



Cascadia Rising 2016 Exercise

Cascadia Subduction Zone (CSZ) Catastrophic Earthquake and Tsunami

Functional Exercise: June 7-10, 2016

Joint Multi-State After-Action Report

September 6, 2016

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HANDLING INSTRUCTIONS

1. The title of this document is the *Cascadia Rising 2016 Exercise Joint Multi-State After-Action Report (AAR)*.
2. The information in this AAR is unclassified.
3. For more information, please consult the following points of contact:

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FOREWORD

The Cascadia Subduction Zone (CSZ) scenario has loomed over Pacific Northwest scientists, the academic community, and emergency managers for many years. Emergency planners have been ardently working to understand the risks and plan for the consequences of this threat for nearly a decade after witnessing a series of devastating subduction zone events internationally. However, the CSZ scenario gained significant national public attention when The New Yorker published a Pulitzer Prize-winning article entitled “The Really Big One” in July 2015. This article reminded the whole community of the staggering proportions of this scenario and the real risks that await the region when the fault ruptures. Indeed, a full rupture of the CSZ will result in impacts beyond the response capabilities of the region and will require resources from around the world to effectively respond and recover. National support will be essential, not just for resources, but also for expertise and coordination.

The importance of the CSZ scenario is reflected in the number of people and jurisdictions that contributed to the Cascadia Rising 2016 Exercise. For two years leading up to the exercise, regional partners at all levels designed, hosted, and attended working group meetings, training events, drills, and other preparation activities. These efforts culminated on June 7-10, 2016, when more than 20,000 people across local, state, federal, tribal, Department of Defense, and non-governmental entities participated in the Cascadia Rising 2016 Exercise, the Pacific Northwest’s largest multi-state functional exercise. Through disaster simulation, the purpose of this exercise was to test and validate catastrophic CSZ plans; the ability of Emergency Operations Centers (EOCs), throughout the whole community, to coordinate and communicate priorities and objectives; to share situational information; and to request, order, and transport life-saving resources to the areas most heavily impacted.

The Cascadia Rising 2016 Exercise marked an unprecedented level of EOC activation and coordination in the Pacific Northwest emergency management community. Responding to a disaster of this magnitude allowed participants to understand the scope and gravity of the situation they will face following an inevitable CSZ rupture. This exercise also helped to uncover our collective strengths and capability gaps. As a region, the coming months and years will be shaped by the daunting task of developing and refining our response and recovery plans and continuing to build regional capacity to respond to this scenario. Though we still have a lot of work to do, we can be proud of the two-year effort and commitment put forth by the whole community to make time and resources available in support of this important initiative. After all, it will be incumbent on our regional partnerships and collaboration to execute our critical mission of supporting the survivors when they need us the most.

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SECTION 1: EXECUTIVE SUMMARY

Exercise Name	Cascadia Rising 2016 Exercise
Exercise Dates	June 7-10, 2016
Scope	This exercise was predominately a Functional Exercise with limited field play that was conducted over a 4-day period at multiple venues in three states.
Mission Area(s)	Response
Core Capabilities	<ul style="list-style-type: none">• Operational Communications• Public Health and Medical Services• Mass Case Services• Situational Assessment• Critical Transportation• Operational Coordination• Environmental Response/Health and Safety• Fatality Management Services• Infrastructure Systems• Mass Search and Rescue Operations• On-Scene Security and Protection• Planning• Public and Private Services and Resources• Public Information and Warning• Logistics and Supply Chain Management
Overarching Objectives	<ol style="list-style-type: none">1. Operational Communications2. Public Health and Medical Services3. Mass Care Services4. Situational Assessment5. Critical Transportation6. Operational Coordination
Threat or Hazard	Earthquake and Tsunami

Scenario	A 9.0 magnitude full-rip earthquake along the 700-mile Cascadia Subduction Zone (CSZ) fault with subsequent tsunamis and aftershocks directly impacting both Washington and Oregon with cascading effects in Idaho.
Sponsors	Federal Emergency Management Agency, Region 10 Washington Military Department, Emergency Management Division Oregon Military Department, Office of Emergency Management Idaho Military Division, Idaho Office of Emergency Management Oregon National Guard Washington National Guard United States Department of Defense, U.S. Northern Command United States Department of Defense, U.S. Transportation Command Federal Emergency Management Agency, National Exercise Division, and the Office of Response and Recovery
Participating Organizations	County and City Offices of Emergency Management, state and Federal agencies, tribal nations, Non-Governmental Organizations, and private sector.

SECTION 2: INFORMATION COLLECTION AND AFTER-ACTION REPORT DEVELOPMENT

The data collection process for Cascadia Rising comprised two sources of information: exercise evaluators and exercise participants. This information was then analyzed and summarized as strategic findings or core capability-specific findings in this report.

EVALUATOR DATA

The Cascadia Rising Evaluation Sub-working Group developed exercise evaluation guides (EEGs) for each of the six overarching objectives identified for this exercise. The EEGs contained several joint objectives for each of the overarching objectives along with critical tasks meant to guide evaluators in assessing each core capability. Evaluators at every operations center were provided these EEGs to complete and submit to the Cascadia Rising After-Action Team following the exercise. In addition to EEGs, all evaluators received After-Action Report (AAR) Input Forms and Evaluator Logs to record data.

EXERCISE PARTICIPANT DATA

All exercise participants (including players, controllers, evaluators, and observers) were asked to submit feedback throughout the exercise. Participants at each venue were instructed to document exercise strengths and areas for improvement on Participant Feedback Forms. In addition, exercise players participated in a hotwash on the final day of the exercise. Evaluators facilitated the hotwashes and captured key discussion points to submit to the After-Action Team at the conclusion of the exercise. Finally, exercise participants were asked to complete a post-exercise, online Participant Survey. The Survey solicited feedback about the value of events leading up to Cascadia Rising; the effectiveness of Cascadia Rising exercise design; and outstanding training needs. In total, 593 participants completed a Participant Survey. A summary of the survey results is included in Annex B.

AFTER-ACTION REPORT DEVELOPMENT

The Cascadia Rising After-Action Team included representatives from the states of Idaho, Oregon, and Washington; the Federal Emergency Management Agency (FEMA); and the University of Washington. Following the exercise, the Cascadia Rising After-Action Team collected, analyzed, and distilled the contents of this AAR from the submitted evaluation materials. In addition, the Team conducted several follow-up interviews with exercise participants to supplement evaluation materials as needed.

SECTION 3: PURPOSE

This multi-state joint after-action report (AAR) synthesizes regionally significant issues observed during the Cascadia Rising 2016 Exercise. Specifically, the AAR identifies major findings related to how emergency operations centers (EOCs) at all levels—cities, counties, state, tribes, federal, military, and others—collaborated to share information and solve problems in the aftermath of a catastrophic scenario. As such, the AAR avoids identifying specific jurisdictions in order to focus on collective strengths and areas for improvement.

Although nearly all 32 core capabilities were performed during Cascadia Rising, this AAR focuses on the six core capabilities linked to the exercise’s overarching objectives. These core capabilities include:

- Operational Communications
- Public Health and Medical Services
- Mass Care Services
- Situational Assessment
- Critical Transportation
- Operational Coordination

This AAR captures larger regional trends and therefore may not reflect the experience of every jurisdiction in the exercise. For example, a shortfall documented in this AAR does not mean that every jurisdiction experienced that shortfall; rather, the shortfall occurred with a high frequency or was significant enough that it impacted regional operations.

Further, it is important to note that this AAR does not include recommendations or an improvement plan. Given the regional scope of this AAR, it was unreasonable for the After-Action Team to make suggestions regarding how jurisdictions should commit time and resources to resolving these issues. Instead, jurisdictions should take this AAR into consideration as they develop their own jurisdiction-specific AARs and improvement plans.

Finally, this AAR is not meant to solely document shortcomings but rather to identify opportunities for increased regional partnership and collaboration. The issues captured in this AAR will require long-term, ongoing efforts involving all regional partners. As such, this AAR should serve as a starting point for shaping the region’s individual and collective efforts in the coming months and years as jurisdictions continue to build and expand their capabilities.

SECTION 4: STRATEGIC FINDINGS

The complexity and duration of the Cascadia Rising 2016 Exercise provided an unprecedented opportunity to identify disaster operational best practices and lessons learned. Although the exercise evaluation was structured around six core capabilities, the findings presented in this section transcended any single core capability. These strategic findings are highlighted here due to the breadth and severity of their impact on key response operations.

Strategic Finding 1: Strength: Regional partners leveraged pre-existing relationships to inform decision-making and facilitate information sharing.

Analysis: Emergency management professionals in the Pacific Northwest have a long history of collaborating with their regional partners on emergency preparedness and response efforts. This collaboration was further bolstered by nearly two years of preparation for the Cascadia Rising exercise. During these two years, emergency management personnel from federal, state, local, tribal, and nongovernmental agencies and organizations both hosted and participated in numerous trainings, workshops, planning efforts, and drills to further develop relationships and gain familiarity with the unique regional challenges posed by the Cascadia Subduction Zone (CSZ) scenario.

This long history of regional coordination and collaboration led to tangible successes during the Cascadia Rising exercise. Numerous on-site and virtual meetings with multiagency stakeholders resulted in faster decision-making and enhanced situational awareness. In addition, dedicated liaisons helped to bridge gaps in communications, information sharing, and problem solving. These pre-existing relationships led to smoother operations at every level, such as the rapid formation of various teams and task forces, and enhanced awareness of partner agencies' roles, responsibilities, resources, and capabilities.

