

LITERATURE REVIEW

Researchers wishing to track down historical details on the development of NOAA Weather Radio will encounter significant challenges, beginning with the program's scant paper trail. One National Weather Service retiree interviewed early in the course of this research said that no comprehensive treatment of the radio network had ever been written because no one in the Weather Service ever saw the need to write one. All of the interview subjects who were vitally involved with the conception and early construction of NOAA Weather Radio, and those who manage the program today — people without whose input and cooperation a history piece on NOAA Weather Radio would be an unlikely proposition — told the author they had never before been approached for information relating to the history of the system's development. To be sure, these individuals provided valuable insights and a number of helpful documents. But for month-to-month, system-development details, it became necessary to depend heavily on small articles appearing in internal Weather Service periodicals, and on many personal and telephone interviews and emails between the author and surviving subject matter experts. If any researcher is successful in locating a book about NOAA Weather Radio, or even a book that treats the development of the system in any measure of detail as an aside, the author would eagerly wish to hear about it.

The highest level of communication theory supporting the NOAA Weather Radio program, and this thesis, finds expression in mass-communication ideas propounded by

Harold Lasswell, who, in describing the “Structure and Function of Communication in Society,” noted three primary such functions: 1) surveillance of the environment; 2) correlation of the components of society in making a response to the environment; and 3) transmission of the social inheritance. Lasswell argued that in democratic societies, rational choices and a successful bid by society for such commonly held “values” as wealth and well-being depend on enlightenment, not only among leaders and experts, but the “rank and file” as well—all of which further reinforces the case for a public surveillance and warning system equally at the service of every citizen.

Theodore Peterson, who described a dominant, twentieth-century “Social Responsibility Theory of the Press,” recognized that certain media might, for sake of the greater good, deserve exemption “from having to earn their way in the market place,” and thus implied a role for government dissemination services. That social-responsibility theory also asserts, not merely a right, but a moral duty of individuals to keep themselves informed. A society dominated with libertarian thought would not likely have produced a publicly owned warning dissemination system like NOAA Weather Radio because the free market would not likely pay for such a thing (except among very wealthy clients who could afford private means of surveillance and warning, and who would benefit privately from those services). Moreover, Peterson observed that when one member of a community suffers for ignorance, other members are likely to suffer as well if that individual’s ignorance triggers unhappy consequences—another notion that supports government-sponsored warning dissemination (and, indeed, education, and a great many other government missions).

Of course, no one claims that every person should be told everything. If ignorance is dangerous, then too much information can be paralyzing. That principle was convincingly described and defended by Herbert A. Simon in his address, “Designing Organizations for an Information Rich World.” Simon explained the desirability of message filtering by reminding us that human beings can only attend to so much information, and that in a world saturated with messages competing for the recipient’s attention, communicators must compose and target their messages carefully or else risk being ignored to the detriment of society and of the individual. Simon called for filtering processes that could respond intelligently to recipients’ “need to know” and convey information only in the type and quantity required to encourage a desired response. This matter informs the science of warning composition, whose practitioners must constantly balance the values of pith and of context; but at base it reminds us that, sometimes, “head for the hills” is all the communication a recipient needs or has time to comprehend. The National Oceanic and Atmospheric Administration, and its Weather Radio service, by their nature utilize multiple layers of message filtering—from NOAA’s supercomputers which monitor and prioritize environmental threats, to that agency’s network of digital radars which are capable of announcing severe-storm conditions even without human intervention, to the editorial judgment of individual staff meteorologists who decide which warnings to convey, to the Weather Radio end-user (the recipient) who can program modern weather-alert receivers to alarm for some warning types, but ignore others.

In historical terms, items appearing in the pre-1966 Weather Bureau publication *Topics* were of great benefit in tracing the early development of VHF-FM weather

broadcasting. *Topics* began publishing in 1915 as a monthly organ titled *Weather Bureau Topics and Personnel* with the stated mission of offering personnel news and a “series of short notes and comments designed to be helpful, not only to the station officials, but to the Central Office, in the conduct of Weather Bureau Affairs...”¹² It continued monthly publication under the shortened title *Weather Bureau Topics* from January 1948 until January 1961, and then became, simply, *Topics* in February 1961. *Topics* went bimonthly with its October-November 1964 issue, and ceased publication entirely with the July-August 1965 issue. In its pages researchers will find announcements of retirements, promotions, transfers, and so forth, along with progress reports on programs old and new, including early efforts to establish a VHF-FM Weather Radio program.

