditions interact with other components of the natural and built environment and human systems. These interactions can be highly spatially and temporally variable. They can also be non-linear and complex, leading to “disasters” with catastrophic consequences. Anyone can be affected by extreme weather; it cannot be perfectly predicted or its impacts absolutely prevented. Yet some people are much more affected by extreme weather than others, due in large part to differences in societal vulnerability. Thus, to understand extreme weather and its impacts, it is important to understand vulnerability and how it interacts with weather conditions to create risk or harm.

While specific definitions vary, in general, *vulnerability* is the susceptibility of people or systems to damage or harm. Recent work describes vulnerability to weather or climate phenomena in terms of three interacting concepts: 1) *exposure*, the conditions of the natural and built environment that position people to be affected; 2) *sensitivity*, the extent to which people are affected; and 3) *coping* or *adaptive capacity*, the potential for a system to alter its features or behaviors to better cope with or adapt to weather or climate. These concepts are interrelated, and they

are influenced by *drivers*, larger-scale environmental, socioecononomic, and political factors that influence a system. Current thinking on vulnerability incorporates a variety of perspectives and approaches, integrating concepts beyond first-order response to hazard severity such as environmental justice, inequity, access to resources, social capital, and other factors.

To cope with and manage the risks of extreme weather, people use a variety of strategies, ranging from hazard mitigation (such as dams and land use planning) to forecast and warning systems to insurance. Discussions of anthropogenic climate change are increasingly focusing on the importance of adaptation to climatic changes (including changes in weather) along with mitigation through reducing greenhouse gas concentrations. In the face of scientific and societal uncertainty and changes, it is important for people to employ multiple strategies for coping with and adapting to extreme weather risk. In doing so, it is important to understand and address the socioeconomic and policy contributors to vulnerability, risk, and harm along with the risk of extreme weather conditions. Because extreme weather events often evolve in unexpected ways, flexibility is needed, to help people manage uncertainty and surprise. Consequently, key priorities include reducing societal vulnerability in general, to promote the ability of individuals, households, and communities to prepare and respond in multiple ways, and building coping and adaptive capacity. An emphasis on reducing vulnerability and enhancing coping/adaptive capacity can help people reduce their susceptibility not only to extreme weather events but also to other political and economic shocks.

Vulnerability to extreme weather and coping/adaptive capacity are highly variable among populations, embedded in local ecology and political and cultural contexts. Further, interactions among extreme weather conditions, societal vulnerability, and risk management decisions are often most prominent at the individual and community scales. Thus, understanding how to best reduce harm from extreme weather requires integrated studies of extreme weather risk and opportunities in specific situations. This includes attending to local views of harm, vulnerability, and acceptable risk, and integrating stakeholders to help develop solutions that are practical and acceptable in the local context. Yet because people tend to have difficulty comprehending the risk of low-probability, high-impact events and to be overly optimistic when making protective decisions, larger-scale (regional, national, and international) programs and facilitation to improve outcomes and ensure long-term sustainability are also needed.

Overall, the challenge is to integrate information about physical characteristics of extreme weather events with information on societal vulnerability in order to help individuals and populations become more resilient to harmful extreme weather, within the context of local policy, their worldviews and goals, and the other stresses they face. Doing so is difficult, but this challenge cannot be ignored given the harm and misery that people—especially more vulnerable populations—experience from extreme weather.

For further information: Rebecca E. Morss, Olga Wilhelmi, Gerald A. Meehl, and Lisa Dilling, 2011: Improving societal outcomes of extreme weather in a changing climate: An integrated perspective. *Annual Reviews of Environment and Resources*. http://www.annualreviews.org/doi/abs/10.1146/annurev-environ-060809-100145

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This semi was overturned by high mountain winds near Fairplay, Colo. (Photo by Blake Beyea)

From the Director: Introducing the New WSW Methods Section

by Jeffrey K. Lazo*

I will be brief this quarter. Rather than pontificate here, I've written the first contribution for a new section for *Weather and Society Watch* called "Methods (see page 5).