In addition, several new working relationships established in the months prior to the exercise resulted in successful outcomes during exercise play. For example, National Guard personnel coordinated with their state partners to conduct aerial damage assessments and incorporate collected information into situational awareness products to assist response operations. In addition, private sector entities, such as telecommunications and power companies, joined emergency managers for the first time during Cascadia Rising to address critical infrastructure damages.

In the wake of Cascadia Rising, the Pacific Northwest's emergency management profession should continue employing techniques and practices to sustain existing relationships and build new ones.

Strategic Finding 2: Area for Improvement: The emergency management community lacked the capacity to respond to the unique complexities for a catastrophic disaster of this magnitude.

Analysis: Scientific modeling for this exercise showed that few jurisdictions in the region will avoid catastrophic damage after a CSZ rupture. Response and recovery efforts for

this scenario will be unprecedented in scope and duration. Notwithstanding several successes, the emergency management community lacked the capabilities and resources to respond to the CSZ scenario.

At the most basic level, the exercise uncovered region-wide staffing and resource shortages. For numerous jurisdictions, the emergency management function was the responsibility of one staff member or, in some cases, was a collateral duty. As a result, these jurisdictions were often not familiar with basic emergency management doctrine, such as the National Response Framework. Many jurisdictions lacked the adequate staffing and resources to support an emergency operations center (EOC), and of those who did have an EOC, several had never activated their EOC prior to this exercise. Some jurisdictions noted that personnel were not fully trained or experienced in EOC activation and operations, reflected by a lack of understanding of the relationships and communication needs between command and general staff positions.

Further, several federal and state partners were unfamiliar with the priorities, needs, and expectations outlined in their catastrophic plans. Emphasis was consistently on executing the plan and checklists, but familiarity with the plan was inconsistent.

In the early stages of the event, some critical stakeholders lacked urgency to form a Unified Command Group (UCG) to synchronize federal and state objectives and strategies. By delaying this process, opportunities were lost to jointly resolve issues of cross-jurisdictional responsibility and authority. Once each state formed its respective UCG, stakeholders were able to create a single incident action plan that synchronized and deconflicted operations while allowing each individual agency to maintain its authority, responsibility, and accountability.

Finally, response operations reflected a lack of planning for how to distribute limited resources among several high-priority tasks. No clear process existed for adjudicating simultaneous requests for limited resources. In several jurisdictions, multiple organizations assumed they would have the highest priority access to a resource without realizing other organizations would have an equally high-priority need. For example, water was essential to fulfilling the essential functions of hospitals, fire departments, and mass care functions.

Prior to the exercise, several communities had discussed logistical considerations for critical commodities such as food, water, and fuel. However, outcomes from these discussions were not documented and therefore could not be referenced during exercise play. Tough conversations on how best to distribute limited resources to meet the needs of the greatest number must occur in advance of a catastrophic incident to ensure resources are distributed effectively.

Strategic Finding 3: Area for Improvement: Catastrophic plans were inadequate for this scenario.

Analysis: The Cascadia Rising exercise revealed significant gaps in catastrophic planning across the whole community. Several jurisdictions did not have a catastrophic plan, leaving them unprepared for addressing command and control structure, resource

needs and expectations, and how best to communicate between organizations with the loss of standard communications capabilities.

Jurisdictions that did have catastrophic plans uncovered several shortfalls in their plans. For example, many jurisdictions had not synchronized their plans with those of partner agencies, leading to gaps and duplications of effort. Further, many plans did not contain adequate detail for functions such as evacuation, reunification, mass care, logistics, fatality management, air operations, movement control, and emergency fuel management. Finally, plans frequently failed to identify information requirements to guide strategic decision-making and situational awareness.

Catastrophic planning is a critical priority for the whole community and must be resourced appropriately. Successful catastrophic plans are a result of the full planning process, to include forming a planning team; understanding the scenario; determining goals and objectives; and developing, implementing, and maintaining the plan. Completing a planning process of this magnitude is a significant task requiring leadership's buy-in and support.

Strategic Finding 4: Area for Improvement: Adherence to current response processes and procedures led to a lack of urgency for the catastrophic nature of this scenario, resulting in delayed response operations.

Analysis: Response process and procedures—such as information sharing, resource ordering and tracking, and logistics management—throughout the Pacific Northwest were designed to address incidents common in this area, including flooding, wind and snow storms, and wild fires. Often, these incidents impact several counties and do not require federal assistance. In addition, these response processes and procedures were developed on the assumption that fundamental capabilities, such as communications and transportation, would be functional. Despite the catastrophic and overwhelming impacts of the CSZ scenario, several jurisdictions were unable to deviate from their existing processes and procedures to meet the novel challenges posed by this exercise.

Responding in the Absence of Requests

For many jurisdictions, standing operating procedure for disaster operations was to respond to requests for resources, information, or other support. However, modeling for the CSZ scenario predicted that impacted jurisdictions would have little to no capability to assess needs and relay requests for resources. As a result, several jurisdictions were unsure of how to move forward with response operations given the lack of incoming requests and situational awareness. Many jurisdictions soon realized they would have to be forward-leaning in requesting and ordering resources and support in anticipation of requests, but it was difficult to pivot response operations to this framework.

Some federal and state plans called for personnel to base their decision-making on modeling and assumptions rather than waiting for assessments to move forward. However, this objective was largely not met. Progress was stymied by a strict adherence to checklists and standard operating procedures, which did not allow for adequate

flexibility to respond to this scenario. Further, the scope of the exercise, along with the large number of jurisdictions exercising this scenario for the first time, revealed numerous areas where current plans and procedures can be modified to support model-based decision-making.

Resource Ordering Process

The period of time for conducting life-saving operations following a disaster of this magnitude is critically short, and the delivery of life-saving and life-sustaining resources needed to be as expeditious as possible. However, there was a widespread lack of ability to expedite the resource ordering processes.

Several jurisdictions were overly rigid in their adherence to resource ordering and tracking processes and technology, which prohibited flexibility in executing expedited procedures. For example, many resource requests were not processed either because they lacked too little detail or, conversely, were too specific. On several occasions, personnel attempted to bypass resource ordering and tracking systems to get life-saving assets moving quickly, with the intention of completing official documentation after the resources were deployed. However, these personnel were told that resources could not be requested or ordered until the appropriate forms were submitted, often resulting in the delayed deployment of life-saving resources.

Emergency management leadership repeatedly issued verbal authorizations to move resources, but these verbal authorizations could not be integrated into existing resource ordering and tracking processes. A formal verbal ordering process was undefined and, consequently, emergency managers and emergency support function (ESF) representatives were still responsible for completing each step of the standard resource request and ordering process.

Other jurisdictions pursued time-consuming work-arounds in order to comply with official processes. For example, some jurisdictions had known resource shortfalls, but rather than communicating those shortfalls directly to a higher jurisdictional level, they were still required to input those requests into their own systems first in order to have the justification to resubmit the request to partner agencies capable of fulfilling the request.

Further, jurisdictions across all levels of government used different resource ordering and tracking systems that were incompatible and often not accessible outside of one jurisdiction. This hindered cross-agency and cross-community information sharing and made it difficult to obtain visibility on the status of resource requests. In addition, these disjointed systems led to duplicate efforts; in many cases, resource requests had to be completely rewritten or manually transposed in order to transfer resource requests between systems.

All of these challenges caused significant delays in getting critical resources to impacted areas and ultimately would have detrimental impacts on life-saving operations. Exercise participants noted that jurisdictions should work with their partners to formalize an expedited resource request and ordering process that would allow personnel to initially

bypass time-consuming administrative process while still tracking resources and obtaining appropriate authorization. In addition, jurisdictions recognized a need to develop a clear and aligned prioritization system for resource requests from local jurisdictions to their state and federal partners so that requests can be processed effectively.

Lack of Adaptive Solutions

Finally, exercise play was characterized by a lack of adaptive solutions to address life-saving needs. There was a tendency to rely on individual agency capabilities rather than exploring the full capability of partners to provide potential solutions to problems at hand. For example, opportunities to request fire fighters to perform search and rescue work or to dual-task helicopter missions to conduct both supply runs and aerial damage assessments to roads and communities were often missed. Further, participants tended to move through tasks sequentially instead of concurrently, which created several choke points in critical processes. In the wake of a CSZ rupture, existing resources will be depleted quickly, and emergency managers and their partners will need to employ creative and innovative solutions to address overwhelming shortfalls and challenges.

SECTION 5: CORE CAPABILITY FINDINGS

The section presents findings grouped by the six core capabilities evaluated in this exercise.

Core Capability 1: Operational Communications

Observation 1.1: Strength: Some jurisdictions successfully implemented alternate communications methods.

Analysis: Federal partners transmitted public messaging to media outlets through the use of an interoperable High Frequency radio channel in a listen-only configuration. Media outlets could then share this information with the public using their existing broadcast capabilities. This success reflected pre-coordination efforts between federal and state partners and local media outlets that had occurred prior to the exercise.

In addition, Emergency Support Function (ESF) 15 personnel used this exercise as an opportunity to learn more about Department of Defense communication capabilities. For example, federal and state partners collaborated to conduct notional leaflet drops. Personnel identified critical considerations, such as leaflet paper type and size, suitable aircraft and airfields, how many leaflets to print, and where to drop them. While some jurisdictions had pre-approved messaging in place, other jurisdictions hit roadblocks in deciding on message content and debated this issue until the end of the exercise. Despite setbacks, exercise participants noted that the pursuit of this capability was beneficial for enhancing public messaging. Federal and state agencies also coordinated with military partners to explore the use of loudspeakers from ground and aerial assets.