Another periodical, an annual titled *Operations of the Weather Bureau*, and beginning in 1970, *Operations of the National Weather Service*, provides yearly summary information on the status of all major programs within the agency. *Operations* began publication in 1966 in response to requests from Weather Bureau executives at the Director and Deputy Director level who stated their need for a yearly reference report on major Weather Bureau programs.¹³ From these volumes the author pinned down dates on some of Weather Radio’s milestones, including the numbers of transmitter installations through various years, and the vitally important inauguration of tone alerts first described in the 1971 issue.

¹² Cumberpatch, Mary Lou. NOAA Central Library staff. Email to the author. 25 Nov. 2002.

¹³ Estelle, Earl. Chief of Public Services, Meteorological Services Division, National Weather Service (retired). Telephone interview. 25 Nov. 2002. Estelle said he was assigned by his superiors to create *Operations of the Weather Bureau*.

The Weather Service devotes attention to the specific field of disaster preparedness in its quarterly publication *Aware*, an organ whose stated mission is “to enhance communications within the National Weather Service and with the natural hazards community.” In its pages the researcher will find descriptions of local, state, and national disaster-preparedness initiatives, including progress reports on the NOAA Weather Radio program. These include news items detailing program milestones achieved by the Weather Service, anecdotes reported by the public bearing out Weather Radio’s life-saving merits, and short features telling of Weather Radio promotional efforts by officials and private citizens across the nation: projects by municipal authorities intent on placing weather-radio receivers into schools, reports on state efforts to secure additional transmitters, civic-club activities promoting Weather Radio, and so on. *Aware* is a continuance of a periodical published, until 1990, under the title *Disaster Preparedness Report*. The author managed to wrest some rare weather-radio receiver sales figures from that earlier title. Somewhat surprisingly, *Disaster Preparedness Report* was no where to be found at the NOAA Central Library, but the federal stacks at Davis Library, University of North Carolina at Chapel Hill, contained issues going as far back as September 1984.

Persons wishing to remain current on Weather Service developments are advised to seek out *NOAA Magazine*, whose publication dates from the creation of NOAA itself in 1970. *NOAA Magazine* is a monthly feature publication with updates on weather-related topics, including climate, environmental prediction and research, hurricane research, and fisheries statistics—as well as status reports and success stories from the NOAA Weather Radio program.

NOAA Report, “a monthly publication for NOAA employees” from that agency’s Office of Public and Constituent Affairs, began publishing as a weekly periodical in 1986 and went monthly in 1992. Like the other journals mentioned above, its back issues contain a number of useful Weather Radio updates. *NOAA Report* is now available online, with electronic archives going back to 1993. If the researcher requires earlier material (from this or most any other Weather Service publication) a trip to the library is in the cards.

Two reports bearing directly on the technology of modern dissemination are worthy of attention. Foremost, *Effective Disaster Warnings: Report by the Working Group on Natural Disaster Information Systems, Subcommittee on Natural Disaster Reduction*, contains prescient, even visionary material on the potential for warning dissemination systems in a digital age. Acknowledging America’s public-private dissemination arrangement, this 56-page report, produced in 2000 by a presidential council and numerous cooperating federal agencies, envisions a seamless, ubiquitous communications infrastructure that can deliver urgent messages to targeted recipients wherever they may be and under whatever circumstances. The other report of note grew out of the Gore Initiative, a call to action by Vice President Al Gore following the 1994 Palm Sunday tornado disasters. Titled *Saving Lives with an All-hazards Warning Network*, this 40-page report was published in 1999 by a committee from the Commerce Department, the USDA, and FEMA. It concentrated almost exclusively on ideas for effectively leveraging the existing NOAA Weather Radio network and further building the system’s reach. Among its recommendations, the report called for intensified efforts to place weather-radio receivers in places where large numbers of people gather, as

well as in private homes and offices. But more futuristically, this report, like the one previously noted, urged faster delivery to market of smart receiving devices such as smoke detectors, television sets, and car stereos featuring Weather Radio alert capabilities. Many of these ideas were reiterated in a “comments document” by a group of Weather Radio receiver manufacturers responding to a Department of Justice solicitation for feedback on its recently announced Homeland Security Advisory System (HSAS)—a document the author obtained from a cooperative, but anonymous source. Constructive criticism of the proposed HSAS itself can be found in the comments by the Partnership for Public Warning, a non-profit group comprising government, academic and industry representatives active in promoting ideas for a national, twenty-first century warning-dissemination infrastructure. Those comments are accessible via the PPW’s web site.

