Final Report

2013 Northern Colorado Flood Oral History Project

A Collaboration of the Colorado Water Conservation Board, the Public Lands History Center, and the Water Resources Archive at Colorado State University

Dr. Ruth M. Alexander, Principal Investigator
Naomi Gerakios, Project Coordinator
Public Lands History Center
Colorado State University
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Funding and Mission:

The floods that swept across Northern Colorado in September 2013 were extraordinary in their severity and scope. Floodwater damaged and destroyed homes and businesses, mountain towns and transportation networks, ditches, dams and bridges, oil and gas drilling sites, farmland, and natural areas across seventeen counties. Eight people lost their lives. This was a hydro-geologic event, as heavy rainfall over many days produced both devastating floods and perilous landslides. State and local officials have estimated the monetary cost of the flood to be over two billion dollars.[1]

Recognizing the significance of the flood to the state of Colorado, the mission of the 2013 Northern Colorado Oral History Flood Project has been straightforward: we have sought to gain knowledge about the 2013 flood from those who experienced it directly so that water managers, government officials and citizens might handle flood mitigation, preparation, management and recovery more effectively in the future. Colorado's water and emergency managers are people of remarkable skill and dedication who want the lessons of the 2013 flood to become the basis for improvements in policy and practice. This oral history project supports these interests and emerged from the collaborative efforts of the Colorado Water Conservation Board (CWCB), the Water Resources Archive at CSU's Morgan Library, and CSU's Public Lands History Center. Funded by the Colorado Water Conservation Board, the 2013 Northern Colorado Oral History Flood Project aligns closely with the CWCB's commitment to conserving, developing, protecting, and managing Colorado's water resources for present and

[1] Andrea Rael, "Colorado Flood Damage: Property Loss Estimated Around $2 Billion," *The Huffington Post*, September 23, 2013; Sarah Hines, "Our Relationship with a Dynamic Landscape: Understanding the 2013 Northern Colorado Flood," *Science You Can Use Bulletin*, United States Forest Service, March-April 2014 , <http://www.fs.fed.us/rm/science-application-integration/docs/science-you-can-use/2014-03.pdf> ; Plumlee, Geoff. "When Water, Gravity and Geology Collide: Firsthand Observations of the Impacts of the 2013 Colorado Floods | EARTH Magazine." *Earth*, February 2014. http://www.earthmagazine.org/article/when-water-gravity-and-geology-collide-firsthand-observations-impacts-2013-colorado-floods.

future generations. More specifically, this project directly supports CWCB efforts to develop programs and activities that "address long-term flood protection for the overall health, safety, and welfare of Coloradans.[2]"

The interviews conducted for this project highlight the work and perspective of individuals who held direct professional or official responsibility for flood mitigation, preparation, response, and recovery in 2013. The collected interviews (thirty in number, some involving multiple informants) offer significant qualitative data that may help professionals and officials in all areas of flood management prepare for and respond to future flood events. Scholars and researchers who wish to evaluate the 2013 flood will likewise find the interviews to be a rich resource. In addition, the interviews provide a valuable resource for citizens of Colorado who may wish to learn about the potential ravages of floodwaters and about the choices communities can make to lessen their vulnerability to flooding. The interviews reflect the CWCB's investment in documenting the history of flooding and promoting a comprehensive understanding of flood events. The digital recordings and transcriptions of the 2013 Northern Colorado floods will be held as a permanent collection in the Water Resources Archive at Colorado State University.[3]

Recording a Disaster: Methodology

The 2013 Northern Colorado Flood Oral History Project has captured the extent and reach of the flood's impact through face-to-face interviews with people whose professional and personal lives were profoundly affected and altered by the flood. Most of the project's

[2] Colorado Water Conservation Board, "Water Management — Floods," Colorado Water Conservation Board, < http://cwcb.state.co.us/water-management/flood/Pages/main.aspx> (accessed July 3, 2014).

[3] Colorado Water Conservation Board, "Water Management — Flood Preparedness and Response," Colorado Water Conservation Board, < http://cwcb.state.co.us/water-management/flood/Pages/FloodPreparednessResponse.aspx> (accessed July 3, 2014).

informants were individuals with direct responsibility for flood management and recovery during the 2013 disaster. Among this group are climate scientists, water and stormwater managers, municipal and county administrators, dam engineers, emergency managers, search, rescue and recovery personnel, disaster relief personnel, and wild land, park, and resort managers. The informants also include a small number of individuals whose homes and physical safety were imperiled by the flood. Interviews with victims of the flood who required the services of rescue and recovery specialists helped to balance the perspective provided by informants who experienced the flood in a professional capacity. Altogether, the experience and perspective of informants in this project provide the foundation for a comprehensive archival collection on a devastating natural disaster.

This project builds on a precedent set in the late 1970s. Between 1976 and 1978, Dr. David McComb, now an Emeritus Professor of History at Colorado State University, conducted oral histories of forty-one individuals affected by the 1976 Big Thompson flood. The informants included both flood victims and people who participated in rescue and recovery. The recordings and transcriptions of the 1976 flood are in a permanent collection at CSU's Water Resources Archive. They became the basis for McComb's book, *Big Thompson: Profile of a Natural Disaster* (1980) and have been used by many researchers, along with the published book, over the past several decades.

Dr. Ruth Alexander, CSU Professor of History and Faculty Council Chair at the Public Lands History Center, began to assess individual and institutional interest in an oral history project on the 2013 Northern Colorado flood in October of 2013. In consultation with Kevin Houck, Chief of Watershed and Flood Protection at the CWCB, and Patty Rettig, Head Archivist at the Water Resources Archive, Dr. Alexander and staff at the Public Lands History Center

(PLHC) developed research and collection goals for an oral history of the flood. They also began to compile the names of potential informants, both professionals directly involved in flood management and recovery and victims of the flood. In early 2014 the PLHC, WRA, and CWCB entered into a formal agreement, with the PLHC taking responsibility for conducting thirty oral history interviews about the 2013 flood. The PLHC also agreed to prepare a final report synthesizing the findings of the interviews, to deliver one or more presentations to water managers and engineers about the project, and to prepare the recorded and transcribed interviews for permanent collection in the Water Resources Archives. With $30,000 in funding from the CWCB, in May of 2014 the PLHC hired Naomi Gerakios (M.A. History, 2014) as the project coordinator along with three research associates with graduate training in History. Gerakios began to collect data about the flood from the news media, government sources, and scientific outlets. She added names to the list of potential informants, eventually identifying seventy-nine individuals of interest to the study. Most of these individuals had some degree of direct responsibility for responding to the flood; the remainder were people whose homes and safety had been threatened or damaged by the flood waters.

While planning the project and identifying potential informants, Alexander and Gerakios became aware of three other oral history projects dedicated to capturing the history and impact of the 2013 flood. All three projects focused on Boulder County, with two examining the city of Boulder and one concentrating on the town of Lyons. All of them highlighted the experience and viewpoint of people whose homes and neighborhoods were damaged or destroyed by the flood. Learning about these projects prompted Alexander and Gerakios to make sure the PLHC project developed a distinctive identity and purpose. We re-committed ourselves to focusing on water professionals, government leaders, and other emergency and resource managers with direct and

formal responsibility for handling the challenges of flood mitigation, preparation, relief and recovery. We also made a deliberate decision to extend the geographic scope of our oral history collection beyond Boulder County by including Larimer, Morgan, and Weld Counties. Along with Boulder, these were the counties hit hardest by the September 2013 flood. Kevin Houck agreed that by looking at all four of the hardest-hit counties and focusing on informants with professional responsibility for the flood we would ensure the creation of a uniquely important oral history collection.

In late May 2014, the PLHC held a one-day workshop for the research associates (Tessa Moening, Zachary Lewis, and Mitchell Schaefer) who had recently been hired to work on the oral history project. Researchers involved in other PLHC projects were also invited to participate, and a number of them chose to do so. The workshop was led by Dr. Ruth Alexander, Patty Rettig, Maren Bzdek (Program Manager at the PLHC), and Naomi Gerakios. Participants learned about methodology and best practices in oral history. Members of the flood research team also discussed the mission statement for the project and learned about the process of transcribing oral histories and turning them into an archival collection. The workshop leaders identified a wide range of technical and situational challenges that researchers might encounter during their interviews, offering advice on how to remedy on-site problems quickly and effectively. Naomi Gerakios conducted a "pilot" interview with a resident of Estes Park (and fellow student) who had been affected by the flood, and all members of the workshop had a chance to ask him follow-up questions. After the informant left the workshop, all participants discussed and evaluated the interview process. Finally, the researchers practiced interviewing one another and using the recording equipment.

From May through early June, Naomi Gerakios assumed responsibility for seeking approval of our project from Colorado State University's Institutional Review Board (IRB). The IRB reviews applications for all research projects at CSU involving human-subject interviews to safeguard the well-being of informants. Gerakios submitted an application describing the project and its methodology. She also submitted various documents required by the IRB for human-subject projects, including the recruitment script to be used in contacting potential interviewees, an informed consent form and guide, a list of interview questions, and a legal release form. In compliance with CSU's IRB standards, Gerakios also directed the project's research associates to complete Human Subjects Protection Training through the Collaborative Institutional Training Initiative, an on-line provider of research education content. This additional training ensured that research associates would know how to maintain high standards of ethical conduct in their interactions with informants. The project received university IRB approval on June 23, 2014.