Finally, face-to-face communication among emergency operations center (EOC) staff was often well-utilized during communications blackouts. Unaffiliated staff that reported for duty were frequently allocated to serve as runners to transfer information in and out of EOCs and to serve as ad hoc liaisons.

Observation 1.2: Strength: Amateur radio was a critical mechanism for backup communications.

Analysis: Numerous jurisdictions utilized amateur radio effectively to coordinate in a communications-degraded environment. For some jurisdictions, this exercise marked the first time public messaging was issued via amateur radio. This exercise served as an excellent opportunity to train novice amateur radio operators and provided experience to all operators in federal, state, and local amateur radio integration.



Image 1: Oregon Amateur Radio Emergency Communications

Although many jurisdictions had sufficient amateur radio capabilities, several others faced significant challenges with amateur radio capabilities, including:

- Insufficient qualified staff.
- Insufficient equipment, which was often resolved by personnel bringing their personal equipment to supplement available supplies.
- Lack of familiarity and practice with radio communications leading to inappropriately long and detailed messages; these messages did not use standard short forms and omitted key information, leading to delays and extra radio traffic.
- Lack of knowledge of emergency communications frequencies for other organizations.
- Uneven recognition of the value of amateur radio operations for emergency communication, at times leading to an overreliance on scarce technology such as satellite phones.
- Incorrect understanding by EOCs regarding regulatory limitations on amateur radio broadcasting capabilities.

Exercise participants noted that efforts to further develop amateur radio capability in the Pacific Northwest region should include incorporating amateur radio usage into regular training and exercises and into plans for communication outages. In addition, amateur radio participation could be expanded in future events to include the use of radios in privately-owned watercraft, aircraft, and other properly-equipped vehicles.

Observation 1.3: Area for Improvement: Many jurisdictions were unable to overcome the challenges posed by a degraded communications environment.

Analysis: Several jurisdictions instituted communications outages throughout the exercise to simulate the degraded communications environment that will result from a Cascadia Subduction Zone (CSZ) rupture. Most EOCs relied solely on internet and telephones as their means of communication; when those services were interrupted by communications outages, there was limited capacity to communicate with outside partners. For example, there was a widespread lack of satellite phone communications inside the EOCs, as staff members had to physically exit the building in order to obtain a satellite connection. In many cases, staff members realized that they did not have basic contact information for their partner agencies' backup or alternate communications equipment, such as satellite phone numbers and radio frequencies. Other key partners, including hospitals, lacked amateur radio capacity entirely. Further, Wireless Priority Service (WPS) access and Government Emergency Telecommunications Service (GETS) cards were not made available to several EOC staff members. Additionally, many EOCs lacked sufficient wireless network capacity to support the influx of personnel into their facilities. These deficiencies rendered many jurisdictions and agencies unable to send or receive information, resulting in a lack of regional situational awareness.

Within the public messaging function, EOCs were often reactive instead of proactive in seeking out alternate forms of communication to reach the public. Few alternate communication strategies were developed in anticipation of widespread

communications outages; rather, alternate communication methods were pursued only after broadcast radio and television were completely inoperable or suffered substantial infrastructure damage.

Alternate message delivery devices, such as loud speaker broadcasts, expeditionary radio (e.g. Radio in a Box), and television broadcast platforms, were not utilized in most locations. One jurisdiction noted a lack of awareness of which organizations had alternate communications capabilities and how those capabilities could be used to support stakeholders. The few jurisdictions that did send out public messaging over alternate communications were unable to confirm whether the target populations received their messages. As a result, it was hard to determine the range and effectiveness of public messaging.

Exercise participants noted that jurisdictions can improve their communications capabilities by seeking to thoroughly understand what tasks they need to accomplish in order to support their mission, and then determining which communications mechanisms (i.e., software, hardware, networking services, connectivity services, and paper Incident Command System [ICS] forms) are needed to support those essential tasks. This should be a collaborative effort between operations and information technology (IT) personnel to determine what communications capabilities are critical and how IT infrastructure could support those capabilities. Further, jurisdictions should anticipate widespread communications outages and pre-identify alternate communication strategies to reach impacted populations. This includes increased collaboration between Public Information Officers and their stakeholders to identify available alternate communications capabilities. These solutions and strategies should be included in new or existing communication outage plans.

Observation 1.4: Area for Improvement: Life-saving and life-sustaining public messaging was limited in scope and effectiveness and did not evolve to reflect the changing conditions within the impacted area.

Analysis: In an effort to keep survivors safe in the aftermath of this catastrophic scenario, it was critical to employ methods of public messaging that effectively addressed life-safety and life-sustaining measures. During exercise play, however, there was a lack of appropriate public messaging in operational communications. Messages were often limited to “Drop, Cover, and Hold On” several days into the incident; after multiple days of aftershocks, these messages had little utility for survivors. Exercise participants noted that soon after the initial shake, public messaging priorities should have adapted to evolving conditions and should have shifted from focusing on immediate life safety to focusing on life-sustaining activities. For example, guidance related to shelter, water, food, and medical supplies should have

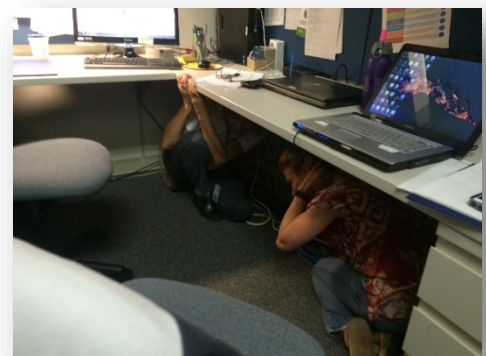


Image 2: Exercising Drop, Cover, and Hold On

been emphasized in public messaging. The message delivery process could have been expedited with pre-scripted, pre-approved messages.

In addition, there were limited efforts to diversify the public messaging strategy to match varying communications needs and capabilities. Instead, singular messaging strategies were implemented to reach all populations without regard for differing needs and capacities of the target communities. As such, the singular public messaging strategies used in this exercise would not have reached all affected communities, or met the needs of populations with limited English proficiency, limited access to technology, or other special considerations. Further, different areas would have experienced varying degrees of damage to their communications infrastructure. Messaging to the hardest hit communities might have focused more heavily on life-safety messaging such as how to obtain medical care or how spontaneous volunteers can assist with search and rescue efforts, while communities with lesser impacts might have received life-sustaining messaging related to staging, sheltering, and reunification.

Finally, initial press releases were delayed in some jurisdictions, allowing misinformation and rumors to spread. Exercise participants suggested that a brief initial press release immediately after the incident followed by more detailed updates over time might have ensured that accurate information was shared as quickly as possible. Subsequent updates would need to be carefully coordinated between organizations to ensure they contained consistent, agreed-upon messaging. Participants recommended that regional stakeholders work collaboratively to pre-identify survival-centric, needs-specific public messaging for this scenario and include commercial broadcasters as future planning and exercise participants.

Core Capability 2: Public Health and Medical Services

Observation 2.1: Strength: Cascadia Rising presented a unique opportunity for public health and medical agencies to conduct regional coordination with the emergency management community and other public health and medical partners.

Analysis: Several healthcare districts sent liaisons to EOCs to ensure coordination between the EOCs and healthcare facilities. This high level of engagement was particularly beneficial for actions such as submitting and tracking resource requests for healthcare facilities. There were also several instances of proactive coordination across local health districts and with participating hospitals. Exercise participants noted that the exercise was a good stressor to test the region's public health and medical capacity.

Observation 2.2: Strength: A U.S. Health and Human Services (HHS) Incident Response Coordination Team (IRCT) integrated with a state health department incident management team (IMT).

Analysis: As part of the exercise design, HHS deployed an IRCT to increase its effectiveness in coordinating with local and state IMTs. Per design, the IRCT arrived on the second day of the exercise and fully integrated with a state health department Type 3 IMT, which was a first for both teams. The IRCT embedded with the IMT at the incident command post.

Personnel identified minor areas for improvement for implementing this integration process in the future. For example, the IRCT and IMT had divergent methods for performing the planning process. In addition, exercise play revealed that although the deployment of resources had been discussed in pre-planning efforts, the employment of resources was not fully addressed. However, the overall process was effective in coordinating joint federal and state operations. The biggest benefit from this integration was that state resource requests were addressed in an expedient manner by IRCT personnel knowledgeable about the federal resource request process. The IRCT's deployment was critical for ensuring resources could be expedited to meet the state's needs.

Observation 2.3: Area for Improvement: Public health and medical services personnel faced significant obstacles to performing critical public health and medical operations due to several contributing factors.

Analysis: The exercise scenario posed overwhelming challenges to the public health and medical services core capability. Exercise players reported confusion regarding which agencies were involved in response operations and when to collaborate with those agencies. Further, there was uncertainty surrounding which agencies had authority to make decisions that would affect public health at the local level. Complications stemmed from disjointed participation between state and local partners.

In some instances, public health staff were improperly tasked to assist mass care planning rather than assisting fire and emergency medical services with patient evacuations, resulting in a delayed and uncoordinated response. This also impacted situational awareness of hospital evacuations due to improper communications between hospitals and health agencies. The exercise also revealed that there were very few existing processes or plans for determining alternate healthcare facilities, resulting in debates over responsibility, which delayed decision-making and response efforts.

Finally, a lack of established communication channels and relationships in some areas was evident several times during the exercise. In some jurisdictions, there was limited contact made between hospitals and health agencies. Other health agencies realized that they had contact information for hospitals but not for other healthcare facilities, such as skilled nursing facilities, dialysis centers, and blood centers. This left a significant gap in situational awareness and complicated follow-on planning and operations to provide healthcare for survivors.

