



Promising Practices for Hazard Communications in Marion County

A Terminal Project Report in Partial Fulfillment of the Masters of Community and Regional Planning Degree Program

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Image Source: Oregon State Parks & Recreation

Executive Summary

This report explores opportunities to enhance interagency and public communications about hazards in Marion County, focusing on communications and communications planning that occurs during the preparation and mitigation phases of hazard management. Research activities included document review, twelve (12) stakeholder interviews, and GIS analysis.

Research revealed that a diverse range of communicators, across several scales of governance, share information across a wide variety of platforms. These platforms range from high-tech multimedia, to in-person meetings.

While communicators share the same target audiences, as well as an all-hazards approach to communicating, they diverge in their rhetorical approaches. Emergency Management professionals favor a range of persuasive techniques, including both narrative and fact-based communications, whereas Public Health and Public Information professionals expressed caution with using story-telling to encourage hazard preparation and mitigation activities. All professionals discussed using the federal Incident Command System (ICS) to coordinate communications across agencies, and many speculated that there is an opportunity to better leverage ICS by convening communicators early to maximize lead-time on messaging. Most interviewees also discussed the benefits and pitfalls of using community liaisons to convey messaging to limited English-speaking populations.

Based on these findings, Marion County might consider taking the following actions:

- (1) Prioritize funding for hiring and training community advocates at an hourly rate
- (2) Link seasonal hazard awareness campaigns to pre-scheduled community events
- (3) Facilitate a dialogue between public health, public information, and emergency management professionals to integrate narrative and fact-based communication styles
- (4) Develop and regularly update template text to use following crises
- (5) Identify opportunities to practice ICS roles during routine operations, or in response to chronic hazards
- (6) Ensure that public health and public information professionals are represented at monthly meetings
- (7) Adopt multi-modal communication tactics to ensure audiences clearly understand information

Chapter 1: Introduction

Managing natural and human caused hazards involves targeted, coordinated activities to ensure community health and safety. These activities range from reducing community exposure to hazards via mitigation projects and policies, to establishing protocols for responding quickly and effectively when hazards occur. Hazard management often involves a wide range of public and private partners, who coordinate efforts keep their communities safe. ***This project interrogates the communication practices that inform hazard management, both among agencies, and between agencies and the public.***

Emergency management is the practice of mitigating, preparing for, responding to, and recovering from system shocks and crises (Veil, 2013). All four phases of emergency management require some element of communications strategy—whether encouraging community leaders and residents to engage in mitigation practices, advising constituents on how to prepare for an event, alerting populations of hazardous conditions, or connecting people to recovery resources.

Effective hazard management requires effective communication. Optimal hazard communication strategies ensure that target populations and stakeholder agencies accurately and actionably understand how to reduce or handle risks. Equipping all relevant constituents, stakeholders, agencies, and organizations have correct, up-to-date, and actionable information requires careful and well-considered coordination.

Research Focus

In 2018, a water advisory resulting from a blue-green algae bloom in Detroit Reservoir, which supplies water to many of Marion County's residents, revealed an opportunity to enhance hazard communications. County, municipal, and state partners used inconsistent public alert systems and protocols, which resulted in conflicting public messages. These communications resulted

in confusion and panic for constituents, including an influx of 9-1-1 calls that overwhelmed the system, and a run on stores for bottled water.

During initial meetings with former Marion County Emergency Manager, Edwin Flick, he discussed the water advisory as presenting an opportunity to improve the coordination of inter-agency communications. Flick also discussed ongoing efforts to enhance public information campaigns surrounding household and neighborhood hazard preparation and mitigation. In particular, he mentioned The Statesman Journal's ongoing Think Big campaign, encouraging constituents to assemble disaster preparedness kits, seasonal wildfire prevention campaigns, and efforts to reach limited-English speaking constituents.

This project explores opportunities to improve ***interagency*** and ***public-facing*** hazard communications in Marion County. The project focuses primarily on communications that occur during the hazard ***preparation*** and ***mitigation*** phases—hazard management activities that occur before a crisis event.

By focusing on pre-crisis communications activities, the project investigates opportunities to practice and improve processes during day-to-day activities. While crisis communications protocols describe communications during and after hazard events, these protocols can be established, refined, and practiced before the event occurs to ensure seamless deployment when the time comes. That is, practicing enhanced communications during routine operations improves agencies' ability to quickly and accurately communicate during or after a crisis.

Enhancing communications during pre-event phases of hazard management creates a wide range of benefits for partner agencies and constituent communities alike, including, but not limited to:

- Reduced inconsistencies in public information campaigns and emergency alerts
- Improved understanding of shared protocols and chains of command
- Reduced community exposure to hazard events via successful and well-managed mitigation projects
- Improved preparation for hazard events, which in turn reduces negative impacts on people and property
- Enhanced deployment of county partnerships during all phases of hazard management

and a table of selected census tracts to provide targeted recommendations for outreach. The sixth and final chapter provides implications and conclusions, formatted as a high-level summary of the project.

Relevance of Hazard Communications in the Planning Field

As the frequency, scale, and severity of natural and man-made disasters increase, community vitality relies more and more on effective disaster planning. Hazards create complex, often cascading community impacts, that challenge planners to take exceptional care in crafting land use code, and challenge emergency managers to attentively consider the relationships among urban systems.

RESEARCH QUESTION:

What opportunities does Marion County have to improve *interagency* and *public-facing* hazard communications during the *preparation* and *mitigation* phases of hazard management?

Report Structure

The first chapter of this report details the research focus, relevance in the planning field, and background and context of the project. The second chapter provides information about the disciplinary frameworks that inform the project, including information from the fields of emergency management, hazard planning, and communications. The third chapter provides a literature review focusing on best practices for public outreach, hazard communications, incentivizing household hazard management, and disciplinary trends. The fourth chapter details project methods, including GIS analysis, interviews, and project limitations. The fifth chapter provides research findings, which focus on strategies that communicators currently use, strategies communicators might consider employing, target audiences, and potential methods to reach them; this chapter closes with several choropleth maps

The new normal of more frequent, more intense hazard occurrences challenges both disciplines to optimize interdisciplinary and public communications, with the objective of creating targeted policies and programs to safeguard community vitality through crises (FEMA, 2011).

Successful planning and successful emergency management are contingent upon one another. Both disciplines require effective internal, inter-agency, and public communications to serve their constituents. Cooperation among planners and emergency managers improves the efforts of both. Emergency management expertise ensures that land use code considers hazard likelihood when siting critical facilities, residential developments, and other community assets. Planning capacity enables emergency managers to mitigate risks by applying overlay zones, mandatory setbacks, and conditional mitigation infrastructure.

Community stability is a cornerstone of effective planning. Effective hazard management allows

planning professionals and local government to anticipate future conditions and prevent loss of life and property. Streamlining interagency and public communications can facilitate a more thorough, nuanced understanding of how hazards and vulnerabilities overlap to create risk, and how development siting, regulatory strategies, projects, and policies can support risk reduction.

Background and Context

A community profile of Marion County's demographic, economic, and hazard planning context can be found in Appendix 1. The following section details the water advisory communications crisis that occurred during May and June of 2018, and precipitated County Emergency Management's interest in this project.

Communication Issues during the 2018 Water Advisory

From May to July of 2018, Marion County experienced a water quality crisis resulting from blue and green algae blooms in the county's water source, Detroit Lake. Detroit Lake is a reservoir fed by the North Santiam River, and has supplied the surrounding area with drinking water for over eighty (80) years. The Salem Public Works department identified harmful levels of cyanotoxins in the water, exceeding safe-drinking thresholds for vulnerable populations. Elevated cyanotoxins can cause stomach pain, vomiting, diarrhea, and liver and kidney damage if consumed via water drinking (EPA).

Following the discovery of elevated levels of cyanotoxins in the water, a series of public and inter-agency communications occurred. Agencies involved in these communications included the Oregon Health Authority (OHA), Oregon Office of Emergency Management (OEM), and Governor's Office at the State level, Marion County, several county School Districts, and several departments

at The City of Salem including the Department of Public Works, Emergency Response and Preparedness, The City Manager's Office, and the Mayor and City Council. Tools and protocols used to address communications regarding the issue include the following:

- Integrated Public Alert Warning System (IPAWS) – An alert aggregator and gateway. Public officials send messages to IPAWS using a common format, and IPAWS aggregates alerts and then disseminates information using the following pathways:
 - Emergency Alert System (EAS) - A public alert and warning system broadcast over a range of channels, including but not limited to cable television systems, wireless systems, and satellite radio systems.
 - Wireless Emergency Alerts (WEA) – Used for Amber Alerts and Civil Emergencies, WEA texts are restricted to a 90 character limit. Default text includes the alert type and “in this area until” a specified time, and instructs the recipient to “prepare for action” in the case of a Civil Emergency.
 - National Oceanic and Atmospheric Administration (NOAA) Weather Radio (NWR) – A nationwide network of radio stations broadcasting consistent weather updates from the most proximate National Weather Service office. NWR coordinates with the Federal Communication Commission's EAS.

Timeline of Events: 2018 Marion County Water Advisory Communications Crisis

Between May 23, 2018, and July 3, 2018, Marion County experienced an ongoing need for both interagency and public-facing hazard communications regarding cyanotoxins levels in the water supply. These communications had varying degrees of effectiveness, with a major breakdown in communications at both the public and the

interagency level occurring on May 29, 2019. Integrating multiple timelines exploring the communications activities surrounding the algae bloom highlights the complexity of communications systems and protocols involved in managing public alert systems and ensuring timely, consistent, and clear communications with the public. Figure 1 details the public-facing and interagency communications surrounding the algae bloom.

Community Impacts of Water Advisory Communications

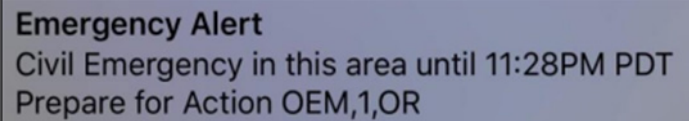
The City of Salem developed a Water Advisory After-Action Assessment through the Novak Consulting Group. Oregon Emergency Management developed an After Action Report and Improvement Plan (AAR/IP). These documents evaluate communications processes and identify the sources of failures and opportunities to improve future communications:

- The abbreviated Wireless Emergency Alert (WEA) message did not provide adequate or clear guidance for the public to understand the event or know what action to take
- WEA and Emergency Alert System (EAS) messages did not match, leading to confusion
 - o The City of Salem does not currently have access to IPAWS, creating a challenge to consistency
- Relevant agencies must pre-establish a system to contact critical staff when routine communications channels are strained or inoperable
- Establishing a common location to view event status, current actions, and recommendations is critical to ensuring consistent, clear communications

The incorrect WEA message sent to three counties at 8:30pm on May 29, 2018, depicted in Figure 3, resulted in an influx of 9-1-1 calls, overwhelming emergency systems. A corrected alert was sent out four hours later, following a second WEA (see Figure 4) clarifying the nature of the emergency. As described by the City of Salem After-Action

Report, messaging constituted an “underreaction” followed by [an] emotional ‘DO NOT DRINK THE TAP WATER’ headline” which “jolted public confidence” (2018).

Figure 2. Emergency Alert Message

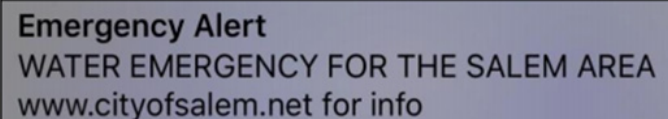


Emergency Alert
Civil Emergency in this area until 11:28PM PDT
Prepare for Action OEM,1,OR

Source: City of Salem, Water Advisory After-Action Report

As depicted in Figure 3 a second WEA sent out at 9:00pm on May 29, 2018 clarified the nature of the emergency.

Figure 3. Corrected Wireless Emergency



Emergency Alert
WATER EMERGENCY FOR THE SALEM AREA
www.cityofsalem.net for info

Source: City of Salem, Water Advisory After-Action Report

These two communications and the resultant confusion and system strain caused by the initial WEA alert highlight the role of character limitations in heightening misinformation and confusion. Further, the events of May 29, 2018 reveal the potential for pre-event protocol clarification, systematic consistency among agencies and scales of governance, and pre-practicing crisis roles as means of ensuring effective crisis communications.

Figure 1: Timeline of Water Advisory Event Highlighting Communications Activities

<p style="text-align: right;">May 25</p> <p>DPW decides to hold advisory. The City of Salem issues a drinking water advisory for vulnerable populations (including children and the elderly)</p>	<p>May 23 Oregon Health Authority (OHA) issues a recreation advisory for Detroit Lake; the Director of Public Works (DPW) informs Salem’s City Council of the advisory The City of Salem issues a press release stating that City water is safe to drink</p>
	<p>May 29 OHA, DPW, City of Salem Emergency Management (EM), and EPA meet School District notifies parents of the water advisory OHA reviews “Do Not Drink the Water Advisory” and the City of Salem releases the advisory City of Salem EM requests that Marion County release an IPAWS alert about the advisory OEM directs Marion County to first use Marion Area Multi-Agency Emergency Telecom (METCOM) to distribute the alert. Marion Area Multi-Agency Emergency Telecom attempts and fails to send an alert; finding METCOM inoperable, the County and City request assistance from Oregon Emergency Management (OEM) OEM fails to access IPAWS and contacts FEMA for assistance At 8:30 pm OEM sends an incorrect Wireless Emergency Alert (WEA) message warning of an unspecified “civil emergency” to phones across three counties; the alert appeared correctly on televisions, but was shortened on cellular devices (see Figure 3) By 8:48 pm, Oregon Emergency Response System (OERS) reported receiving over 120 pending calls regarding the alert At 9:00 pm, a WEA message is sent out indicating a water emergency for the Salem area, and directing recipients to the City website (see Figure 4) At 9:30 pm OEM sends a corrected IPAWS message</p>
<p style="text-align: right;">May 30</p> <p>City of Salem hosts a “contentious” press conference OHA activates Joint Information Center (JIC) and Incident Management Team Marion County activates its Emergency Operations Center (EOC)</p>	
	<p>May 31 Governor declares a State of Emergency National Guard troops distribute water</p>
<p style="text-align: right;">June 1</p> <p>City of Salem opens water stations at 9am instead of 7am, as initially scheduled</p>	
	<p>June 2 City of Salem lifts the advisory after several days of tests that show results below the EPA threshold for cyanotoxins</p>
<p style="text-align: right;">June 6</p> <p>Tests show that cyanotoxin levels have again elevated beyond the safe threshold for drinking water City of Salem activates its JIC City of Salem reinstates the drinking water advisory (See Appendix 3) Marion County notifies residents of water distribution centers</p>	
	<p>June 28 OHA issues temporary statewide cyanotoxin rules</p>
<p style="text-align: right;">July 3</p> <p>City of Salem lifts the drinking water advisory</p>	

Source: City of Salem After Action Assessment Report; Oregon Emergency Management After Action Report and Improvement Plan

Chapter 2: Disciplinary Frameworks - Emergency Management and Communications

Several ideological and disciplinary frameworks inform this project, including the all-hazards approach, the hazard management cycle, incident command structure, hazard vulnerability assessment process, and hazard mitigation theory. The following section explains these frameworks.

Communications in the Emergency Management Cycle

As shown in Figure 4, the four phases of hazard management have distinct and interrelated communications components. Pre-event communications often involve using rhetorical strategies and persuasion to encourage action on the part of both constituents and stakeholder agencies. Post-event communications involve concise, timely, and accurate alerts and informational updates, as well as instructions for accessing and using recovery resources and tools.

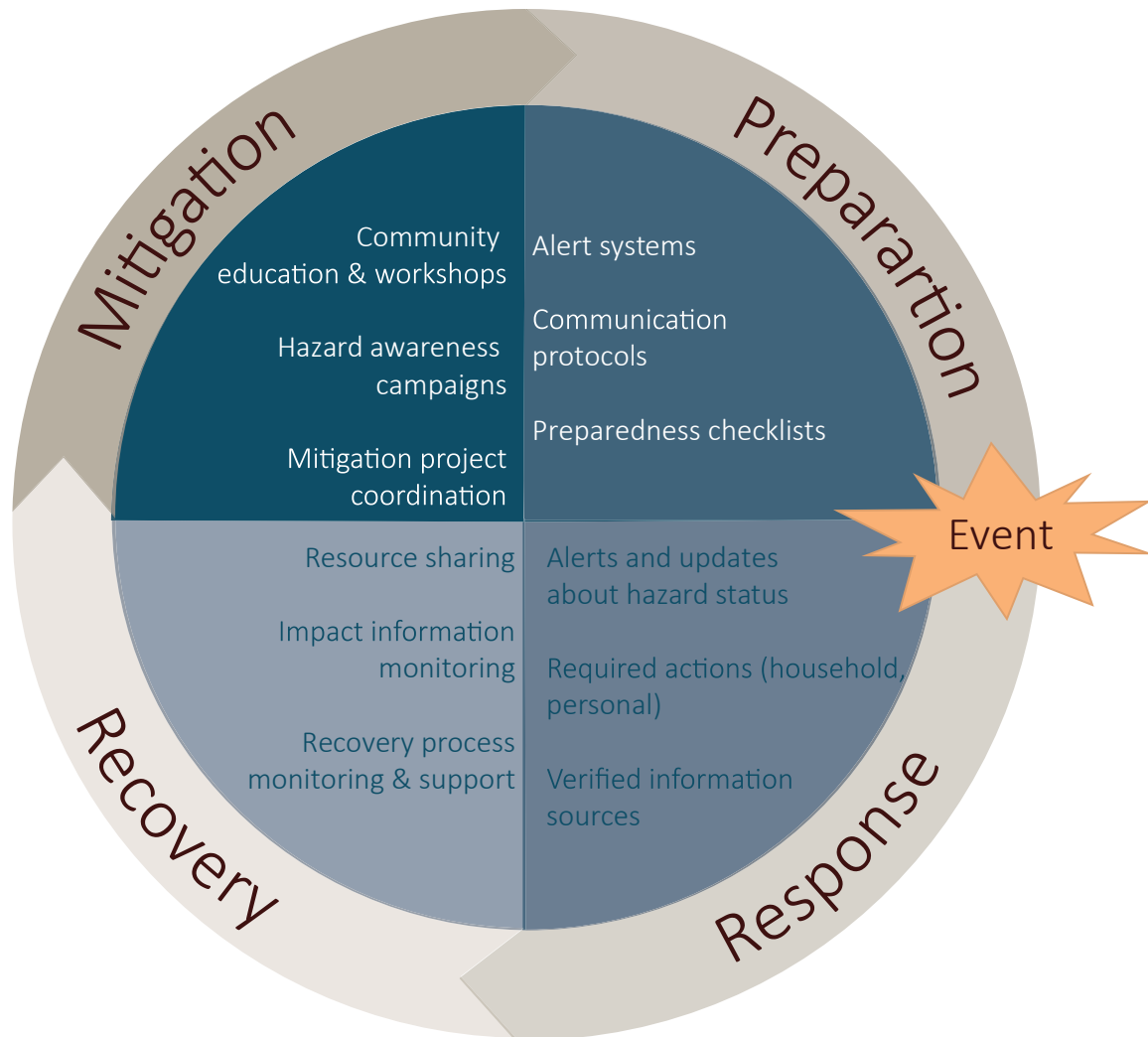
Many mitigation projects and policies, including those in Marion County's Natural Hazard Mitigation Plan, involve public education, which requires communicators to identify audiences and craft targeted workshops and lessons to empower those audiences to reduce their exposure to hazards. Larger scale mitigation projects often involve multiple agencies including land use planners, engineers, community leaders, and private developers; coordinating among these stakeholders to arrive at feasible, effective implementation requires skilled communication (FEMA, 2000; FEMA 2007; interviews).