Upon receipt of IRB approval, Gerakios began to contact individuals to assess their interest in participating in an interview. Of the sixteen individuals named as potential informants by Kevin Houck, nine agreed to participate in this oral history project. Gerakios then contacted an additional fifty-two individuals about providing interviews. In total, Gerakios obtained agreement from thirty individuals to participate in the project. She subsequently established times and locations for each interview and sent interview questions, informed consent guides, legal release forms, and short biographic data forms to all informants.

During the first two weeks of June 2014, Gerakios also compiled a resource base for the project's research associates, using Zotero, an on-line research platform. She gathered newspaper and journal articles, fliers, links to websites, and government documents related to the flood. Prior to each interview, research associates conducted background research using these

sources and, as appropriate, looked for material related to the specific professional responsibilities of the individuals whom they were to interview. Based on their background investigations, the research associates drafted an additional list of five to ten interview-specific questions for each informant. Research associates recorded all oral history interviews using a digital recorder. At the conclusion of the interviews, our research associates asked interviewees to sign release forms that transferred ownership of the interview to the Water Resources Archive at Morgan Library, Colorado State University. Research associates also took photographs of nearly all the informants and asked them to complete a personal data form for inclusion in the WRA interview files. Research associates made back-up copies of all interviews, saving them to the PLHC's central computer drive, and transcribed the recorded interviews.

The Event:

> We're in …an area called Blue Mountain and our property bordered… the Little Thompson River....[M]y husband and I had been out there since we purchased the home in February of 1992....[I]t was entirely destroyed. It was washed away. We understand it took about 15 minutes. - Kim Campassi, homeowner, flood victim

> And…then we heard the gulch go. My husband was down stairs and he ran outside and said, "There goes the gulch." And he ran out and he came back in,… less than a minute later, and he said, "Joey's house collapsed and he's in it. Call 911." - Tara Schoedinger, Mayor of Jamestown, Colorado

The 2013 Northern Colorado flood event was unlike any other water disaster in the state's history in its geographic scope and severity. Numerous informants to this project remembered two other floods in the region that were extraordinarily destructive to natural resources, human life,, and property, but both of the earlier events were relatively local in their impact. The Colorado Big Thompson Flood of 1976 claimed the lives of 143 people in a narrow mountain canyon east of Rocky Mountain National Park. The Spring Creek flood of 1997 claimed the lives

of five people in Fort Collins. Flash flooding caused both of these floods. In contrast, the September 2013 floods resulted from six days of heavy rainfall over a seventeen-county area already affected by severe drought and wildfire. The region's drought-affected land was parched and hardened. In Larimer and Boulder counties fire-scarred land was both severely diminished in absorption capacity and covered with burned organic matter that was no longer firmly attached to the ground. Heavy rain swept tons of this organic debris into the regions' waterways. Floodwater and debris broke the banks of rivers and creeks and rushed through communities and cities across Northern Colorado, creating physical and social havoc and claiming the lives of eight individuals.[4]

The conditions for the 2013 flood began to develop in early September as monsoonal air from Mexico moved northward toward Colorado, Mexico, and Southern Utah. Initially, state climatologist Nolan Doesken and his colleagues thought the plume of tropical moisture would bring much needed relief from Colorado's heat and drought. Rather than moving onto the Western slope, however, as Doesken had anticipated, the moisture shifted eastward and started to cause small isolated instances of flooding near Arvada, Colorado. By the 10th of September, Doesken recalled, climatologists began to see the development of upslope conditions on the east side of the Rockies. Moisture rose with the topography and cooled into water-laden clouds, increasing the potential for high levels of precipitation in the northern Front Range, from Denver to Laramie, Wyoming. Indeed, historic levels of high-elevation rainfall dropped over a wide geographic area, producing flooding in all of Northern Colorado's watersheds. [5]

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[4] William Schnieder interview by Naomi Gerakios, digital recording,5 July, 2014, Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado; Cook, Terri. "2013 Front Range Flooding: An Ecological Perspective | EARTH Magazine." *Earth*, February 2014, http://www.earthmagazine.org/article/2013-front-range-flooding-ecological-perspective.

[5] Nolan Doesken, interview by Zach Lewis, digital recording, 3 July 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

Mike Chard, the Director of Boulder's Office of Emergency Management (OEM) recounted how the Boulder OEM tracked and monitored the September rains, realizing by September 11th that the city faced a true water disaster:

> We were aware of the danger on September 9th, and we became…heightened to it by 11 AM the morning of the 11th. We were anticipating a problem by 14:30 hours on the 11th, which is the time we opened the EOC [Emergency Operations Center] and implemented our severe weather protocol, and we knew we were in trouble by 8:30 that evening and were leaning forward....We had full EOC going within the next hour and the rest is history…[6]

Over the course of six days the skies poured down on much of Northern Colorado. The St. Vrain Creek, Left Hand Creek, Coal Creek, south Boulder Creek, Sand Creek, the Cache la Poudre River, Big Thompson River, Little Thompson River, South Platte River and a number of smaller creeks, rivers, and tributaries all swelled and overflowed far beyond their normal capacity causing flooding that stretched from the small mountain town of Nederland to the plains of Crook, Colorado. The Colorado Climate Center at CSU reported total rainfall for the week of September 9th at more than sixteen inches in Boulder, nine inches in Estes Park, and six inches in Loveland and Fort Collins. Some areas of Colorado experienced 1 in 1000 year flood levels. [7]

Emergency and first responders across the Front Range faced daunting challenges as they tried to protect the safety and welfare of residents while also limiting damage to community and regional infrastructure and natural resources. The flood caused over 250 debris slides and washed out over 350 miles of roads. Fast moving water killed eight, endangered the lives of thousands of other people in buildings and moving vehicles throughout Northern Colorado, and yet

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[6] Michael Chard, interview by Naomi Gerakios, digital recording, 27 June, 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.
[7] David Gochis et al, "The Great Colorado Flood of September 2013," *Bulletin of the American Meteorological Society* (2014) early on-line release; National Weather Service, "Analysis of the September 11-18, 2013 floods," http://www.crh.noaa.gov/images/bou/precip/Sep2013Flood.pdf

simultaneously prevented many people from leaving hazardous settings or gaining access to relief services.[8]

As the dire effects of the September rain and flooding became apparent, professionals in water management quickly devised measures to limit the dangers posed by overflowing waterways. For example, William "Bill" McCormick, head of dam safety for the Colorado Division of Water Resources, mobilized staff and volunteer engineers from the Western Slope to monitor over 200 dams, generally too small to be subject to inspection, that were in danger of failing during the floods.[9] Similarly, professionals in the field of emergency response find ways to help people in urgent need of shelter, food, and social services as the circumstances around them kept changing. In Boulder County, Mike Chard, Director of the Office of Emergency Management, went "off script" from his agency's emergency action plans as designated evacuation shelters were inundated by flood waters:

> The life safety thing was the first hurdle….[W]e were opening shelters and they were closing as quickly as we were opening because they were flooding. So, every shelter that we had in our playbook was off-script, so we had to develop new shelters….[S]o schools would be like "We can do it!" And then we would say, ok, logs[10] you gotta throw in a complete…shelter support skid on that, and they would get everything they needed from food to medicine.…
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> Every plan we had we were off-script on pretty quick, but the process of the planning was what was important, not so much that the plan itself didn't hold as long as it did, cause your plans are only as good as what you know and, and, these things are – there's so many contingencies it's more important that – and we did – our whole system is designed around contingencies. It's that you'll plan and it will fail. So, how do you deal with failure? So we train to failure, that's the stuff we do p-getting preemptive, so people have the skill set and the muscle memory to know how to perform in those environments, and that, that paid-off immensely.[11]

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[8] Hines, "Our Relationship with a Dynamic Landscape", 2.
[9] William McCormick, interview by Naomi Gerakios, digital recording, 8 July, 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.
[10] Logistics.
[11] Michael Chard, interview by Naomi Gerakios, digital recording, 27 July 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

Recollections by McCormick, Chard, and others attest to the enormous challenges faced by the professionals tasked with responding to, and managing, the 2013 Northern Colorado flood. In interview after interview, our researchers found that individuals with professional responsibility for flood management had to think creatively, act quickly, and develop solutions to problems they may never had encountered before. The practical and moral obligations assumed by resource managers, emergency responders, and public officials were of staggering proportion, and these individuals acted with noteworthy effectiveness and courage. Our researchers also discovered that informants in positions of professional responsibility were eager to learn from the flood and to consider how they might improve flood and disaster preparation and response in the future. Comments from homeowners also attest to critical interest in learning from the flood.

Our informants' interest in learning from the flood is commendable and understandable. After all, these are people who will continue to bear responsibility for emergency and resource management in the future. In addition, resource managers know that scientists are asking about the connection between unusual flood events such as Northern Colorado's in 2013 and climate change. Though the severity of the 2013 flood cannot be directly attributed to climate change, climate scientists have noted a correlation between global warming and increasingly volatile storm patterns. Reflecting on how we might think about climate change in relation to the 2013 flood and future flood events in Colorado, Nolan Doesken remarked:

> …is changing climate going to change the probability of such events? And as such, do we plan differently for the future?..[W]e can…tell everybody that the climate will be warmer with quite a bit of confidence 50 years from now. Telling you with a lot of confidence that we'll have big floods—that's a tougher one because…precipitation in semi-arid areas like ours is not…closely tied to temperature. But…the capacity for water vapor to be contained in the atmosphere is a function of temperature in a non-linear way….And that's why you will hear people say… as a best guide, assume the risk will be higher in the future because

> a warmer atmosphere will have potential to carry and deliver more water vapor to whatever storm systems we happen to have. [12]

With Doesken's comments in mind, we use the remainder of this report to consider in careful detail the principal lessons of the flood shared by informants.