Core Capability 3: Mass Care Services

Observation 3.1: Strength: Emergency managers used a whole community approach to mass care by forming multiagency task forces to reduce communications and logistics barriers to delivering services.

Analysis: ESF-6 personnel from federal, state, local, and nongovernmental agencies and organizations formed several task forces to address regional issues in a collaborative and coordinated manner. This structure allowed personnel to identify and resolve communications breakdowns, consequently expediting problem-solving and service

delivery. The effort was further bolstered by having dedicated mass care representatives from all levels of government embedded at the same physical location.

Despite many successes, exercise participants identified several opportunities to improve the mass care task force concept. For example, participants noted that it was often difficult to integrate information from the task forces into operations and decision-making. Further, task forces at times failed to coordinate with one another, reducing their effectiveness. In addition, there were several stakeholders outside of the mass care community that needed mass care information but were unaware of the task force structure; as a result, these stakeholders frequently did not know how to obtain critical information related to mass care. Finally, there was confusion regarding which agencies should be included on the task forces, and which agencies had the authority to make decisions that would impact other major functional areas, such as public health. This confusion resulted in some delays in gaining situational awareness.

Observation 3.2: Area for Improvement: Pushing resources into pre-staging areas according to pre-existing plans was effective, but several challenges prevented these resources from being deployed to their intended destination.

Analysis: The decision to push life-sustaining mass care resources into pre-staging areas was effective in many areas and correctly erred on the side of deploying too many resources in anticipation of need rather than waiting for detailed assessments and specific resource requests. However, the delivery of these pre-staged resources to their final destination was often delayed. In some cases, the delay was caused by a lack of finalized directions from operations personnel. Limited awareness of and familiarity with existing plans impeded execution, as did lack of familiarity with resource request procedures and confusion on how to expedite processes. Further, points of distribution and pre-staging areas were often decided without fully consulting stakeholders during planning, which negatively impacted the effectiveness of distributing resources.

In addition, the deployment of these resources to their intended destinations was impacted by logistical barriers. Life-sustaining activities were lower-priority than life-saving activities, so airlift support for delivery of life-sustaining mass care resources was not available early in the response. To avoid swamping limited logistical pipelines, mass care asset deployment needed better prioritization, particularly in the earliest hours of response. In addition, alternate transportation and distribution were required but were not identified or implemented. These choke points were difficult to identify in a timely manner and were further compounded by lack of sufficient authorization on the ground to override official procedures.

Observation 3.3: Area for Improvement: Mass care plans relied too heavily on traditional solutions to meet the overwhelming need for services following a CSZ rupture.

Analysis: Overwhelming numbers of survivors and heavily damaged transportation routes place unprecedented strain on sheltering logistics. The exercise demonstrated an over-reliance on single-point failures by outsourcing mass care to a limited number of organizations. Any single organization would be quickly overburdened by the

overwhelming need of this catastrophic. Similarly, the extent of infrastructure damage would limit local capacity and delay the arrival of external support. In particular, damaged transportation infrastructure would inhibit large-scale evacuations in impacted areas.

Discussions on regional sheltering strategies during the exercise were productive in that they provided a basic framework from which to move forward on a tactical level. For instance, one recommendation was to establish shelters and reception centers east of the Cascades and issue shelter-in-place warnings to areas west of the Interstate 5 corridor. In addition, some counties realized that although their plans contained an inventory of potential shelter locations, they were lacking information about the specific capabilities of those shelters or how long sheltering would be feasible.

Jurisdictions also discussed how to provide basic needs to shelter-in-place survivors and soon realized that it would likely be too difficult to deliver an adequate volume of resources to impacted areas. This highlighted the importance of determining how to utilize local assets or how to deploy basic resources that could be used to fill the larger need. For example, drinking water needs could be addressed with local assets or by treatment and storage equipment rather than the standard practice of transporting bottled water into the impacted area. Jurisdictions also recognized the need for various modes of public messaging to advise survivors sheltering in place.

A catastrophic event like a CSZ earthquake will demand creative solutions. Exercise participants concluded that all jurisdictions and agencies will need to develop their own capacity and be prepared to coordinate and share or distribute response capability amongst several agencies and the community. They will also need to develop more realistic expectations of their mass care needs independent of support from other agencies. Finally, all levels of government need to develop flexible plans for survivors to shelter in place or at shelter facilities.

Observation 3.4: Area for Improvement: ESF-6 personnel missed a critical opportunity to communicate life-saving messaging to impacted populations within the initial response period.

Analysis: In the immediate aftermath of a CSZ rupture, countless survivors will be unharmed but in need of shelter, water, food, and reunification services. Many other survivors will be trapped in collapsed buildings. However, catastrophic plans predict that specialized urban search and rescue (US&R) teams will be unlikely to arrive in impacted areas within the first few days following a CSZ rupture, depending on several factors such as the extent of damage to transportation infrastructure, weather conditions, and the distance from survival resources. Additionally, the demand for US&R assets following a CSZ rupture will outstrip the nation's current US&R capacity. As such, many trapped people will be rescued by spontaneous local rescuers and community rescue teams.

ESF-6 personnel recognized that key public messaging related to sheltering in place, guidance for spontaneous volunteers able to assist with response efforts, and other survival tips would need to be delivered within days of the initial

rupture to maximize the potential for survivors. However, this critical messaging was not disseminated in all jurisdictions during the exercise.

In order to disseminate effective messaging, ESF-6 personnel noted that expedited coordination and approval processes between jurisdictions and levels of government would be needed to decide on message content and prioritization of messaging. In addition, ESF-6 personnel will need to partner with external affairs personnel to facilitate the dissemination of this messaging and to ensure that the messaging is accurate and complete. This partnership was seen during the exercise when external affairs staff members worked with the Reunification and Evacuee Support Task Forces to develop accessible messaging about reunification resources, evacuation, and sheltering.

Observation 3.5: Area for Improvement: ESF-6 personnel did not have a clear plan for managing volunteers and donations.

Analysis: Exercise participants noted that catastrophic plans for a CSZ rupture did not adequately address the issue of volunteer and donations management. While some ESF-6 personnel noted successes in this area, many others identified several volunteer and donation management tasks that need to be addressed in catastrophic planning.

First, ESF-6 personnel recommended that jurisdictions develop clear, pre-scripted messages to provide instruction to volunteers both inside and outside of the impacted area. Messaging to those inside the impacted area should include information about first aid and safety measures and should direct local volunteers to the appropriate volunteer registration and management sites. Messaging directed outside of the impacted area should discourage willing volunteers from self-deploying so that they do not put themselves in harm's way, instead suggesting alternate options for providing assistance to impacted populations. Finally, messaging should help to ensure donations are delivered to the most effective and reputable sources.

Further, social media should be leveraged as a tool to manage volunteers and donations. Social media platforms will be particularly beneficial for communicating with volunteers outside of the impacted area; they will most likely have full communications capabilities and will turn to social media to learn how they can help those affected by this catastrophic event.

ESF-6 personnel also identified the need for an expedited process for background checks and just-in-time training for spontaneous volunteers. Catastrophic plans should identify which agencies have responsibility for managing donations and for volunteer reception, training, and sheltering.

Core Capability 4: Situational Assessment

Observation 4.1: Strength: Controlled access to information management systems and collaborative online platforms was crucial for effectively collaborating and sharing information.

Analysis: Several jurisdictions granted external partners access to their emergency management information systems, such as WebEOC. In addition, federal and state

partners used web conferencing software as an ongoing, real-time communication tool. These practices allowed for effective sharing of detailed information and continuously improved situational awareness. Access to WebEOC provided external partners visibility on the latest operational updates, while the web conferencing software allowed numerous partners to share screens and documents, work together on projects, and chat. Neither platform was behind an agency firewall, which allowed for access to be tailored to the requisite audience.

Exercise participants recommended that all jurisdictions consider extending access to their information management and collaboration systems to external partners as needed, while ensuring the appropriate moderation and maintenance required to sustain any increased access.

Observation 4.2: Strength: Several jurisdictions demonstrated the ability to share geographic information system (GIS) data effectively with their external partners, resulting in enhanced regional situational awareness.

Analysis: GIS personnel throughout the region used advanced mapping techniques and expert input to share high-level GIS information across jurisdictions. Although nearly all jurisdictions used different GIS systems, some GIS layers were successfully exported and reimported to other GIS systems for repurposing by other agencies. The ability to share GIS file types common to all platforms allowed jurisdictions to consolidate information in each system, in many cases in near real time. Integrating the input from subject matter experts from various federal agencies along with detailed shake maps into overlay representations provided detailed information on critical infrastructure damage and enhanced situational awareness throughout the region.

Observation 4.3: Area for Improvement: Critical information requirements were not effectively identified or communicated, resulting in personnel collecting vast amounts of data that obscured actionable, validated information needed to guide decision-making.

Analysis: An overwhelming amount of unfiltered data was a major problem for both staff and leadership. Leadership across the region had critical information requirements to support ongoing operations and drive strategic decision making; however, these information requirements were not always communicated to staff members. As a result, there was a tendency for staff members to become “fact finders,” meaning that they seemed to collect information for the sake of collecting information rather than to fill critical information gaps. Other information was collected for unclear purposes, and feedback mechanisms for confirming successful data entry were not in place. The problem was compounded when this mass of unmanageable data was uploaded into difficult-to-use information management systems that were unable to filter data effectively.

The lack of predefined information requirements led to EOCs being “data rich” but “information poor.” Vast quantities of data were collected and stored in various information systems, but this information was not accessible or actionable. This unmanageable collection of data resulted in information distortion, the lack of a single

and shared common operating picture, and delayed or suboptimal decision making. Exercise participants noted that in the future, leadership must pre-identify information requirements and include these in catastrophic plans. This will allow for quality data to be strategically collected and integrated in a common operating picture.