In an effort to make WSW more interesting, useful, or perhaps just different, we've decided to include a new section focusing on methods in the arts and practices of the social sciences. These are not intended to be theoretical discussions or even very broad—in fact the more focused and the more practical, the better!

To this end I've written a piece on the use of monetary incentives in mail surveys as an approach to increasing response rates. It's a pretty specialized topic that I won't even claim to be an expert about—but something of concern in the research I do using surveys.

Why include this new section? The purpose is to expose readers to the methods we social scientists use in our research to:

- give others ideas how to improve their methods
- inform non-social scientists about some of the tools in our toolboxes
- generate discussions about best practices.

I sincerely encourage you to spend a couple of hours thinking about some tool, trick, or approach you use in your research and then write a piece for WSW. We may include more than one Methods article in any given issue should we get good contributions. I also encourage you to respond to and add to any prior Methods pieces that have been contributed.

So … what is your Method?

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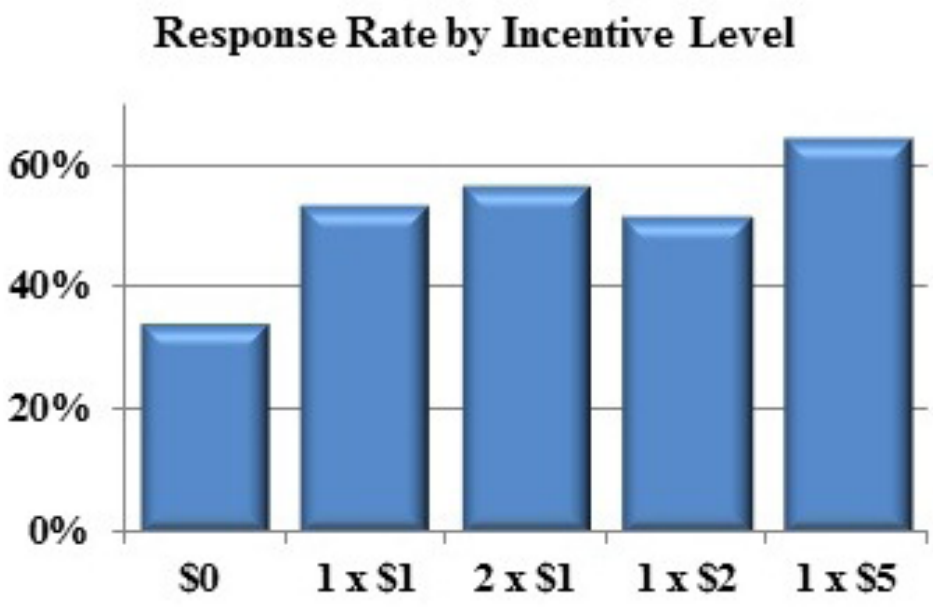

Response rate by incentive level in survey. See "Cash Incentives" article on page 7.

Contribute to WSW

Weather and Society Watch is always accepting contributions!

We accept articles on planned, in-progress, or completed research projects, highlights about programs and milestones, book reviews, historical/interest articles, guest editorials expressing views about a relevant topic, and much more. We also accept submissions of weather photographs.

To contribute to Weather and Society Watch, please contact Emily Laidlaw at laidlaw@ucar.edu.

WSW Methods: Cash Incentives in Mail Surveys

by Jeffrey K. Lazo*

Survey researchers put considerable effort and research into making sure that the data they get can say something about the population they are sampling. All else equal, the higher the response rate to a survey, the more likely the data will be representative of the population that was sampled. In fact for some government sponsored surveys, the Office of Management and Budget (OMB) requires (or maybe it is "suggests") a response rate of 70% or more (OMB 2006).
As an add-on to an NSF-funded project on mental models of flash floods and hurricanes, we implemented a survey with the general public about flash floods in Boulder, Colorado. This work was conducted in part with University of Oklahoma senior meteorology majors Kelsey Mulder and Curtis McDonald as their 2010 Capstone Project. Numerous others were also involved in development and implementation of this survey (including those who spent hours and hours stuffing envelopes) but are too many to mention now.