[12] Nolan Doesken, interview by Zach Lewis, digital recording, 3 July 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

Lessons Learned:

This section of our report organizes our informants' views on lessons learned from the September 2013 flood into four categories. Each category addresses a distinctive area of flood management and highlights multiple issues that communities must confront if they wish to become more resilient in the face of flooding and other natural disasters.

1. Floodplain Management and Mitigation

The informants interviewed about the September 2013 flood identified numerous measures that city, county, and state officials have taken, or might take, to reduce the threat of flooding Colorado communities. Here, we highlight watershed restoration and protection measures at the state level, floodplain management measures in the city of Fort Collins, and comparisons our informants made between Fort Collins and Boulder.

Watershed restoration: Chris Sturm, Stream Restoration Coordinator for the Colorado Water Conservation Board, was one of our most important informants at the state level regarding watershed planning, protection, and mitigation. During his interview Chris noted that successful flood mitigation and recovery requires the protection of watersheds and well-functioning ecosystems. Yet he also pointed to the difficulties involved in putting watershed protection plans into place. In any given watershed, multiple stakeholders will have varying points of view about how a watershed should be treated and the extent to which it should be protected, developed, used, or restored. A quick look at any map of Northern Colorado suggests the complicated array of stakeholders in the region's major watersheds, ranging from the residents of tiny mountain towns and the inhabitants of large cities to foresters and park managers, developers, manufacturers, oil and gas drillers, public officials, ditch companies, farmers and ranchers. Support for industrial, recreational, agricultural, residential, and municipal water consumption

varies widely across these disparate groups. It's also difficult to create coalitions involving a mix of public and private interests, agencies, and organizations. Moreover, only limited government funding is available for watershed planning and restoration, though funding sources have improved since 2013. The Colorado Water Conservation Board helped to fund and direct over thirty watershed restoration grant projects between 2009 and 2012, but none of them were in Boulder County, an area diverse both in opinion and in its array of water users. Much of Boulder County is highly susceptible to flooding because of its multiple watersheds and close-in development.[13]

Brian Varella, a Storm Water and Floodplain Manager in Fort Collins and the current chair of the Colorado Association of Flood Plain Managers (CASFM), confirmed Sturm's comments on the critical importance of floodplain planning, noting newly-energized efforts by CASFM and the CWCB to support watershed planning across Colorado.[14] Since the 2013 flood nine new watershed coalitions have formed in Colorado and, with funding from the CWCB, are in the process of developing watershed and restoration master plans. All rely in part on volunteer support, whether at the community level or through non-profit entities such as CASFM.[15]

Pro-active measures in Fort Collins: While the total cost of damage caused by the flood will likely exceed three billion dollars across the state, the city of Fort Collins incurred damages of just over one million dollars.[16] There, stormwater and floodplain managers took a proactive and multi-dimensional approach to flood mitigation that prevented significant damage to the city's residents and infrastructure during the 2013 flood. The city's flood mitigation practices

[13] Chris Sturm, interview by Mitchell Shaefer, audio recording, 23 July, 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.
[14] Brian Varella, interview by Zach Lewis and Naomi Gerakios, audio recording, 28 July, 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.
[15] "Volunteer Opportunity," *The Open Channel: Newsletter of the Colorado Association of Stormwater and Floodplain Managers*, 25:2 (Summer 2014), 10.
[16] Brian Varella, interview by Zach Lewis and Naomi Gerakios, audio recording, 28 July, 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

developed over many decades but were significantly expanded and improved after the Spring Creek flash flood of 1997 caused millions of dollars in property damage and killed five city residents.

One of the first steps the city's stormwater and floodplain managers took after the 1997 Spring Creek flood was to move toward a community-wide approach to floodplain management. In practice this meant that after 1997 all fees for flood basin improvements were collected city-wide, rather than on a basin-by-basin basis. The city also increased fee rates and used the new funds to complete projects aimed at mitigating flood risks and damages. These projects ranged from constructing large detention ponds, levees, and storm sewers to purchasing properties in the floodplain, protecting open space, and limiting development near the Poudre River .[17] Fort Collins' stormwater managers believe these capital improvements helped the city get through the 2013 flood without devastating damage or loss of life. The construction of the Oxbow Levee, for example, was integral to preventing the Buckingham neighborhood in Fort Collins from flooding. Fort Collins' restructuring of its floodplain system created a community-based solution to a community problem. Other cities might follow Fort Collins' lead in recognizing flooding as a problem requiring coordinated action across multiple flood basins and watersheds.

A number of other steps undertaken after 1997 furthered mitigated the effects of the 2013 flood in Fort Collins. The city developed a flood warning system, installing rain gauges around town that helped stormwater and floodplain managers monitor severe weather effectively, especially in September 2013. Data gathered through the flood warning system has also helped the city's stormwater and floodplain managers remap their floodplains and update rainfall data. In addition, the city passed a regulation restricting the construction of critical facilities in the

[17] Ken Sampley, Marsha Hilmes-Robinson, Brian Varella, interview by Naomi Gerakios and Zach Lewis, digital recording, 28 July 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

100- year floodplain, and it instituted a floatable materials regulation, prohibiting new structures in the city from storing any floatable materials (fleet vehicles, pallets, oil drums, lumber, etc.) outside of a building, where they might be washed downstream during a flood, endangering lives and property.[18]

Finally, the city became increasingly proactive in educating the public about what to do before and during a flood event. It improved the flood information available to the public on its website and used social media as an educational tool. Fort Collins also began sponsoring a "Flood Awareness Week" once a year where community members learned how to find flood-related information and real-time data during an event. Moreover, this event gave city leaders and specialists an opportunity to reach both public and private partners with targeted messaging. By conveying simple and direct messages such as, "Don't drive through floodwater," city officials prioritized the information they most wanted residents to remember and understand. [19]

Comparing Fort Collins and Boulder: The 2013 flood interviews provide valuable insight into the differences between Fort Collins and Boulder with regard to flood mitigation and vulnerability. The two cities differ geographically, of course. Fort Collins has a large river running through it, but it is located on nearly flat terrain. The most developed and densely populated sections of the city are a couple of miles from the foothills of the Rocky Mountains. In contrast, Boulder is built right into the foothills. The western portion of the city rests in the mouth of Boulder Canyon, with Boulder Creek flowing from the canyon and bisecting the city. Boulder has encroached upon this waterway, with residences and businesses built on the banks of the creek. Major floods occurred in the city or county in 1894, 1919, 1929, 1938, 1969, and 2013. In recent decades Boulder has attempted to limit development and re-development of flood

[18] Marsha Hilmes-Robinson interview.
[19] Marsha Hilmes-Robinson interview.

vulnerable areas, for example, by building factories and parks on its eastern fringe, away from the floodplain. It has also introduced features along waterways (sharp rocks along embankments, bike paths, hinged footbridges) that will help keep water channelized, provide secondary pathways for overflowing water, and prevent potentially dangerous infrastructure from breaking and moving downstream. Still, Boulder cannot undo its long history of building near waterways, and the city remains at high risk for flooding. [20]

Historically, Fort Collins has taken a different approach to city development, sharply limiting development along the Cache la Poudre River and actively preserving natural areas along the Poudre and smaller waterways to reduce the city's vulnerability to flooding. Assessing the differences between the cities in terms of mitigation and vulnerability during the 2013 flood, Brian Varella, a Fort Collins stormwater and floodplains manager and Chair of the Colorado Association of Stormwater and Floodplain Managers, stated:

> The difference between Boulder and Fort Collins is Fort Collins has worked hard on the Cache la Poudre River to try and buffer themselves against the risk associated with flooding by maintaining it as a natural resource, or natural asset. Boulder on the other hand has chosen, as a community, to encroach upon that asset, make it a part of their integral daily life, which is fantastic. But when that flood risk comes through it spreads out into those human-encroached areas. And I always say, that disaster takes three parts: one part water, one part gravity, and one part human interaction. In Fort Collins they took the human part out of that equation. In Boulder the human element is extremely close to the asset, and that's part of what really made that a major disaster for them. The other part I would say—to Boulder's credit—is they got a whole heck of a lot more rain in a lot less time than we did, in Fort Collins. In Fort Collins, we got about twelve inches over three days; in Boulder they got I think up to eighteen inches in a day. And you just cannot escape flooding under rain like that.[21]

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[20] Best, Allen. "Sound Planning Helped Spare Boulder." *Planning*, November 2013. http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=9cbf94ea-6231-4979-a37d-62824339c414%40sessionmgr4003&vid=2&hid=4107.