Observation 4.4: Area for Improvement: Jurisdictions used various information systems that were not integrated or sufficiently interoperable, resulting in disjointed situational awareness.

Analysis: A wide variety of information systems were used locally and regionally by a number of EOCs. These systems included information management systems such as WebEOC, GIS platforms such as ArcGIS, and other emergency management systems such as WISE, RAPTOR, and OpsCenter. These systems provided a wealth of functionality to support responders' missions. However, different versions, configurations, and implementations of these systems introduced varying functionality, a lack of compatibility, and different interfaces for the user, all of which lead to varying representations of incidents, tasks, resource requests, and related data. As a result, the exchange of information between systems of different versions and functionality became a cumbersome task.

Moreover, information could not be transferred easily between systems. For example, information collected and compiled in GIS platforms such as ArcGIS could not easily be imported into WebEOC. As such, organizations often had to manually transfer information from one system into another, wasting precious time and resources and adding a source of potential error and inconsistency.

Information sharing among and between responders was hampered, and even made impossible, when using incompatible and non-interoperable systems, resulting in blind spots and an incomplete common operating picture. In one circumstance, a jurisdiction outside of the impacted area was delayed in deploying supplemental emergency management staff to the impacted area because there was no effective way to obtain critical safety information, such as road closures, availability of food/water, and sheltering, for personnel deploying into the impacted areas. The necessary safety information existed but had to be pulled from multiple information systems and required time-consuming validation efforts before support staff could deploy.

Exercise participants agreed these information systems required better integration and interoperability to reach their full potential and produce the efficiency needed and expected for use during a catastrophic incident.

Observation 4.5: Area for Improvement: Social media platforms were not used to build situational assessment.

Analysis: Social media platforms were monitored in various capacities throughout the exercise. However, information gathered from monitoring activities was not integrated in a systematic fashion into situational awareness. In some cases, valuable information was shared by the public via social media and other Internet-based platforms that was unattended by responders. These platforms could have provided missing pieces of information. Other jurisdictions successfully monitored social media and captured

detailed information reported by residents, but it was unclear who in the EOC should receive that information or how it could be integrated into situational assessment.

While much of the publicly accessible communication infrastructure might be heavily degraded following a CSZ rupture, it is likely some pockets will maintain functionality. It is from these pockets that the public will share vital information, such as directing attention to unknown damage or reporting on local conditions. The collecting and vetting of this information needs to become a part of standard practice for building situational awareness at all levels. Further, responsibility for completing these tasks need to be clearly assigned to EOC personnel. Expanded monitoring of these platforms and integration of intelligence will go a long way toward improving situational awareness.

Core Capability 5: Critical Transportation

Observation 5.1: Strength: Some jurisdictions identified effective means of communicating the status of transportation infrastructure and assessments.

Analysis: State and federal departments of transportation had some success with keeping stakeholders informed on the status of their infrastructure and ongoing activities being conducted to address damages. This was primarily accomplished through public-facing GIS platforms but was also disseminated through press releases, multi-platform social media updates, and damage reports in WebEOC. One state infrastructure information system provided separate reports on the status of roads, bridges, ferries, airports, and other facilities, allowing for faster documentation and information filtering.

Despite these strengths, there were still areas for improvement. It became clear that the roles and responsibilities of different transportation departments were not clearly understood by all stakeholders. For example, state departments of transportation were repeatedly asked for status updates on assets outside of their responsibility including: pipelines; private, military, or federally-operated airports and ports; and vehicles providing evacuation support. Further, unfamiliarity with information management systems was also a challenge. Information was posted in the wrong place within these systems, conflating bridge and road closures and thus hindering accurate situational assessments. Finally, information systems were often unable to present information to a sufficient level of specificity; for example, a bridge could be marked as closed, but not as closed in only one direction with limited access in the other.

Observation 5.2: Area for Improvement: Failure to quickly prioritize critical transportation routes for evaluation and clearance delayed the restoration of key routes into and out of the impacted area.

Analysis: High-level policy directing clear prioritization on route assessments and clearance was not immediately forthcoming. While some priorities for evaluating specific locations were quickly established, no overarching policy or strategic plan was communicated to guide decisions on how to reopen critical transportation routes. This reduced the value of assessments in establishing critical

transportation entry points and routes within the impacted region. Further, some of the priorities were created in isolation without input from key stakeholders. This resulted in piecemeal assessments and clearance efforts that did not contribute to creating alternative routes within the region and did not necessarily serve the needs of other core capabilities like mass care and health services.

The lack of prioritization guidance for transportation routes delayed or reduced the efficiency of moving resources into the impacted areas and evacuating people out of the impacted areas, which would have reduced resource demands. This reduced availability of transportation routes also failed to reduce reliance on rotary-lift aircraft, which were already over-burdened. Further, this confusion led to uncertainty about how best to allocate limited resources. In some instances, this manifested in paralysis while awaiting external directives. In others, assets were assigned to multiple tasks in rapid succession.

Observation 5.3: Area for Improvement: Attempts at using alternate modes of transportation within the impacted area were severely limited.

Analysis: Transportation efforts were disproportionately focused on rotary-wing aircraft, often to the exclusion of alternate modes. While rotary-wing aircraft are effective for transporting assets into and out of severely damaged areas, over-reliance on this single mode of transportation will quickly create a bottleneck. Logistical constraints will limit the number of rotary-wing aircraft initially, and available rotary-wing aircraft will be allocated largely to life-safety missions. However, even as more rotary-wing aircraft become available, demand for them will still exceed capacity.

Coastal communities will be the most heavily impacted, incurring the greatest damage to transportation infrastructure, yet discussion about the use of maritime resources to provide alternate transportation options did not happen until several days into the exercise. Early use of these valuable resources could support numerous life-saving and life-sustaining activities in an otherwise inaccessible area. Further, insufficient relationships between government, military, and private sector transportation systems hindered the use of ferries, private railroad, recreational cruise ships, or commercial shipping lines in establishing transportation pipelines.

Partnerships with private and military assets would greatly expand the transportation options available. Jurisdictions should build these relationships prior to a CSZ rupture to help identify what assets are potentially available to them. Processes for formalizing new relationships need to be streamlined to an expedited process during disaster response. Further, responders must determine how to balance the early use of maritime resources, particularly boats and ships, with the dangers posed to these resources by the initial tsunami and follow-on tsunamis, as well as the massive amounts of debris that tsunamis will pull into the water.

Observation 5.4: Area for Improvement: Critical transportation personnel were not adequately integrated into decision-making for other core capabilities.

Analysis: Transportation agencies tended to function in silos with minimal collaboration with other core capabilities to pool information and assets. This led to information gaps and lack of awareness of resources available for assistance.

Nearly every core capability relied on critical transportation capabilities to carry out key missions. However, critical transportation representatives were not included on some task forces and other collaborative bodies to weigh in on important topics such as the prioritization of transporting assets into the impacted area. In one case, mass care assets were ready for transport, and airlift capacity was available, but the lack of critical transportation representatives resulted in a failure to link that need to the available resource. Critical transportation representatives should have been better utilized so that requests could be filled as efficiently as possible.

Core Capability 6: Operational Coordination

Observation 6.1: Strength: EOCs throughout the region activated and coordinated operations at an unprecedented level in the region.

Analysis: More than 20,000 players participated in Cascadia Rising, including 53 counties, 18 tribes, 3 state EOCs, multiple federal coordination centers, and numerous private sector and non-governmental entities. This high level of participation presented a unique opportunity for jurisdictions to apply their plans and procedures to coordinating and communicating with their real world partners. Jurisdictions could test-run task forces, a Unified Command Group (UCG), and other coordination bodies in a realistic post-catastrophic event setting given direct jurisdictional presentation.

Some jurisdictions went a step further to take full advantage of the scenario's projected impacts by evaluating their Continuity of Operations (COOP) plans. These jurisdictions practiced evacuating key personnel and reestablishing operations at alternate sites. This was not a federal, state, or tribal requirement but showed great initiative by organizations who implemented their COOP plan.

Observation 6.2: Area for Improvement: Federal and state partners frequently missed opportunities to conduct proactive coordination and information sharing.

Analysis: Cascadia Rising uncovered several opportunities to improve coordination between federal and state agencies. For example, states and federal partners routinely held separate key meetings—such as tactics, command and general staff, and planning meetings—with no representation at each other's meeting. Further, federal-to-state liaison positions were either non-existent or were not uniformly integrated into operations. Finally, although many federal and state partners were co-located, there was often an over-reliance on utilizing technology systems for coordination rather than communicating face-to-face.

The failure to coordinate operations at this level resulted in delayed and disjointed development of joint objectives amongst the varying levels of government, leading to numerous breakdowns in situational awareness, resource requests, resource tracking, and current and future planning. These breakdowns ultimately diminished the ability to support impacted populations.

There were various causes for the lack of coordination. First, the vast number of personnel involved in Cascadia Rising led to confusion over job duties and responsibilities, ultimately leading to choke points and information gaps. Personnel struggled to determine which positions had responsibility or authority for certain tasks. Further, the overwhelming extent of damage necessitated support from outside of the region, meaning that many federal and state counterparts were working together for the first time. Personnel from outside of the region were understandably unfamiliar with many of the nuances of operating in the Pacific Northwest, such as organizational structures, planning processes, and operating environment. Some of these personnel attempted to familiarize themselves with the area but struggled to find good contacts or resources to provide that information. Others insisted on operating according to their own processes and procedures, with little to no regard for their local partners, resulting in friction between personnel.