Community education plays a major role in the preparation phase. Hazard communicators can prepare their constituents by informing communities of their exposure to specific hazards, as well as optimal strategies to prepare for and respond to those hazards. Constituents might benefit from workshops helping them to prepare and assemble two-week ready kits, which contain the supplies necessary in the event of a two-week cessation of public services. Constituents may also enhance their preparedness by learning about communications protocols and support agencies that would provide information and services following a crisis; these preparation activities can help reduce misinformation, confusion, and potential panic (FEMA 2007; interviews).

The challenge of encouraging action prior to direct hazard experience informs the pre-event focus of this research. Direct experience of a hazard provides a powerful impetus for taking action to prepare for or mitigate future hazards (Gotham, et al., 2017). However, optimally effective mitigation and preparation occurs before a hazard event. The difficulty of persuading community members to take on the expense, time commitment, and effort of practicing hazard mitigation and preparation underpins the difficulty of this research.

This focus also provides a useful parameter for focusing research and questions, and seeks to make use of the researcher's prior career and academic experience in marketing, composition, and communications.

Figure 4. Communications in the Hazard Management Cycle

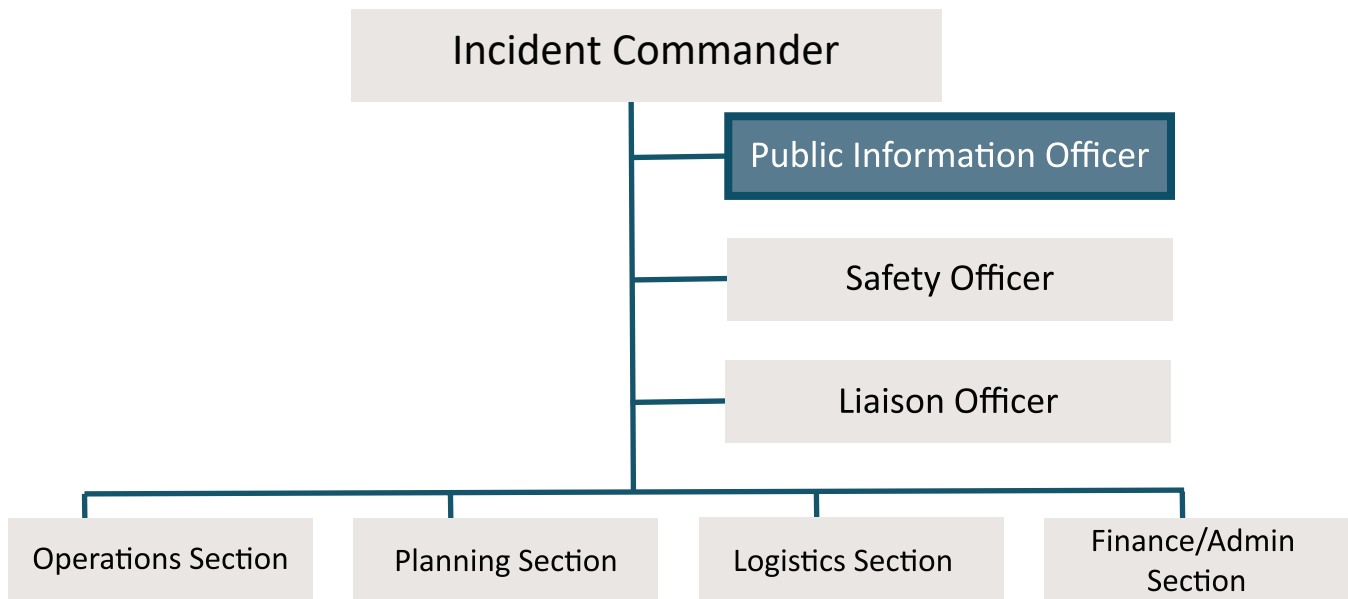


Source: Oregon Partnership for Disaster Resilience; Jessica Morey-Collins

Communications in an Incident Command System (ICS)

The Incident Command System (ICS) standardizes the organization and management of messaging to ensure consistency. The ICS manages hazard response and recovery by “integrating facilities, equipment, personnel, procedures, and communications” into a shared organizational structure. This structure most effectively leverages an agency or community’s resources when roles are established and practiced prior to a crisis (FEMA, 2007). In an ICS, communications are managed by a Public Information Officer. Figure 5 shows where a Public Information Officer falls within a typical ICS for a small-scale or local hazard event:

Figure 5: Public Information Officer within ICS



Source: FEMA Basic Guidance for Public Information Officers (National Incident Management System): 2007

Joint Information Centers

Since FY2006, federal funding for state, local, and tribal preparedness grants has been conditioned by compliance with the National Incident Management System (NIMS). This financial incentive has provided a compelling and effective impetus for widespread implementation of Incident Command System (ICS) trainings throughout agencies that engage in hazard management activities. In effect, ICS has been institutionalized throughout governance systems (FEMA, 2004).

The communications structure established by NIMS is the Joint Information Center (JIC). JICs provide critical organizational functions for crisis communications. Based on Incident Command System structure, JICs allow agencies to swiftly integrate messaging among stakeholder organizations, to ensure that the public received accurate, timely, and consistent information. However, for JICs to have this beneficial impact, they must be established early on during the hazard event. If the JIC is established after public communications have been issued, agencies may be too late to reap the benefits of centralized command, interdisciplinary expertise, and expanded reach via partner platforms.

Regardless of the efficacy (or lack thereof) of local implementation strategies, the institutionalized nature of NIMS makes JICs a key component of hazard response communications, and successful integration of NIMS training is a key component of hazard preparation.

One crucial element of effective implementation of ICS systems is training. Relevant personnel should be trained in Incident Command before a hazard event occurs. There are four (4) required trainings for participation in an ICS system:

- Introduction to the Incident Command System
- ICS for Single Resources and Initial Action Incidents
- Intermediate Incident Command System
- National Incident Management System (FEMA, 2007)

These trainings are available online, and provide agency representatives with working knowledge of ICS structures, including JICs. Ensuring that key staff participating in these trainings equips agencies with the ability to swiftly and effectively stand up an ICS, such as a JIC, following a hazard event.

A Public Information Officer (PIO) leads the JIC.

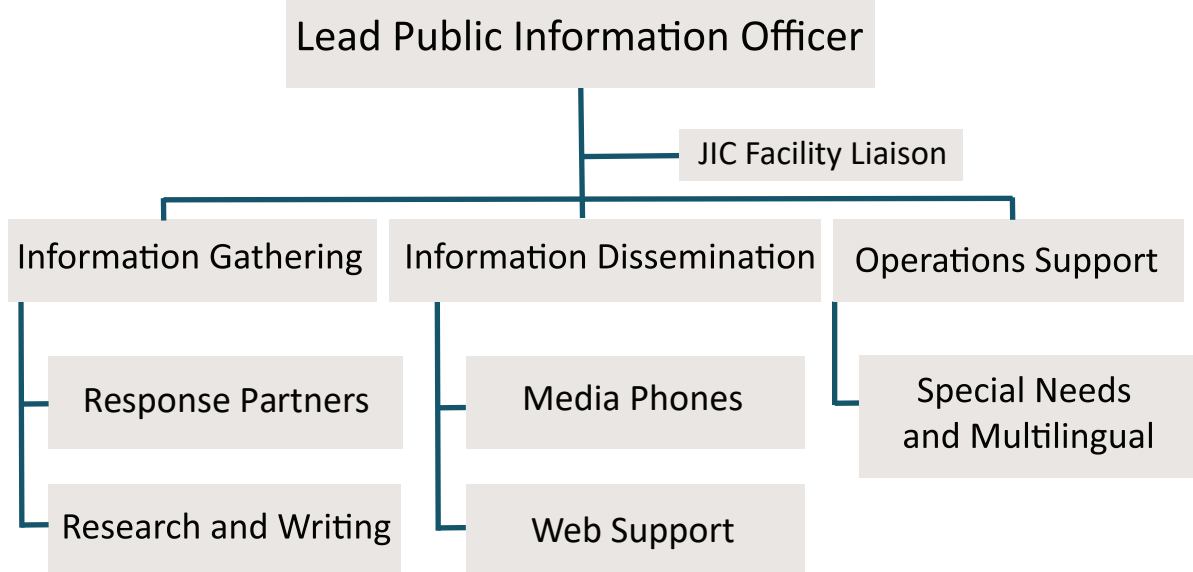
FEMA recommends that PIOs plan, develop, facilitate, and evaluate exercises to test public information systems and capabilities during routine operations, ensuring effective deployment during hazard events. According to FEMA, PIOs should also play a large role in disseminating preparedness and mitigation information to the public, in addition to orchestrating and executing press releases, situation reports, and other emergency information (2007).

JIC Structures Based on Incident Scale

The structure and extent of a JIC depends on the scale and timeline of an incident. For the initial response to an incident, a JIC involves ten (10) professional functions, with the Public Information Officer acting as the lead. For incidents that escalate, persist, or expand in their geographic extent, seventeen (17) professional functions manage crisis communications. Ideally, each of these roles is supported by redundant staff, with multiple agency employees able to fill any given role. This redundancy ensures that there’s an available “bench” to relieve JIC staff during ongoing incident communications scenarios.

Figure 6 shows a JIC structure for an initial response or local incident. The JIC is led by a Public Information Officer (PIO) and supported by roles that facilitate and carry out the gathering, vetting, and dissemination of information.

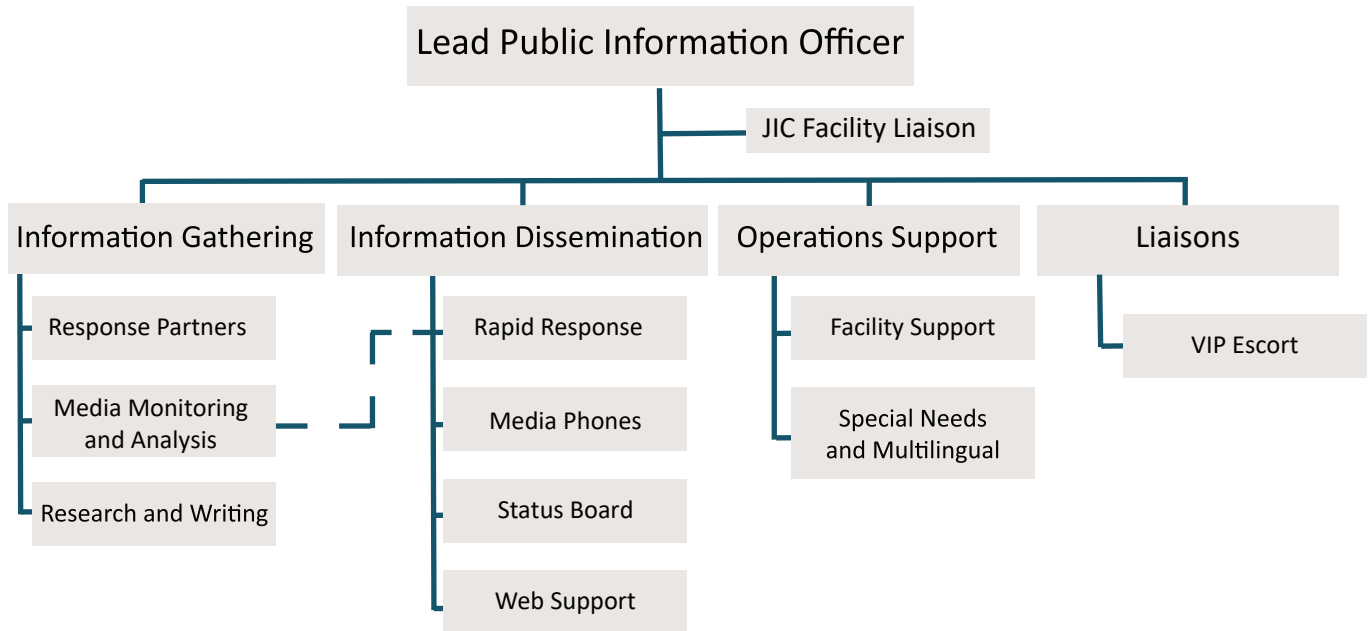
Figure 6: JIC Structure for Initial Response or Local Incident



Source: FEMA Basic Guidance for Public Information Officers (National Incident Management System): 2007

Figure 7 shows a JIC for an escalating incident. Roles are added to expand the capacity of all activities, including monitoring of media response, facility management, and dedicated liaisons who can coordinate among agency communicators and community leaders and subject-matter experts.

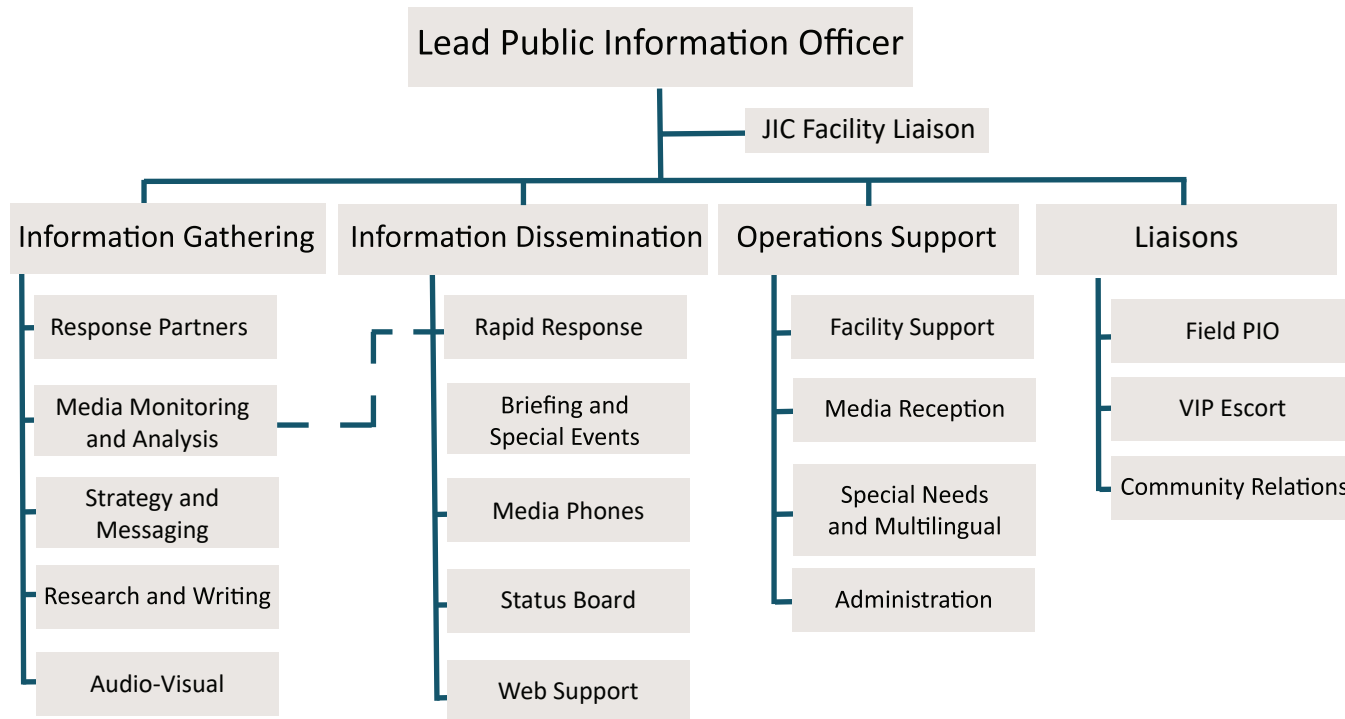
Figure 7: JIC Structure for Escalating Incidents



Source: FEMA Basic Guidance for Public Information Officers (National Incident Management System): 2007

Figure 8 shows JIC structure for a large-scale incident, which continues to accrue roles to support communications activities. Additional roles relate to strategy, technology, and bureaucratic functions.

Figure 8: JIC Structure for Large Scale Incidents



Source: FEMA Basic Guidance for Public Information Officers (National Incident Management System): 2007

While the FEMA handbook for Public Information Officers shows these roles as detailed above, flexibility may allow for agencies to incorporate roles that best suit their target audiences for a particular incident. For example, audio-visual support may be warranted for events that impact communities with large populations of persons with sensory impairments, the elderly, or persons with limited literacy.

JIC Types within the National Incident Management System

Within NIMS, several JIC structures exist, and are used for varying situations and purposes. FEMA’s handbook “Basic Guidance for PIOs” details the roles, structures, and styles of JICs. This section details these structures.

Incident – Depending on the scale and severity of the event, incident specific

JICs coordinate Federal, State, tribal, and local agencies to streamline media access. These JICs are typically located on scene, and coordinate information from relevant experts and stakeholders to ensure that consistent, up-to-date information reaches the public both via the media and direct outreach.

Virtual – If a physical on-scene location is not possible, an agency may opt to establish a virtual JIC, which uses digital and telecommunications infrastructure to connect PIOs with relevant stakeholders and one and other.

Satellite – Satellite JICs are smaller scale structures that support and report to the incident JIC. Generally, these JICs are sited closer to the incident.

Area – In an event that multiple incidents occur over a broad geographic area, a JIC sited near the largest media market can provide regional public information support on a local, State, or multi-state basis. Large-scale storm damage or multi-state wildfires are two examples of crises that might require public information agencies to stand up this JIC type.

Support – Support JICs supplement communication efforts of multiple Incident JICs in multiple States when an area JIC is not appropriate. These JICs offer staff and resources to areas outside of the immediate incident site.

National – Staff from Federal departments and agencies run national JICs, which coordinate communications for incidents that require Federal support and require information coordination over longer periods of time (weeks or months) (FEMA, 2007).

Communication Strategies

Several common tenets of effective communications inform this project. Assessing common communications strategies for applicability to public outreach and information campaigns provides an interdisciplinary approach that yields unique insights into current practices, and potential areas of improvement. Whereas communications in the marketing discipline, as outlined by Shyduik, seek to encourage specific consumer behaviors, the same strategies can serve to encourage constituents to undertake the time, effort, and expense of hazard preparation and mitigation. FEMA's guidelines for Public Information Officers (2007) discuss the application of communication strategies to more clearly and effectively communicate with constituents.

The tenets of communications that apply to this project include:

Targeting – Identifying and targeting audiences should involve depth and nuance of consideration beyond demographics, such that communicators respond to behaviors, situational norms, and community values.

Engagement – Effective communications and public outreach professionals craft messages that invites/incites feedback and participation. They use information channels and situations that allow for back-and-forth. Consider campaigns the start of a conversation, not a one-way conveyance of information.

Conversion – Conversion commonly refers to the transformation of content into audience action. Marketers encourage consumer behaviors by creating simple, easy-to-navigate portals for purchasing products. Public health and safety professionals can do the same by clearly, succinctly encouraging simple, accessible household actions. Tailoring recommendations to community feasibility can enhance results—in particular, identifying low- and no- cost

Analysis – Follow up on campaigns with back end analysis that enables the calibration and improvement of future efforts. An investment in the data collection that shows the extent of a campaign's effectiveness is an investment in the community's safety and responsiveness.