[21] Brian Varella, interviewed by Naomi Gerakios and Zach Lewis, 28 July 2014, 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

In sum, our oral history informants made it clear that effective flood mitigation in a city, watershed, or state depends on an array of tools and strategies. These include the development of watershed restoration coalitions, plans, and funding structures; restrictions on floodplain development; public education; and storm monitoring and warning systems. All of these measures proved their worth in the floods of 2013. Some communities, for example, Fort Collins, proved to be more advanced than others in putting mitigation measures into effect. Communities that invested relatively few resources in mitigation up to 2013 should pursue mitigation more aggressively in the future, especially as climate change increases the risk of extremely damaging and widespread storms and floods. And yet, for all their worth, mitigation measures can provide no absolute guarantee against damaging, even catastrophic, floods or landslides. Communities must prepare adequately for flood events, even as they seek to reduce the likelihood and gravity of flooding.

2. Preparation and planning for natural disasters

> I'm a firm believer in the saying, "you fight like you train." - Danny Basch, Rocky Mountain National Park

How do agencies and municipalities plan for an event as large and potentially severe as the 2013 floods? Certainly, the collection of real-time weather data helps communities anticipate and prepare for extreme weather events. Nonetheless, climatologists and stormwater managers may not always recognize a severe event in the making. That was certainly the case with the 2013 flood. Moreover, severe weather events cannot be avoided. Knowing that natural disasters are inevitable, state, county, and municipal offices in Northern Colorado have developed complex plans to prepare for natural disasters effectively. This section of our report highlights the preparedness strategies and emergency capabilities considered most valuable by emergency responders and managers in the 2013 flood.

Emergency offices, plans, and training programs: All counties in Colorado have Offices of Emergency Management that prepare their communities for natural disasters and other emergencies. Cities such as Fort Collins and Loveland have their own Offices of Emergency Management. Rocky Mountain National Park has an Incident Command Team that is trained and ready for activation in emergencies. Colorado's counties and cities also offer citizens a range of opportunities to learn about, train, and prepare for natural disasters. They work in collaboration with the state's Office of Emergency Management, with federal entities, especially FEMA, and with a range of non-profit organizations such as the Red Cross. The state's disaster education program for citizens, Ready Colorado, works in conjunction with local disaster education programs.

One of the foremost duties of offices of emergency management at the local, county, and state level is to provide personnel with formal training for emergency response. Many individuals in this oral history collection noted the value of training for disaster and recovery prior to the 2013 flood. Informants with responsibilities and experience spanning local, county, state, and federal contexts all stressed the particular importance of regular mock disaster training scenarios. Some informants in our study trained at the National Disaster Training Center in Rhode Island. Others trained at Colorado's Office of Emergency Management training academy for local emergency managers and responders.[22] The state's recently established OEM Training Academy is an invaluable resource for officials and personnel across the state who might not be able to afford travel to the National Training Center in Rhode Island.

Formal training prior to the 2013 flood, especially in mock disaster scenarios, imparted essential technical skills and taught responders how to "plan for failure" and adapt their

[22] Bruce Holloman, interview by Naomi Gerakios, digital recording, 8 August 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

emergency responses to constantly-changing circumstances and contingencies. In addition, regular training exercises afforded emergency responders important opportunities to build relationships within and across departments and with other coordinating agencies. Building relationships proved vital to making sure communication flowed effectively and efficiently during the flood. Marsha Hilmes Robinson, a stormwater and floodplain manager for the City of Fort Collins, explained:

> It's not just knowing what to do, it's knowing who to talk to, and knowing who these people are and developing those relationships and that communication to be able to know when an incident happens you can trust the other person that's on the other end of the line, that they know what they're doing, and also who to call. Who should I get in touch with? And what is their role going to be through that?[23]

Reflecting on training from a state-wide perspective, Bruce Holloman, Colorado's Director of Emergency Management, explained how relationship-building and training for failure reinforced one another. Training exercises prior to the 2013 flood were "a tenth of the scale of what we just saw." Emergency personnel in Boulder, for example, did annual training exercises related to the potential flooding of Boulder Creek. They had never prepared for flooding across multiple watersheds. Yet, Holloman said, "if you do training and exercises one of the biggest wins…is that you're building a team. You're getting people used to having to work through these problems together." Even during the vast flooding of 2013, "the processes, principles, [of] team building, that's pretty…consistent."[24]

Importantly, training and preparation prior to the flood even took place in small mountain towns, helping them to survive the destruction and devastation they experienced. In mountain

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[23] Marsha Hilmes-Robinson interview; Mike Chard interview; Scott Sandridge, interview by Tessa Moening, digital recording, 24 July, 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

[24] Bruce Holloman, interview by Naomi Gerakios, digital recording, 8 August 2014; Danny Basch, interview by Mitchell Schaefer, digital recording, 29 July 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

towns such as Nederland and Jamestown systems of training and preparing for natural disasters were already in place and recognized as vital to mitigating threats to public safety. Previous experience, especially with wildfire, had taught these communities about the necessity of having emergency response plans and responders ready for action. Emergency preparations that crossed the geographic boundaries of individual communities were especially important. Boulder County's Inter-Mountain Alliance, put in place after the fires of 2011, prepared towns from Nederland to Lyons to offer one another material support and shelter. Similarly, Boulder County's Amateur Radio Emergency Services was ready to provide radio communication to remote areas of the county cut off from telephone land lines, cell phone systems, and internet services.[25]

Tara Schoedinger, the mayor of Jamestown, noted the transferability of emergency preparation for wildfires to flood events. Before the 2013 flood Jamestown had been working towards becoming a federally-recognized *Firewise Community* because of its vulnerability to wildfire. While the town was not directly prepared to respond to the severity and magnitude of the September flooding, community members translated many aspects of the *Firewise* training into overall emergency preparedness training. Schoedinger stated:

> I think we were prepared just on an emergency preparedness basis, in that people knew where the evacuation center was, we knew to go down the list…um… people were cooperative with the information that they were receiving… It was the middle of the night. And, um, people worked really well together… I don't know if that's emergency preparedness, or just a sense of community, but… people got it. People got it very quickly.[26]

Mutual aid agreements: In addition to training and public education, informants also stressed the vital importance of putting formal mutual aid agreements into place prior to the

[25] Mike Chard interview.
[26] Tara Schoendinger, interviewed by Tessa Moening, digital recording 30 July 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

flood. These compacts allowed cities, communities, and counties to share expertise, equipment, facilities, and services. Brian Varella, speaking as a floodplain and stormwater manager for the City of Fort Collins, pointed out that communities could not afford to wait until an emergency to put cooperative aid agreements into place:

> …. you've got to have mutual aid agreements or memorandums of understanding in place before the disaster, because trying to put those together during recovery is really difficult. You've already... you're already busy. And, being more busy by putting together mutual aid agreements to go help others is going to lose time. So getting those mutual aid agreements in place before the disaster is absolutely critical. We're finding that true across all communities in Colorado, not just ours.[27]

Prior to the September 2013 flood, the state had also put in place Colorado's Emergency Management Assistance Compact (EMAC) system, a state-to-state agreement between Colorado, Kansas, Nebraska, Wyoming, Utah, and New Mexico. It gave emergency managers in Colorado access to crucial resources and personnel from other states, and removed barriers to the use of professionals licensed outside of Colorado.[28]

In sum, informants stressed the importance of emergency preparation that included careful planning and coordination, deliberate training, and the development of effective systems of communication and relationships of trust across multiple communities and entities. Numerous informants noted that communication preparing the public for disaster needed improvement, as did communication in and across emergency preparation and response entities. Regular training in workshops and through mock disaster scenarios gave emergency managers and first responders essential skills, transferable from one type of disaster to another, and it needed to be given even greater priority. In addition, informants noted that mutual aid agreements between

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[27] Brian Varella, interview by Naomi Gerakios, digital recording, 28 July, 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

[28] Bill McCormick, interview by Naomi Gerakios, digital recording 8 July 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado; Bruce Holloman, interview by Naomi Gerakios.

municipalities and across state lines allowed for the efficient transfer of critically needed equipment, personnel, and services. Responders found, however, that not enough of these agreements were in place. Planning, training, communication, and mutual aid agreements should be sustained and enhanced as they will be required again in future emergencies.

3. Managing a disaster

> I guess the biggest philosophical change has just been, I think… I mean I had never seen a dam fail or experience that first hand… um, and so it had gotten to be like I didn't think it would ever really happen. – Kallie Bauer, Dam Safety Engineer
>
> There's no playbook for flood. - Sean Cronin, St. Vrain amd Lefthand Water Conservancy District.

Colorado counties, towns, and cities were affected by the 2013 flooding at different rates. Counties on the eastern plains had the greatest time advantage. According to John Crosthwait, Morgan County's Planning and Zoning Administrator, Morgan County had between 26-48 hours of advance notice that flood waters were moving east from the mountains. The Colorado eastern plains had previously dealt with flooding of the South Platte River after heavy rainfall, and many communities on the plains had learned to monitor weather conditions and agricultural dams carefully.[29] In contrast, mountain communities did not have the luxury of time on their side. Whether flooding in a community occurred quickly or developed after several days of rainfall, emergency managers were key figures in meeting the challenges of the 2013 flood and devising effective and appropriate measures for evacuation, relief, and recovery. When emergency managers such as Mike Chard in Boulder County and Mike Gavin in Fort Collins reflected on

[29] John Crosthwait, interview by Tessa Moening, digital recording, July 16, 2014, 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

the lessons they had learned from the flood, they stressed the need for greater coordination and communication, the value of going "off-script" to create novel solutions to emerging circumstances, the need for more mutual aid agreements, and the value of both new and old technologies. We discuss each of these factors below.

