RAPTOR

REAL-TIME ASSESSMENT AND PLANNING TOOL FOR OREGON

CASCADIA RISING REPORT

DRAFT REPORT

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TABLE OF CONTENTS

1   BACKGROUND

The Real-Time Assessment and Planning Tool for Oregon (RAPTOR) is the Oregon Office of Emergency Management's (OEM) situational awareness mapping tool.

RAPTOR allows authenticated users to spatially display interrelated information and aggregate information from various systems such as IRIS, SAFE, Bridge, OpsCenter, ODOT T-TIP and the National Weather Service into a geospatial platform. This allows for a real-time comprehensive situational picture. Examples of this include:

- Displaying the location of hospitals around a rapidly escalating traffic incident
- Showing the location of schools or childcare centers around a hazardous material spill
- Showing the infrastructure affected by a storm or natural disaster
- Facilitated improved regional coordination and interoperability

RAPTOR's value is that it instantly displays the relationships between events, allowing emergency operations centers (EOCs) to be alerted to potential issues and providing real-time analysis for decision support. As this tool will complement other existing systems, it is intended to promote GIS information sharing amongst all levels of government via standardized feeds and data services. This allows maximum information sharing with OEM and other members within the emergency management community regardless of which system agencies and localities are using for daily operations and in emergencies, therefore maximizing existing investments and minimizing potential costs.

The Cascadia Rising Exercise took place from June 7th through June 10th, 2016. This exercise encompassed Oregon, Washington and Idaho, involving various state agencies, local entities and the National Guard.

2   RAPTOR OBJECTIVES

In order to take advantage of the opportunity for examination of the RAPTOR mapping application, a set of four exercise objectives were developed, which are listed below:

1. (External) Incident Data Population:
    a. Members of the emergency management community will demonstrate the ability to effectively populate their incident data within RAPTOR utilizing the edit data tools interface.
2. (Internal) Data Coordination and Storage:
    a. OEM will effectively demonstrate the capability to coordinate and manage map information data for display purposes during the exercise.
3. (Internal) Disconnected Environment:

a. The Emergency Coordination Center (ECC) will effectively demonstrate the capability to display statewide and local incident map data on printed paper maps during the exercise.

4. (Internal) Decision Making Support:

a. Statewide and local incident map data will be effectively utilized by the ECC Planning Section to support critical decision making.

Specific objectives were tested during each day of the exercise, as listed in the table below:

Day 1	Day 2	Day 3	Day 4
Objectives: 3, 4	Objectives: 1, 3, 4	Objectives: 1, 2, 3, 4	Objectives: 1, 2, 3, 4

3   RESULTS

During the period of exercise play, there were a number of local, tribal, state, and federal entities viewing and interacting with RAPTOR. The following results list the overview of actions and data provided during exercise play.

3.1   OVERVIEW

- Features created (using edit data tools): 368 total
- Entities contributing data: 28 total (includes web services)
  - Federal Entities:
    - Federal Emergency Management Agency (FEMA)
    - National Geospatial Intelligence Agency (NGA)
    - National Weather Service (NWS)
    - US Bureau of Land Management (BLM)
    - US Department of Homeland Security (US DHS)
    - US Forest Service (USFS)
    - US Geological Survey (USGS)
  - State Agencies:
    - Oregon Department of Administrative Services
    - Oregon Department of Aviation
    - Oregon Department of Environmental Quality
    - Oregon Department of Geology and Mineral Industries
    - Oregon Department of Human Services
    - Oregon Department of Transportation
    - Oregon Military Department
    - Oregon Office of Emergency Management

- Oregon Water Resources Department
  - County Entities:
    - Baker County
    - Clackamas County
    - Columbia County
    - Coos County
    - Deschutes County
    - Lane County
    - Yamhill County
  - City Entities:
    - City of Eugene
    - City of Roseburg
    - City of Springfield
    - City of Salem
  - Public/Private Partners:
    - Civil Air Patrol
- Total Maps Produced for SITREP: 18

Server Requests and Views by Exercise Day:

	Day 1	Day 2	Day 3	Day 4	Total
Server Requests	1,108,359	1,799,185	2,910,562	1,044,464	**6,862,570**
Total Basemap Views	290	337	260	174	**1,061**

Server Requests were based upon ArcGIS Server statistics for the time period of exercise play.

Total basemap views were based upon statistics from ArcGIS Online's webmap usage tab for the time period of exercise play.