Consistency – Communicators leveraging multiple agencies and organizations to convey a message must take care to ensure that messages are consistent. Mixed messaging can cause undue confusion and panic, whereas consistent messaging reinforces confidence in community leadership and public outreach.

Technology – Now more than ever, there are a plenitude of channels available to reach constituents. This is as much an obstacle as it is an opportunity, in that selecting particular communication modalities will mean more effectively reaching some constituents, while potentially leaving others out (Shyduik, 2014; FEMA, 2007).

These strategies serve as the evaluation criteria with which I evaluated Marion County's hazard communication strategies.

Chapter 3: Literature Review

This literature review explores research and best practices related to the conveyance of public information regarding hazards. This review highlighted four (4) main categories, summarized in the bullet points below:

- Promising practices for public outreach and hazard communications
- Promising practices to incentivize hazard mitigation efforts
- Strategies to ensure consistent messaging among partner agencies
- Current conditions in the fields of hazard management and community resilience

Literature Review Themes

An initial literature review consisted of twenty-three (23) peer-reviewed articles and studies, and resulted in findings detailing:

- Optimal timing for pre- and post-hazard communications
- Competing and/or coordinated program evaluation focuses including:
 - Theoretical frameworks
 - Practical applications
- The role of new media technology in disseminating information
- The role of GIS and visual communications in enhancing accessibility

Interview processes, GIS analysis, and document review revealed the need for a subsequent literature review, which consisted of twenty-four (24) peer-reviewed articles and studies, and resulted in the following findings:

- Trust is critical to successful hazard communications, both for interagency communications and public information campaigns
 - Fear-appeals can erode community trust in public communications
- Several key demographic factors drive

population vulnerability to natural, human caused, and health hazards

- Vulnerable communities are often subject to land use decisions that increase their exposure to hazard events
 - Vulnerable populations may have a heightened awareness of risks
- Spanish-speaking communities may prefer family and community networks for receiving public information
- Narrative transportation (getting “lost” in a story) enhances audience receptiveness to persuasion

Promising Practices for Public Outreach and Hazard Communications

Public awareness of hazards and how to avoid or manage them is a cornerstone of public safety (Dunbar, 2007). The intersection of hazards (such as a flood, fire, or human-caused accident) with vulnerabilities (a physical, economic, cultural, or environmental asset) creates crises; when crises occur, emergency management professionals must notify relevant communities quickly while also negotiating a range of inter-agency and interdisciplinary inputs (Henstra, 2010).

Prior to crises, emergency management professionals have the opportunity to reduce the impact of crises by encouraging, executing, or empowering mitigation and preparation projects. These activities can help communities to avoid the worst effects of an event, or ease recovery processes. As such, the severity of a crisis’ impact depends directly upon the pre-crisis conditions of a community (Kartez, Lindell, 2007; Henstra, 2010). Optimal strategies for hazard related outreach vary based on the stage of hazard management. However, multi-modality is a critical component of communications in any public information scenario (Park, Johnson Avery, 2016).

Key themes regarding promising practices for public outreach and hazard communications include:

- Regular, systematic, and theoretically informed evaluation of program efficacy
- Engagement and empowerment of vulnerable communities
- Leveraging new media technology, GIS, and visual communication
- Identification of and response to community media preferences

Evaluate Program Effectiveness to Enhance Comprehensiveness

While case studies provide pertinent insight into the practical application of hazard management strategies—including public information and outreach campaigns—a robust theoretical framework and thematic connections can serve to improve the coherence of hazard-related research (Montz, Tobin, 2011; Karetz, Lindell 2007). This more coherent hazard-related communications research provides a more effective, holistic consideration of the wide range of variables involved in hazard management. Regular and systemic evaluation of emergency management programs can incentivize this sort of holistic, categorical approach.

On the other hand, Henstra suggests an evaluation approach that prioritizes implementation success, assessing policies and programs based on their concrete application (2010). Henstra advises practitioners to specifically evaluate policies based on the four elements of the hazard management cycle, with special attention paid to planning, partnerships, governance systems, continuity of operations, material and intellectual resources, as well as the consistency, accuracy, and reach of public information management (2010).

To negotiate these two perspectives on program evaluation for hazard management, this assessment seeks to bridge thematic and practical approaches by extracting common themes and relating them to practical applications.

Engage and Empower Vulnerable Communities

While the adage that “disaster is the great leveler” may apply to some extent, planning decisions regularly result in the location of disadvantaged populations in hazard prone areas. These decisions result in a higher risk for those populations that lack the economic, social, and cultural capital to ensure resilient locations and building practices for their homes and communities. New Zealand Emergency Management scholars Britton and Lindsay note that the “popular misconception that disasters and other large-scale impacts affect everyone equally” neglects to fully acknowledge the role of land use decisions in exposing less resourced populations to greater hazard risk (1995).

Legal scholar Sharona Hoffman argues the following:

“planning and the production of planning documents alone are not sufficient to achieve comprehensive and effective disaster readiness. Rather, at a minimum, planners must identify at-risk individuals through registries, delegate authority and responsibility to appropriate government officials, collect supplies, and allocate resources, among other steps” (2009).

Hoffman’s article “Preparing for Disaster: Protecting the Most Vulnerable in Emergencies” applies the theoretical framework of redistributive justice to disaster planning practices, that is—the ethical allocation of “resources, benefits, and rewards” through planning processes. Hoffman emphasizes “that disaster readiness for vulnerable populations goes hand in hand with preparedness for the general population” (2009). This argument supports FEMA’s 2011 paper advocating for a “Whole Community Approach to Emergency Management.”

The whole community approach stipulates that community resilience stems from holistic engagement that involves all members of the community in hazard management (FEMA, 2011). This holism requires careful consideration of those populations that may be more susceptible to the impacts of a crisis.

Identifying Vulnerable Populations

In the document “Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups. A guidance document for Emergency Managers,” the Centers for Disease Control and Prevention (CDC) applies a social vulnerability matrix consisting of four (4) categories to identify vulnerable populations. Those categories are:

- Socioeconomic Status
 - o Below Poverty Level
 - o Unemployed
 - o No High School Diploma
- Household Composition & Disability
 - o Aged 65 or Older
 - o Aged 17 or Younger
 - o Persons with Disabilities
 - o Single-Parent Households
- Minority Status and Language
 - o Minority
 - o Speak English “Less than Well”
- Housing & Transportation
 - o Multi-Unit Structures
 - o Mobile Homes
 - o Crowding
 - o No Vehicle
 - o Group Quarters (2015)

Hoffman details the particular challenges facing a range of vulnerable communities, including persons with disabilities, the elderly, pregnant people, children, prisoners, persons with language barriers, economically disadvantaged minorities, and undocumented workers. Of individuals with disabilities, Hoffman identifies the communication challenges of creating alert systems that are inclusive of sensory impairments, as well as the concern that persons with mental or emotional disabilities may be misunderstood in times of crisis (2009).

Educational attainment is another demographic characteristic that may impact hazard preparedness and situational awareness. A 2011 study compared board participation and a “civic engagement index” of activities including community projects, club meetings, volunteer work, news consumption, and group membership to educational attainment.

The study demonstrates a correlation between educational attainment and civic engagement, with a particularly high level of engagement for persons educated in the social sciences (Young, 2011). Participation in community activities, consumption of news media, and group membership provide opportunities to both enhance awareness of hazard risk and mitigation techniques, and serve to enhance community networks which provide crucial support during and after hazard events.

Leverage New Media Technology and GIS

Hazard management professionals have an expanding array of communication tools at their disposal. Many agencies already leverage social media to reach audiences, but ensuring that technology is used effectively is key to successful public outreach.

Simple, Visual Presentation for Big Data

As data collection and storage capacities become increasingly robust, professionals tasked with communicating complex hazard information must take care to select the appropriate media, as well as to identify the most relevant, understandable information to include.

For example, database-style organization couples with the open, online accessibility of cloud storage to expand the accessibility of public information campaigns, and the possibilities to connect information in varied disciplines (Dunbar, 2007). However, massive and/or complex datasets can intimidate audiences. To successfully deploy large or complex data sets, hazard management professionals should use simple, visual layouts and graphic communications that ensure audiences of varied technical abilities can navigate and interpret information.

Making Use of Maps

Geographic presentation of data-rich information supports accessible visual communication of the intersection of risk-prone areas and human assets (Montz, Tobin, 2011). By presenting information on a map, public outreach campaigns appeal to visual as well as verbal information processors, while expanding the capacity of agencies to synthesize relevant information (Montz, Tobin, 2011).

Beyond visual accessibility, geospatial presentation of hazard-related information helps viewers to quickly orient themselves to the location, extent, and proximity of the event. That is, viewers can relate their neighborhoods and homes to the event at-a-glance, and quickly understand whether they need to take action.

professionals should consider both modality and rhetorical strategy as they appeal to target audiences. For hazard communications, these strategies vary widely depending on the phase of the hazard cycle—with different modalities and argument styles appropriate to each mitigation, preparation, response, and recovery. Because the scope of this project covers only pre-event communications and communication strategies, this review focuses on mitigation and preparation.

Considerations for Communication Modes and Channels

In targeting communications, agencies must select among a range of communication modalities and media channels, including print media, web-based communications, telecommunications, in person presentations and meetings, television, audio broadcasts, and more. While ideally agencies would use a multi-modal communication approach to reach a broad range of constituents, capacity often dictates a more selective approach.

Social Media's Power to Go beyond Communication to Facilitate Discourse

While the relatively recent and developing nature of these media platforms limits the extent of academic research into their use surrounding hazard communications, early research posits that “during disasters, the two-way communication process inclusive of the public have (sic) significant values to emergency responders and public safety officials (Holmes, 2016). The dialogic nature of these media create the impression of transparency by allowing “real time information to be disseminated to concerned citizens,” and in turn allowing those citizens to respond with questions and concerns in a public forum (Prentice, Huffman 2008). As such, social media has the potential to go beyond one-way communications to facilitate discourse between audiences and agencies, rather than simply conveying messaging from a source to a community. The immediacy of these multi-directional communications allows professionals to swiftly correct misinformation while gauging current community sentiments.

Identify and Respond to Community Communication Preferences

FEMA's 2011 report *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action* states “Engaging members of communities as partners in emergency planning is critical to developing collective actions and solutions.” In developing a strategically robust communication strategy,

Although audience preferences for communication channels vary substantially among individuals within community groups, identifying and responding to the preferences and needs of communities can expand the reach of a public information campaign. This process is complicated by the ongoing emergence of new media, a term referring to interactive digital media platforms that empower consumers to respond to and participate in messaging processes. Because of the multitude of emerging platforms and their sometimes fleeting popularity with specific communities, agencies are better served by identifying

generalizable strategies for targeting modalities than by generating extensive approaches tailored to a single media platform.

Demographic Factors for Communication Channel Preferences

Community studies indicate that media channel preference may vary based on demographic factors. A 2016 survey investigating media source preference by demographic category found the following:

“females, minority respondents and younger individuals reported using more channels for information than white, male and older respondents. It is possible that these groups perceive themselves to be more vulnerable, and are therefore more diligent about gathering information from a variety of sources” (DeYoung et. al, 2016).

1991 researchers investigating media channel preference among ethnic groups found that while African American, white and Hispanic media consumers gather hazard information about a train derailment event through mainstream media sources rather than from local authorities, “Mexican-Americans preferred family and personal networks for gathering information about the hazard event more than the other two ethnic groups” (DeYoung et. al, 2016). More recent research supports this claim. For example, a survey of NGOs focused on enhancing hazard preparation found that radio, TV, and print media are popular formal channels for conveying emergency preparedness information Spanish-speaking communities. This survey, however, also identified a range of informal, interpersonal channels for sharing information. Researchers discuss the critical importance of cultural competence, community trust, and appealing the values of familial-orientation, respect for elders, and community belonging as key factors for engaging Latinx communities (Baezconde-Garbanati et. al, 2006).

In their study on risk perception in post-Katrina New Orleans, Gotham, et al. provide context for DeYoung’s assertion that media behaviors vary

based on demographic characteristics. Their research demonstrates that “women and respondents with low incomes were more likely to have higher flood risk perceptions than men and higher income people, a finding that is consistent with past research” (2017). Connecting their research on risk perception to other work in the field of risk management, the authors state that socioeconomic disadvantages limit the capacity of individual and family safety nets, such as insurance, savings, or the resources necessary to relocate in the event of property damage. Socioeconomic disadvantage may also exacerbate vulnerability by reducing a population’s ability to influence public sector investments in social services and infrastructure. According to Gotham, et al., “those who are objectively more likely to be at risk for adverse consequences from environmental hazards may also be more likely to feel at risk due to their socioeconomic position and past experiences with environmental hazards” (2017).

Considerations for Rhetorical Approaches

Persuading constituents to prepare for and mitigate crises presents a rhetorical challenge for hazard management professionals. For public sector employees, optimizing the effectiveness of persuasive strategies without compromising the ethics of their position poses a dilemma. Two key strategies that this study explores are the use of narrative or storytelling to encourage behavior change, and the use of fact-based or objective communications. It is important to note that these two strategies are not mutually exclusive, and can serve to inform one another as a means of message optimization.

Narrative Strategies for Encouraging Household Hazard Management

Narratives provide an effective vehicle for engaging audiences around hazard management. The love of storytelling is “so deeply rooted in the human experience and history... that social science accounts can only be partial and highlight selected dimensions” (Slater, 2002). Recent research into the role of narratives in persuasion focuses on

the role of transportation—or getting lost in a story—in lowering resistance to persuasive elements (Kitae, 2015). According to Slater, et al., issue-related persuasive messages heighten their impact when the drama of the story is “compelling enough to cause [awareness of the persuasive intent] to fade into the background.” This research indicates that the level of narrative absorption impacts the polarity of the response to the persuasive content, and can have a mitigating effect on resistance to suggested changes. This mitigation of polarity can, in turn, impact the attitudinal or behavioral effects of the narrative (2002).

As they relate to encouraging hazard mitigation and preparation, narratives may fall into the category of fear-appeals, or communications that use audience fear as a motivator for action. Communications practitioners generally content that while fear appeals are effective, they often backfire by eroding trust in the communicator (Witte, 2000).

Fact-Based Strategies for Encouraging Household Hazard Management

Advertising researchers Liu and Stout note that “a factual message tends to elicit more support arguments than an emotional message, regardless of message modality” (1987). This notion supports the theoretical basis for conventional public information systems, which emphasize factual information, transparency about sources, and objectivity with minimal persuasive elements (Ferraro, 2015). Without overtly attitudinal content, communicators rely on data and factual information about cause-effect relationships to provide a basis for individual and community action. Transparency and directness convey respect to the intelligence of audiences, and safeguard trust in public information providers. This trust proves critical in hazard events, when constituents must often respond with quick compliance to public messaging.

Hazard Communication Best Practices - Synthesis

Based on this literature review, best practices for public information campaigns surrounding natural hazards include:

- An integrated, interdisciplinary approach
- A multi-modal dissemination strategy
- A clear system of command, ensuring consistent messaging
 - Establish command systems and messaging protocols prior to crisis events
- Use of geographic presentation to synthesize complex datasets
- A holistically considered, theoretically grounded approach

Best Practices for Incentivizing and Inciting Household Hazard Management

Persuading households to undertake the time, energy, and expense of managing their hazard risk requires effective communications. Incentives and incitements are two styles of communication that persuade households in this fashion. Kartez and Lindell assert that “few incentives promote [local disaster planning] prior to a major disaster” (2007). However, the pre-event condition of a community is the most influential factor in how that community fares during a crisis (Henstra, 2010). As such, identifying and testing these incentives is a critical gap in the reviewed literature. Montz and Tobin note that “a range of variables [are] positively associated with higher preparedness” for natural disasters at the household level, supporting the need for complexity, nuance, and diversity in identifying optimal public information strategies (2011). As such, the use of a multi-pronged public information strategy—adopting a range of rhetorics and dissemination strategies—would be apt to achieve the most success.

Coordinating this range of strategies—for both rhetoric and reach—requires careful consideration of consistency. As detailed in the project background, Joint Information Centers (JICs) provide a powerful

tool for ensuring that communications are consistent, timely, accurate, and actionable.

Trust plays a critical role in establishing a basis for household participation in risk-reduction behaviors. McComas notes that this social trust “is based, in part, on perceived shared values, which are learned via stories or narratives that institutions tell.” (2006) Values-oriented strategies for refining public-facing narratives provide one key technique for inciting hazard mitigation at the household level.

Based on the literature review, best practices for incentivizing hazard mitigation behaviors at the household level include:

- Values-based narratives
- Leveraging Joint Information Centers
- A range of diverse approaches
- Community-specific strategies that account for diversity

Trends and Conditions in Hazards and Resilience

This section summarizes selected trends and conditions in emergency management, hazard mitigation, and community resilience over the last several decades.

Since 1996, academic and professional discourse surrounding risk has evolved to account for both objective and subjective information, defined by McComas as “an iterative exchange of information among individuals, groups, and institutions related to the assessment, characterization, and management of risk.” (2006) This integration represents a challenge to the perceived separation of audience from communicator, encouraging a more conversational and engaged approach with constituent communities.

Further complicating the relationship of risk and public information is social amplification of risk framework (SARF) which poses an integrated approach for assessing public perception of risk using technical and sociocultural factors. (Hocke, 2018) Current SARF has evolved into a context-informed depiction of the “amplification or

attenuation” of public awareness of risk, and informs the work of public relations officials in “[triggering] a heightened sense of awareness” with regard to specific hazards (Hocke, 2018).

Enhancing Trust

Because hazard management often requires “uncharacteristically flexible decision making” it is critical that there is a high level of trust shared by the agencies involved. (Kapucu, Van Wart, 2006) In a study investigating the interagency communications and response following the September 11 attacks, 95% of respondents indicated that information exchange was “critical or somewhat important in emergency situations.” (ibid) As such, the disciplines of hazard management and community resilience are concerned with metricizing and assessing the degree of trust involved in their work.

Literature on interagency trust defines the concept as “the willingness of one agency to take risks in relation to another on the basis of expectations that the other agency will behave according to particular standards of behavior (e.g. fairness, competence, and transparency) in their mutual interactions.” (Temby, et. al, 2015) While crucial to effective hazard management, trust among agencies requires familiarity and mutual understanding, which develop over time with consistent exposure and positive experience.

Rapidly evolving communication modalities and norms couple with escalating complexity of governance systems to challenge audience trust in communications and information campaigns disseminated by public agencies. These challenges deepen when public agencies release information to members of the media, who may or may not cleave to the initial messaging (Staszak, 2001).

Gaps

While integration, trust, and systems-orientation are explored in detail in the literature reviewed, sources do not delve into the practical applications of these values. Processes for crafting values-based narratives around hazard mitigation and preparation must

be developed, tested, and evaluated. Further, these processes ought to be context-sensitive and community-driven, with both narratives and value-systems originating from the target audience communities they will attempt to reach. This research project will focus on how agency communicators identify and respond to the narratives, values, and rhetorical strategies preferred by communities in Marion County households.