Exercise participants identified several solutions for improving federal and state coordination. One recommendation was to make liaison positions more clearly defined so that they can assist with the initial integration of federal and state operations, especially for response personnel deploying from outside the region. The liaison's expertise can ease the integration process and help familiarize incoming personnel with the region until the UCG is established. Another suggestion was to make state profiles more readily available to incoming personnel.

Observation 6.3: Area for Improvement: Nearly all jurisdictions reported a lack of clarity surrounding resource request processes.

Analysis: Jurisdictions throughout the region struggled with the mission essential task of submitting and processing resource requests. Several jurisdictions reported challenges within their own internal resource request processes. For example, unfamiliarity with documentation requirements slowed resource request processing. Numerous resource requests were returned to their submitters for missing key information or not having appropriate statements of work. In some cases, personnel responsible for submitting resource requests simply did not have adequate training on how to perform that process. In other cases, personnel responsible for approving and processing resource requests were overly rigid in their requirements, effectively lengthening the resource request process when life-saving operations were the most time-sensitive.

Other complications stemmed from resource management IT systems. Personnel were often not trained in their own jurisdiction's resource management system. In addition, systems that performed well for routine disasters were not equipped to handle the volume of requests in this exercise. Resource requests became difficult to locate in

systems overcrowded with resource requests and lacking adequate filtering mechanisms.

Jurisdictions also had challenges submitting resource requests to external agencies and partners. One major challenge was the federal resource request process, which required extensive efforts on behalf of states to complete resource request forms and submit them in a timely manner. Additionally, some jurisdictions already knew they could not fulfill a particular resource request but for justification purposes still had to submit the request in their own resource management system in order to deny it before submitting it to partner agencies who could fill the request.

These numerous challenges and complications resulted in the delay of resource requests being approved and processed, which ultimately impacted the delivery of critical resources to impacted areas.

Observation 6.4: Area for Improvement: There was a widespread lack of visibility on the status of resource requests and resource deployments.

Analysis: Throughout the exercise, jurisdictions struggled to gain visibility on the status of resource requests and resource deployments. Often, it took days for a jurisdiction to get an update on whether their resource requests had been approved, denied, or otherwise delayed. In some cases, resources had been deployed in response to requests, but requestors were not informed. In other cases, jurisdictions assumed that their resource requests had been addressed, only to discover hours or days later that no action had been taken on deploying critical resources.

Jurisdictions soon realized that there was no effective way to obtain information on the status of resource requests. The most up-to-date information should have been accessible through resource management systems. However, these systems often had restricted access and were difficult to navigate. Consequently, personnel attempted to follow up directly with partner agencies. This direct method was also challenging as it was often difficult to identify the appropriate person to talk to, and communications outages further complicated these efforts.

As a result of these myriad challenges, jurisdictions were unable to make timely plans for the employment of resources.

Observation 6.5: Area for Improvement: Several jurisdictions used modified versions of incident management doctrine as the foundation of their response efforts, leading to coordination roadblocks.

Analysis: The catastrophic nature of the CSZ scenario required several regional partners to co-locate and conduct joint response coordination efforts. All jurisdictions based their incident management processes and procedures on the standard ICS structure as outlined in the National Incident Management System (NIMS). This common ICS foundation should have allowed for easy integration of response coordination efforts. However, Cascadia Rising revealed that many jurisdictions had modified their EOC ICS processes to varying degrees to meet their unique needs.

These modified ICS processes resulted in contrasting incident management structures that were not easily integrated. One example was the mismatch of titles and functions across many levels of government. Responsibilities for a position title in one organization did not always match responsibilities for that same position title in other organizations, causing personnel to spend time sorting out roles and responsibilities. Further, ESFs did not align across all organizations. This made it difficult to task specific support functions in planning documents and to grasp the entirety of activities being performed by various support functions.

ICS forms also differed across organizations. For example, an ICS-205a for one jurisdiction did not match the form of the same name in another jurisdiction. Although both forms contained the same information, the varied structure interrupted IAP development. Finally, the purpose and agenda for key meetings varied greatly between jurisdictions. At times, an entire tactics meeting would be spent debating what could or could not be done at a tactics meeting. These differences led to tense moments as personnel tried to assert their own methods of conducting response coordination.

NIMS is hailed as a flexible and scalable emergency management doctrine. However, when every emergency management agency modifies it, incident management coordination processes and procedures are no longer standardized. Although these modifications are acceptable per NIMS doctrine, this lack of standardization will pose a formidable roadblock in an event like a CSZ rupture when the entire emergency management community will need to work closely to overcome overwhelming challenges and shortfalls.

Observation 6.6: Area for Improvement: There was a lack of awareness of the tribal disaster declaration process.

Analysis: The topic of tribal disaster declarations was addressed twice during the exercise. On one occasion, a tribal emergency manager requested information to help tribal leaders decide whether to request a tribal disaster declaration. On the third day of the exercise, an inject was delivered announcing that 38 tribes had requested and been approved for disaster declarations. Both of these instances led to concern and confusion regarding federal, state, and tribal roles and responsibilities in the tribal disaster declaration process.

EOC personnel turned to federal and state tribal liaisons for assistance and guidance through this process. These liaisons were able to provide answers and recommendations in a limited capacity but could not resolve the larger issue of widespread lack of familiarity with tribal response doctrine and policies.

Exercise participants noted that providing training on the tribal government disaster declaration process to Federal Emergency Management Agency staff and regional partners would help to address this issue.

ANNEX A: EXERCISE PARTICIPANTS

State of Washington

Clallam County

Grays Harbor County

- Grays Harbor Hospital

Homeland Security Region (HSR) 3 Incident Management Team (IMT)

HSR 4 (Clark, Cowlitz, Skamania, and Wahkiakum Counties)

- Clark County Public Health/Region IV

Island County

Jefferson County

King County

- Bloodworks Northwest
- City of Auburn
- City of Bellevue
- City of Issaquah
- City of Kirkland
- City of Mercer Island
- City of Redmond
- City of Renton
- City of Sammamish
- City of Seattle
- City of Shoreline
- City of Tukwila
- Evergreen Health Medical Center
- Group Health Bellevue Ambulatory Surgery Center
- Group Health Capitol Hill Ambulatory Surgery Center
- Harborview Medical Center
- Highline Medical Center
- MultiCare Auburn Medical Center
- MultiCare Covington Medical Center

- MultiCare Good Samaritan Hospital
- MultiCare Mary Bridge Children's Hospital and Health Center
- Northwest Hospital
- Northwest Kidney Center
- Overlake Hospital Medical Center
- Providence Health & Services
- Public Health Seattle & King County
- Rainier State School
- Sammamish Citizen Corps Council
- Sammamish Plateau Water & Sewer District
- Seattle's Children Hospital
- St. Elizabeth Hospital
- St. Francis Hospital
- Swedish Medical Center, Ballard
- Swedish Medical Center, Cherry Hill
- Swedish Medical Center, First Hill
- Swedish Medical Center, Issaquah
- Swedish Medical Center, Redmond
- UW Medical Center
- VA Puget Sound Medical Center – Seattle
- Valley Medical Center
- Vashon Island
- Swedish Edmonds Hospital
- Virginia Mason Medical Center

State of Washington (continued)

Kitsap County

- Bainbridge Island
- City of Poulsbo
- Harrison Medical Center – Bremerton
- Harrison Medical Center – Silverdale
- Kitsap County Transit
- West Sound Utility District

Lewis County

Mason County

Northwest Healthcare Response Network (NWHRN)

Pacific County

- Ocean Beach Hospital
- Willapa Harbor Hospital

Pierce County

- City of DuPont
- City of Fife
- City of Lakewood
- City of Orting
- City of Puyallup
- City of Roy
- City of Sumner
- City of Tacoma
- Group Health Tacoma Ambulatory Surgery Center
- Multi-Agency Coordination Center
- MultiCare Allenmore Hospital
- MultiCare Covington Medical Center
- MultiCare Good Samaritan Hospital
- MultiCare Mary Bridge Children's Hospital
- MultiCare Tacoma General Hospital
- Pierce Transit

- Pierce County Jail
- Pierce County Public Works Road Operations Division
- Port of Tacoma
- Rainier State School
- St. Anthony Hospital
- St. Clare Hospital
- St. Joseph Medical Center
- Tacoma Pierce County Health Department
- Tacoma Public Utilities
- VA Puget Sound Medical Center, American Western State Hospital Lake

San Juan County

Skagit County

Snohomish County

- Cascade Valley Hospital
- Community Transit
- Evergreen Health Monroe
- Port of Everett
- Providence Regional Medical Center Everett
- Snohomish Health District
- Swedish Edmonds Hospital
- Swedish Medical Center, Mill Creek

Spokane County

Thurston County

- City of Lacey
- City of Olympia
- City of Tumwater
- St. Peter Hospital
- The Evergreen State College
- Thurston County Public Health
- Thurston County Public Works

State of Washington (continued)

Whatcom County

- City of Bellingham

Washington Emergency Management
Division (EMD) – Washington State EOC

Washington Commission on Asian-
Pacific Affairs (APA)

Washington State Department of
Agriculture (WSDA)

Washington Department of Commerce

Washington Department of Ecology

Washington Department of Enterprise
Services (DES)

Washington Department of Natural
Resources (DNR)

Washington Military Department (MIL)

Washington National Guard (WNG)

WNG Joint Operations Center (JOC)

Washington State Department of Health
(DOH)

Washington State Department of
Licensing (DOL)

Washington State Department of Social
and Health Services (DSHS)