## 3.2 ITEMS PROVIDED DURING EXERCISE

Mainly during exercise play, the GIS position within the ECC provided screenshots from RAPTOR for inclusion in the SITREP as well as data extracts when asked.
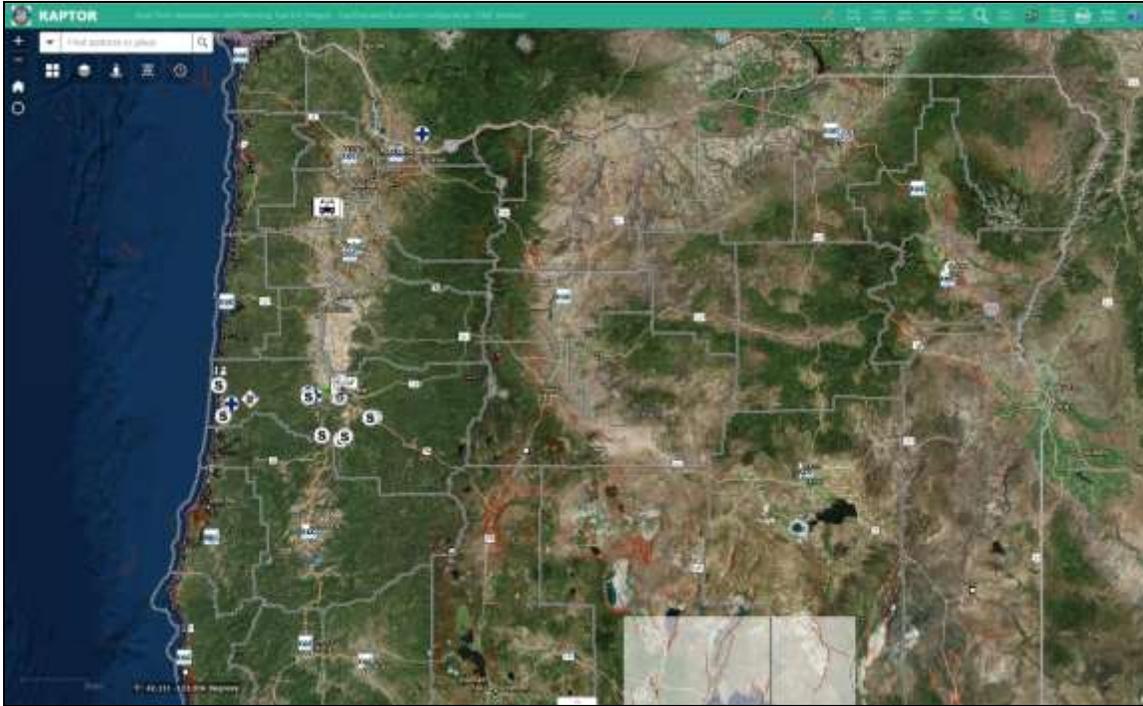
Day 1 Image 1: Situation overview map - Overview of the state including emergency operation centers (EOCs) activated and incident details within Lane County. All data placed within Lane County were generated by the Lane County GIS teams using the edit data tools functionality within RAPTOR. All activated EOC locations were generated by OEM.
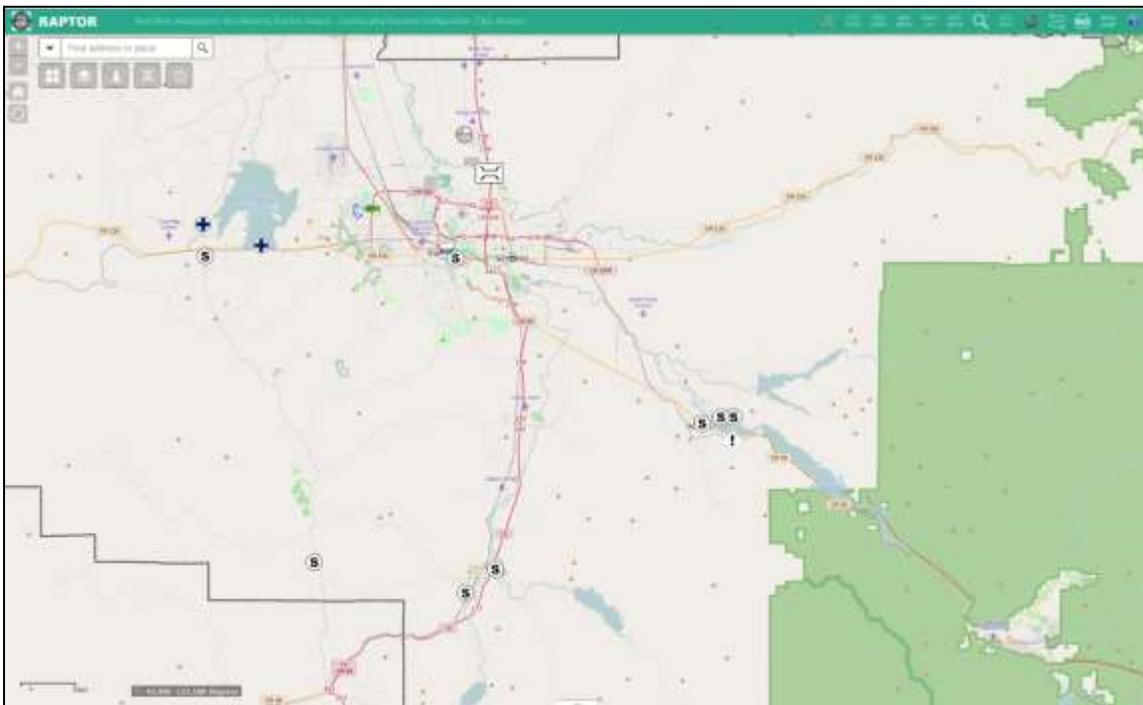

Day 1 Image 2: Lane County detail map - Lane county incident details indicating location of shelters, staging areas, bridge collapse. Incident details were also extracted to a spreadsheet.

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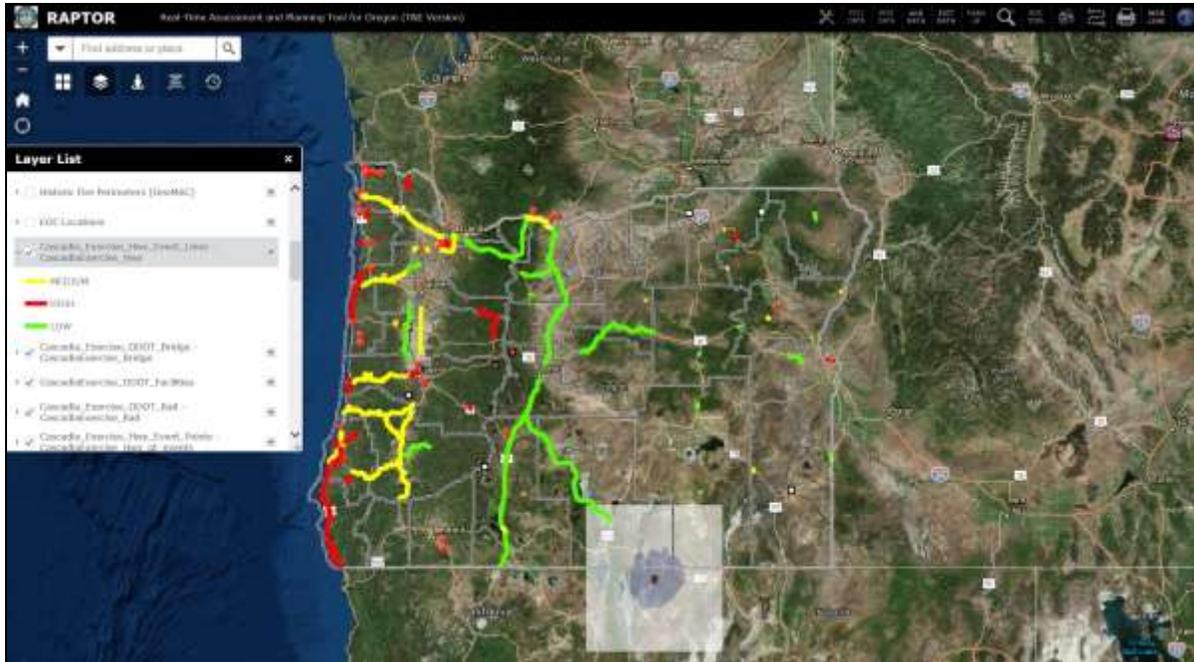
Day 1 Image 3: Road network status map - statewide road network status (from ODOT services).