More up-to-date research regarding channel and modality preference based on demographic characteristics would enrich and empower the field of hazard communications by illuminating opportunities to improve constituent trust in agency messages. In particular, the field would benefit from research focused on how agencies can best leverage the transparency and currency of social media platforms.

To develop on the body of existing research, scholars must go beyond highlighting the *need* for collaboration to identify optimal methodologies for collaborative plan development and implementation. (Skavdahl, 2009) Because a wide range of factors—geographic, climatic, social, economic, political, among others—influence the severity of a crisis' impact on a community, integrating diverse information sources is a key component of hazard communication research.

Chapter 4: Methods

Research activities for this project focused on assessing current practices in Marion County's hazard communications, using a range of literature-supported practices as a baseline for comparison and exploration. I investigated Marion County as a case study for hazard communication practices in general, and in order to understand the norms and behaviors that informed the 2018 water advisory communications crisis. The project focused on communications that occur before a hazard event, which occur during the mitigation and preparation phases of hazard management.

Research Question: "What opportunities does Marion County have to improve interagency and public-facing hazard communications regarding preparation and mitigation?"

To answer the research question, this project uses a mixed-methods approach. The research integrates a review of academic literature, a review of relevant planning documents and reports, GIS analysis, and stakeholder interviews. By incorporating academic and professional information, the project identifies and interrogates hazard communication practices as they exist in the county, and as they are recommended broadly in the field. This review provides an ideological context for interviews and GIS analysis, which explore current hazard communications in Marion County and their geospatial context.

Interviews



Interviews sought to gain a range of professional perspectives on current hazard communications practices in Marion County, as well as in two (2) case study communities: Multnomah County and Deschutes County. This section provides the number and professional category of contacts spoken with, and high-level information about the interview process.

Recruitment Methods

Participants were recruited at Marion County's monthly hazard managers meeting, which is attended by hazard management professionals working in a range of agencies and organizations within Marion County. Approximately forty (40) persons attended this meeting. The meeting occurred on Tuesday, January 22, and was hosted by Marion County Emergency Management, in the Public Works facility. Edwin Flick, the current Emergency Manager for Marion County, hosted the event and invited me to present my preliminary findings.

After detailing the communications principles I sought to apply in my evaluation, I engaged the room in a discussion to identify priority communications strategies. I used this discussion to inform the development of my interview guide, as detailed in the following section.

Interview Guide Development

Based on the initial literature review and presentation at the Marion County hazard management meeting, I identified three priority focus areas:

- Ensuring consistent messaging among relevant stakeholder agencies and community partners
- Using targeted, value-driven, narratives to encourage community action
 - Providing inclusive messaging for non-English speaking communities
- Developing proactive, pre-event content to ensure constituents know protocols before crises occur

These focus areas informed the content of each question. In the interest of respecting the time and professional demands of participants, I sought to develop an interview script that could be completely answered within thirty-minutes. In support of this

interest, I included no more than four (4) questions within each category. The interview script can be read in full in Appendix 1.

Interview Participants

I interviewed twelve (12) persons working in hazard communications in Marion County. These individuals worked in County and City offices, fire districts, and universities. These professionals worked in professional capacities including emergency management, public information, fire safety, and education.

I spoke to two individuals from outside of Marion County to gain insight into practices being employed by other Oregon Counties—Deschutes County, and Multnomah County. These counties were selected on the basis of conversations with persons from Marion County, and the understanding that these Counties employ exceptional public or interagency communications practices.

Consent and Ethics

Interview participants received two notifications of consent protocols. The first was in the e-mail recruitment script, which is included in its complete form in Appendix 1. The second was an oral script, spoken during the initial interview explanation. The interview script is included in its complete form in Appendix 1.

The University of Oregon Internal Review Board (IRB) for research with Human Subjects approved these scripts. Participants' responses to the final three questions were recorded.

Two of these persons interviewed requested to remain anonymous, and ten consented to having their name and position included in the report. To preserve anonymity and to prevent persons from being identifiable, information in the project findings is presented in a generalizable manner, without direct or specific attribution to any person or agency.

Recording Practices

During interviews, I took detailed notes using Microsoft Word. Per IRB protocol, these notes were saved in a password protected folder on my laptop computer, which is also password protected. Interview notes were kept only in this location, and not transferred to any other machine or cloud storage.

GIS Analysis



To target the synthesis of my research and ensure relevant recommendations, I created several choropleth maps visualizing selected demographic data in Marion County. The purpose of creating these maps was exploratory – to investigate potential patterns, and identify any relevant population clusters that might require specific consideration in hazard communications. I used Hoffman's vulnerable population categories, the CDC social vulnerability matrix, and conversations with Marion County emergency management to identify priority demographics for analysis. The demographics selected include:

- Vulnerable age groups
 - Percent of population aged 19 and younger
 - Percent of population aged 65 and older
- Educational attainment
 - Percent of population aged 25 and older with a high school diploma or greater
 - Percent of population aged 25 and older with a bachelor's degree or greater
- Language spoken at home
 - Percent of population that speaks a language other than English at home
- Disability status
 - Percent of population with a disability

Each of these demographic categories impacts communication strategies or hazard vulnerability. Marion County will need to focus its communications on areas with a high concentration of vulnerable age groups, and to consider the role of age with technological literacy and preferred messaging

receipt. The County should also consider the role of income in both hazard vulnerability and the feasibility of proposed preparation and mitigation activities.

Data Sources

Data was drawn from the American Community Survey 2016 and 2017 estimates. I used the American Fact Finder Advanced Search portal to locate and select tables, using the following parameters:

Geography: All Census Tracts within Marion County, Oregon

Topics:

- o Age
- o Education
- o Language
- o Disability Status

This search yielded the following relevant tables:

- S0101 – Age and Sex: 2013-2017 American Community Survey 5-Year Estimates
- S1501 – Educational Attainment: 2013-2017 American Community Survey 5-Year Estimates
- S1602 – Limited English Speaking Households: 2013-2017 American Community Survey 5-Year Estimates
- S1810 – Disability Characteristics: 2013-2017 American Community Survey 5-Year Estimates

Limitations

Several interview candidates were unavailable, or unresponsive to interview requests. I was unable to successfully recruit a representative from Oregon Emergency Management (OEM) to discuss their hazard communications practices and protocols. Because OEM played such a major role in the communications crisis surrounding the water advisory, this represents a significant gap in my research. I was also unable to reach representatives of the Willamette Region Association of Public Information Officers (WRAPIO) or Community Emergency Response

Teams (CERT), which play key roles in coordinating the communications of regional PIOs. I also did not identify contacts with school districts, which may have provided useful insight into some of the community education processes described.

During the completion of this project, Marion County's Emergency Manager left the County to begin work in another role. This transition resulted in some extended gaps in communication, in particular during the research design and interview guide development process. While Marion County Emergency Management provided invaluable feedback and insight into their communication protocols and opportunities for improvement, more consistent communication during the research design process may have resulted in a more targeted interview guide.

Chapter 5: Findings

Chapter 5 summarizes the findings of my research processes as they clarify the research question:

Research Question

What opportunities does Marion County have to improve interagency and public-facing hazard communications during the preparation and mitigation phases of hazard management?

Findings identify key communicators, target audiences and vulnerable populations, before discussing the following themes:

- Dissemination Channels
- Coordination Strategies
- Outreach Strategies
- Rhetorical Strategies
- Pre-event Networks and Relationships

Hazard Communicators in Marion County

Interviews, document review, and both formal and informal meetings revealed that a range of agencies and organizations communicate about hazards in Marion County. Figure 10 identifies the agencies in Marion County that communicate with one another and with the public about hazard preparation and mitigation.

The Role of Partnerships in Message Amplification and Accuracy

As discussed by several interviewees, and detailed in the Marion County Natural Hazard Mitigation plan, many hazard communicators in Marion County are keen to partner with other agencies as a means of amplifying messages and leveraging

Figure 9. Selected Marion County Hazard Communicators

Communicating Agencies	
State Level	Oregon Emergency Management
	Oregon Health Authority
	State Fire Marshall's Office
	Governor's Office
Regional Level	Oregon School Activities Association
	Fire Districts
County Level	Media (Print, Digital)
	Marion County Public Works
	Marion County Emergency Management
Municipal Level	Marion County Sheriff's Office
	Incorporated Cities
Other Organizations	School Districts
	The Strategic Economic Development Corporation
	Community Emergency Response Teams
	Faith Organizations

Figure 9. Selected Marion County Hazard Communicators

expertise. Partner agencies can contribute their platforms and professional networks to the hazard communicator, expanding the reach of the message and engaging with otherwise inaccessible communities. Interviewees provided several examples of this strategy, including the following:

- Working with school districts to bring hazard preparation and mitigation curriculum into classrooms throughout the County
 - o Coordinating hazard-related lesson plans with local educators
 - o Coordinating with Universities and Community colleges to host workshops and guest lectures
- Collaborating with business associations and economic agencies, including the Latino Business Alliance, SEDCOR, and others to highlight economic preparedness
- Building relationships with local and state media to ensure timely and accurate news content
 - o Establishing content for radio operators

Target Communities

All interview participants indicated the intent to reach all constituents within their respective jurisdictions and/or service areas. Hazard communicators in Marion County favor a holistic approach to community outreach, and strive for comprehensive audience engagement that does not neglect any populations. In particular, interview participants discussed the challenge of reaching vulnerable populations. As identified in the literature review, vulnerable populations are those groups of people who are more susceptible to the negative impacts of hazard events. Interview participants discussed several vulnerable populations as priorities in their hazard communications, consistent with the CDC social vulnerability matrix.

Demographic Vulnerability

One risk communicator working in public health education discussed the vulnerabilities specific to public health hazards, identifying the following groups as having heightened vulnerability:

- Children
- Elderly persons
- Women of reproductive age
- People with chronic illnesses
- People who have access and functional challenges
- Alternative language communities

The elderly, disabled, and chronically ill also have a higher likelihood of relying on medical devices which are vulnerable to power outage.

Another interview participant communicating hazards discussed the difficulty of conveying public information and messaging to unhoused populations. This participant reported outreach to homeless constituents as a major gap in hazard communications, and mentioned that a recent student collaborator had suggested printed fliers as one potential vehicle for conveying information. However, the interviewee stated that this method presents substantial logistical challenges.

Regional Vulnerability

Interview participants discussed vulnerability in terms of both demographic identity and geographic context. Regional exposure to hazards in the county varies by location, with populations occupying mountainous regions more vulnerable to landslide, and households located along the rural urban interface more vulnerable to wildfire. These geographic factors can help hazard communicators target their public information efforts to more susceptible populations.

Dissemination Channels

Interview participants revealed that a range of dissemination channels are used by hazard management, public information, City, and County staff in Marion County. Agencies do not use these channels ubiquitously for all hazard scenarios, but select among these and other options based on the target audience, hazard type, and agency resource capacity. Hazard communicators also consider target audience perceptions of media channels, in particular as these perceptions relate to trustworthiness and reliability.

Media Releases & Traditional News Media

Interviewees from all agencies reported that they distribute media releases and work with print and online news outlets to expand the reach of their messaging. Media releases require careful consideration of timelines—for the publication schedules of recipient media outlets, audience use patterns for specific channels, and also for the relative urgency of messaging based on the hazard event type. Depending on the distribution service, media releases may also present an expense to agencies and organizations. However, there are currently a wide range of news media publishing both digital and print content throughout the region, making this medium a powerful tool for hazard messaging. State respondents reported a high level of media engagement, including both the dissemination of original messaging and the tracking of trends and patterns to identify and respond to emergent community health and safety hazards.

Social Media Platforms

According to interview participants and literature alike, social media platforms have the benefit of providing a forum and a real-time opportunity for discourse between experts and community members. However, the open and forum-like nature of social media poses a

risk of misinformation, and can exacerbate mixed-messaging when too many perspectives and voices convey information.

Interview participants also noted that social media provides an opportunity for constituents to share personal experiences with hazards, as well as with mitigation and preparation efforts. With mediation from agency and organization subject-matter experts, these conversations can be cross-referenced with available resources, connecting constituents to information and assets. For example, social media campaigns focused on Firewise development standards might connect interested parties to tips for fire resistant landscaping practices, or community initiatives to support the creation of defensible space.

Electronic and Print Mailing

City, County, and State hazard communicators reported the use of direct-mailing and e-mail to disseminate messaging about hazard preparation and mitigation practices. State level communicators use e-mail lists to communicate with counties and jurisdictions, and to coordinate public communication efforts. Communicators reported that these e-mails frequently get forwarded on to other agencies, organizations, and community groups. As such, the ease of sharing digitally mailed communications presents an opportunity to enhance the reach of public information campaigns.

Radio Operators and Stations

Marion County facilitates a community radio check-in once a month with amateur radio operators. The check-in is organized using an e-mail list of over 200 people through different agencies, including hospitals, healthcare organizations, and citizens. In the event of communications disruptions, power outages, or media blackouts, radio operators can serve as critical information providers. These pre-crisis check-ins allow radio operators to develop protocols and relationships that enable them to quickly share information during or after a hazard event.

Interview respondents also discussed coordination with local, community, and regional radio stations

to generate and distribute content. In particular, several Spanish language radio stations in the region present an opportunity to expand outreach to Spanish-speaking constituents. Hispanic partners of Marion County report that low power broadcast radio is an important communication tool for many of their community members.

Community Events

Hazard communicators report a high degree of success disseminating messages through in-person events hosted in-house or through partner organizations and stakeholder groups. These events include informational presentations, workshops, and community forums, and range from statewide multi-agency efforts, to independent local and municipal group efforts. Some such events constitute public input for NHMP or EOP processes, and some are independent of planning processes.

County emergency management discussed planning and executing a range of events leveraging institutional partnerships to encourage community members to prepare two-week survival kits. These events linked to clear and evidence-backed timelines for community crisis recovery, and focused on enhancing preparation at the individual and family level.

Message Amplification through Community Groups, Schools, and Business Associations

Many of the above messaging techniques gain audience engagement through community groups, schools, and business associations. For household mitigation and preparation, interview participants discussed homeowner associations and neighborhood associations as powerful allies.

One interviewee discussed hosting workshops in schools with students from non-English speaking households as a means of bringing information to those constituents in a culturally sensitive way. The hope of these programs is that students learn hazard preparation and mitigation activities from their instructors, and then bring those tools home to their families.

Coordination Strategies

Interview participants described several coordination strategies that their agencies use to ensure message consistency among the diversity of communicators, and for working to optimize dissemination based on each communicator's particular reach, resources, and areas of expertise.

County, State, and Municipal Use of Joint Information Centers (JICs)

While all interview participants mentioned the use of Joint Information Centers as a key strategy for coordinating communications across multiple agencies, interviewees representing emergency management and public information roles in particular discussed the importance of maintaining close fidelity to the structure outlined by Federal ICS. According to these hazard communicators, the common, consistent framework of ICS across all relevant agencies, as well as the ICS training requirements of many federal, state, and local agencies makes it a highly effective message coordination tool. These professionals discussed the importance of maintaining consistency with national messaging and protocols, unless there is a specific and compelling reason to divert with Oregon's practices.

Pre-Event Strategies

Designating and clarifying JIC roles prior to a crisis event is a critical means of ensuring that communications protocols are mutually understood and easy to execute during or following a hazard incident. During the 2018 water advisory, participants in the JIC included City, County, State, and Regional representation.

Key Stakeholders in the Water Advisory JIC

During the water advisory incident response, participants in the JIC included representatives of the City of Salem, Marion County, Oregon Health Authority, Oregon Office of Emergency Management, Oregon Military Department, local Fire Department, and Salem-Keizer School District. A Fire Department

official acted as the Public Information Officer for the JIC. The JIC had IT support and assistance liaising to the City Council from City of Salem staff members. The Deputy City Manager of the City of Salem “appointed a Spanish speaker to the JIC to provide real-time translations for the City’s Spanish population.” (City of Salem, 2018) The Oregon Health Authority activated its own Incident Command Center on May 30.

community, with the caveat that existing community trust and connectedness impacts the efficacy of this system. In addition to information dissemination, this model provides the capacity for data collection and analysis, and private sector collaboration, while maintaining the ability to integrate with NIMS. (2015)

By practicing JIC roles during “blue-sky” pre-hazard conditions, and convening communications staff rapidly following a crisis, hazard communicators can use longer lead-times to coordinate messaging, tone, and dissemination strategies

The City of Salem After Action Report for the water advisory noted that the City missed an opportunity to convene communications staff early on in the crisis, which would have provided essential lead-time for coordinating messaging and tone (2018).

Alternate Model: Social Networking and Public Participation System (SNAPPS)

The transformative popularity and widespread use of social networking applications provides an important opportunity to explore other models of communications coordination, while presenting challenges to message consistency and coherence.

Based on an extensive study of the Federal response to Hurricane Sandy, Engineering researcher Kimberly Chantal Young-McLear poses a model for response communications that integrates social networking technologies into a “Social Networking and Public Participation System (SNAPPS).” (2015) Young-McLear posits that effective social networking can both enhance a disaster response effort and serve to diffuse a message more thoroughly in a constituent

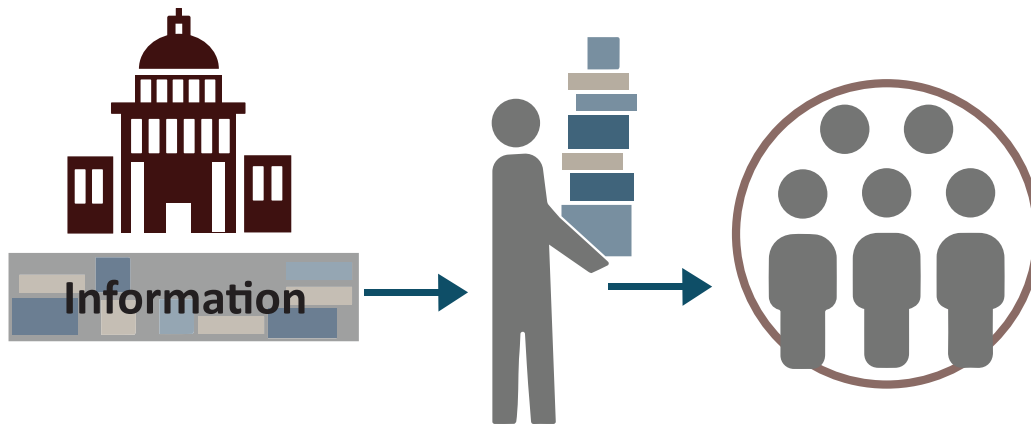
Community Outreach Methods

Hazard communicators in Marion County use a range of outreach methods to share information with constituents. This section discusses the role of seasonal programming and events and trusted advocates in sharing timely and relevant information to target audiences.

Seasonal Programming and Events

Agencies conduct many of the public information campaigns regarding pre-event hazard management on an annual or seasonal basis. Natural hazard month in September provides an effective impetus for involving partner agencies in targeted mitigation campaigns. During late spring, in advance of wildfire season, agencies often promote wildfire mitigation activities such as fuels reduction, defensible space maintenance, and air filter replacement.

A wide range of social and cultural seasonal events offer County hazard communicators with the opportunity to minimize the cost of providing public information about hazard preparation and mitigation activities. Through public-private partnerships the County can support local economic development while gaining a platform for information sharing.