For the purposes of this Methods section, I am going to talk solely about one part of the implementation of the mail survey—the inclusion (or non-inclusion) of cash in the survey mailing and how that affected survey response rates.
All told, we distributed 1,400 survey packages. Of these, 400 were part of a convenience sample hand-delivered to people in downtown Boulder and on the University of Colorado campus. Another 250 survey packages were mailed, but not using the "Dillman" method for mail surveys. I'll focus the current discussion on the 750 that were mailed using the Dillman method (Dillman, 2008).

The 750 mailed surveys contained one of five different incentive levels, for a total of 150 surveys each with one of the following incentive levels:

- No incentive
- A single $1 bill
- Two $1 bills
- A single $2 bill
- A single $5 bill.
-

We threw in the single $2 bill versus the two $1 bill to see if the "oddity" of this would affect response rates at that level. Survey packages that were returned by the U.S. Postal Service indicating bad addresses (107 of them) were removed from the response rate analysis, giving us a different sample size for each incentive level as shown in Table 1. The number of surveys returned completed is shown, as well as the responses rates for each incentive level (the number completed divided by the sample size). The figure plots these response rates by incentive level.

Table 1: Response Rate Information by Incentive Level (Dillman method mailings only)

Line	Incentives	Distributed	Bad Addresses	Sample Size	Completed	Response Rate
A	$0	150	30	120	41	34.17%
B	1 x $1	150	16	134	72	53.73%
C	2 x $1	150	25	125	71	56.80%
D	1 x $2	150	15	135	70	51.85%
E	1 x $5	150	21	129	83	64.34%
F	Total	750	107	643	337	52.41%

We had an overall response rate of 52%,which is actually very good for a mail survey! As revealed in the figure, a visual inspection of this suggests that increasing the incentive (more dollars) increases the response rate to the survey. But this is not a perfect fit: Note that we had a lower response rate with the single $2 bill than we did with the two $1 bills—not what I expected!

To see if there is a statistically significant impact of the level of incentive in the survey, we performed a regression

(continued on page 8)

Incentives (continued from page 7)

analysis using a probit model. The "dependent" variable was whether or not the survey was completed and returned. This was coded as a "1" if a survey was returned and a "0" if a survey wasn't returned. Table 2 shows the results of this analysis.

Table 2: Probit Model of Response Rate (n=643)

	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Wald 95% Confidence Interval for Parameter Estimates	
Intercept	0.4079	0.1179	11.9619	0.0005	0.1767	0.6391
1 x $1	0.5016	0.1602	9.8005	0.0017	0.1876	0.8156
2 x $1	0.5792	0.1631	12.6061	0.0004	0.2595	0.8989
1 x $2	0.4543	0.1599	8.0778	0.0045	0.1410	0.7677
1 x $5	0.7755	0.1634	22.5227	<.0001	0.4552	1.0958

Essentially this analysis is testing whether or not the amount of the incentive (from none to $5) changed the likelihood that an individual would complete and return the survey. Of interest are the results on the four different incentive levels (1 x $1, 2 x $1, 1 x $2, and 1 x $5), which are shown in the column labeled "Estimate." All of these are statistically significant (the significance levels in the "Pr > ChiSq" column are all much smaller than 0.05), indicating that including an incentive increases the likelihood of an individual returning the survey. And for the most part, the more the money the higher the response rate will be as indicated by the larger estimates the large the incentives.
So put more cash in the survey and get a better response rate!

But … the question for a researcher is whether or not it is worth putting the extra money into including incentives (if this is even an option—in New Zealand it apparently is illegal to mail cash). Depending on how important it is to get a higher response rate and how much the budget for the survey is, the researcher may consider trading off a higher response rate with a smaller sample size …. this could be a whole new topic for future Methods articles!
There are a lot of other "methods" implicit in this discussion that could also be the focus of future Methods articles including the use of a probit model instead of linear regression, the treatment of non-respondents, the use of mail versus internet, or telephone surveys.