A brief summary included the following:

- Here is a summary of the impacts:
    - Hwy 97 – low impacts, mostly clear
    - Hwy 101 – majority is high damage, some parts unknown at this time.
    - US 26 – medium damage
    - Hwy 39 – medium damage – landslide
    - Hwy 62 – medium damage
    - Hwy 38 – medium damage – landslide
    - Hwy 42 – medium damage
    - Hwy 138 – medium damage
    - I5 – medium damage MP 209 to 244, high damage in Portland area near MP 300
    - Hwy 22 – high damage MP 45 to 80
   - I84 – medium damage MP 64 to 87
    - I205 – medium damage

Also included extract of bridge impacts based upon services from ODOT.
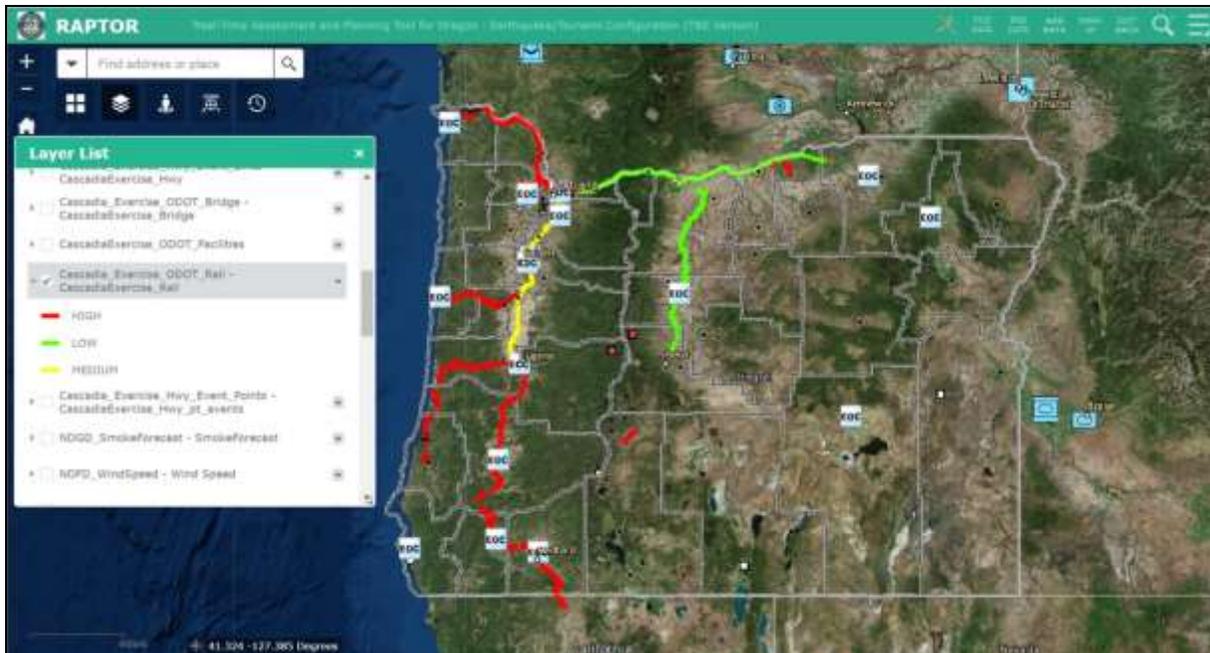
Day 2 Image 1: Rail network map - statewide rail network status (from ODOT services). Also included are friendly forces tracking (FFT) of military assets from a SAGE server KML file and activated EOCs.
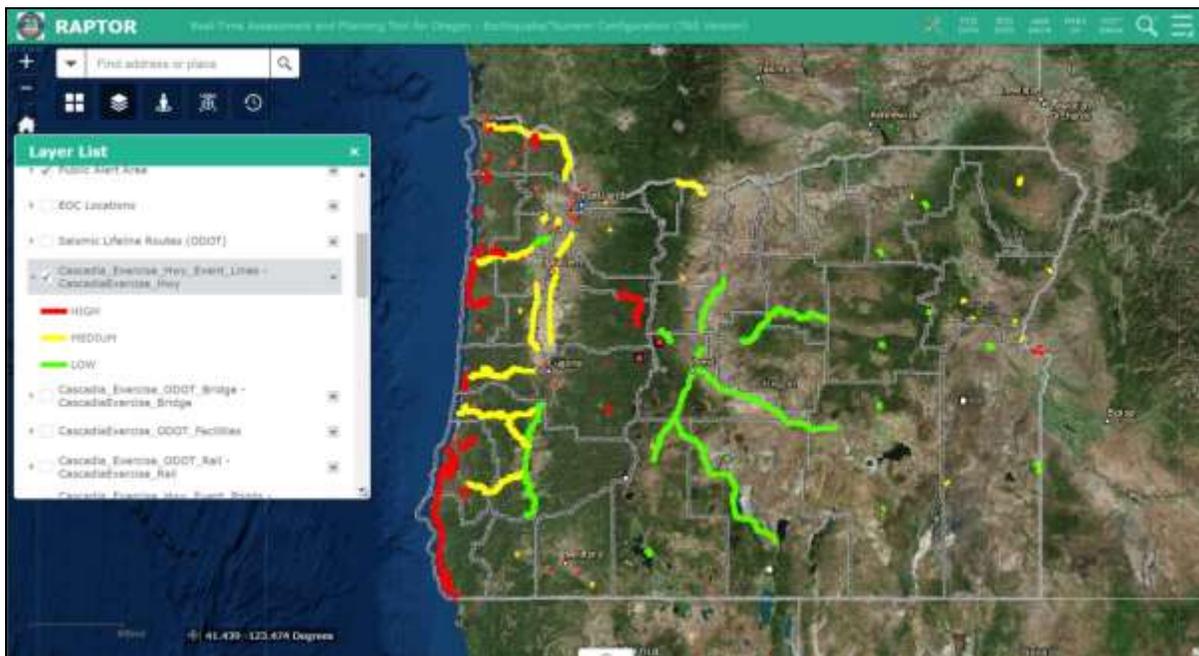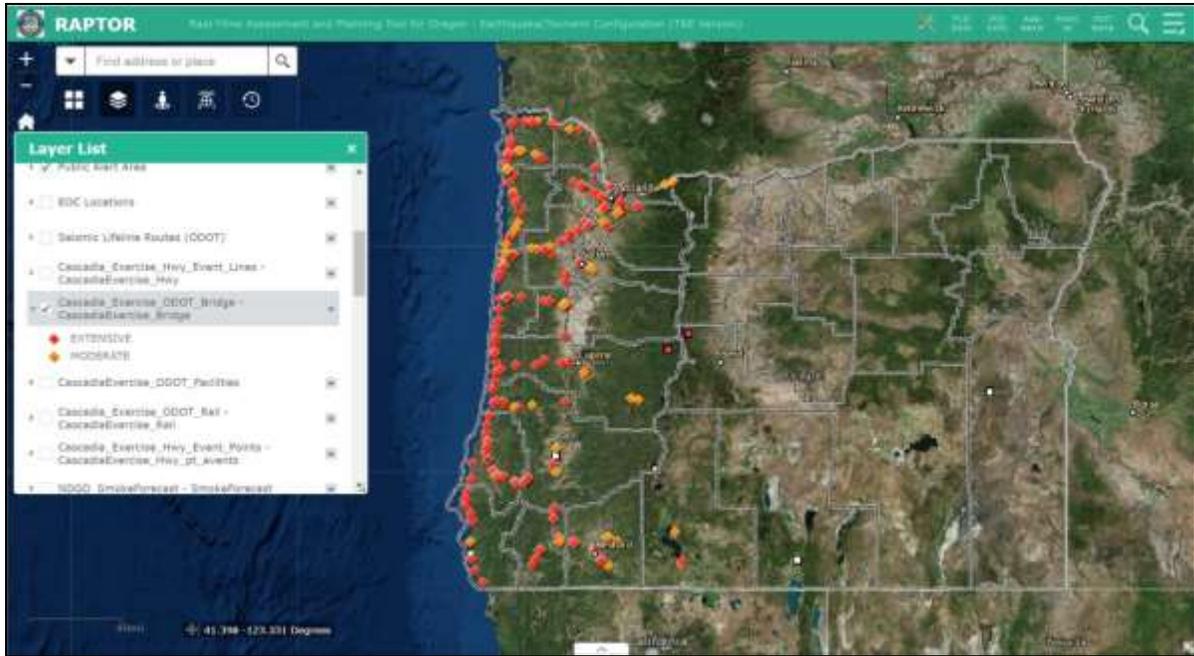