Leadership and coordination: Emergency managers in Boulder, Larimer, Weld, and Morgan counties, and in the cities of Fort Collins and Loveland, were tasked with gathering information quickly and effectively during the 2013 flood, and then translating their knowledge about rapidly-changing circumstances into action. They gathered resources and personnel from a range of federal, state, county, and local agencies, and coordinated numerous types of public and volunteer services with those offered by private and charitable agencies. With lives, property, infrastructure, and natural resources at great risk, emergency managers confronted a staggering array of challenges, both practical and moral.

Nearly all of the emergency managers interviewed in this oral history collection had professional background in firefighting, and this background proved particularly helpful during the 2013 flood. Training and working as firefighters gave the emergency managers an understanding of the natural hazards in their communities and familiarity with the landscape. Knowledge about the location of burn scars and unstable mountain terrain helped them monitor and anticipate threats in problematic areas. Moreover, firefighting had given them extensive experience in planning, responding to contingency, emergency technologies, emergency resource management, decision making, and the deployment of personnel.

In the context of the 2013 flood, the planning, training, and prior firefighting experience of emergency managers made the difference between lives saved and lives lost. Mike Chard recalled the frustration and fear he and the one hundred staff members in his Emergency

Operations Center felt when they realized the destruction of roads in Boulder County and non-stop rainfall kept them from evacuating the hundreds of people whose lives were endangered in small mountain communities. They were dependent on ordinary citizens in mountain towns who wanted to help one another: "So there's all these 911 calls happening and, literally we were kind of paralyzed, but there was pockets of, you know, effort going on that were doing miraculous things and there was tremendous heroism, not just from first responders, but from community members that were helping neighbors rescue each other and survive through the events and support one another, which is pretty remarkable." Yet even as Chard and his staff worried about people whom they couldn't reach, they used their time effectively, calling in resources and planning for evacuations to begin as soon the rain let up:

> so even though we were kinda paralyzed operationally, we were…getting things amassed and staged and ready to go…cause we knew at some point we were gonna get a break…. And then Friday night…the skies parted for a bit. And we…had the Army here by then….The Guard was the first night, Army was coming Saturday, so we had all that arranged, and we started launching sorties and we started getting humanitarian missions up to communities that were isolated, in dire need of food and water, cause they were getting close to that point where people are running out of resources. So we were able to start launching sorties and that's…when we started to feel good about it. Cause now you're thinkin' "Alright, we're finally, we're finally kicking some butt instead of getting our butts kicked!"….And then Saturday it was just airshow time…nonstop helicopters flying, and then all the stories of people coming out of the hills, and … it was a relief for me to finally…see people getting out of here and that's when I actually went home, on Saturday night, cause I felt we had held it.

The situation in Fort Collins was never as dire as in Boulder County's mountain towns, yet stormwater managers knew that public safety could not be taken for granted. They ordered the evacuation of three low-lying subdivisions in the northeast quadrant of the city. Then, they made a highly unpopular decision to close the cities bridges, believing that by doing so they would keep more residents in their homes and out of the way of floodwater and debris. As Brian Varella remarked:

> I think one thing…that was critical to the success of the safety of our citizens was closing all the bridges on the Poudre River. They did the same thing to the Big Thompson River down in Loveland. So for those of us who live downstream of these canyons between those two rivers anybody in this part of town was stuck here. Couldn't get in and couldn't get out….But really the closing of the bridges is key to the success of this community because two-thirds of people who died in a flood nationwide in 2013 died either walking or driving.…[T]he best thing you can do is prevent them from going over and around the hazard, and that is by closing the bridges off, and keeping people away.

Danny Basch, Facilities Manager for Operations at Rocky Mountain National Park, recalled that operations personnel were closely monitoring deteriorating conditions in Boulder and Larimer counties, hearing on September 11th and 12th of extensive road flooding and damage, overflowing lakes, and the overtopping of bridges in Estes Park. The park activated its Incident Command Team on September 12th and quickly evacuated campers and their vehicles from Moraine Park, allowing these visitors to "shelter in place" at the Bear Meadows Visitor Center parking lot. The ICT also evacuated backcountry park visitors, with escort provided by backcountry rangers. The park announced its closure, but the ICT remained active, monitoring the park and giving extensive aid to the gateway community of Estes Park. "We were helping the town, the county, and other neighbors, like the Y.M.C.A., and others with equipment, with vehicles, with loaders, hand crews, hand tools, … it was a really amazing… [I]t was neat to see working within the rules how much we were able to provide help to our friends and neighbors in the valley. [30]

Colorado's emergency managers are widely recognized as having served their communities with great dedication and skill in 2013. Among our informants, Sean Cronin, Executive Director of the St. Vrain and Lefthand Water Conservancy District, reflected on how much he and the ditch companies he serves benefitted from excellent emergency managers in

[30] Danny Basch interview.

Boulder County as they responded to the flood emergency and then seamlessly from rescue and relief to recovery operations:

> I got to know those people…through this flood event and, and it's been one of the…silver linings, if you will, of the disaster…it…personally gave me great comfort in the people who dedicate their careers and their lives to emergency management….I got to know Mike Chard with Boulder County and he is a spectacular asset to this community in terms of how he runs recovery efforts. I got to know Gerry Safferson [sp?], who dealt with the…wildfire restoration efforts in Boulder County and was put on the flood recovery efforts….I don't think the communities at large recognize the quality of people that do…that kind of work. ….I was very fortunate to get to know them and really appreciate their leadership…and the…strong qualities they have about them to get stuff done. [31]

Managers in private industry also demonstrated effective leadership during the flood. Brian Varella spoke on this point in his interview, highlighting decisions by oil and gas drillers that lessened the scale of environmental damage. Some 40,000 gallons of oil spilled during the flood, along with 40,000 gallons of water that had been used in hydraulic fracturing. The spillage could have been worse. According to Varella, oil and gas drillers made some commendable decisions, even though their motivations were not environmental:

> …they didn't spill as much product as we thought they would spill, given how many tank batteries and well sites are located in and around flood hazard areas, especially in Weld County. I give the oil and gas groups a lot of credit for going out, seeing the floods coming, shutting things off as quickly as they could so that when tank batteries would float or well heads would get hit with debris, or something would snap off, they didn't lose product. They don't want to lose product, because then they're just losing money, and they're not in the business of doing anything except making a profit and that's what they do.[32]

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[31] Sean Cronin interview by Tessa Moening, digital recording, 8 August, 2014, 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.
[32] Brian Varella interview. Subsequent to the flood, the staff of the Colorado Oil and Gas Conservation Commission recommended to the commissioners an array of modifications in drill-site operations, communication, and decision-making during flood events to reduce the likelihood of spillage and environmental harm. The staff did not recommend statutory or regulatory changes. See, Matthew Lepore, "A Staff Report to the Commissioners: 'Lessons Learned" in the Front Range Flood of September 2013," Colorado Oil and Gas Conservation Commission, 14 March 2014.

While our informants pointed to many examples of commendable leadership during the flood, we also heard about ways to improve leadership and coordination in natural disasters. Nolan Doeskan stressed the need for improved "integration" of information about weather during a severe storm. Climate and weather professionals need to be connected at multiple levels (local, county, state, region). Those who monitor storms also need to communicate more consistently with emergency managers and local citizens. The latter, Doeskan suggested, were an essential resource for "real-time" data collection. [33]

Brent Schantz, the Main Stem Coordinator and Compact Commissioner with the Colorado Division of Water Resources expressed genuine frustration that good information about the 2013 storm's weather patterns and effects on waterways were not communicated to local water users and managers. He noted that water commissioners, who deal on a daily basis with water users and ditch owners, were too far removed from emergency management during the flood. They weren't getting enough information about the threat of flooding to small farming communities and, without guidance from emergency managers, they struggled over when to tell farmers to shut down their ditches or prepare for evacuation. Some farmers refused to shut their head gates, others were panicked by exaggerated rumors of raging floodwater. "[W]e need to be tied into the emergency management system. The guys, I mean the boots on the ground, the field guys, the water commissioners need to be part of that process. So far I don't think that's happened."[34]

Adaptive management: A crucial lesson of the flood was that emergency managers and other professionals needed to be prepared to adapt creatively to the rapidly-changing circumstances of natural disasters. The effects of the 2013 flood were so grave and complex that

[33] Nolan Doeskan interview.
[34] Brent Schantz, interview by Naomi Gerakios, audio recording, 25 July 2014, 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado.

managers and staff had to go "off-script" to contend with the crisis at hand. As already noted, Mike Chard, director of Boulder's EOC, had to locate and open a series of shelter for evacuees as one shelter after another was damaged by floodwater. Doing so wasn't easy, and reviewing the details of "off-script" management will be of value to this report's readers. Chard recalled what it took for his office to send staff and resources into buildings that had not been intended for use as shelters:

> ….[I]t turns out every shelter is either you can't get to it or it's flooding….So we…[called] faith-based communities, got churches, "Yeah we'll do it but we have no infrastructure to help support this." So how do you do catering? How do you get sanitation? How do you get water? How do you get linked up to medical assessments? All those things that need to go into a shelter that commonly go in under the normal shelter plan when we pick shelters that are designed for that. So…now we had to kinda create and not just deliver it, but you had to put infrastructure and staff down there…

Similarly, it took quick thinking, and a certain amount of desperation, to put the state's emergency small-dam monitoring system into place. Kelli Bauer, a dam safety engineer for the Colorado Division of Water Resources, recalled that road closures throughout Northern Colorado made it impossible for dam safety engineers to inspect dams for failure. Many of these were small earthen dams that were not legally subject to inspection and not likely to fail catastrophically. Still, in the context of the 2013 floods they were of real concern as their failure would certainly exacerbate difficult conditions at the local level. Indeed, a number of minor dams did fail, for example, at Big Elk Meadows near Estes Park and at Havana Ponds inside Rocky Mountain Arsenal National Wildlife Refuge, northeast of Denver. A family was stranded in a flooded home in the first instance; in the second, a suburban development had to be evacuated. To make matters worse, the media was spreading inaccurate information about the number and severity of dam failures in the state, raising public anxiety about the possibility of new episodes of flooding.