Our plans for now include future Methods discussions on other aspects of this survey in particular, including the use of the "Dillman" method for mail survey implementation and the use of GIS for tracking respondents location and comparing that other non-survey information (such as flood zones). And we'd love it if you contributed your "Methods"!

* Jeff Lazo (lazo@ucar.edu) is the director of the Societal Impacts Program.

Resources and References

Some places to look for more information on the use of incentives in mail surveys include:

Church, A.H., 1993. Estimating the Effect of Incentives on Mail Survey Response Rates: A Meta-Analysis. The Public Opinion Quarterly, 57(1):62-79. Available at http://www.bebr.ufl.edu/files/May%2025%20%20ESTIMATING%20THE%20EFFECT%20ON CENTIVES%20ON%20MAIL%20SURVEY%20%20RESPONSE%20RATES%20-%20A%20METAANALYSIS_0.pdf)

Dillman, D.A., J.D. Smyth, L.M. Christian. 2008. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. 3rd Ed. Wiley & Sons. 512pp.

OMB. 2006. Office of Management and Budget: Standards and Guidelines for Statistical Surveys. Available at http://www.whitehouse.gov/sites/default/files/omb/inforeg/statpolicy/standards_stat_surveys.pdf.

Singer, E., 2006. The Use of Incentives to Reduce Nonresponse in Household Surveys. Public Opinion Quarterly. 70(5):637–645. Available at http://poq.oxfordjournals.org/content/70/5/637.full.pdf+html)

Jobs & Opportunities

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To Apply: Please visit: http://reliefweb.int/node/401129.

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Fluency in English is required, and fluency in a second language preferred.

To apply, please submit a cover letter, resume, salary history, 3 professional supervisory references, and date of availability to hremergency@ri.org. The email subject line must include the following: Emergency Response Director. The closing date for applications is June 10, 2011. Qualified applicants will be contacted via email for an interview. For more information, please visit: http://reliefweb.int/node/401129. 010.

WSW Book Review

The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl

by Kim Klockow*

Anyone who's been to the Oklahoma Panhandle has seen the artifacts of a puzzling history, left for decades to weather, motionless yet expressive. It's as if these relics are shouting something important at us across the vast, empty spaces. Speaking for and decoding these objects, Timothy Egan weaves together the ghostly, eerie, and mystical aspects of the area stretching from the Texas Panhandle up through Wyoming and Montana, west of the 37th meridian, to bring the Dust Bowl era to life in the 2005 book, "The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl." In this history, the stories of men and women are intertwined delicately with their senses, myths of nature, human nature, and the explosive intersection of economic and climatic forces. Threading all of these plotlines together, Egan makes the reader feel the lives of real people, understand their choices, triumphs and pain, and take an honest look at how we're mirror images of our ancestors in so many ways. Understanding this history, Egan argues, is key to understanding our present social-ecological situation throughout the Great Plains. This book is an eloquent plea for sustainable development and critical evaluation of modern-day agricultural practice, and appeals to a wide audience, including the atmospheric scientists, anthropologists, sociologists, economists, and others who subscribe to *Weather and Society Watch*. It's a must-read for those concerned with the intersection of weather, climate and society.