Day 2 Image 2: Road network map - statewide road network status (from ODOT services).

Oregon Office of Emergency Management
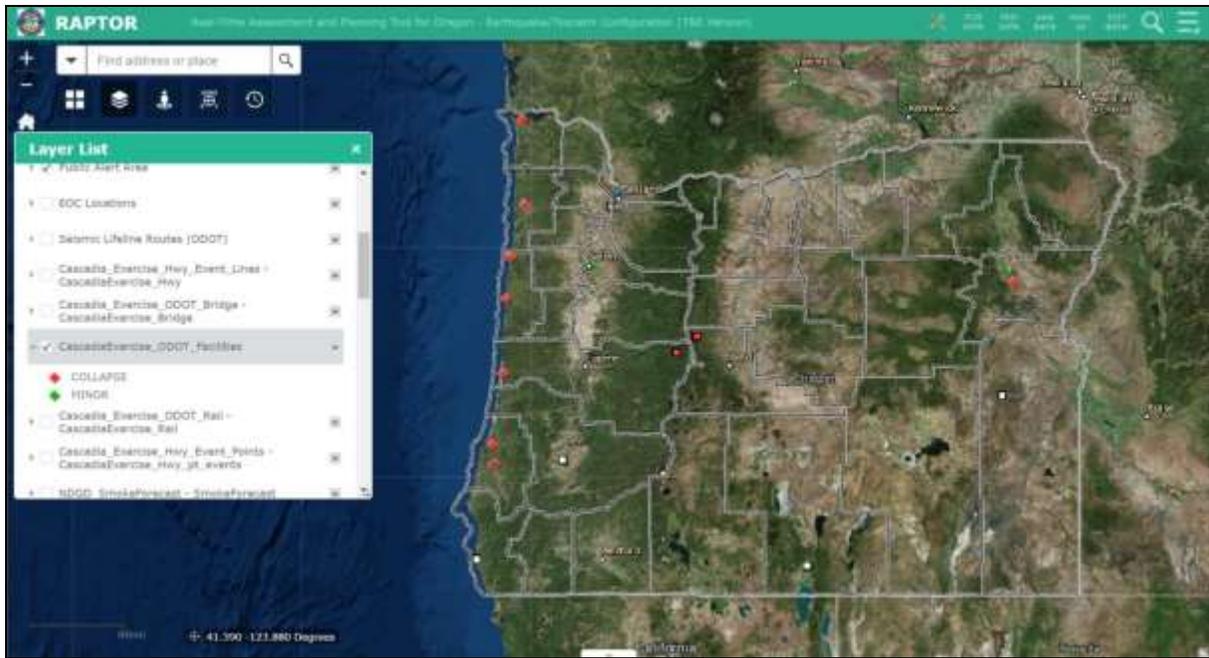
Day 2 Image 3: ODOT facility status map - statewide ODOT facility status (from ODOT services).
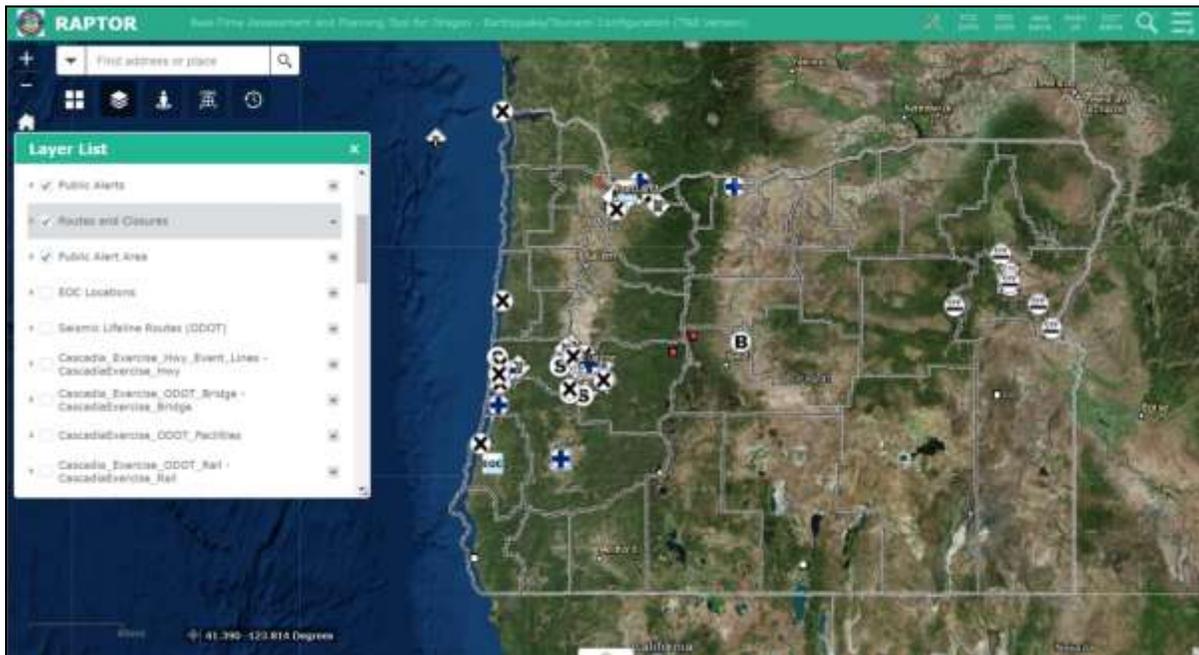
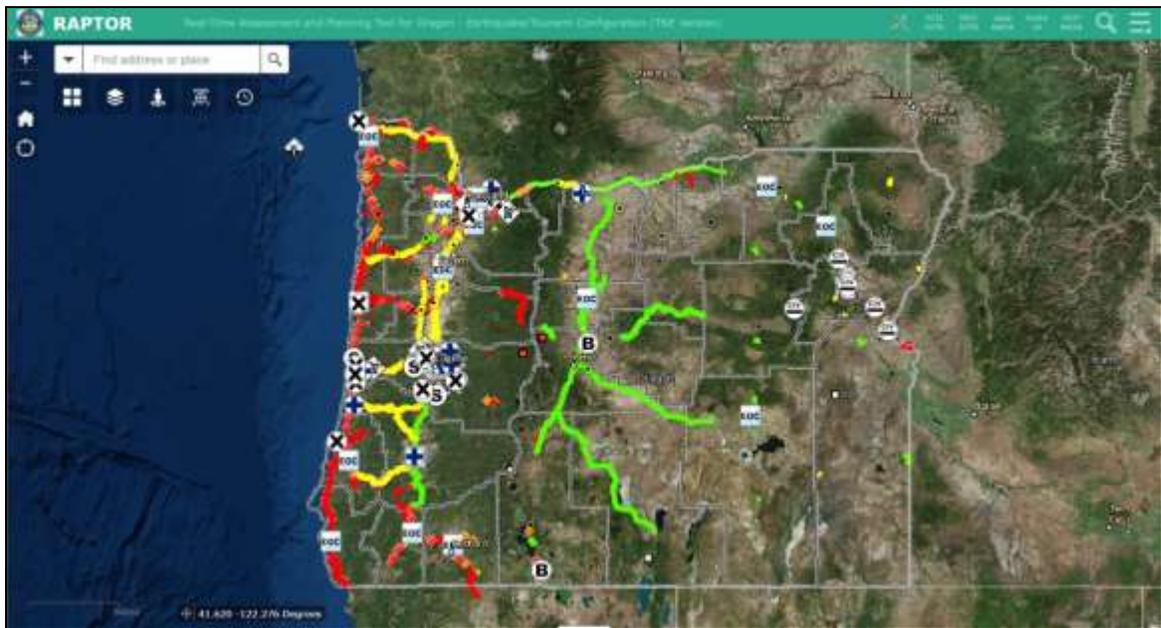