In these circumstances, Kellie and her colleagues began to make phone calls to "the owner who was there or someone who was there. I mean it got to the point where we were calling just other professionals that we knew in the industry that were near--- that lived near the dam to say, 'can you go out to the dam and take a look at this? And send me pictures or call me, let me know.'"[35] Quickly, Bauer and other dam inspectors' reliance on "volunteer" inspectors became the basis for a coordinated Emergency Inspection Program. Bill McCormick, chief of dam safety for the state, assembled a team of volunteer engineers to monitor 207 at-risk dams during the flood. In McCormick's words:

> So it ended up being a pretty fair process. …[A]ll the engineers from the West Slope had come in to Denver. So all twelve of us were together. We broke out those lists of 207 dams....[T]en of the engineers were group managers. So they were each given a group of dams and consultants…So, within you know like seven or eight days of the flooding happening we had people starting to do the emergency inspections. By the end of the next week…seventy percent of the inspections had been done.[36]

Jason Gdovicak, Chief of the Glen Haven Volunteer Fire Department, confronted the need for novel rescue methods after flooding wiped out his small town east of Estes Park. West Creek, usually a benign tributary of the North Fork of the Big Thompson, cut a swath of destruction through the town that was a hundred feet wide. His fire department was well trained and had a good command system in place. Members of the fire department coordinated their efforts with other local, county, and national emergency responders, including the Larimer County Office of Emergency Management, FEMA, and the National Guard, to retrieve people from demolished homes and get them to

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[35] Kallie Bauer, interview by Naomi Gerakios, audio recording, 25 July, 2014. 2013 Northern Colorado Oral History Collection, Water Resources Archive, Colorado State University, Fort Collins, Colorado; Olinger, David, and Bruce Finley. "Colorado Flood: Dams Break in Larimer and Adams Counties; Overflowing in Boulder " Local News. Denver Post, 9–12, 2013. http://www.denverpost.com/environment/ci_24080336/dams-break-at-rocky-mountain-arsenal-and-larimer.

[36] William McCormick interview by Naomi Gerakios, digital recording, 8 July 2014. 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

appropriate shelter and medical care. That said, access to the more than 200 people in the flood-swept canyon where Glen Haven sits was extremely difficult. The landscape was obliterated, and communication was nearly impossible, except by walkie-talkie radio. One of Gdovicak's most innovative and effective moves was to turn to volunteer technical climbers: "They were able to rig up some zip lines, we were able to get people out from the Glen Haven area here and [across] West Creek, and then… dive rescue came down and they we were able to shore up the ziplines and get people across on the boat."[37]

Erik Nilssen, Larimer County Emergency Manager, offered a very different example of adaptive management in the 2013 flood, related to mountain evacuations. According to Nilssen, many people in the mountains west of Buckhorn Canyon didn't want to be evacuated by helicopter, regardless of the dangers posed by floodwater, landslides, and impassable roads. They simply did not want to leave their homes. In the face of this resistance, Nilssen and his staff presented an ultimatum but eventually had to back down, arranging for the repair of four wheel drive roads so mountain residents would have a way of getting down to Buckhorn Canyon when they finally chose to do so on their own. He explained the situation in the following way:

> [W]e got the word out to a lot of people in a lot of back areas, urban interface areas, that the helicopters are coming tomorrow morning…and grab some things that you'll need and get onboard and we'll evacuate you to the shelter. Answer: "No, we're staying." "You're staying? You have no electricity, you have no water, you have no food, you have no propane deliveries, you have no way in and out because your road's annihilated, you have dogs and you have children, what do you mean you're not coming?" "No, I'm afraid of looters," or "I think this isn't as bad as everyone's saying so we're staying." Hundreds of people stayed, hundreds. So we finally said, "Okay, here's the deal. This is your last flight. If you get word out somehow that you need help we may or may not come for you, depends on if we have the resources. So make your decision for yourself right now, are you coming or not?" Hundreds said no…. So we had hundreds of people

[37] Jason Gdovicak, interview by Zach Lewis, digital recording, 7 July 2014. 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

> who, then they started making demands that we try to fix some washed out Forest Service roads so at least they'd have four-wheel drive access out of the Cedar Cove or the Cedar Park area down into the Buckhorn where they could get out, and we had to placate that demand because these people were up there. We couldn't just let them languish.[38]

Activating and creating mutual aid agreements: Another way in which first responders managed the challenges of the flood was by activating mutual aid agreements with other cities, counties, and states. Whether the agreements were between cities, or between a city and state governmental office, such as the Department of Transportation, the mutual aid agreements proved essential to getting resources and staff to the places they were needed. The agreements also include procedures for reimbursing the communities whose resources have been lent out. Yet numerous water and emergency managers noted the inadequacy of the agreements and reimbursement procedures already in place. Fort Collins found that its existing agreements did not support simultaneous aid to communities ranging from Drake and Estes Park to Loveland and unincorporated towns in Larimer County. Mike Gavin, the city's Emergency Manager, pointed out in his interview that he was working with county and municipal attorneys to create a single all-purpose agreement that would allow entities across Larimer County to render mutual aid in times of need. [39]

The inadequacy of existing mutual aid agreements during the 2013 flood does not mean, of course, that aid was not provided. We have already seen that Rocky Mountain National Park provided extensive aid to its neighbors, though no compacts were in place obliging it to do so. Moreover, whenever they could, municipalities created mutual aid agreements at the moment of need. For example, after flooding forced the city of Evans to close its wastewater treatment plant

[38] Erik Nillson interview by Mitchell Schaefer, digital recording, 17 July 2014. 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.
[39] Mike Gavin interview; Brian Varella interview; Varella, Hilmes-Robinson, Sampley interview.

and issue a "no-flush" order to city residents, city managers sought aid from Greeley. Greeley quickly put in a pipeline that conveyed Evan's waste to Greeley's wastewater treatment plant, preventing both a long-term disruption of services to Evan's residents and the discharge of raw sewage into the South Platte River. Because the two cities had other preexisting agreements, they were able to forge the new agreement quickly. Greeley also opened its evacuation shelters to individuals from Evans and surrounding communities.[40]

It's important to acknowledge that the scope and scale of emergencies during the 2013 flood sometimes simply overwhelmed municipal and county managers and their resources, whether aid agreements were in place or not. Coordination of information and resources at the state level thus became crucial. Bruce Holloman reflected on his responsibilities at the state level:

> I remember the Larimer County Sheriff's Office saying, "You know, we were calling for mutual aid but nobody was coming." They said "I didn't understand why." And it took him a few days to realize that everybody around him was in the same situation. So, one of the big functions we provide here at the state is resource support to these jurisdictions….I would say a lot of our time was spent on, one, gaining situational awareness in each of the locations, trying to understand the scope of the damage, trying to ascertain where we had survivors that still needed to be…pulled out of those situations for life safety reasons. Finding those resources to do that…working with the Colorado National Guard, working through FEMA and…the US Army- do you have enough airlift resources, because that was the only way we were getting in was by helicopter. …So we were collecting…satellite imagery….[W]e had Civil Air Patrol flying reconnaissance missions for us, taking photographs. We had helicopters…trying to ascertain damage in the area and then as much ground reporting as we could get to build that situational awareness of what was happening. And again, you know, providing that information up to the governor so he could make decisions on how the state was going to best support that operation.

[40] Scott Sandridge interview by Tessa Moening, digital recording, 24 July, 2014; Eric Reckentine and Pete Morgan, interview by Naomi Gerakios, digital recording, 18 August, 2014. 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

Using old and new technologies: Many informants spoke about the role of technology and media during the 2013 flood. Holloman noted the importance of helicopters, satellite imagery, and photography. Emergency managers in Northern Colorado noted the tremendous value of advanced warning systems and of using real-time GIS data and other monitoring systems to track flooding and coordinate rescue efforts. Throughout Northern Colorado, government offices relied on Reverse 911 technology to give evacuation orders. The Boulder Office of Emergency Management used social media to track individual's reactions to the storm and assess the community's awareness of the severity or magnitude of the event. Various municipalities also used websites and social media platforms such as Facebook and Twitter to disseminate information to the public. These new technologies helped emergency managers save lives and coordinate response efforts.