The story of the Great Plains relics begins near the end of the nineteenth century, with the stories of the people who first settled throughout the Southern Plains. Initially, cowboys and ranchers replaced Comanche Indians removed from the land after bitter wars. Native bison were killed off to force away the Indians, and replaced with cattle, easily supporting a profitable ranching lifestyle until overproduction shot prices down. Investors eager to make a better return began to promote the Southern Plains as a haven for development, an oasis of booming culture and fertile soil, relabeling the Great Desert as the Great Plains. The investors targeted several new audiences with their ads, and with the U.S. government's blessing, the price was right. German Russians, persecuted and moved many times over, were eager to find a place where they could work hard, keep clean and implant their traditions and music. For their very hard-working reputation, these people were solicited heavily. Others came for the opportunity to advance themselves from mere farm hand to farm owner. Some came for medicinal reasons, as the Plains were advertised for clear and breathable air. All came with dreams, and many with crushing personal histories. A lot of heart was put into the move, and none of the immigrants were told the truth: the area was completely undeveloped and climatologically too dry to sustain any sort of agricultural practice established in the country to date.

At the time, settlements in the Northern Plains were already showing signs of failure due to difficult climatic conditions, but the Southern Plains opened their doors for development. When the families arrived, they didn't expect to see the desolation that appeared before them, but they decided to make the best of the opportunity and make "improvements" to the land. To overcome the lack of moisture, windmills were built—an absolute necessity. Many families built homes into small hillsides, called dugouts, to get their families started. Immediately the "nesters" began to suffer from severe weather and flash floods; yet they maintained a foothold. Dry farming methods were disseminated widely, with the belief that the problem was not in a lack of rainfall but, rather, in finding ways to hold moisture in the soil and reduce evaporation. Many settlers believed that "the rain follows the plow," and chose to work the land harder in response to cultivation difficulty. Around 1917,

(continued on page 10)

Hard Time (continued from pg 9)

large quantities of land that for thousands of years had been grassland were broken. Following the extirpation of the bison, this marked the second affront by settlers to the natural ecology of the Plains, and represented a key interpretation of climate in the story: a little dry, but not outside of the realm of control.

Quickly, the land proved bountiful for development, with the blessing of several relatively wet years. The new settlers couldn't realize the conditions were abnormally moist, believing in the promises sold to them so they could have faith in their futures. They moved forward to develop their sections, build families, and make long-term plans. A byproduct of the ongoing war was a sharp increase in the price of wheat, a high price soon fixed by the U.S. government, to which the nesters responded by tearing up more land and raking in revenue, occasionally an order of magnitude over costs. The news of this brought even more immigrants to develop the marginal lands. In this time, the advent of the motorized combine exponentially increased efficiency of farming, allowing for even more development per farmer. This growth wasn't undisturbed by local meteorological problems: there were hailstorms that ruined thousands of acres of wheat and bitterly cold winters to contend with. But at the time, these events didn't phase the overall pattern of development. The Southern Plains began to explode with growth, with millions of acres of grassland torn up through the 1920s. The Federal Bureau of Soils claimed that "[t]he soil is the one indestructible, immutable asset that the nation possesses. It is the one resource that cannot be exhausted." Producers joined in the buying and spending sprees of their contemporaries, borrowing against their futures. Cultivation farming edged out ranching, the ranchers left disillusioned and unsettled. None who roamed the land before this time felt that the development was right for the area, but they could hardly stop the forces of economic incentive and climatological ignorance.

The agricultural industry had boomed, but by the end of the 1920s, it threatened collapse. Overproduction, as with the introduction of cattle ranching in the Southern Plains, pushed prices down. Producers faced two choices for maintaining profitability and paying their debts: work together to reduce the amount generated, or dig into the land and plant even more. With no grounds for cooperative effort to be negotiated, the farmers took to the land and grew more. The weather was wet enough and no late freezes harmed the crops, leading to an excess of production that left piles of unused product near silos and train stations. Prices merely plummeted further, particularly by the end of that year—1929. Within a year, the nation was going hungry, and the farmers of the Plains were harvesting the most they had ever grown but could not sell it to support themselves. And then, by the fall of 1930, the Southern Plains began to get a taste of a new atmospheric phenomenon that would soon dominate their lives: dust storms.