Day 2 Image 4: RAPTOR incident details map - RAPTOR incidents indicating locally populated data, including shelters, staging areas and closures.

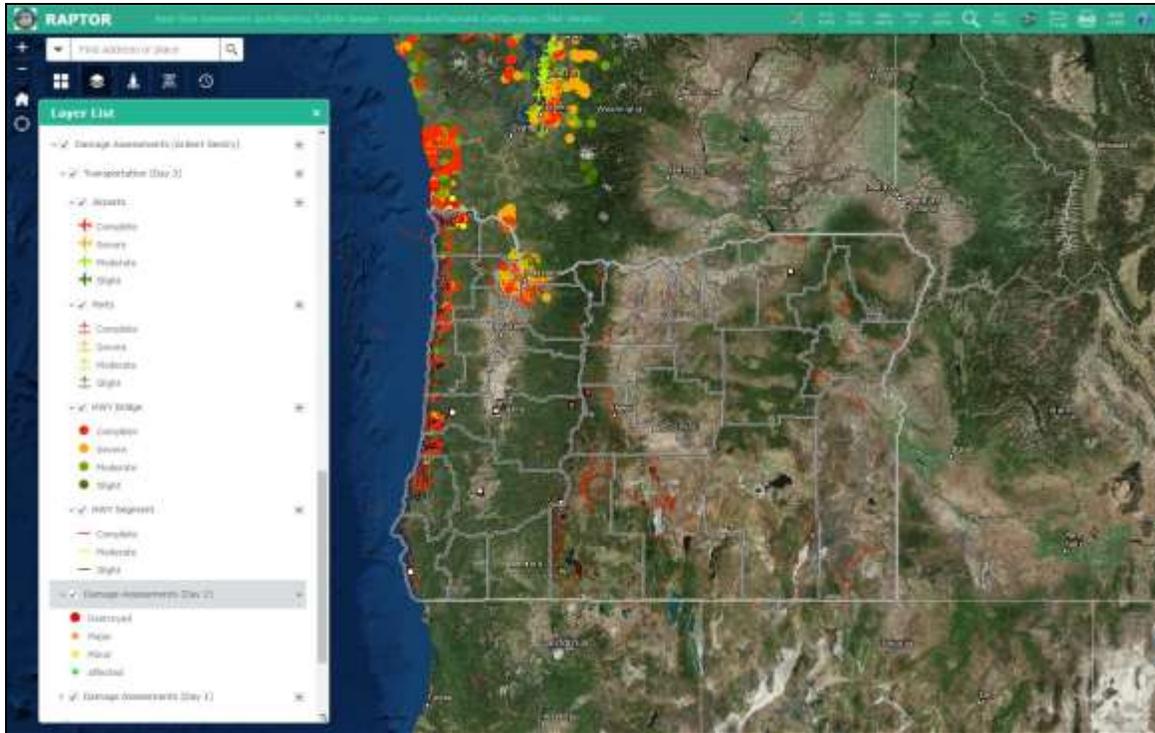*Oregon Office of Emergency Management*

Day 2 Image 5: Bridge status map - bridge status (from ODOT services).

Provided extract of CPOD information by county to planning section.

Day 2 Image 6: Situation overview map - statewide overview, including road network status, rail network status, RAPTOR incidents, bridge status.

Oregon Office of Emergency Management

Day 3 Image 1: Damage assessment map - damage assessments gathered from Ardent Sentry (NGA services).
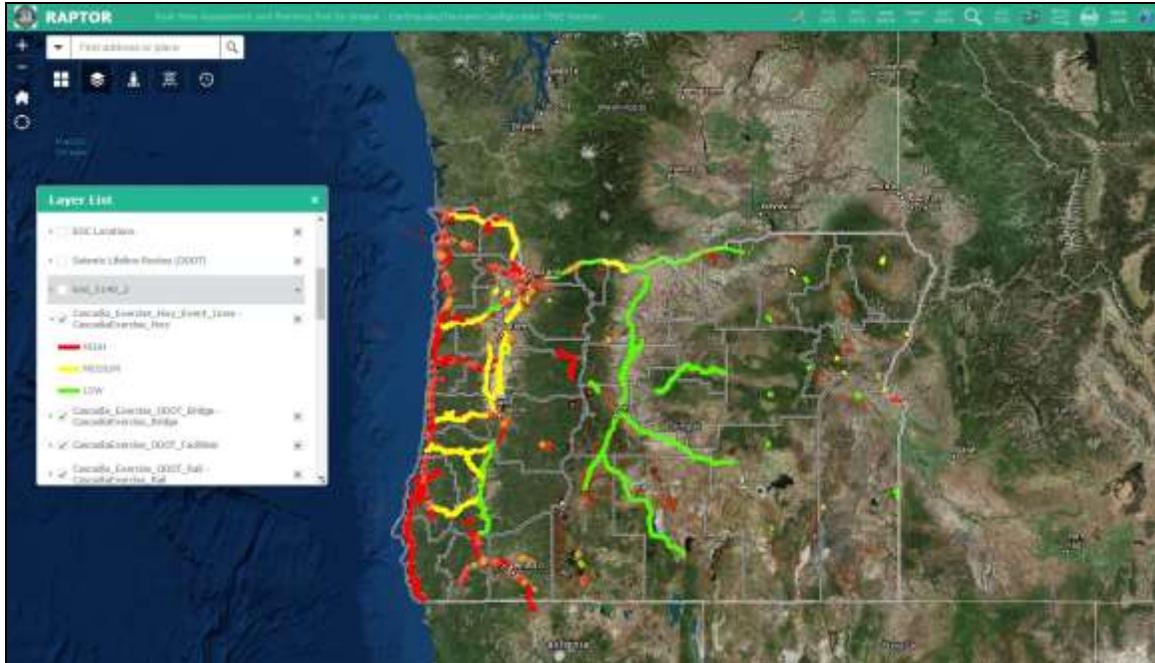
Day 3 Image 2: Transportation network status map - transportation network status (from ODOT services) depicting bridges, rail, roads, and ODOT facility status.