Trusted Advocates

Interviewees revealed that agencies throughout Marion County use trusted community advocates to facilitate or carry out public information programming with vulnerable or difficult to access populations, including non-English speaking communities. These liaisons act as crucial conduits for information, ensuring that their communities receive accurate information about local and regional hazards, how to manage them, and any public resources that may be available. At present, Marion County and the agencies that communicate about hazards within the county operate using volunteer community liaisons.

Community liaisons provide valuable translation services, as well as insights into effective outreach strategies for particular communities. Trusted advocates may conduct agency-developed presentations with their target communities, or they may develop their own content based on the information provided.

As detailed by both interview participants and academic researchers in the field, these volunteers are often dedicated community members who share agency directed information with their friends and neighbors. Often, volunteer community liaisons will work through community groups such as faith organizations, business associations, or community centers. In addition to providing translation services, these valuable volunteers also ensure that information is shared in a format and environment that optimizes their communities' receptiveness.

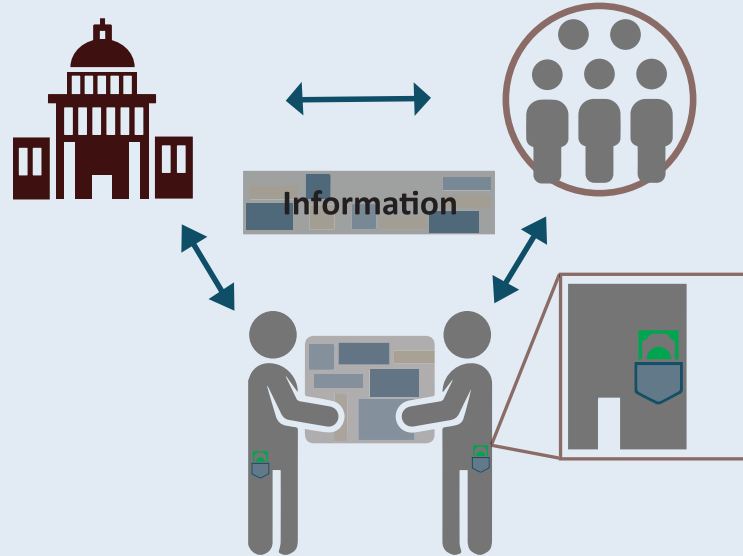


While valuable, interview participants report that volunteer community liaisons frequently experience burnout, according to interview participants. These uncompensated communicators undertake critical outreach to some of the County's most vulnerable populations, but often lack the training, support, and incentives to maintain their role for more than a few years. In some cases, these liaisons substitute for all direct outreach efforts on behalf of the agency. According to interview participants, this leads to turnover and inconsistency, with many volunteers ending their service without identifying or establishing a replacement.

Because of the high value of these services, academic researchers and interview participants alike suggest that hiring, training, and compensating these advocates may provide an opportunity to enhance program sustainability, and support more consistency with communications to limited-English speaking communities. Multnomah County has a program to compensate community translators, as detailed in the following case study.

Case Study: Multnomah County

Located along Oregon's Northern border, alongside the Columbia River, Multnomah County has the smallest area of any Oregon County, and the largest population—an estimated 811,880 persons. (ACS 2018 Estimates) Multnomah County has an estimated 3.9% of households with limited English. (ACS 2017 Estimates)



Multnomah County hires community liaisons to provide emergency preparedness presentations in their native languages. These county employees complete background checks and training processes, and are brought into JICs during emergent situations. The County currently compensates these employees at \$26 hourly, and has each conduct approximately eight (8) 90-minute presentations.

Depending on the community, some of these presentations are delivered as formal PowerPoint presentations, while others are held as community conversations. While the impact of these presentations is estimated to be substantial, it is difficult to measure; for some cultural communities, leadership representation is the key factor in determining whether an event succeeded, whereas for others, a high number of attendees is the metric for success.

Multnomah County also seeks to leverage “Safe Harbor Languages,” or the most commonly spoken non-English languages. These are languages that are public agencies identify via demographic analysis, which provide a basis for Title VI non-discrimination compliance by enabling translation services targeted to the largest groups of non-English speakers.

Rhetorical Strategies

At their core, public information campaigns regarding hazard mitigation and preparedness are rhetorical appeals, seeking to persuade constituents to take specified actions on behalf of their individual, household, and community safety. This section explores the approaches currently employed in Marion County, and offers suggestions for other approaches to incorporate.

Fact-Based and Objective Communications

In hazard communications, objectivity refers to communications that lack bias, prejudice, or emotional charge. While a factual basis ought to underpin hazard communications regardless of their rhetorical approach, interview participants often coupled objectivity and factuality in discussing rhetorical strategies for encouraging the public to more effectively manage hazards. Following a crisis event, clarity, accuracy,

and reach are primary priorities for hazard communicators. In these time-sensitive situations, interview participants discussed the importance of prioritizing objective and fact-based communications.

The rhetorical approach of fact-based and objective communication also benefits pre-crisis communications. Depending on audience preference, appealing to data-driven, factually bound information can encourage constituents to take action.



Narrative Strategies

Narrative strategies, in hazard communications, involve the use of storytelling to convey hazard-related information. These stories may involve personal or anecdotal experiences with hazards, emphasizing the role of mitigation and preparation in minimizing the negative effects of the hazard event.

Some of the benefits of using narrative strategies include rhetorical efficacy, memorability, and increased community engagement. A compellingly told story helps listeners to connect to the experience described, and to better imagine their own application of the mitigation or preparation strategies deployed. During interviews, Emergency Managers and Fire District leadership highlighted the efficacy of storytelling as a method to encourage constituents to prepare for or mitigate their risk to hazards.

Some of the pitfalls of using narrative strategies include perceived manipulation, the potential to needlessly scare constituents, and a lack of objectivity. During interviews, public information and public health professionals discussed their ethical concern with using emotional content as a lever for compelling community action. They highlighted the ethical standard dissuading

communicators from capitalizing on tragedy, and the comparative benefit of focusing on stories of community strength and resiliency. These interview participants highlighted the importance of community trust, and the ways in which capitalizing on tragedy can erode that trust.

The Role of Values

The academic literature reveals that appeals to community and individual value systems may compensate for challenges inherent to compelling pre-crisis mitigation and preparation activities.

Interview respondents consistently reported an opportunity for improvement in identifying and responding to target audience values as a means of informing hazard communications. Some respondents use community liaisons to identify the values and priorities of communities, as well as any potential barriers to action. Others reported engagement with faith communities as one technique their agencies employ to both improve outreach to vulnerable communities, and to develop better understanding of what is important to a particular population.

Multi-Modality to Encourage Mitigation and Preparation

Using multi-sensory communication strategies can enhance narratives and objective communications alike by ensuring accessibility and appeal to a range of learning styles and abilities. Additionally, using multiple modes to convey a message can support the target audience's apprehension of the reality of a threat that may still be abstract. For example, one interview participant reported using video of the 2011 Tohoku earthquake and tsunami in Japan as a means of illustrating the potential devastation of a Cascadia Subduction Zone earthquake.

Hazard communicators in Marion County can leverage the benefits of multi-modality to illustrate the effectiveness of mitigation and preparation strategies, as well. Wildfire prevention efforts frequently use visual communications to highlight the efficacy of mitigation techniques like maintenance

of defensible space. For example, at the January monthly hazard management meeting, Jon Koenig (Lieutenant of the Woodburn Fire District) presented about Oregon firefighters' support of the Camp Fire. Koenig used photographs to demonstrate both the devastation of the fire, and the efficacy of fuels reduction and defensible space in protecting some development.

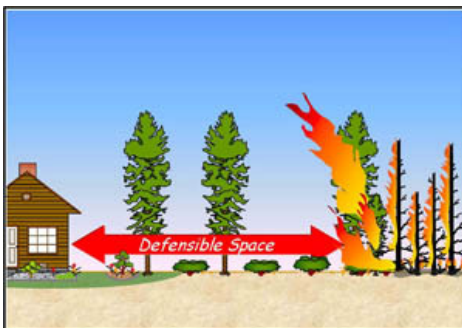
Deschutes County likewise uses robust visual and audio communications to support Project Wildfire, which connects homeowners to resources for fuels reduction and expansion of defensible space. Figures 10 and 11 show examples of Project Wildfire's use of visual communication to enhance messaging.

[Figure 10. Photograph of Defensible Space from Deschutes County's Project Wildfire](#)



Source: Project Wildfire blog

[Figure 11. Graphic Depicting Defensible Space](#)



Source: Project Wildfire blog

[Building Networks Before Hazard Events Occur](#)

Interview participants discussed the importance of developing robust communication networks before a crisis occurs ensures—both inter-agency and between communities and public agencies. These networks can serve to disseminate information in the event of a hazard, as well as to ensure messaging consistency among partner agencies.

One participant discussed the efficacy of a network-based approach in serving vulnerable populations. In particular, groups that face economic stress or hardship may more readily engage with solutions that emphasize community connections rather than purchasing equipment or supplies.

[Community Trust](#)

Trust is a cornerstone of community resilience. Establishing and maintaining networks prior to hazard events can build community trust in the agencies and organizations that communicate about hazards. One interview participant noted that everyday connections are the key to building trust, because the variable in emergency contexts make trust-building more difficult.

Interviews support the critical importance of trust in successful hazard communications. Interview participants discussed the lack of trust in public agencies as a substantial barrier to successful public information campaigns. In particular, one emergency management professional discussed the lack of trust between Spanish speaking communities and the government, stemming from both domestic immigration narratives and potential corruption in the governments of their countries of origin. However, by having more regular contact with communities and demonstrating the value of information, hazard communicators can more effectively encourage individuals and families to prepare for and mitigate hazards.

Conversely, one interview participant provided an anecdote to highlight complexity of constituent trust in agencies. This hazard communicator discussed a constituent who heard about evacuation orders

from a neighbor, but remained in his home until receiving the same message from a public official. Another interview participant noted that the level of trust in healthcare providers and public health professionals is very high.

While trust in public agencies may present a barrier to community buy-in for some constituents, others want official messaging before they will take action.

Inter-agency Trust

Trust also enhances inter-agency coordination and collaboration. Working together during the day-to-day builds the relationships and networks necessary to effectively manage hazards. As such, identifying preparation and mitigation projects to collaborate on can provide hazard communicators with the pre-event impetus to get to know one another, ensuring that teams are able to quickly assemble and take action during or after a hazard event.

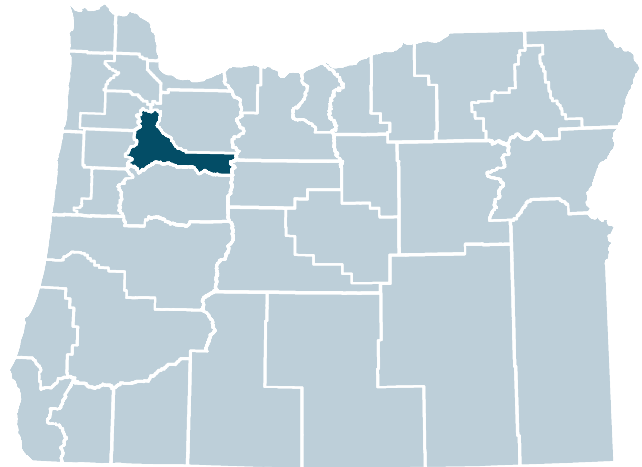
Geospatial Analysis

Based on interview participants' concern about reaching vulnerable populations in the County, I completed a series of choropleth maps to identify any concentrations of specific vulnerable groups. I used geospatial analysis to provide targeted recommendations based on demographic patterns in Marion County, and detail the relevance of findings to strategies for public and inter-agency outreach. The initial section provides a high-level summary of geospatial information about the county. The following sections integrate selected demographic information from choropleth maps with hazard maps as identified via Marion County's planning documents.

The creation and analysis of choropleth maps revealed several cross-cutting patterns, most strikingly that a higher percentage of both non-English speaking households and vulnerable age groups live in the census tracts in Woodburn and Hubbard. This pattern indicates an opportunity to provide targeted outreach. Geospatial analysis also revealed that constituents in and around the

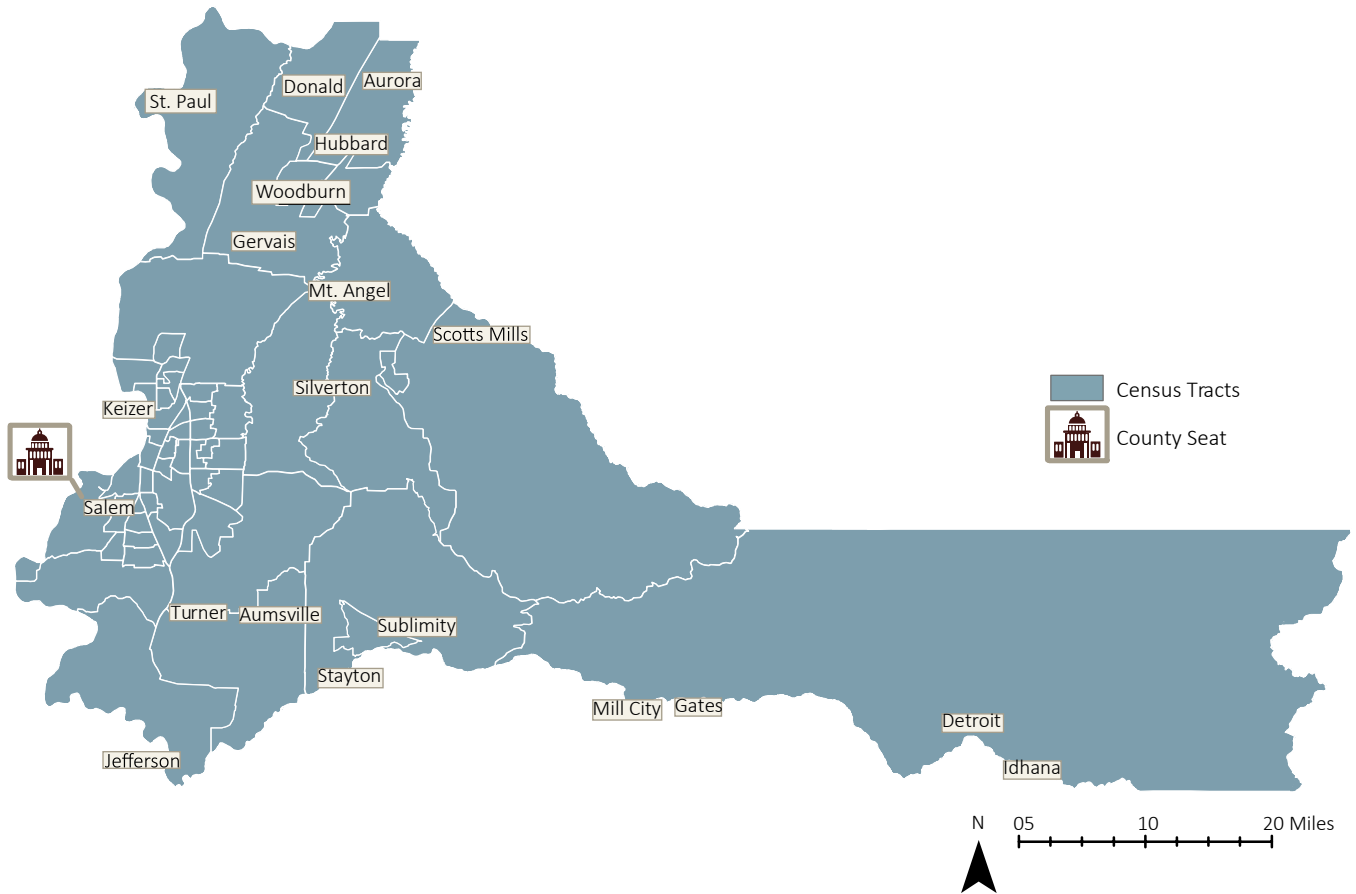
Salem metropolitan area tend to have higher levels of education. Another broad pattern is that persons with disabilities in Marion County tend to live in the Eastern part of the county. Figure 12 depicts Marion County's location within the State of Oregon.

Figure 12. County Location



Source: Marion County GIS

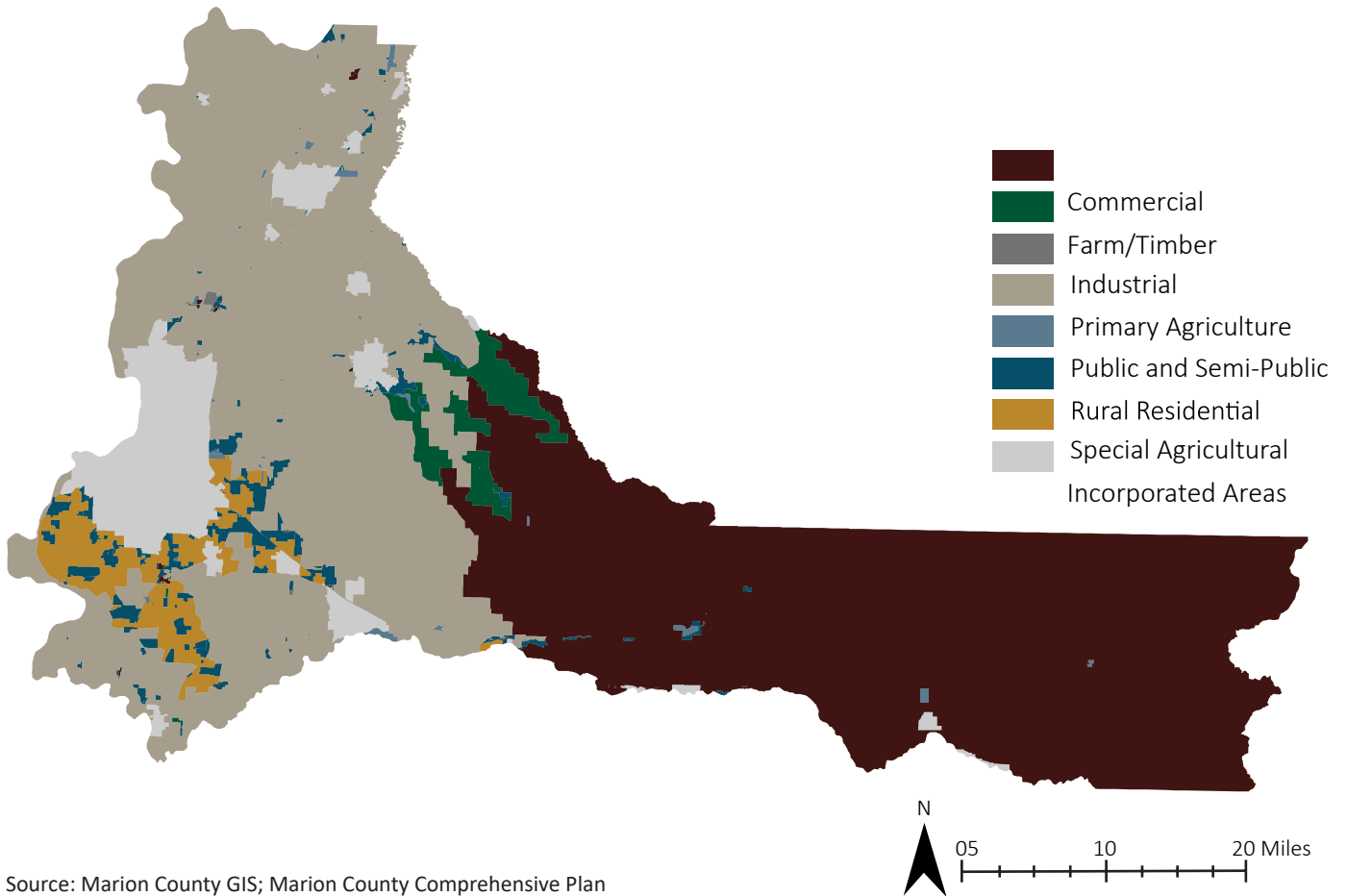
Figure 13. Marion County Cities



Source: Marion County GIS

Marion County encompasses 1,194 square miles stretching from the Willamette Valley to the Cascade Mountains. The county seat is the City of Salem, which is also the State Capitol. This fact draws an estimated 30,000 additional commuters into the county, daily, to work. The majority of cities within the County are located along the Interstate 5 corridor, as shown in Figure 13. The County's varied elevation impacts climatic conditions throughout the area, with higher temperatures and lower rainfall in the valley, and the reverse in the Cascades. Six major rivers flow through the County, and several minor rivers.