The new technologies were not without downsides, however. Citizens actively communicating via social media sometimes conveyed information about the flood that was inaccurate. Municipal websites and social media sites were not always up to date. The traditional news media also produced false reports about flood damage and recovery resources. These technologies allowed communication about the flood to travel quickly and widely, but they also facilitated some degree of inaccuracy. Moreover, Reverse 911 did not work well with cell phones, making it difficult to reach people without land lines. Erik Nilssen, Director of the Larimer County Office of Emergency Management, suggested that Reverse 911 also created a problem in human behavior, undermining people's sense of responsibility for their own welfare. "Ultimately…all of these warning devices are subservient to the necessity of people to pay

attention and have some situational awareness as to what's going on around them and to not sit back and be a victim and wait to be told to leave."[41]

Finally, in small mountain towns and in Rocky Mountain National Park, citizens and relief personnel were forced to rely on "outdated" technologies. In these areas, internet and cellphone services quickly broke down. Telephone land lines were damaged. Emergency managers used radios to communicate with incident command and response teams in isolated mountain communities, but many stranded residents were without any communication technology whatsoever. Carolyn and Gib Dunning, elderly homeowners near Drake, CO, recalled that they never received an order to evacuate but left their home as water in the Big Thompson rose ominously, taking shelter in an abandoned mobile home on a nearby hill that seemed relatively safe. In the meantime, the river flooded, their home was inundated, and their road and bridge were blocked by debris. They had no direct communication with relief personnel until they were airlifted to safety three days later, learning of the helicopter airlift from a neighbor who came searching for them.[42]

In sum, emergency management and relief during the 2013 flood was generally highly effective. Well-trained and dedicated personnel met the challenges of on-going flooding and severe damage to resources with commendable resourcefulness. Some eight hundred people were missing or stranded during the acute stage of the flood, but only eight people died. Emergency managers monitored the changing flood conditions carefully and deployed staff and resources effectively for rescue and relief. They used a range of communication technologies to inform the

[41] William "Bill" McCormick, interview by Naomi Gerakios; Brian Varrella, interview by Zach Lewis and Naomi Gerakios; Michael Chard, interview by Naomi Gerakios; Erik Nilsson interview.
[42] Carolyn and Gib Dunning, interview by Zach Lewis and Naomi Gerakios, digital recording, 27 July 2014. 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

public of road and bridge closures, imminent danger, evacuation orders, and relief services. They used and created mutual aid agreements as necessary. As our informants noted, communication networks and technologies need refinement, and more mutual aid agreements should be put in place. Improvements can and should be made to existing emergency management systems. Nonetheless, the informants in this study believe that emergency managers handled the immediate challenges of September 2013 with an extraordinary degree of success.

4. Recovering from the Storm and Post-disaster Resiliency

> It's changed everybody, how we operate....You've gotta sit down and you've gotta be ready to make the changes as far as operational…systems…. [I]t's all really…brought everybody to an A game... – Randy Gustafson, Water Administrator, City of Greeley

The disaster recovery infrastructure in Colorado is both comprehensive and extraordinarily complex. It involves volunteers, private charities, and government offices operating at multiple levels, from small farming communities and mountain towns to large cities, counties, the state, and the federal government. Services are material, educational, social, psychological, medical and environmental. The possibility of an individual or community slipping through the cracks of recovery services, or receiving inaccurate information, most definitely exists, as some of our informants revealed. Our informants also spoke at length about the intricacies of recovery policy, the challenges of coordination, and their own frustration, whether professional or personal, in trying to negotiate a complex system. Despite flaws in the recovery system, it's important to note that Northern Colorado's water and emergency managers invested heavily in trying to make recovery a reality. Their goal was to ensure that individuals, communities, and the

region emerged from the 2013 flood whole and well-prepared for future disasters. We cannot offer a quantitative assessment of flood recovery. Still, our interviews point simultaneously to distressing gaps in recovery programs, commendable efforts to deliver and coordinate recovery services, and noteworthy innovations in recovery management. They point to vigorous efforts to recover both ecosystem and societal function. Numerous interviews point to "lessons learned" and improvements still to be made. We discuss these issues in greater detail below.

Recovery services and coordination: Carolyn and Bob Dunning, the elderly couple from Drake who evacuated after being stranded behind floodwaters for three days, spoke thoughtfully and gratefully about the recovery services available to them. After their evacuation, a disaster center in Loveland provided temporary shelter and food. The Red Cross provided them with funds for an inexpensive car. They read in Loveland's local newspaper about Larimer County's Home Improvement Program and obtained a loan that allowed them to repair their home. Various churches offered additional material and moral support. The Dunnings, though elderly, were quite resourceful and determined; they did not think of themselves as victims but as individuals eager to rebuild their lives.[43]

The Dunning's story of successful recovery highlighted the moral strength that served them well during their ordeal. It also pointed to various recovery services available to them, yet provided little detail about how they went about the process of obtaining this aid. Another flood survivor, Kim Compassi, offered a far less sanguine story of recovery than the Dunnings, though she offered more detail than the Dunnings

[43] Carolyn and Bob Dunning interview.

about her efforts to secure it. Kim and her husband were residents of unincorporated Larimer County, five miles northwest of Lyons, in an area called Blue Mountain. They lived in a large home on rural property near the Little Thompson River that they had purchased in 1992. The flood washed away their home, foundation and all, and devastated their land. Campassi and her husband had a positive experience with FEMA after the flood and quickly received almost $32,000 for the loss of their home. But their property needed hundreds of thousands of dollars of restoration work if they were to rebuild, their home could not be re-built for $32,000, and, as it turned out, the couple qualified for no other assistance. They had too much income to qualify for county recovery funds and their house was outside the city limits of Lyons so they didn't qualify for recovery funding supplied to the town. Kim Campassi interacted with community groups, faith groups, and recovery agencies but discovered that she and her husband fell outside the definition of people in need, even though they had been through a life-changing event and had lost much of their financial worth. The couple sold their property in Lyons, in its greatly damaged state, and bought a home near her business office in Boulder.[44]

These two cases point to the value of recovery services, while also raising questions about the communication, coordination, and accessibility of recovery systems. While a comprehensive assessment of recovery services is beyond the scope of this project, project informants who were directly involved in emergency and water management acknowledged offered valuable insight into the successes and deficiencies

[44] Kim Campassi interview by Naomi Gerakios, digital recording, 21 August 2104, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

of recovery efforts after the flood. In some instances, they described innovations they tried to introduce to meet unmet needs and move recovery to a higher level.

Renda Kelsch, Team Lead for the Northeast Plains Flood Recovery Outreach Program in Morgan County, described professional responsibilities that revolved around recovery service coordination. Kelsch's program was funded through a grant from FEMA and channeled through the state-wide Colorado Spirit Program and the local offices of Centennial Mental Health. Based out of Sterling, CO, Kelsch and her team were charged with contacting individuals affected by the 2013 floods and helping to coordinate access to groups and organizations involved in flood recovery. The team worked with a network of relief organizations, directing flood survivors to financial, material, and emotional support. Kelsch spoke of mobile home residents whose homes had been demolished in the flood who were able to move into new homes with the help of her team. That work was a gratifying success. But she also spoke of farmers and ranchers in Sterling for whom she could do relatively little. They were disproportionately underserved by FEMA policies that provided relief to people whose homes had been damaged or lost but not when the flood-damaged home was also the site of a privately-run business. Additionally, farmers lacked flood insurance because FEMA didn't cover farming operations, yet their crop insurance didn't cover floods. Farmers in Morgan County looked to Christian charities for direct help as they cleaned and repaired their property. [45]

Sean Cronin, Executive Director of the Left Hand and St. Vrain Conservancy District, assumed a leadership role in helping ditch companies repair their water-delivery

[45] Renda Kelsch, interview by Zach Lewis, digital recording 21 July 2014, 2013 Northern Colorado Flood Oral History Collection, Water Resources Archive, Morgan Library, Colorado State University, Fort Collins, Colorado.

systems. He found himself mediating between the agricultural ditch companies in his area and FEMA and, interestingly, reported greater success than Kelsch in trying to fit FEMA policies to the needs of ditch companies. As he explained:

> [T]he way the ditch companies operate is they're… incorporated ditches where they assess the shareholders the cost of the repairs. Well for a ditch company that typically operates, maybe, you know, 30,000 …to 100,000 dollars a year of operating expenses, to immediately be faced with…two million or three million or six million dollar expenses…it'd be crippling to the agricultural economy here in the basin. So we quickly started working with FEMA to say, do these ditch companies qualify for public assistance? And the real challenge was they're private, incorporated ditches, how, by definition then, do they qualify for public assistance? And so we work very closely with FEMA to try to educate them on…public interest, ownership in these ditches. So, for example the City of Longmont or Boulder County might own a large percentage within the ditch company and the City of Longmont in particular relies on this ditch company's infrastructure to provide water to a water treatment plant and that water treatment plant cleans the water up, and delivers it to its customers in Longmont….[I]t took quite a while for them to…get a handle on that…[R]ight now it stands that most of these ditches will get some level of FEMA reimbursement. [46]

As Cronin's remarks suggest, managers learned that recovery services worked best when they were tailored to the unique needs of communities, so he worked to fit FEMA policies to the needs of ditch companies and farmers. Tara Schoendinger, the mayor of Jamestown, did not just meet with recovery managers from FEMA, the state, and county. She took them on extensive walking tours of her town to familiarize them with its unique challenges. This tactic paid off, as Shoendinger was able to acquire the resources to develop a new stream corridor master plan, rebuild the town's water treatment plant, and construct new roads and bridges. Similarly, Mike Chard noted that Boulder's generally successful recovery was due in large part to the leadership of Boulder's County Commissioners who recognized the complexity of the tasks ahead, the multiplicity of stakeholders and agencies in his county, and the need to delegate responsibility for different types of recovery to skilled teams. The commissioners also recognized the critical