Oregon Office of Emergency Management
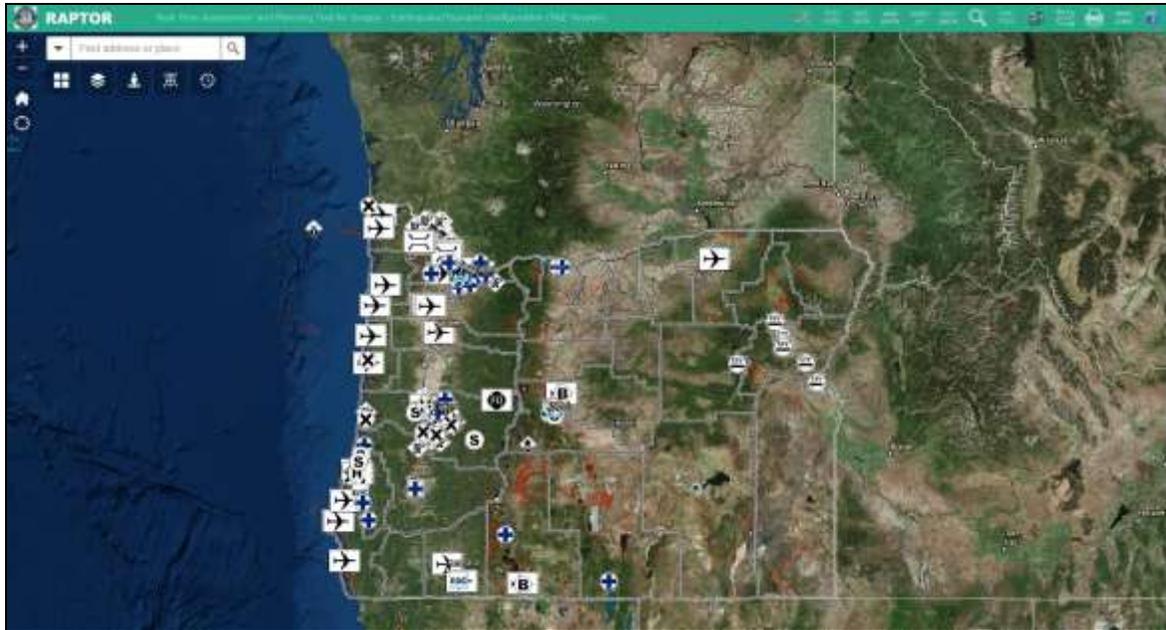
Day 3 Image 3: RAPTOR incident details map - RAPTOR incidents from local populated data depicting airport status (from Oregon Department of Aviation), shelters and staging areas.
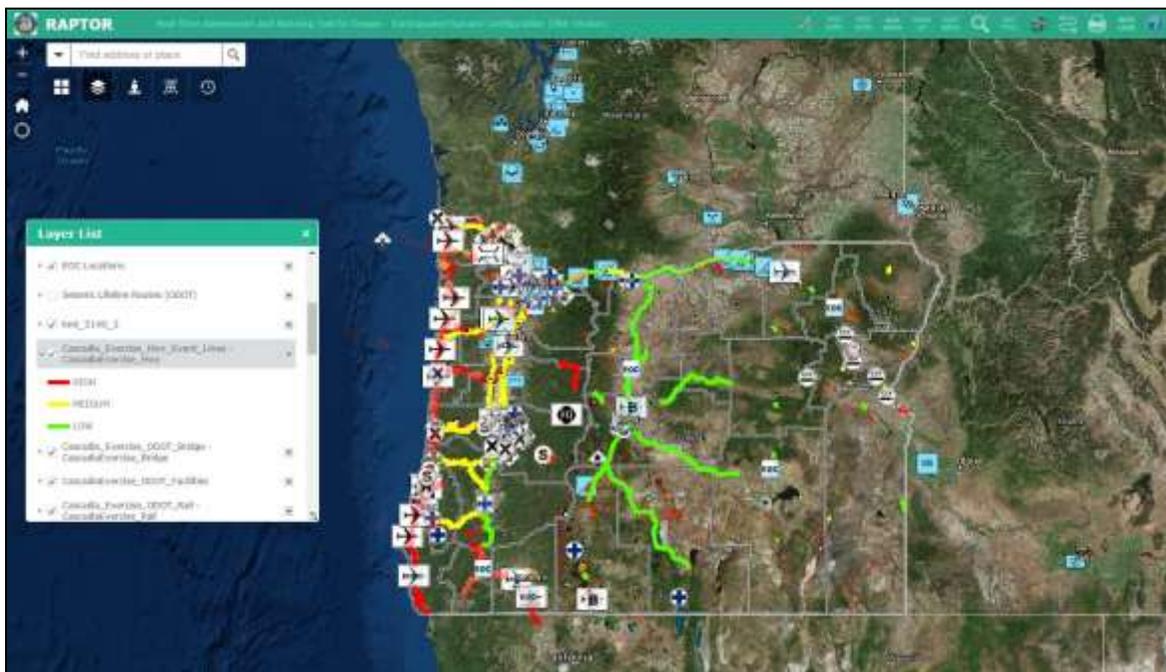
Day 3 Image 4: Situation overview map - statewide overview, including RAPTOR incidents, road network status and FFT.