Washington State Gambling Commission
(GMB)

Washington State Guard (WSG)

Washington State Labor & Industries
(LNI)

Washington State Patrol (WSP)

Washington State Department of
Transportation (WSDOT)

University of Washington (UW)

Washington State University (WSU)

State of Oregon

Baker County	Oregon Department of Corrections (DOC)
Clackamas County	
Clatsop County	Oregon Department of Energy (ODOE)
Columbia County	
Coos County	Oregon Department of Forestry (ODF)
Crook County	Oregon Department of Geology and Mineral Industries (DOGAMI)
Deschutes County	Oregon Department of Human Services (ODHS)
Douglas County	
Harney County	Oregon Department of Transportation (ODOT)
Hood River County	
Jackson County	Oregon Health Authority (OHA)
Jefferson County	Oregon Judicial Department (OJD)
Josephine County	Oregon Metro
Klamath County	Oregon Military Department (MIL)
Lane County	Oregon Office of Emergency Management (OEM) – Oregon State ECC
▪ City of Eugene	
▪ City of Springfield	Oregon Parks & Recreation Department (OPRD)
Lincoln County	
Marion County	Oregon Public Utilities Commission (PUC)
Multnomah County	
▪ City of Portland	Oregon Office of the State Fire Marshal (OSFM)
Umatilla County	
Union County	Oregon Office of State Medical Examiner (OSME)
Wasco County	Oregon State Police
Washington County	Oregon 911
Oregon Department of Administrative Services (DAS)	

State of Idaho

Benewah County

- Benewah Community Hospital
- Benewah Medical Center

Bonner County

- Bonner General Health

Boundary County

- Boundary Community Hospital

Clearwater County

- Clearwater Valley Hospital and Clinics

Idaho County

- St Mary's Hospital and Clinics
- Syringa Hospital and Clinics

Kootenai County

- Coeur d'Alene Airport
- Coeur d'Alene Police
- Kootenai County Coroner
- Kootenai Fire & Rescue
- Kootenai Health
- Kootenai Emergency Medical Service (EMS)
- Kootenai County Sheriff's Office
- North Idaho Advanced Care
- Northern Lakes Fire
- Northwest Specialty Hospital

Latah County

- Gritman Medical Center

Lewis County

Nez Perce County

- Kindred Transitional Care & Rehabilitation
- Lewis Clark State College
- Lewiston Fire

- Lewiston Regional Airport
- Lewiston Police
- Nez Perce Coroner
- Nez Perce Sheriff's Office
- Royal Plaza Retirement Center
- St Joseph's Regional Medical Center

Shoshone County

- Shoshone Medical Center

Public Health District 1 (Panhandle)

Public Health District 2 (North Central)

Public Health District 3 (Southwest)

- St Alphonsus, Nampa
- West Valley Medical Center

Public Health Districts 4 (Central)

- Boise VA Medical Center
- St Alphonsus, Boise
- St Luke's, Boise
- St Luke's, Meridian
- Southwest Idaho Advanced Care

Public Health District 5 (South Central)

Public Health District 6 (Southeastern)

Public Health District 7 (Eastern)

ID Bureau of Homeland Security (IBHS) – Idaho State EOC

ID Department of Health and Welfare (IDHW)

Idaho National Guard

Idaho Wing Civil Air Patrol

University of Idaho

Tribal Nations

Oregon

Burns Paiute Tribe
Confederated Tribes of the Coos,
Lower Umpqua and Siuslaw Indians
Confederated Tribes of the Grand
Ronde Community of Oregon
Confederated Tribes of Siletz Indians
Confederated Tribes of the Umatilla
Indian Reservation
Confederated Tribes of Warm Springs
Coquille Indian Tribe
Cow Creek Band of Umpqua Tribe of
Indians
Klamath Tribes

Washington

Confederated Tribes of the Chehalis
Reservation
Jamestown S’Klallam Tribe
Lower Elwha Tribal Community of the
Lower Elwha Reservation
Lummi Tribe of the Lummi
Reservation
Makah Indian Tribe of the Makah
Indian Reservation
Quinault Tribe of the Quinault
Reservation
Shoalwater Bay Tribe of the
Shoalwater Bay Indian Reservation
Skokomish Indian Tribe of the
Skokomish Reservation
Suquamish Indian Tribe of the Port Madison
Reservation
Swinomish Indians of the Swinomish
Reservation
Tulalip Tribes of the Tulalip
Reservation

Federal

U.S. Department of Energy (DOE)
U.S. Small Business Administration
(SBA)
U.S. Department of Commerce (DOC)

- National Oceanic and
Atmospheric Administration
(NOAA)
- National Tsunami Warning
Center
- National Weather Service
(NWS)

U.S. Department of Transportation (USDOT)

- Federal Aviation
Administration (FAA)

U.S. Department of Health and Human
Services (HHS)

- Administration for Children
and Families (ACF)
- Assistant Secretary for
Preparedness and Response
(ASPR)

Federal (continued)

U.S. Department of Homeland Security (DHS)

- Federal Emergency Management Agency (FEMA)
 - FEMA Headquarters
 - FEMA Region 10
 - FEMA Region 6
- U.S. Coast Guard (USCG)
 - Base Alameda
 - District 11
 - District 13
 - Joint Harbor Operations Center; Columbia River Sector; North Bend Sector; Sector Puget Sound
 - District 14
 - District 17
 - Pacific Area
- National Coordination Center for Telecommunications
- National Protection and Programs Directorate (NPPD)

U.S. Department of the Interior (DOI)

- Bureau of Indian Affairs (BIA)
- Bureau of Reclamation (BOR)
- U.S. Geological Survey (USGS)

U.S. Department of State Operations

U.S. Department of State Office of Foreign Missions

U.S. Department of State Office Emergency Management

National Aeronautics and Space Administration (NASA)

The Bureau of Diplomatic Security

Executive Office of Western Hemisphere Affairs

General Services Administration (GSA)

U.S. Environmental Protection Agency (EPA)

U.S. Department of State (DOS)

Bonneville Power Administration (BPA)

U.S. Department of Agriculture

- U.S. Forest Service (USFS)
- Animal and Plant Health Inspection Service (APHIS)
- Food and Nutrition Service (FNS)

U.S. Army Corps of Engineers (USACE)

- Headquarters, Operations Center
- Northwestern Division (Portland)
 - Walla Walla District
 - Omaha District (Division HQ Alternate)
 - The Dalles Dam (Portland District alternate)
 - Chief Joe Dam (Seattle District Alternate)

U.S. Department of Justice (DOJ)

- Bureau of Alcohol, Tobacco, Firearms & Explosives (BATF)

Consulate General of Canada

Consulate of El Salvador

Consulate General of Japan

Consulate of Mexico in Seattle

Consulate General of Republic of Korea in Seattle

Consulate of Sweden

Department of Defense

Navy Region Northwest (NRNW)

Joint Base Lewis McChord

- Madigan Army Medical Center

U.S. Transportation Command (TRANSCOM)

U.S. Army North (ARNORTH)

- Region 10 Defense Coordinating Element (DCE)
- Region 6 DCE

U.S. Army Medical Command and Madigan Army Medical Center (MAMC)

U.S. Northern Command (NORTHCOM)

Non-Governmental Organizations

American Red Cross

Private Sector

Amazon

Amtrack

Avista

Comcast

Foss Maritime

Intel

Microsoft

Nintendo

Northwest Natural Gas

Portland General Electric

Puget Sound Energy

Tropical Shipping

United Natural Foods, Inc.

Verizon

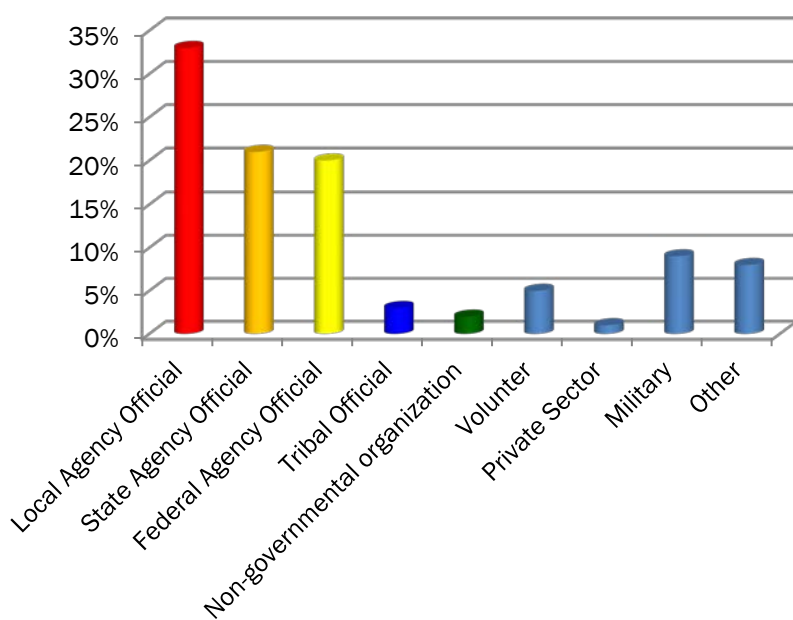
Walgreens

ANNEX B: PARTICIPANT SURVEY DATA

This section provides the results of the post-exercise Participant Survey administered to players, controllers, evaluators, and observers. In total, 593 participants completed a survey. The Survey solicited feedback about the value of events leading up to Cascadia Rising; the effectiveness of Cascadia Rising exercise design; and outstanding training needs. The information below includes results of four demographic questions with multiple choice answer options; eleven rating questions; and highlights from the open-ended response questions.