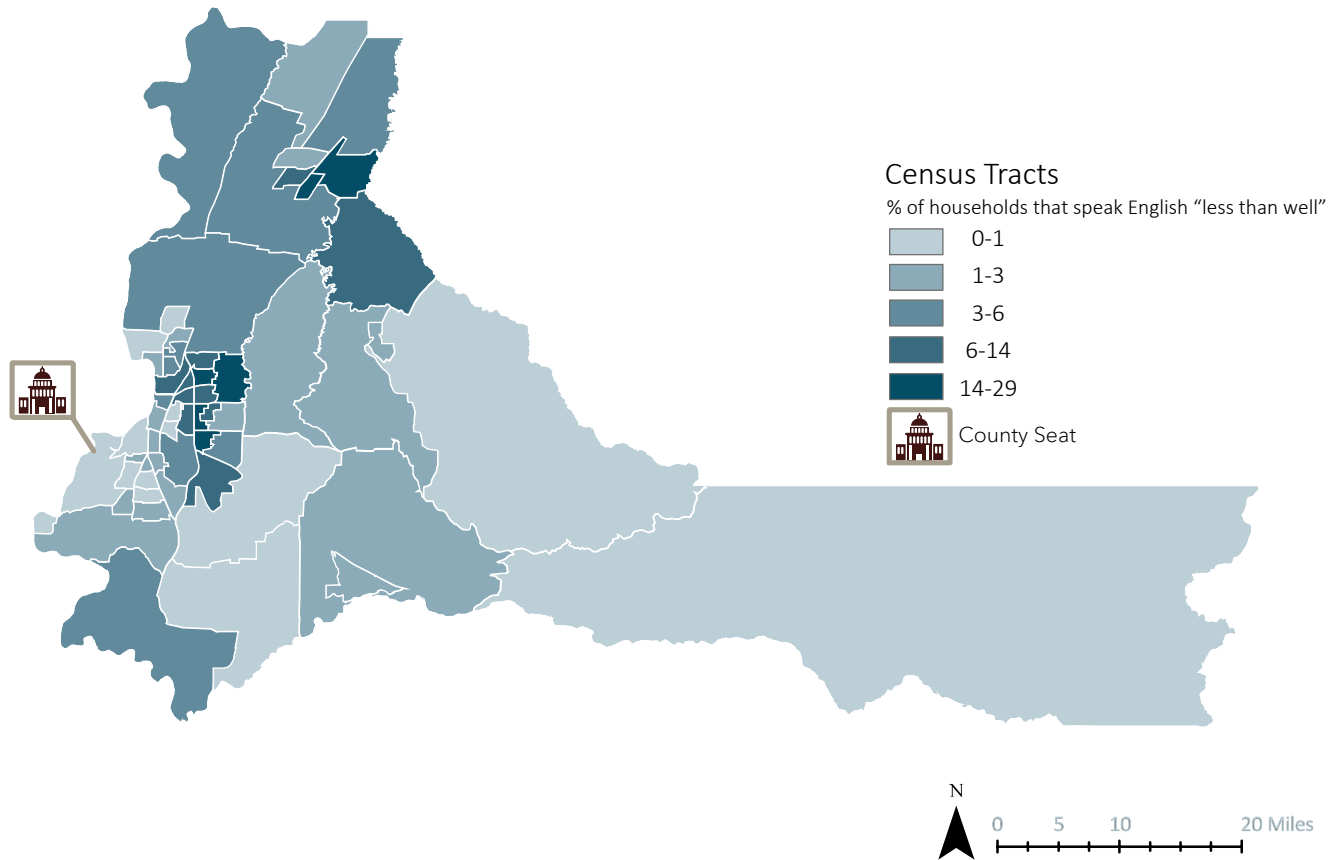
Figure 14. Marion Unincorporated Territory: Zoning



Source: Marion County GIS; Marion County Comprehensive Plan

As depicted in Figure 14, Marion County's unincorporated territories are predominantly zoned for commercial and agricultural use, with other areas zoned for special agricultural use, timber extraction, industrial activity, public use, and rural residential use. Much of the rural residential, industrial, and special farm use are located near incorporated areas. Zoning designation provides a useful context for considering demographic vulnerabilities as they relate to the predominant land use of the area. Further, knowing the locations of rural residential development may provide a useful starting point for any future research investigating high incidence of demographic vulnerabilities in commercial or agricultural areas.

Figure 15. Percent of Limited English Speaking Households



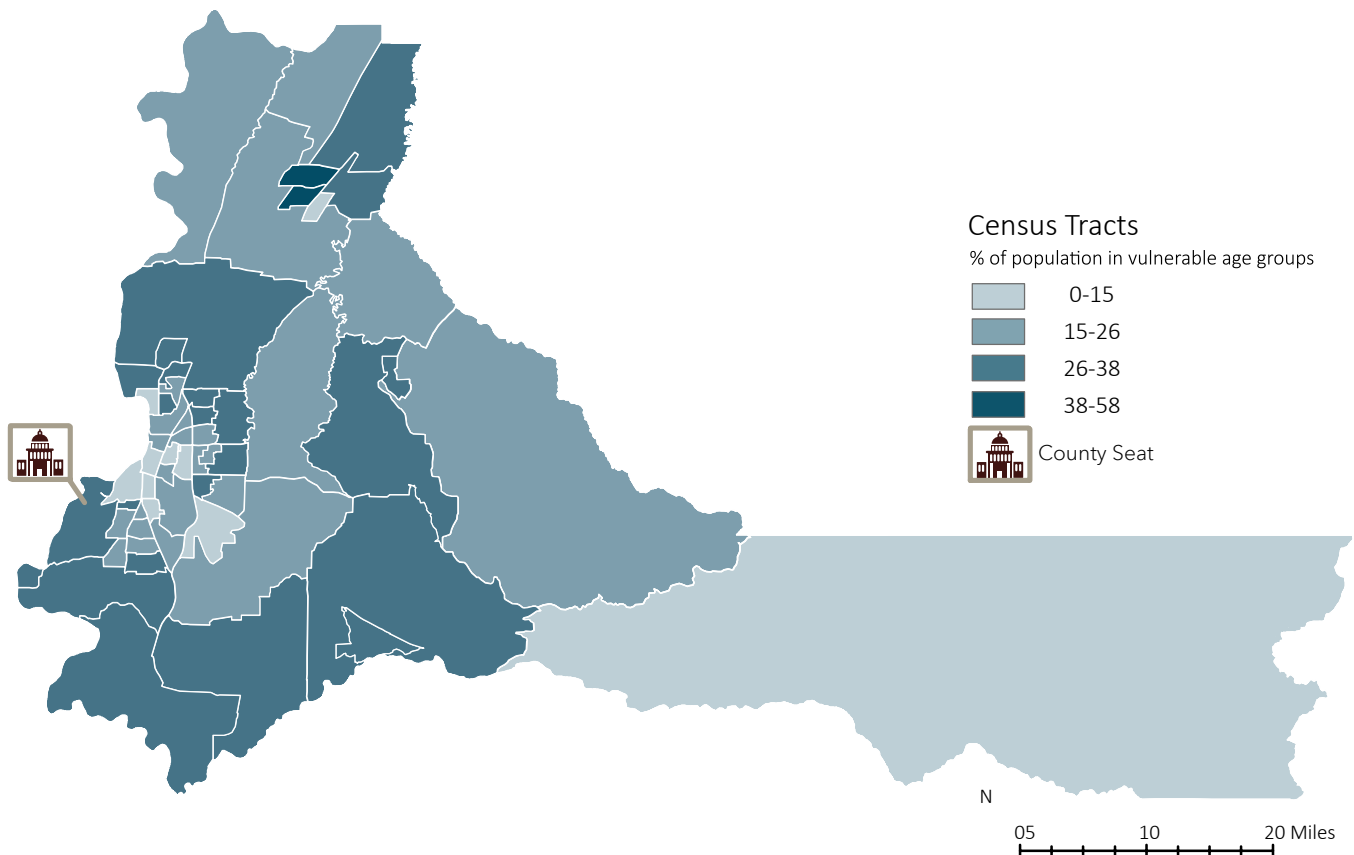
Binning Method: Jenks Natural Breaks
County Average: 5%
State Average: 3%
National Average: 22%

Data Source (ACS 2017 five-year estimates, Table S1602)

Figure 15 shows limited English speaking households by census tract. Census tracts near Woodburn and Hubbard have a higher percentage of limited English speaking households compared to other areas in the county. Census tracts in the East portion of the Salem-Keizer area likewise have a high percentage of limited English speaking households.

Based on this concentration, resources for translation services should be focused on these areas. Hired community advocates and/or translators should come from community organizations in the East portion of Salem-Keizer, or from the Woodburn area. By focusing community outreach resources on these areas, county hazard communicators can enhance their impact.

Figure 16. Vulnerable Age Groups (19 and younger and 65 and older)



Binning Method: Jenks Natural Breaks
County Average: 43%
State Average: 40%
National Average: 40%

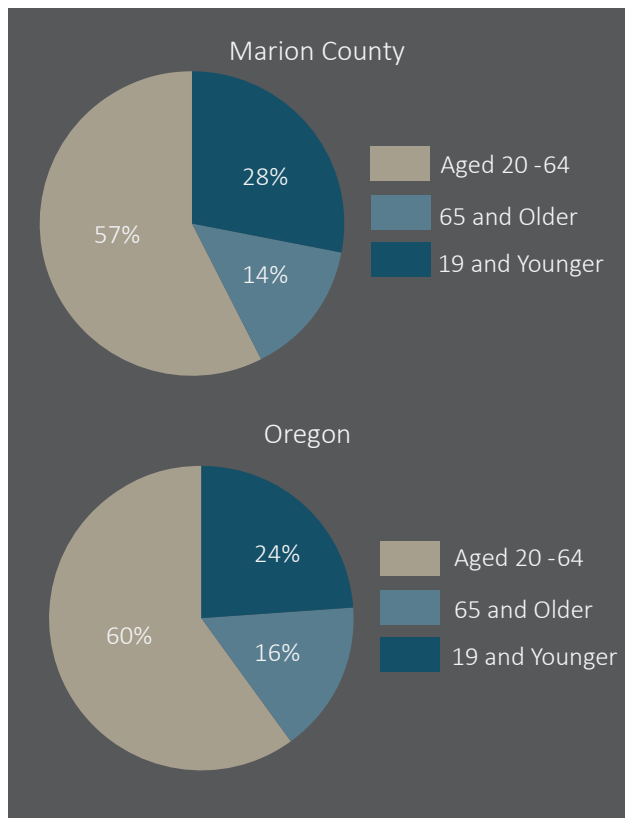
Data Source (ACS 2017 five-year estimates, Table S0101)

Figure 16 shows that a high concentration of vulnerable age groups exist in the area between Woodburn and Hubbard. The Eastern portion of the county has a lower percentage of its population in vulnerable age groups, as do several of the Census tracts surrounding Salem. Comparing current population estimates with data from the 2010 Marion County NHMP reveals that vulnerable age groups have grown in Marion County over the last decade, increasing the county's overall vulnerability to hazards.

Figure 17 shows that Marion County has a particularly high percentage of persons under the age of 19. These constituents are likely to have less economic stability and power, reduced access to transportation options, and a limited ability to provide for themselves. Hazard communicators in Marion County should consider this expanding demographic in their rhetorical approach, outreach methods, and public information campaigns.

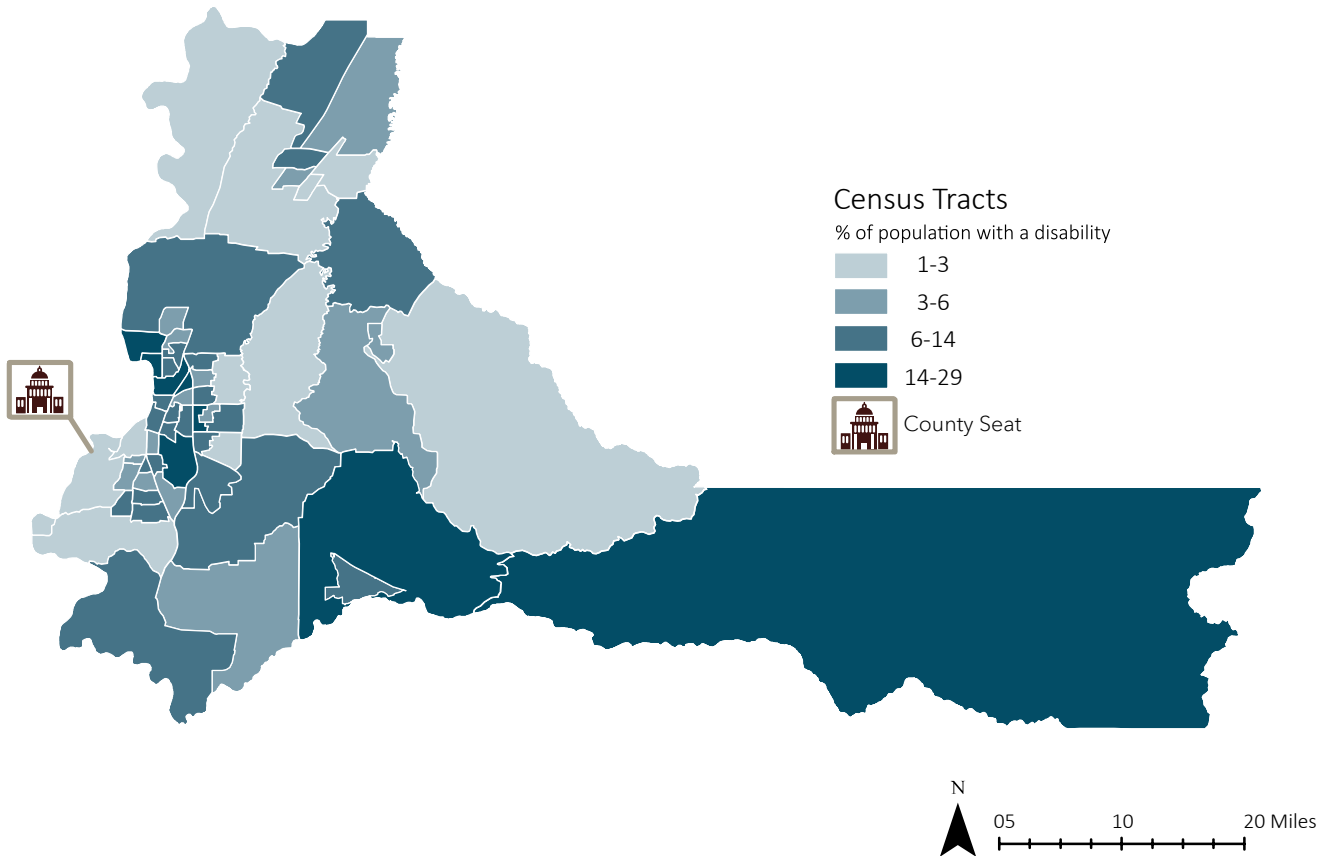
Given the high concentration of non-English speaking households in the Woodburn area, and the high concentration of vulnerable age groups, Marion County should take particular care to ensure effective communications to this area. Given the high percentage of persons under the age of 19, and the characteristics of that demographic, Marion County hazard communicators should prioritize partnerships with school districts, and public information campaigns that focus on inexpensive or free preparation and mitigation activities. In particular, highlighting mitigation and preparation techniques that leverage community connections and networks may provide the most feasible method of enhancing hazard resilience for this demographic.

Figure 17. Vulnerable Age Groups, State v. County



Source: American Community Survey 2016 5 year estimates

Figure 18. Percent of Population with a Disability



Binning Method: Jenks Natural Breaks

County Average: 15%

State Average: 14%

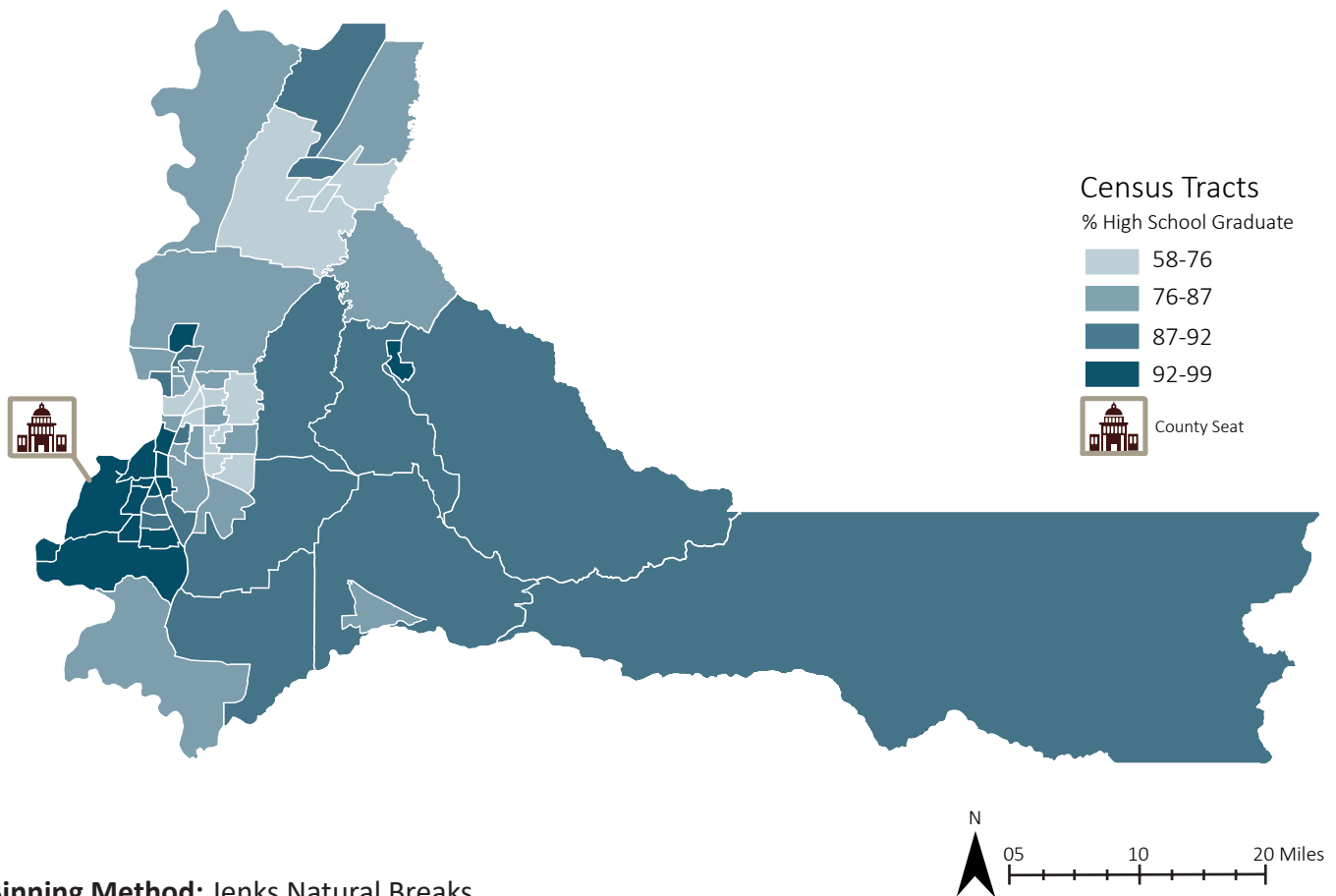
National Average: 13%

Data Source (ACS 2017 five-year estimates, Table S1810)

Marion County has a slightly higher percentage of the population living with disabilities when compared to the state and national average. As shown in Figure 18, the highest percentages of persons with disabilities live in the eastern portion of the county, as well as a few census tracts in the Salem-Keizer area.