The dust came mildly at first, a curious annoyance to be swept away, particularly from the tidy German households. Over the first year or two, many homesteaders began to leave the Plains, unable to make a living from the land. As more people left, more land was torn up and exposed, but unused. Not that those who lived there were making the most of their land, as it cost more to produce than they'd gain in revenue. Additionally, many areas had been so overused that the soil was only marginal for production, and yields decreased per unit of farmer effort. It seemed that everyone became poor as the Great Depression and a strange dry year began to settle over the farmlands. While many initially thought they could at least survive by cultivating their food and raising cattle, the dust began to come on more strongly as the years passed. The cattle ingested the dust and starved to death, their stomachs so full of it that nothing else could be processed. Many chickens went blind from it. And most crops and trees died, despite irrigation efforts. Many families had stocks of food to last them through difficult times, but within two years some were forced to brine and jar tumbleweeds and go on mad rabbit hunts for sustenance. The people had adapted to a wet climate and to a ground that had no history of being so exposed. When a very normal event set in—a spell of seven dry years—the people were unprepared.

Those who remained throughout the ordeal did so for a variety of personal and financial reasons, all believing in the future of the Plains, all in love with an image of the land that was either pre-development and stable or amid-development and wet. Nobody had much money, but communities came together to hire weather modifiers to shoot explosives into the sky in order to bring rain. People stubbornly persisted in thinking that they could influence the atmosphere and control the land, even through its torrential onslaughts of dust that lead everyone present to be touched by a plague of dust pneumonia. Women lost babies, men went blind, children suffocated walking home from school—the silicates in the dust had a corrosive and destructive power unlike anything these hardy populations had ever seen. Living standards were intolerable, with entire months blotted out in complete darkness, leaving the people to cower in their dark and dank hillside shanties with infestations of black widows and other bugs. The dust didn't even abate in the winter, when blizzards became black. Any precipitation that fell was laden with dirt. Each passing summer seemed to break heat records, as the ground became dry, rock-hard, and piled with enormous dunes. Years into the war with the weather, without any ability to maintain a crop, everyone was debt laden and unable to pay. Yet, most people remained in their homes with the help of government assistance, if such a thing could be considered help. Tractors were repossessed, and cows were sold or killed in government-sponsored attempts to raise cattle prices. By 1936, most farmers had literally nothing left, their children adorned in sackcloth and without shoes in a land of brutal frigid wind and searing, record-breaking heat.

That year the U.S. government would find that the Dust Bowl was not caused by a climatic fluke. In fact, tree ring and other

(continued on page 12)

Six Words (continued from pg 3)

very dangerous storm." It ends up being an awful lot to keep straight, and asking the general public to recognize the uniqueness of a PDS watch might be a tall order, especially when it is so difficult to find out if one is valid in the first place.

All of this matters only because of what PDS watches represent: *particularly dangerous situations*. The average PDS Tornado watch leads to fatalities and significant damage, and when such a watch is in effect, you can expect news-worthy results more times than not. Forecasters have become quite skilled at identifying PDS-type conditions, and clearly, they have a strong desire to share that information with society at large. Unfortunately, the current apparatus for doing so is not especially effective.

Though I believe a thorough, formal research effort is the best way to evaluate and critique the societal value of PDS watches, the following simple actions could help alleviate some of the more obvious issues in the meantime:

1) Include information about PDS watches in NWS Severe Weather Awareness materials.
2) Allow PDS tags to be placed into Watch Outline products.
3) Make certain that PDS tags are broadcast on NOAA weather radio.
4) Make certain that valid PDS watch information is available on NWS forecast office web pages.
5) Use "Integrated Warning Team" meetings and other such collaborative venues to explain PDS watches to emergency managers.
6) Consider changing, or dumping, the current PDS language—tradition alone is a poor reason for continuation, and there may be better ways of saying what the SPC is trying to say.

PDS watches are issued when the threat for severe weather-related casualties and damage is especially large. They constitute the most important sub-class of watches issued by the SPC, yet the current watch/warning infrastructure, combined with broken lines of communication and a good bit of terminological ambiguity, make it very unlikely they are serving their purpose of heightening public awareness of a uniquely high severe weather threat.