One other report is recommended for students harboring a more general warning-sociology interest: “Communication of Emergency Public Warnings” by Dennis S. Mileti and John H. Sorensen, written in 1990 under contract to the Oak Ridge National Laboratory, runs to more than 160 pages in surveying best practices in the field of public warnings. This document draws on “more than 200 studies of warning systems and warning response” to describe the variances in warning components (such as composition of content, credibility of originator, and medium of dissemination) and how these factors affect the public’s willingness to heed; how characteristics of the warned population, such as race, gender, and age, can also aid or detract from attention paid to the warning; and how “special systems such as tone-alert radios are needed to provide rapid warning” capability. While the material relating specifically to NOAA Weather Radio is thin,

students of warning sociology and human behavior will find much room for exploration in the report's prodigious bibliography.

For the dry details on procedures by which the Emergency Alert System operates, readers should refer to the Federal Communication Commission's EAS Handbooks for AM and FM, television, and cable operators; and for information on the regulations stipulating EAS participation and compliance, readers will wish to download the latest copy of the FCC's Part 11 EAS Rules document. The National Weather Service makes its operational procedures available by Internet, for those with the patience (or the contacts) to find them. Fascinating details on Weather Radio dissemination policy and procedure, including contingencies for a Weather Radio role during nuclear and terrorist attack, can be found in the document "National Weather Service Instruction 10-1710." This document also relates the wider range of more work-a-day matters governing the operation of NOAA Weather Radio transmitters, such as descriptions of permitted and proscribed content, guidelines for message composition and prioritization, as so forth.

For a broader perspective of modern National Weather Service capabilities, and the plans for improving those capabilities further, *Vision 2005*, the Weather Service's strategic plan for years 2000-2005, makes for beneficial reading. Here the Weather Service presents evidence of its improving performance, especially its lengthened lead times for storm warnings, and it declares goals and benchmarks for improvements going forward. One example: "Increase the probability of detection of winter storms to 90 percent and the lead time to 18 hours" by 2005. Other goals range from the specific ("develop a course in 'Application of Climate Data' for international students") to the more general ("advocate open exchange of information worldwide"), and although the

document is written in a tone of executive-speak, the reader can get from it a sense of where the agency intends to take itself in the next several years.

For historical materials relating to the Weather Bureau's creation and early years, two books in particular were found to be useful, and this researcher regrets that both authors are deceased (one recently), because their friendship might have proven a considerable boon to this project. Patrick Hughes wrote *A Century of Weather Service: A History of the Birth and Growth of the National Weather Service, 1870-1970* as a NOAA insider. Perhaps for that reason his volume is loving in its treatment of the Weather Service, and Hughes does not delve too heavily into matters of controversy. Nor, as a historical survey, does this book go into great detail on particular programs within the agency. VHF-FM weather broadcasting by the Weather Service is mentioned not at all, which is understandable given Weather Radio's tiny profile when the Hughes book came out. Still, the book rates commendation for its engaging style, historical photographs, and wide-ranging, if broad-brush, rendering of the National Weather Service's evolution from a mid-nineteenth century military telegraph service into a modern staple of Americans' daily lives.

Historian Donald R. Whitnah published his volume, *A History of the United States Weather Bureau*, in 1961. Here is a first-class history book, scrupulously researched and footnoted (there are 958 footnotes in 267 pages of text)—a consciously academic work deserving a place on the bookshelf of anyone interested in the nation's weather-service history. (An Internet search located three volumes for sale with used-book services, ranging in price from \$25 to \$89.) Whitnah, in fact, wrote in his preface, “the present manuscript is a revision and extension of my dissertation of the doctor of

philosophy degree in history at the University of Illinois.” It was a degree that eventually led him to chair the history department at the University of Northern Iowa, whence he retired in 1992. Whitnah died only this past July. Most striking about Whitnah’s book is his prodigious and obvious legwork, drawing as he does not only upon an abundance of old newspaper articles and official government memoranda and reports, but heavily too upon the personal memoirs and letters of individuals who acted instrumentally in nurturing the Weather Service’s early and middle life. Whitnah does not shy away from controversy; in fact, at times, he seems to relish exposing the comical underworld of bureaucratic intrigue. As with the Hughes book, Whitnah’s can offer no help with the NOAA Weather Radio program itself. But for researchers wishing to understand the Weather Service’s administrative evolution—those who can bear to see how sausage gets made—Whitnah’s book may be unsurpassed.

A couple of other history books deserve some mention, though they proved less bountiful to the project at hand than the two volumes described above. The editors of the *Army Times* published a *History of the U. S. Signal Corps* in 1961 that was mainly useful for background information, and for certain details concerning the life of Signal Corps founder Albert Myer. In addition, Gustavus Weber’s 87-page monograph *The Weather Bureau: Its History, Activities, and Organization*, published in 1922, is worth seeking out for its snapshot of early Bureau organization, and for information on a number of Bureau founding fathers.

The author could find no work in the literature of comparable purpose and scope to the one here submitted.