Given the remote nature of the eastern portion of the county, accessibility and proximity of medical services may present a substantial concern to hazard management. Marion County’s hazard communicators might focus on highlighting community resources, connecting individuals and families to one another to enhance local networks, and providing workshops on mitigating and preparing for probable hazards.

Figure 19. Percent of Population with a High School Diploma or Greater



Binning Method: Jenks Natural Breaks

County Average: 85%

State Average: 90%

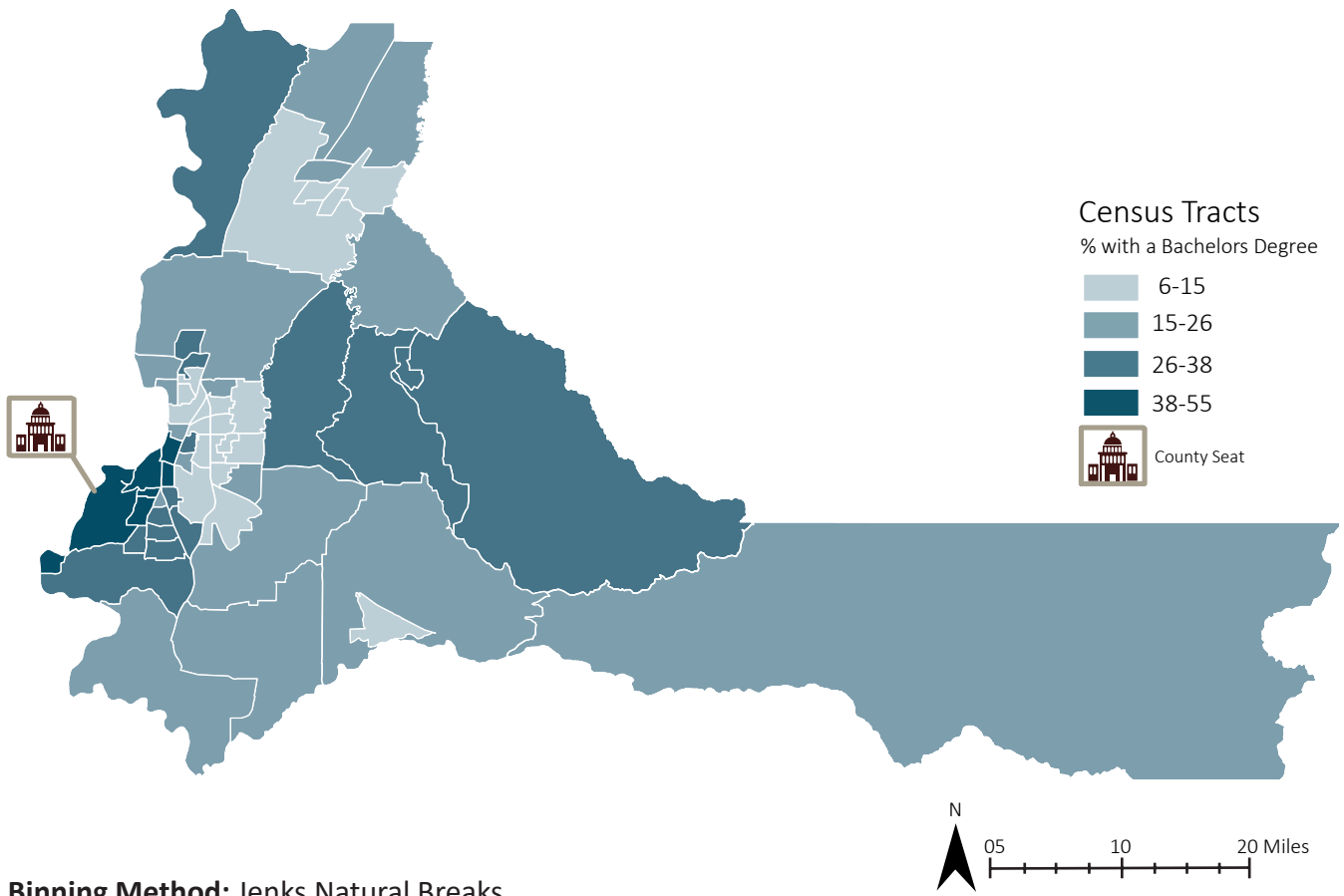
National Average: 87%

Data Source (ACS 2017 five-year estimates, Table S1501)

Figure 19 shows that a higher percentage of persons with a high school diploma or greater reside in the Salem area. This area also has a higher percentage of persons with a Bachelor’s degree or greater, as shown in Figure 20.

The positive correlation between educational attainment and community engagement—as detailed in the literature review—reveals two key considerations for hazard communications in Marion County. First, public information campaigns targeting communities with lower educational attainment may require more strategic outreach methods. Second, community groups provide an opportunity to connect with constituents in census tracts with high levels of educational attainment.

Figure 20. Percent of Population with a Bachelor's Degree or Greater



Binning Method: Jenks Natural Breaks

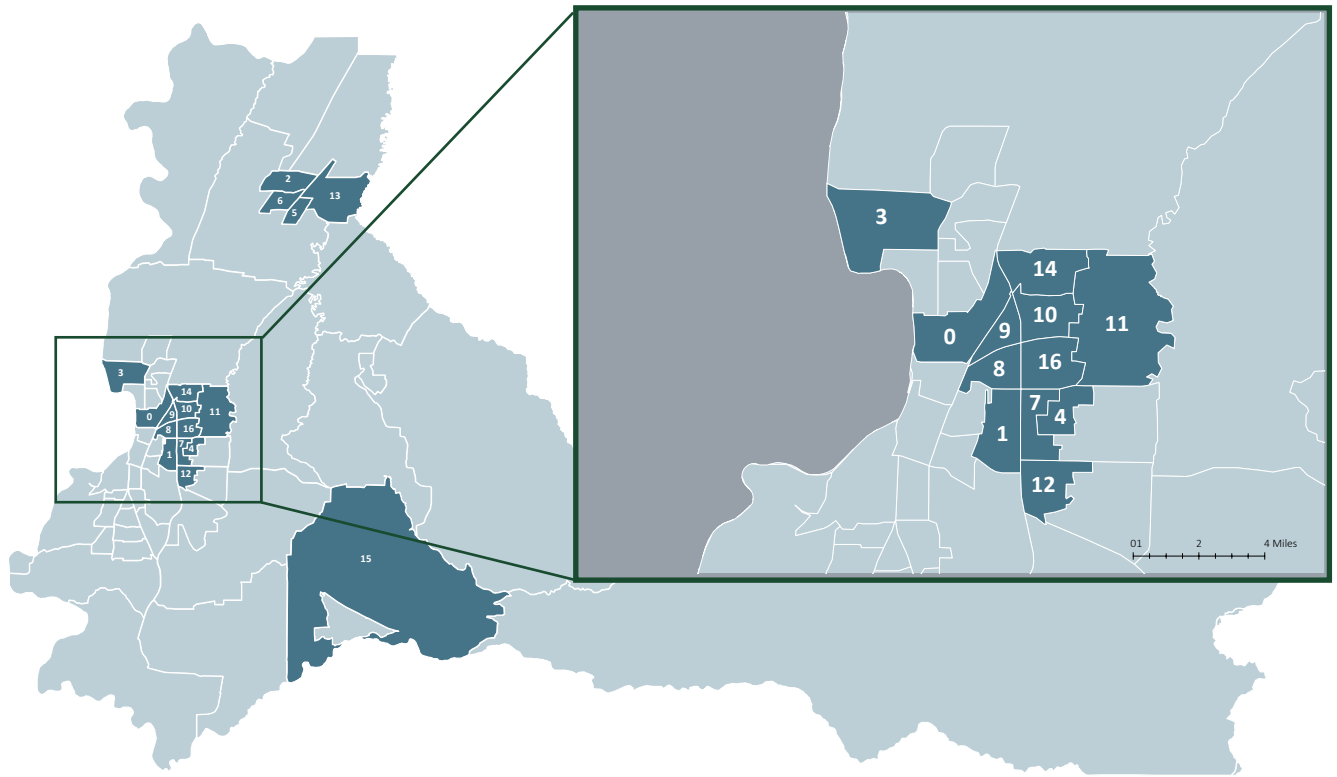
County Average: 22%

State Average: 32%

National Average: 31%

Data Source (ACS 2017 five-year estimates, Table S1501)

Figure 21. Selected Census Tracts with Corresponding Vulnerability Characteristics



Selected Census Tracts by Demographic Vulnerability Characteristic				
Census Tract ID	% Limited English	% with a Disability	% Vulnerable Age Group	% without a High School Diploma
0	14	19	38	29
1	10	17	29	20
2	2	17	53	9
3	1	21	44	14
4	12	12	42	29
5	29	10	37	42
6	9	13	56	30
7	15	19	42	30
8	10	12	42	25
9	9	22	41	30
10	20	14	46	33
11	16	8	44	25
12	16	18	45	24
13	17	10	44	37
14	10	17	47	15
15	2	22	49	10
16	11	16	39	21

Analysis of Selected Census Tracts

The preceding map and table display demographic vulnerability characteristics as they occur in selected census tracts. Census tracts were selected based on high incidence of vulnerability characteristics, and reveal higher concentrations of multiple population vulnerabilities in the Keizer area, as well as in the Woodburn/Hubbard area. These geographic areas may provide a basis for targeting Marion County's outreach efforts, as recommended by this report.

Findings – Synthesis

Current hazard communications in Marion County can be characterized by the following:

- A large number of diverse agencies and organizations communicating to constituents
- A focus on outreach to non-English speaking communities, in particular Spanish speaking communities
- A focus on all-hazards preparation and mitigation activities

Promising practices for hazard communications in Marion County include:

- Compensation and training for community liaisons and/or trusted advocates
- Discourse around rhetorical strategies between PIOs and Emergency Managers
 - o Identifying optimal narrative strategies, including prioritization of stories that highlight successful mitigation/preparation activities
- Pursuing opportunities to integrate the IPAWS system fully in all county municipalities with Emergency Management capacity
- Coordinate with healthcare and public health professionals to develop public information campaigns regarding hazard mitigation and preparation
 - o Leverage community trust in these sectors to enhance individual and family hazard management

Chapter 6: Implications & Conclusions

This section synthesizes project findings to identify implications for Marion County, based on the literature review of best practices, twelve (12) stakeholder interviews, meetings with emergency management professionals and academic researchers in the field, and geospatial analysis.

Information Channels and Coordination Methods

Information channels and coordination methods explored in depth focus on activities that occur during the preparation and mitigation phases of hazard management; however, given the integrated nature of the four phases of hazard management, this section also details some of the pre-event coordination strategies Marion County uses to ensure that response and recovery communications are clear, consistent, and effective. That is, effective hazard communications that occur during the response and recovery phase gain their effectiveness from deliberate and coordinated activities that occur before a hazard event.

Information Channels

The County currently uses a wide range of information channels for both public outreach and interagency communications. Public information strategies include both traditional and new media, with interview participants reporting that community and agency preferences and media consumption behaviors inform channel selection.

Messaging Coordination Methods

As noted by interviewees, and revealed through case study analysis, the breadth of agencies and organizations communicating about hazards makes message coordination a major concern. Methods for coordinating communications include:

- Monthly emergency managers meetings
- Quarterly healthcare coalition meetings
- Intergovernmental agreements
- Community Emergency Response Team (CERT) Programs
- Joint Information Centers (JICs)
- The Willamette Region of Associated Public Information Officers (WRAPPIO)
- The Wildfire Smoke Protocol
- The Health Alert Network

Community Outreach Methods and Models

Demographic and geospatial analysis reveal that economic, cultural, ethnic, and age diversity complicate public outreach in Marion County, and require careful consideration of community identity. Interview participants acknowledged that outreach to non-English speaking and disability communities represent a significant gap in County hazard communications.

Seasonal Events and Community Meetings

The seasonal nature of many hazard events makes annual content development and dissemination a key strategy for keeping the community prepared. Leveraging existing community events such as seasonal celebrations, festivals, and other public activities helps to both amplify messaging and reduce the capacity required to identify and fund platforms for public information campaigns.

Trusted Advocates

Throughout the interview process, one of the most discussed and controversial methods of outreach to vulnerable groups is the use of community liaisons, or trusted advocates. These persons are members of the target community who partner with communicating agencies to bring information and messaging to difficult-to-reach groups. These positions are often volunteer, and have high turnover as they require considerable labor and time investment—especially those involving translation.

Hiring these community partners as hourly, as-needed County employees provides an opportunity to conduct background checks and trainings, and to empower community liaison's to work with JICs to share messaging after crisis events.

Implications

Based on my interviews and analysis, I recommend that Marion County take the following actions to enhance community outreach methods:

1. Prioritize funding hired community advocates to communicate with non-English speaking constituent groups
2. Leverage partnerships to link seasonal hazard awareness campaigns with other community events

Pre-Event Networks and Relationships

Many interview participants support a community-oriented approach to hazard management that takes a holistic approach to both populations and hazards. That is, in addition to taking an all-hazards approach that supports preparation and mitigation with multi-hazard strategies, Marion County's hazard communicators support a whole community approach.

Implications

Based on my interviews and analysis, in addition to maintaining monthly Emergency Manager Meetings, I recommend that Marion County take the following actions to enhance rhetorical strategies for hazard communications:

1. Ensure that public information and public health professionals are well represented at regularly scheduled meetings
2. Prioritize familiarity with JIC staff roles and relationships
 - a. Collaborate on drills and exercises that allow stakeholder agencies to practice standing up ICSs and JICs
 - b. Use small-scale or chronic hazards as opportunities to stand up ICSs and JICs
3. Prioritize mitigation and preparation projects that require interagency and interdepartmental coordination

Rhetorical Strategies

Interviews revealed a disciplinary divide between Emergency Management and Public Information. Whereas emergency management professionals favor the use of narrative strategies to encourage communities to take action to mitigate or prepare for hazard events, public information professionals indicated caution regarding this strategy. In particular, public information professionals expressed wariness about any real or perceived emotional manipulation of the public. This divide highlights the ethical dilemma of negotiating efficacy of persuasion with disciplinary principles for public outreach.

While this project focuses on pre-event communications, many participants reported that fact-based, highly objective communications are critical in post-event contexts.

Pre-Crisis Message Development

Hazard communicators discussed the importance of developing text for messaging prior to crisis events. This “skeleton text” can be quickly filled out with the details of the event, reducing the time necessary to craft and disseminate messaging.

Implications

Based on my interviews and analysis, I recommend that Marion County take the following actions to enhance rhetorical strategies for hazard communications:

1. Facilitate a dialogue between Emergency Management, Public Information, and Public Health around optimal use of narrative strategies
 - a. Focus on stories that highlight community strength and resilience
 - b. Prioritize stories that detail successful use of preparation and mitigation strategies
 - c. Ensure that narratives clearly and consistently highlight factual and evidence-based content
2. Develop and regularly update template text to be deployed during crisis events
3. Use multi-modal communications to illustrate risk, as well as the opportunity to mitigate and prepare for threats

Opportunities for Further Study

Opportunities to build on this research include focused study on the roles of community and nonprofit groups, agency associations, and social media networks and applications in enhancing hazard communications.

Study focused on the role of community groups, nonprofit organizations, and agency associations would help to identify opportunities to better integrate these bodies into the hazard communication efforts of Marion County and other agencies. Specific groups to research include Community Emergency Response Teams (CERT) and the Willamette Region Association of Public Information Officers (WRAPIO).

Exploring rural resources for hazard resilience, community health, and personal safety might provide more specificity and focus to public information opportunities for rural Marion County. The high percentage of persons with disabilities in this part of the County indicates heightened vulnerability to hazard events, exacerbated by the rural nature of the area. As such, this area would be a high-impact area to study in relation to hazard resilience.

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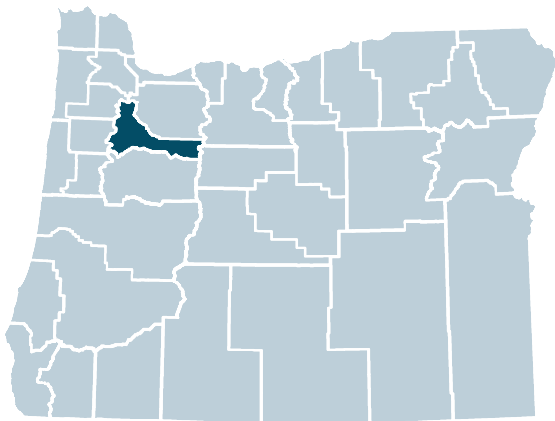
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Appendix I - Community Profile

This appendix provides information about Marion County, including a community profile, hazard background, overview of current plans related to hazard communications, and timeline of events during the 2017 water advisory communications crisis. The section also provides information about the emergency management and communications frameworks that inform this research.

Figure 1. County Location



Source: Marion County GIS

Community Profile

Located along the Interstate 5 corridor, Marion County consists of twenty (20) incorporated cities and thirty-seven (37) unincorporated territories. The county has an estimated total population of 341,286 persons. Of those residents, 163,654 (48%) live in the State Capitol and County Seat, the City of Salem (2017 ACS Estimates). The City of Salem also attracts approximately 30,000 commuters who do not reside in Marion County, but may also require communications regarding hazard events during working and commuting hours.

The county spans 1,194 square miles of the Willamette Valley. The county is relatively flat in the west, and mountainous in the east where it encompasses a segment of the Cascade Mountains. Marion County's geography and built environment intersect to expose communities to a range of natural hazards. Figure # shows the location of Marion County in the State of Oregon.