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References

[1] Christenberry, A., A. Lamers, B. Mejia, A. Dean, and S. Weiss, 2010: A multi-tiered verification of SPC Tornado Watches (2003-2008); *Preprints, 25th Conf. Severe Local Storms*, Denver, CO.

[2] Dean, A.R., and J.T. Schaefer, 2006: PDS Watches: How Dangerous are these "Particularly Dangerous Situations?" *Preprints, 23nd Conf. Severe Local Storms*, St. Louis MO.

[3] http://www.spc.noaa.gov/climo/torn/fataltorn.html

[4] http://www.usatoday.com/weather/tornado/wtpds.htm

[5] http://www.spc.noaa.gov/faq/#2.7

[6a] http://www.weather.gov/om/severeweather/

[6b] http://www.weather.gov/om/severeweather/resources/ttl6-10.pdf

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Hard Time (continued from pg 10)

evidence showed that such dry spells were very normal. It was human forcing that had transformed prairies into rolling desert. While this was an affront to the popular belief, espoused by the President, in the positive power of hard-working men, he acknowledged its reality. Roosevelt sponsored enormous conservation efforts at the behest of Hugh Bennett, a chemist turned ecologist who had led the effort to prove the Dust Bowl's cause and enact a solution. The solution required massive collective effort, but the farmers were so desperate that they abdicated their former self-interested ways and accepted that each defector could bring down what little hope they might have in improving their situation. Broad dunes were torn down, drought-resistant grasses reseeded and huge plots of land returned to prairie. Farmers planted new varieties in hedgerows to stave off corrosive wind effects. The President planted millions of trees in an effort to break the wind. By 1937, the rains began to come again, but with it came swarms of grasshoppers that forestalled agricultural productivity. Nature had been thrown far out of balance, and it took many years of adaptation efforts to reign it back in.

As Egan tells this story, success only came by learning to work with the land and meet its needs. The Great Plains is a semi-arid and very windy region where great effort must be placed on preserving a delicate balance between the wants of man and nature. The story ends with almost all of the lead characters either leaving or dying soon after the Dust Bowl, stubbornly tied to the land they loved, many leaving ancestors who remained in the Dust Bowl region. The author also leaves us with a scathing depiction of modern society and our present-day treatment of the Plains, one that has strayed from a sustainable philosophy. With advanced irrigation technologies, we are fast depleting the only source of water for the entire region. Over-farming land is common, and many crops are grown that have no natural place in the Plains. He begs the question, "Have we forgotten the lessons of our ancestors?" Through all of our modern activities, their abandoned artifacts remain, shouting at us to listen to Timothy Egan's story and take heed. He leaves the book with a clear message: Man is not more powerful than nature, and if we do not adapt to the climate that's presented to us, it will deal us a severe blow in response.

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The 15th Annual High Plains Conference will be held in Wichita, Kansas, August 4-6, 2011, at the Wichita Marriott Hotel. Papers related to severe convective and winter weather, climate, educational programs, societal impacts, aviation, fire weather, new technology, and other topics are welcome. Submit abstracts through the at http://www.wichita-amsnwa.org/HPC or by email to kenneth.cook@noaa.gov. Abstract submission deadline is June 1, 2011.

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Location: Chicago, Illinois
For More Information: Please visit http://www.drought.gov.

NIDIS will hold a free drought workshop entitled, "Building a Sustainable Network of Drought Communities 2011," June 8-9, 2011, at the Summit Executive Centre in Chicago, Illinois. The workshop will explore a wide range of drought preparedness topics and measures that can be taken before, during and after a drought event. Drought and water management professionals are invited to attend the workshop, which aims to expand communication and increase collaboration across the national drought preparedness community. Please register by going to http://www.drought.gov and clicking on the workshop link under Events & Announcements. Please direct questions to crystal.bergman@huskers.unl.edu or dwoudenberg2@unl.edu.

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