Also included excel spreadsheet extract of infrastructure status (later revised to include location name and county jurisdiction impacted).
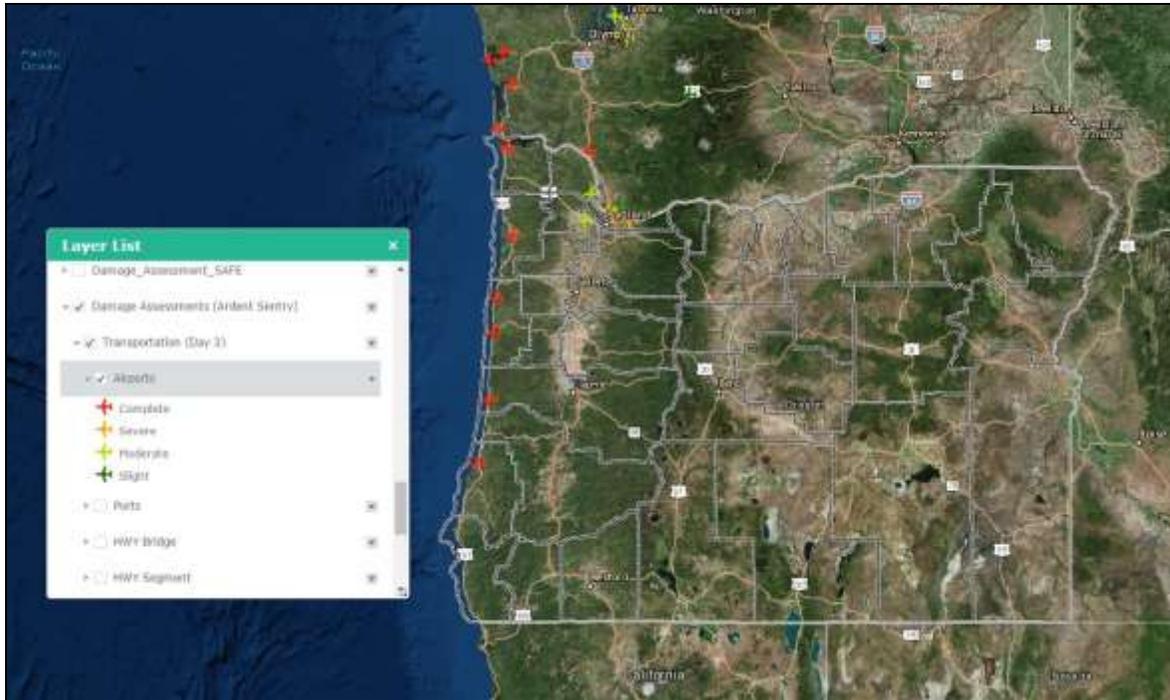
Day 4 Image 1: Airport status map - airport status based upon damage assessments (NGA).
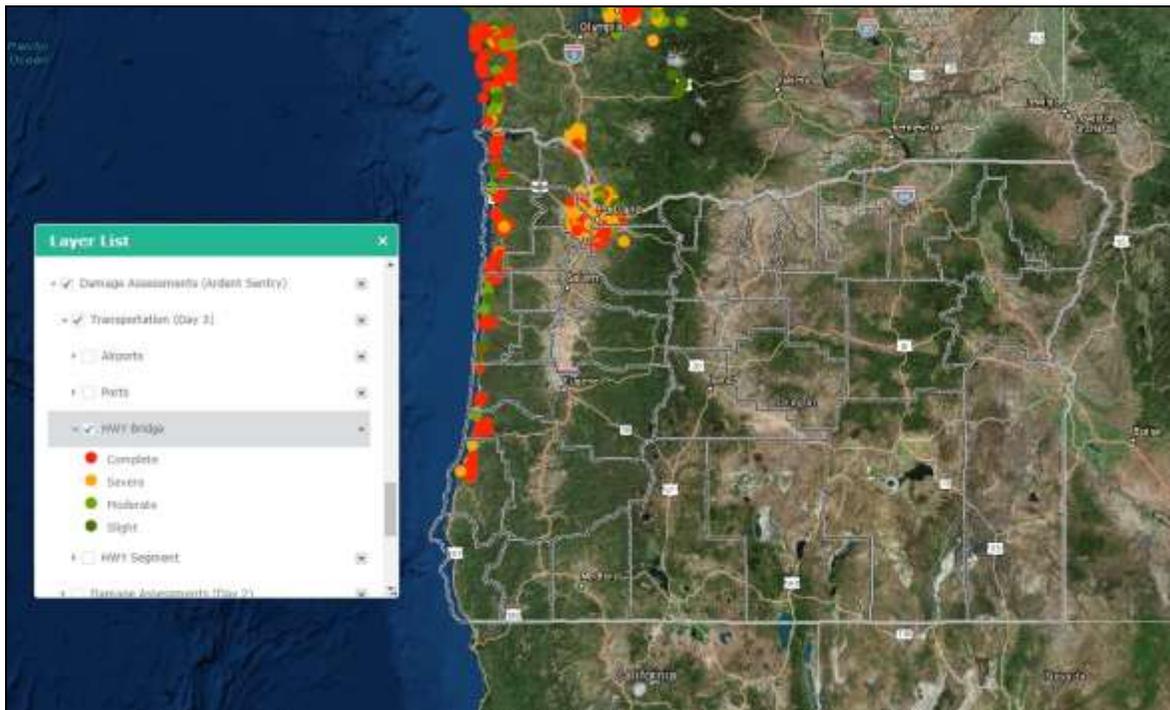
Day 4 Image 2: Bridge status map - bridge status based upon damage assessments (NGA).