Economic Characteristics of Marion County

Marion County's median income is \$53,828, compared to the state median income of \$56,119, and the national median income of \$60,336. Marion County has an unemployment rate of 6.8%, equal to that of the state, and 11.3% of all families whose income during the past 12 months is estimated to be below the poverty level. 15.9% of the total population in Marion County is estimated to have an income below the poverty level. The State of Oregon is estimated to have a 9.8% of families and 14.9% of individuals with an income below the poverty rate during the last 12 months. These figures compare to the National unemployment rate of 6.6%, and the poverty rate of 10.5% of families and 14.6% of individuals (ACS 2017 Estimates)

These figures depict heightened economic vulnerability in Marion County when compared to both the State and the Nation. Families, businesses, and communities are likely to have fewer resources to apply to preparation and mitigation activities, and to have a more difficult time recovering economically in the event of a crisis.

Figure 2. Selected Vulnerable Population Characteristics in County vs State

	<u>Marion County</u>	<u>Oregon</u>
Population	341,286	3,982,267
% Vulnerable Age Groups	43	40
% Limited English Speaking	5	3
% w/ a Disability	15	14
% w/ High School Diploma +	87	91
% w/ Bachelors Degree +	23	34
Median Income	56,354 USD	53,270 USD
% Households in Poverty	12	10
% Individuals in Poverty	16	15

Source: ACS 2017 five-year estimates

The Disaster Mitigation Act of 2000 (DMA2K) established the requirement that jurisdictions draft and maintain approved Natural Hazard Mitigation Plans (NHMPs) to qualify for Federal financial assistance on mitigation projects. FEMA defines hazard mitigation measures as “sustainable actions taken to reduce or eliminate long-term risk to people and property from future disasters.”

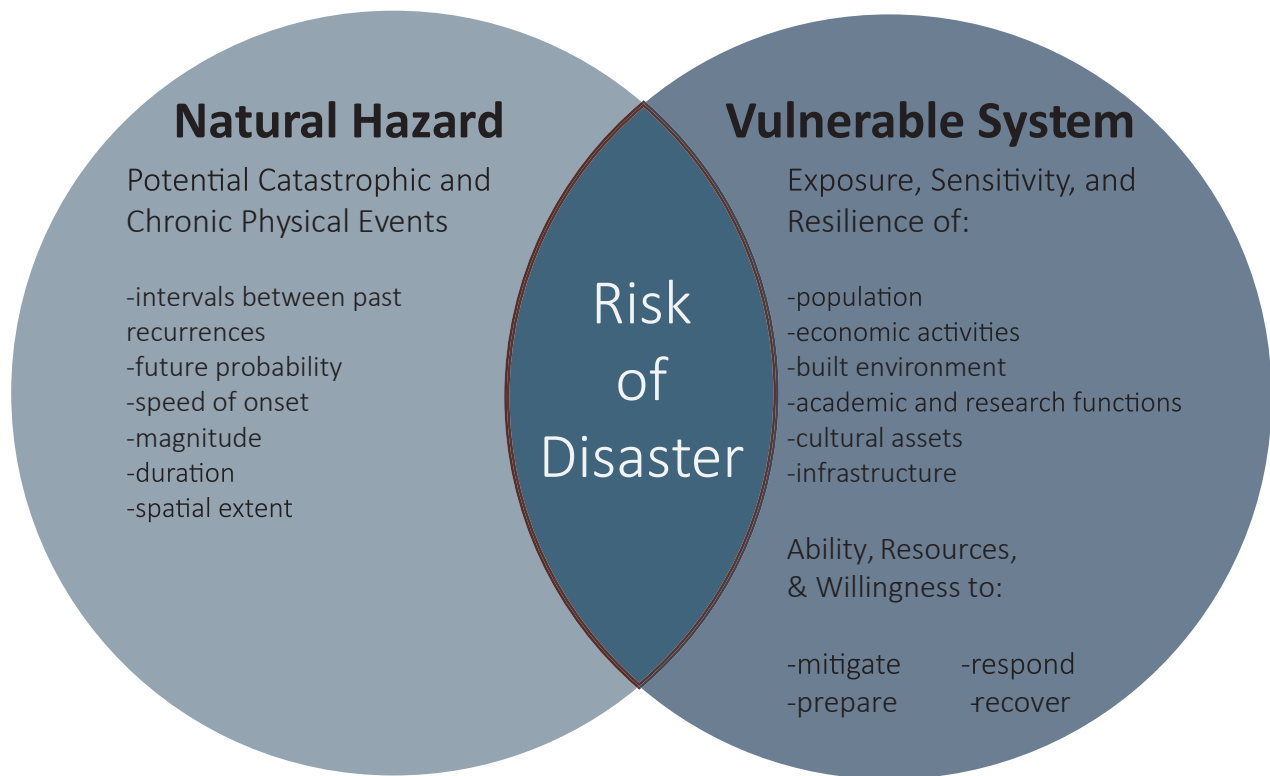
Statewide natural hazard mitigation processes occur in compliance with Statewide Planning Goal 7, which requires local governments to adopt comprehensive plans to reduce natural hazard risk to people and property. NHMP processes involve the following State stipulated activities:

- Inventorying existing and new natural hazards
- Inventorying vulnerable systems, populations, and infrastructure
- Evaluating risk based on a framework and formula relating the history, frequency, severity, and probability of each hazard
 - o Relating this evaluation to development potential and land use intensity
- Engaging in public input and review
- Adopting and amending plans (Oregon’s Statewide Planning Goals, 2001)

Many of these planning activities require coordination among public agencies, and involvement of public outreach and input. Optimally, NHMPs also include action items that provide clear guidance for implementation, including lead agencies, timelines, and funding sources. The policies and projects that result from these action items and planning processes likewise require interagency collaboration and effective public engagement and education. Because of the substantial role of communication in these activities, enhancing hazard communications has the potential to improve overall community resilience to natural hazards.

Figure 3 depicts the relationship of vulnerabilities and hazards to create risk, as inventoried and assessed during the NHMP planning process.

Figure 3: Understanding Risk



Source: USGS – Oregon Partnership for Disaster Resilience

Approved in August 2017, the Marion County NHMP details the County’s risks and opportunities for risk reduction regarding nine (9) natural hazards:

- Drought
- Earthquake
- Flood
- Landslide
- Volcanic Eruption
- Wildland Interface Fire
- Tornado
- Severe Weather/Storm
- Extreme Weather – High Temperature

The NHMP identifies these eleven (11) other hazards, which are not covered by the plan:

- Animal Disease Outbreak
- Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism
- Civil Disorder / Terrorism
- Dam or Levee Failure
- Epidemic
- Hazardous Materials Incident
- Pandemic

- Power Failure
- Radiological Release
- School & Workplace Violence
- Transportation Accident/Train Derailmeny

The landscape of natural hazards in Marion County has shifted over the last seven years. Figure 4 details the relative planning of natural hazards as identified by the 2010 NHMP, demonstrating the evolving changes to hazard probability, history, frequency, and severity, and how the County must maintain up-to-date inventories to ensure accuracy and responsiveness in hazard planning and management. Marion County has maintained the goal of improved communications through its last two NHMP update processes. The 2010 NHMP introduction identifies “increased cooperation and communication within the community through the planning process” as one of the benefits of mitigation activities. (NHMP 2010, Introduction, 1-1) The 2018 NHMP includes the following Priority Action Items, which require robust communication strategies:

- Multi-Hazard #2: Develop a community education program such as an all hazard community outreach forum.
- Earthquake #5: Collaborate with SEDCOR

to develop relevant public-private partnerships with businesses that can contribute to mitigation, response, and recovery.

- Flood 36: Develop a program that maps and communicates real-time flood related road closures. (i-7)

The 2018 Marion County NHMP also identifies two communications actions specific to utility providers:

- Joint Utility Liaison: Establish a position responsible for coordinating information sharing across sector service providers. NOTE: this position could also link to or coordinate activities in other critical infrastructure sectors.
- Special Communication District: Create a special district to generate revenue for ongoing system maintenance, equipment modernization, and hazard mitigation activities. (i-7)

The City of Woodburn identifies the following high priority action:

- Multi-Hazard: Work to streamline the communications systems between all emergency responders. This might include purchasing additional equipment for some units.

All-Hazards Approach

Current Emergency Management planning favors an all-hazards approach (ready.gov/planning). As the name entails, this approach accounts for all natural and human caused hazards that a community faces. Because the probability of specific hazards is impossible to determine, hazard planners find it more appropriate and effective to take mitigation and preparation actions that could support better outcomes for a range of hazards. This approach entails a comprehensive evaluation of a community's vulnerable systems, infrastructure, and populations, and how they interact with the threats that face the area. This evaluation enables planning activities that target the most significant hazards facing a community.

Marion County's All-Hazards Approach

Marion County's Emergency Operations Plan uses a hazard analysis matrix to weigh identified hazards based on their (1) history of occurrence, (2) vulnerability, (3) maximum threat, and (4) probability. Based on these interrelated criteria, the following hazards are identified as priorities for County Emergency Operations:

- Earthquake
- Severe Weather
- Flood
- Civil Disorder/Terrorism
- Dam Failure
- Transportation Accident/Hazmat
- Wildland Interface Fire
- Volcanic Eruption (2-5)

Emergency Management protocols, practices, and behaviors are classified as Emergency Support Functions (ESFs) and given a corresponding number. Consistent with the Federal Emergency Management Agency's (FEMA's) Federal Response Plan, communications are identified as ESF 2 by the Marion County Emergency Operations Plan.

Planning Significance of Hazards in Marion County

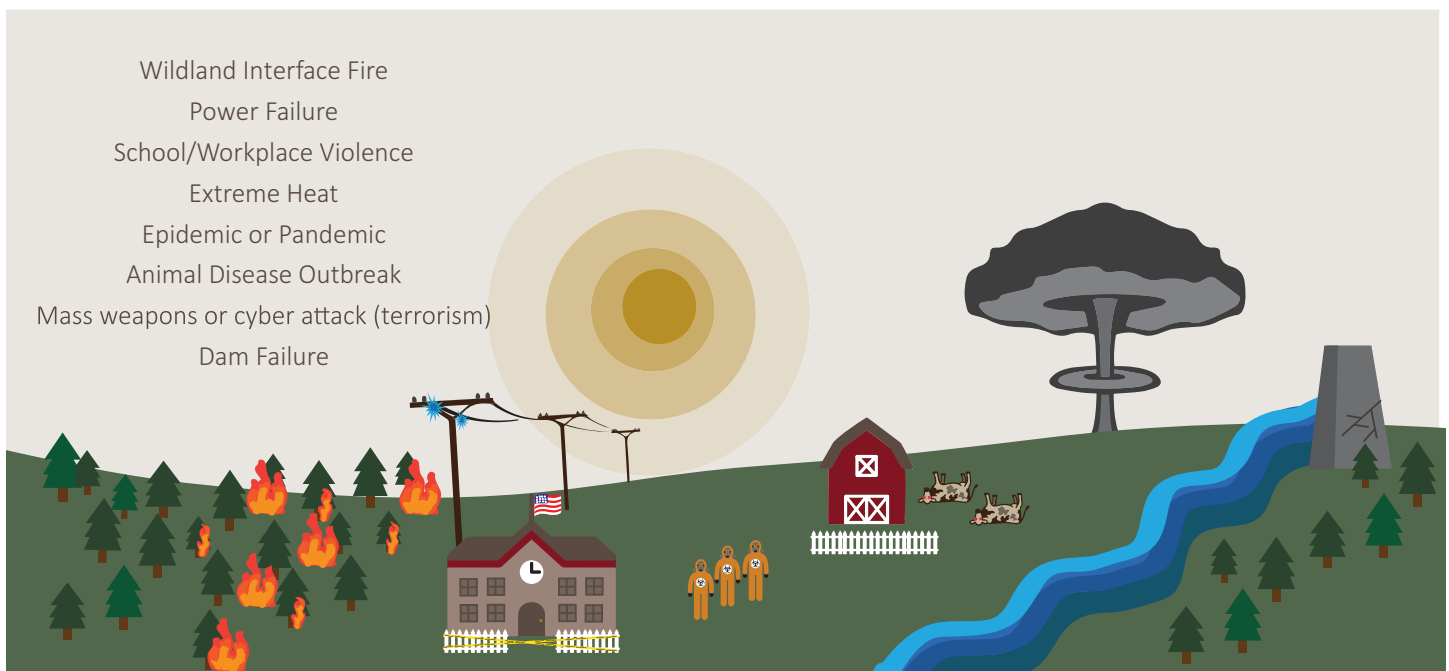
The 2017 Marion County Natural Hazard Mitigation Plan identifies nineteen (19) hazards of planning significance within the County. Figures 4-6 depict those hazards.

Figure 4: Hazards of High Planning Significance in Marion County



Data Source: Marion County 2017 NHMP / Graphic Source: Jessica Morey-Collins

Figure 5: Hazards of Moderate Planning Significance in Marion County

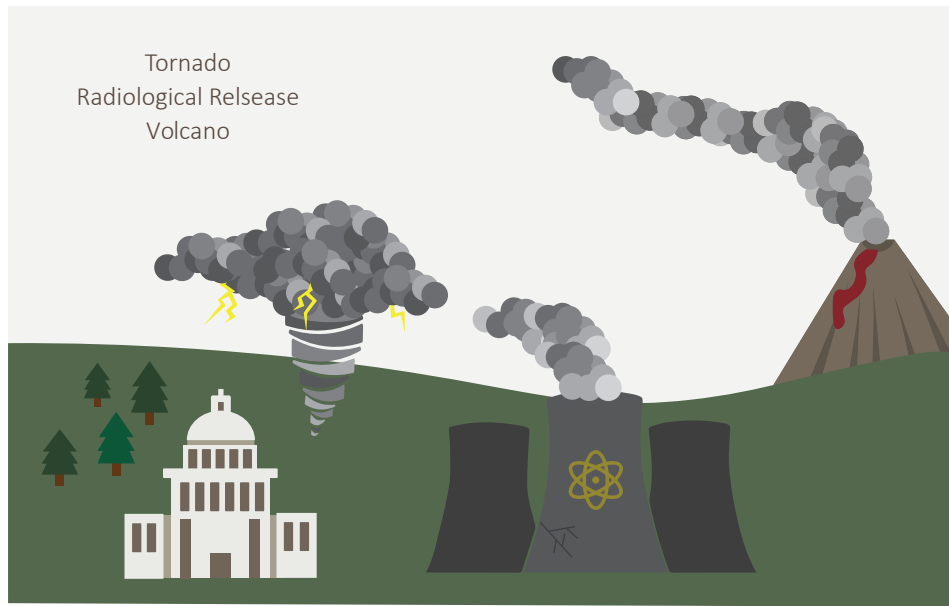


Data Source: Marion County 2017 NHMP / Graphic Source: Jessica Morey-Collins

Figure 4 shows hazards of high planning significance in Marion County, which include landslide, drought, earthquake, hazardous materials incident, civil disorder, flood, severe weather, and transportation accident.

Figure 5 shows hazards of moderate planning significance in Marion County, which include wildland interface fire, power failure, school/workplace violence, extreme heat, epidemic or pandemic, animal disease outbreak, mass weapons or cyber-attack (terrorism), and dam failure.

Figure 6: Hazards of Low Planning Significance in Marion County



Data Source: Marion County 2017 NHMP / Graphic Source: Jessica Morey-Collins

County Organizational Structure

The water advisory communications crisis unfolded within the framework of Marion County’s many interrelated hazard management stakeholders, agencies, and organizations. Familiarity with the range and diversity of communicators involved in county messaging and coordination highlights the complexity of achieving consistency.

Marion County’s Emergency Operations Plan identifies the Oregon Department of Administration as the primary agency responsible for state communications, and Marion County Emergency Management, North County Communications, Santiam Canyon Communications, Willamette Valley Communications, and Marion County Interoperability Council as responsible for communications as an Emergency Support Function (ESF).

Marion County’s Emergency Management is housed in the Public Works department, and coordinates County hazard mitigation, preparedness, response, and recovery with other Federal and State agencies including:

- Army Corps of Engineers
- Federal Emergency Management Agency
- Oregon Emergency Management
- Oregon Emergency Management Association

The County also coordinates hazard management activities with emergency management agencies within county municipalities.

Appendix II - Interview Guide

Introduction:

This interview considers opportunities for improving public and interagency communications regarding hazard management. I will ask questions about hazard-related communication strategies. These communication strategies are:

1. Ensuring consistent messaging among relevant stakeholder agencies and community partners
2. Using targeted, value-driven, narratives to encourage community action
 - a. Providing inclusive messaging for non-English speaking communities
3. Developing proactive, pre-event content to ensure constituents know protocols before crises occur

I will reiterate these strategies during the interview to let you know which we are discussing for particular questions. The interview will take approximately thirty minutes.

Ethics and Consent:

I will use the interview to inform a research study about Marion County's use of specific practices related to hazard communications. Findings will be presented to Marion County Emergency Management and University of Oregon faculty, staff, and students. You have the option to opt out at any time. You may also request that your input be included anonymously. Do you consent to take part in the interview? [Y/N] Would you prefer to be anonymous? [Y/N] Do you consent to have the interview recorded? [Y/N]

The first four questions provide background on your work related to hazard communications:

- (If not anonymous) What is your name and professional affiliation?
- What communities are you trying to reach with your communications?
- What strategies does your agency use to reach this/these audience(s)?
- What are the most substantial risks facing these communities?

The following three questions address consistent messaging among stakeholder agencies and community partners:

- What other agencies or community organizations are involved in these communications?
- How does your organization coordinate messaging with these partners?
- Do you use any strategies to ensure consistent messaging? If so, what are they?

The following two questions address the use of targeted, value-driven narratives to encourage community action:

- How does your agency/organization identify the values of your target communities?
- How does storytelling factor into your hazard communications?

The following questions address the development of proactive, pre-event content:

- What strategies does your agency/organization use to encourage communities to prepare for potential hazards?
- What strategies does your agency/organization use to encourage communities to mitigate their hazard risk?
- How does your organization share emergency protocols with target communities?

Finally, is there anything else you'd like to tell me about hazard communications in Marion County?

Is there anyone else that you recommend I speak with about this research?

Thank you for taking the time to speak with me today. I will be compiling my findings into a report and recommendations in May of this year. Please let me know if you would like me to update you on this process.

Appendix III - City of Salem Water Advisory

June 6, 2018

Applies To: Vulnerable Populations of the City of Salem, City of Turner, Suburban East Salem Water District, and Orchard Heights Water Association

Does Not Apply To: Healthy individuals over 6, Keizer, Private drinking water wells

Results from water quality samples received Wednesday morning (June 6, 2018) indicate that cyanotoxins are present in the City of Salem's water distribution system at levels that exceed Environmental Protection Agency (EPA) guidelines for children and vulnerable populations. For the vast majority of Salem residents, the water is safe to drink and no action is needed.

Until further notice, a Drinking Water Advisory is in place that applies to the following populations ONLY:

- Children under the age of six
- People with compromised immune systems or pre-existing liver conditions
- People receiving dialysis treatment, or other sensitive populations
- The elderly
- Pregnant women or nursing mothers
- Pets

The City is currently working on distribution sites for vulnerable populations. Residents in need of assistance can contact City of Salem Public Works at 503-588-6311. For medical information during the advisory, please call 2-1-1. Industrial consumers with questions and those seeking health-related information can contact the Marion County Environmental Services at 503-588-5346.

The City will continue to post sample results, and updated information related to Salem's water advisory on the City of Salem website and Facebook Page. Neighbors are encouraged to look out for those who are unable to collect bottled water on their own.