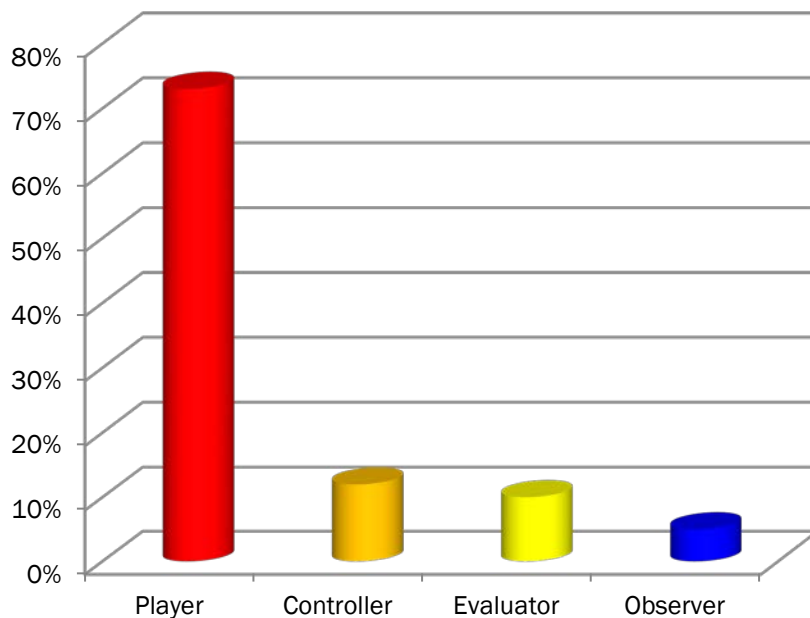
DEMOGRAPHIC DATA

Question 1: What is your agency affiliation?



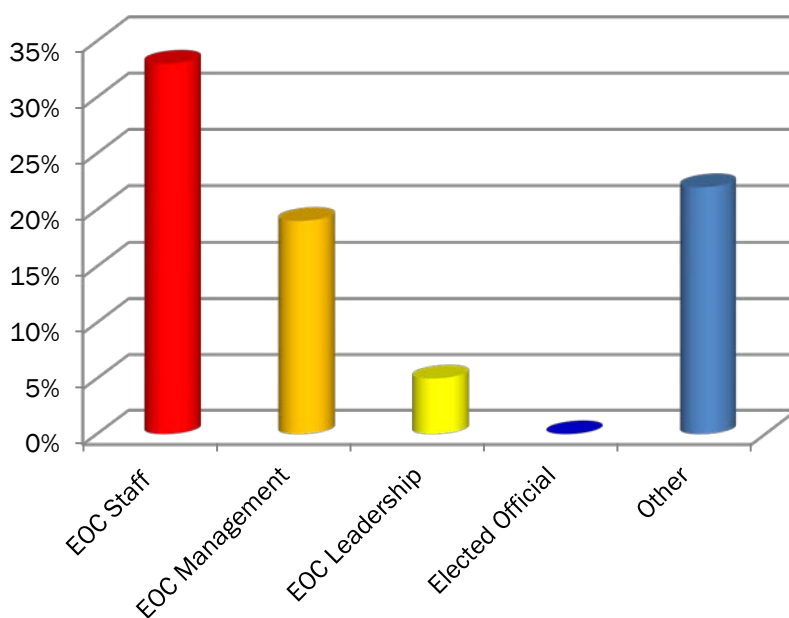
Answer Choices	Responses	
Local Agency Official (city or county)	33%	193
State agency official	21%	124
Federal agency official	20%	118
Tribal official	3%	15
Non-governmental organization	2%	12
Volunteer	5%	28
Private Sector	1%	5
Military	9%	53
Other	8%	45
Total		593

Question 2: Please select your exercise role.



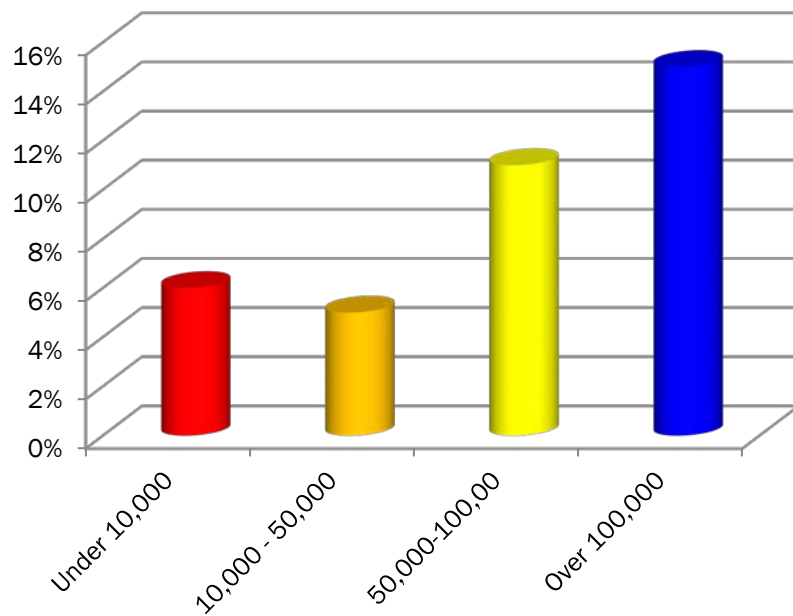
Answer Choices	Responses	
Player	73%	470
Controller	12%	79
Evaluator	10%	61
Observer	5%	31
Total Respondents		641

Question 3: If you are an exercise player, please select your EOC role.



Answer Choices	Responses	
EOC staff (ESF official, volunteer, etc.)	33%	206
EOC management (branch director, section chief, etc.)	19%	119
EOC leadership (EOC director)	5%	33
Elected official	0%	1
N/A	19%	119
Other	22%	137
Total		615

Question 4: If you are a local official, what is the population of your community?



Answer Choices	Responses	
Under 10,000	6%	36
10,000 – 50,000	5%	32
50,000 – 100,000	11%	65
Over 100,000	15%	87
N/A	63%	373
Total		593

RATING QUESTIONS

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A
EOC players were actively involved in the exercise.	1%	2%	4%	36%	53%	4%
The 'pace' of the exercise was appropriate.	1%	11%	13%	50%	22%	2%
The exercise injects provided by the Control Cell provided realistic issues and challenges for players.	3%	7%	15%	46%	21%	7%
The exercise increased my understanding about and familiarity with the capabilities and resources of other participating organizations.	2%	5%	11%	44%	36%	3%
The exercise provided the opportunity to address significant decisions in support of critical mission areas.	1%	5%	11%	51%	29%	3%
This exercise reinforced my ability to respond to actual situations.	2%	3%	10%	48%	34%	4%
Overall, I was adequately prepared for this exercise by existing plans and training.	4%	11%	19%	45%	18%	4%
The exercise improved my understanding of catastrophic disaster interagency EOC response operations.	2%	5%	12%	45%	34%	3%
The simulated media products (SimulationDeck and WNN) added value to the exercise.	2%	6%	23%	23%	24%	22%
The exercise improved my understanding of EOC processes and major response actions.	2%	4%	15%	44%	31%	4%
Overall, I was satisfied with the exercise.	2%	3%	11%	47%	36%	2%

OPEN-ENDED RESPONSES

This section highlights the most common or representative responses to the questions below.

What exercise materials were most useful?

- SimulationDeck
- Situation Reports
- Simulation cell
- GIS products
- CSZ plans
- WebEOC
- Positon manuals and checklists

Please identify any specific training opportunities that helped you prepare for this exercise.

- Ramp-up drills and exercises
- Previous online and in-person emergency management training

Please suggest training opportunities that could have helped you to be better prepared for this exercise.

- Entry-level ICS instruction including basic overviews and position-specific training
- ICS 300/400 training delivery
- Increased ESF familiarity, to include learning opportunities addressing each ESF function and how the functions interact.
- Liaison training on the expectations and duties in an EOC activation
- Training on procedures for requesting resources from federal partners
- WebEOC training
- PIO training to include social media

What was the greatest strength of the exercise?

- “The involvement of multiple jurisdiction levels such as federal, state, local and other stakeholder organizations. The encouragement and empowerment of local EOC’s to design and develop their most effective and worthwhile exercises.”
- “Developing the relationships with other agencies and understanding the overall process better.”
- “So many agencies were involved. This gave some realism to the exercise and people got caught up in the energy of it. Great for our staff!”
- “Demonstrating to non-EM leadership the potential massive scale of a CSZ earthquake; generating buy-in on preparedness activities.”
- “It helped our team identify the places where our plan was adequate and the places that need additional specificity.”
- “The interagency collaboration and the opportunity to help the public better understand the risks associated with a catastrophic earthquake.”
- “I believe that building relationships with the people and organizations that must work together in the event of a real disaster is the greatest benefit of participating in an

exercise. Understanding what resources are available to you via those relationships is vital.”

- “Participation of so many different agencies -- both state and federal. Most players ‘played hard’ to try and meet identified needs and were very forthright about the capabilities their respective agencies brought to the table.”

ANNEX C: LIST OF ACRONYMS

Acronym	Term
AAR	After-Action Report
COOP	Continuity of Operations
CSZ	Cascadia Subduction Zone
DCE	Defense Coordinating Element
EEG	Exercise Evaluation Guide
EOC	Emergency Operations Center
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HHS	U.S. Health and Human Services
ICS	Incident Command System
IMT	Incident Management Team
IRCT	Incident Response Coordination Team
IT	Information Technology
NIMS	National Incident Management System
UCG	Unified Command Group
US&R	Urban Search and Rescue