[46] Sean Cronin interview by Tessa Moening, digital recording, 8 August 2014, 2013 Northern Colorado Flood Oral History Collection, Colorado State University, Fort Collins, Colorado.

importance of community engagement and communication. Chard thought Boulder's County Commissioners should have invested even more energy in community education, especially around watershed restoration and hazard mitigation. He worried, too, that Boulder would suffer from slow reimbursement from FEMA for its recovery expenditures. Overall, however, he thought recovery had gone pretty well. [47]

Innovations in recovery: Some of the most successful recovery efforts after the flood involved innovation. Sean Cronin's interventions with FEMA resulted in flood assistance going for the first time to ditch companies that operated for private farmers and the public good. Cronin was also involved in innovative efforts to help private ditch companies remove tree limbs, sediment and other debris from water channels before the high-snowpack Spring 2014 runoff turned it into hazardous material. The landowners on either side of the rivers, creeks, and ditches had property rights to the waterways; the county had no jurisdiction to compel them to clear debris from these sites, yet was worried about the damage that might result from a failure to act. Cronin helped create new public and private partnerships involving ditch companies (large and small, incorporated and unincorporated), FEMA, and the Colorado Water Conservation Board, which cleaned up and re-channelized waterways, thereby preventing damaging runoff. Similarly, Mike Chard worked closely with the National Resources Conservation Service (NRCS), FEMA, and the Environmental Protection Agency (EPA) to develop a new High Hazard Stream Reduction Program in Boulder County. The new program removed everything from mine tailings and homes to cars, large boulders, chemicals, fuels, and radioactive material that had washed into Boulder's watersheds during the 2013 floods.

Brian Varella, Chair of CASFM, described another innovative program that emerged from the flood. He took the lead in creating a network linking the members of his non-profit

[47] Mike Chard interview.

professional association to communities in need of recovery assistance. Many communities simply did not know how to access the services available to them. Relationships connecting small communities such as Estes Park to services available at the county, state, or federal level were often inadequate; people didn't know where, or to whom, they should go to for help. Varella focused CASFM's efforts immediately after the flood on getting the non-profit's members out into damaged communities. He envisioned an integrated system of leadership and response involving, "volunteer cadre of experts that could go out to the different communities and assist with recovery." For Varella, "one of the benefits of having that disaster is it got us very integrated, very serious about disaster recovery, and very serious about creating those relationships that we had not created over the years."[48]

Ecosystem function: The debris removal programs led by Cronin and Chard were of critical value, but their fixes were temporary and problematic. Individual landowners, volunteer crews, and local government workers created waterways that were sometimes too scoured and channelized to support fish populations and full ecosystem function. They didn't consider long-term restoration goals. And they sent to landfills material that had restoration value. As Chris Sturm of CWCB pointed out,

> A lot of the debris in the stream channels was not trash.…Trees can be used for stabilization, sediment can be reconfigured into…a natural channel shape, so hauling that away will cost more money to bring those materials, or materials from quarries, back in as we get into our restoration effort. We anticipated a need for those materials; we didn't anticipate the widespread removal of those materials and hauling it to the landfills. We thought we'd have more success with stockpiling that stuff.[49]

Fortunately, Sturm and his colleagues at the CWCB, have been able to direct funding and staff time to post-flood long-term restoration and eco-system function. The CWCB has assumed

[48] Brian Varrella interview.
[49] Chris Sturm interview.

a leadership role in developing new watershed restoration coalitions, especially in Boulder and Larimer counties. Nine new coalitions are now working to develop master plans for watershed protection. Sturm is also working with the Colorado governor's office, FEMA, and the Army Corps of Engineers to develop integrated plans for flood recovery that will consider medium and long-term watershed protection goals. Sean Cronin noted that some of these coalitions, as well as other volunteer and scientific groups, are actively engaged in monitoring streams and rivers that underwent emergency debris removal and repair for fish population, habitat, and ecosystem function. Sturm, Cronin, and other water managers interviewed for this project acknowledge that watershed restoration is essential to long-term recovery and to flood resilience.

Summary of Key Findings

This project has pointed to numerous "lessons learned" by water and emergency managers during the 2013 flood. To summarize, the most important of these lessons are as follows:

1. Communities defined by geographic watershed, municipality, and county should organize to create and implement master plans for maximal watershed protection and floodplain management based on the best available scientific data and sound administrative practices. Buy-in from multiple stakeholders is essential. State offices and agencies play a critical role in facilitating the development of watershed coalitions and other watershed planning efforts at the municipal and county level.

2. Communities must improve communication capabilities within and across agencies, jurisdictional boundaries, and with the public. Communication technologies must be continually assessed for situational effectiveness. Communication needs to be assessed with regard to all stages of flood management, from mitigation and preparation to rescue, relief, and recovery (short and long-term).
3. The core features of effective preparation for flooding include: educational outreach to the public; multiple communication technologies and media; regular mock disaster training; team building; and mutual aid agreements reaching from the local to the county, state, and regional levels. All of these elements of flood preparation need continual assessment and improvement.
4. Successful rescue and relief builds on effective training, communication, and mutual aid. It also requires the ability to suspend disbelief in the face of extraordinary damage and the capacity to work "off-script" to invent solutions to unforeseen and unimaginable problems.
5. Effective recovery requires skilled coordination and innovation. Services and programs reach from the national level down to the state and across counties, municipalities, towns, and rural enclaves. Recovery programs do not always overlap or intersect cleanly. They do not always reach clients in need. Recovery managers as well as clients report frustration with existing systems. Improvements in recovery programs appear to depend often on individuals who are willing and able to innovate and to build bridges across organizations that might otherwise work at cross purposes.
6. Recovery must aim for long-term resilience that is social, civic, and environmental. Climate change is likely to increase our exposure to high hazard weather events.

Recovery that sustains communities, governance, civic engagement, and ecosystems will facilitate resilience in future disasters.

7. The commitment, good will, and skill of Colorado's water and emergency managers is extraordinary. So too, Colorado is fortunate to have citizens who are invested in effective disaster mitigation, preparation, relief, and recovery through voluntary efforts. The good efforts of individuals and organizations emerge, fundamentally, from our human capacity to make choices, to engage in scientific discovery and moral reasoning. We need to honor and support these capabilities so they will protect us (and the natural systems on which we depend) from harm whenever possible and will work to maximum benefit for all when disaster strikes.

Alphabetical List of Interviews in the Collection:

1. Basch, Daniel. Operations Manager, Rocky Mountain National Park.
2. Campassi, Kim. Homeowner and flood victim, Blue Mountain Community (outside of Lyons, Colorado).
3. Chard, Michael. Director, Boulder County Office of Emergency Management.
4. Cronin, Sean. Executive Director, St. Vrain and Lefthand Water Conservancy District.
5. Doesken, Nolan. Colorado State Climatologist .
6. Dunning, Carolyn and Gilbert. Homeowners, Drake, Colorado.
7. Fried, Eric. Larimer County Chief Building Official.
8. Gavin, Mike. Emergency Management Director, Fort Collins, Colorado.
9. Gdovicak, Jason. Volunteer Fire Chief, Glen Haven, Colorado.
10. Gease, Michael. Natural Hazards Specialist, Federal Emergency Management Agency (FEMA).
11. Holloman, Bruce. Director, Colorado Office of Emergency Management.
12. Jim Struble and Amy Johnson, Northern Colorado Central Water Conservancy District.
13. John Crosthwait, Morgan County Planning and Zoning Administrator, Morgan County.
14. Jones, Donald. Real estate agent and appraiser, Morgan County, Colorado.
15. Kallie Bauer, Dam Safety Engineer, Colorado Department of Water Resources
16. Kelsch, Renda. Northeast Plains Recovery Team, Colorado Spirit, Morgan County.
17. McCormick, Bill. Chief of Dam Saftey, Colorado Department of Water Resources.
18. Milay, Pat. Emergency Management Director, Loveland, Colorado.
19. Nilssen, Erik. Director, Larimer County Office of Emergency Management.
20. Randy Gustafson, Water Resources Administrator, Bellevue Water Treatment Plant.
21. Ray, Randy. Executive Director, Central Colorado Water Conservancy District.
22. Reckentine, Eric and Pete Morgan. Water and Sewer Department, Greeley, Colorado.
23. Rorabaugh, Skylar. Director, Estes Valley Parks and Recreation Department.
24. Sampley, Ken with Marsha Hilmes-Robinson and Brian Varrella. Stormwater and floodplain managers, City of Fort Collins, Colorado.
25. Sandridge, Scott. Director, Evans Parks and Grounds.
26. Schantz, Brent. Mainstem Coordinator and Compact Commissioner, Colorado Division of Water Resources.
27. Schnieder, William. Water Commissioner, Colorado Division of Water Resources.
28. Schoedinger, Tara. Mayor, Jamestown, Colorado.
29. Strum, Chris. Watershed Restoration Specialist, Colorado Water Conservation Board.
30. Varella, Brian. Chair, Colorado Association of Stormwater and Floodplain Managers.