Oregon Office of Emergency Management
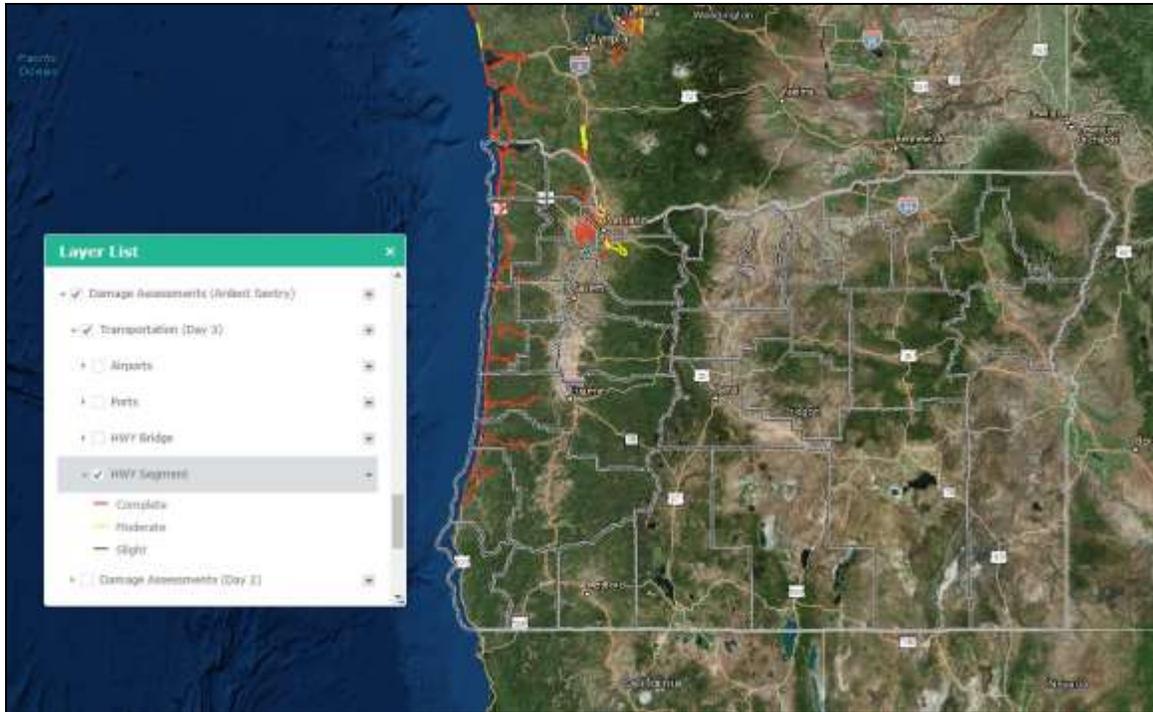
Day 4 Image 3: Highway network status map - highway network status based upon damage assessments (NGA).
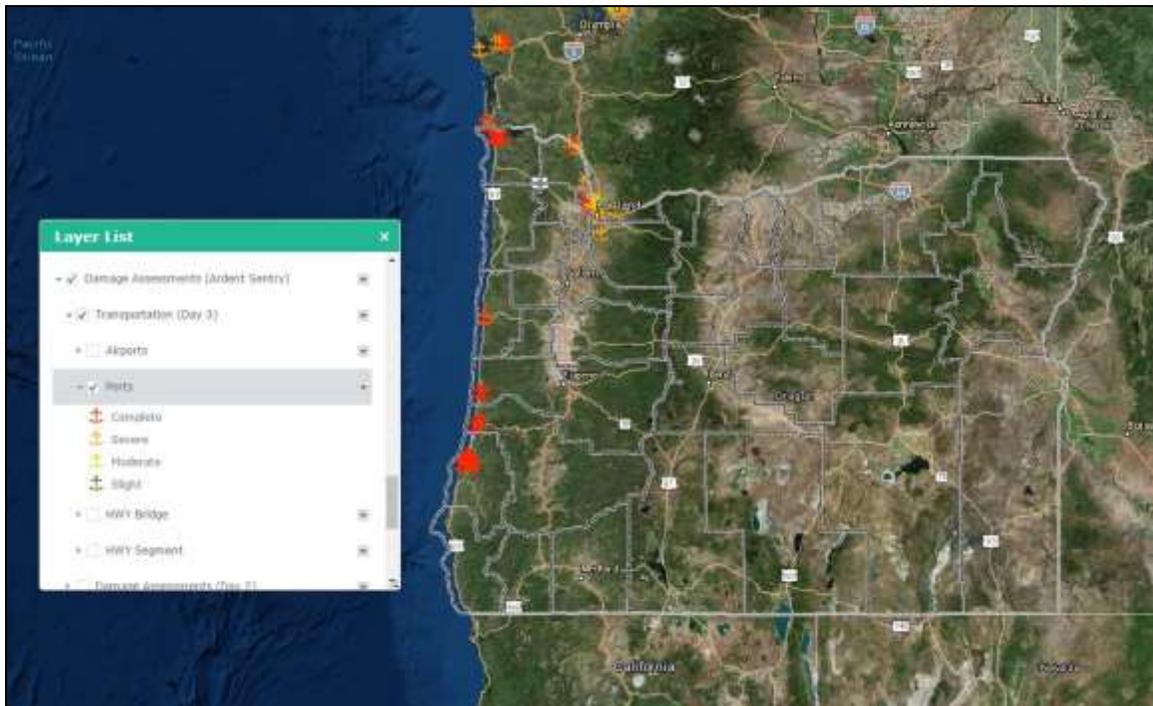
Day 4 Image 4: Port status map - port status based upon damage assessments (NGA).
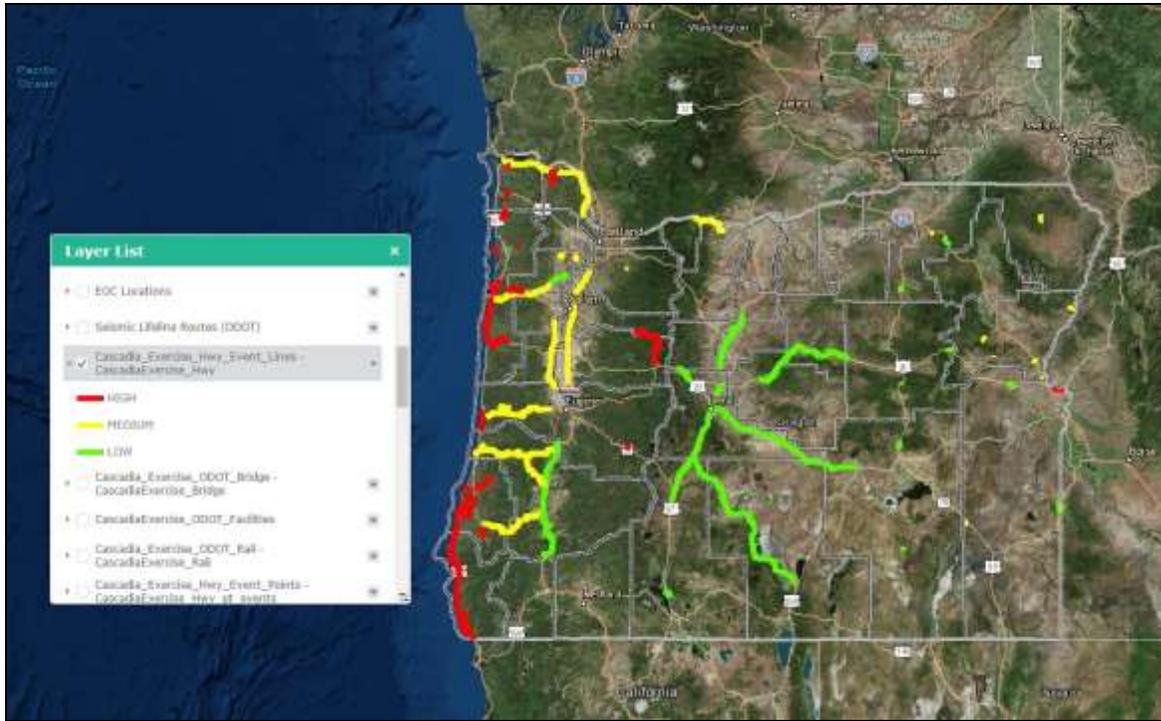
Day 4 Image 5: Highway network status map - road network status (ODOT services).

4   EVALUATION WITH OBJECTIVES

This section provides the evaluation of each objective with what was accomplished during exercise play. Objectives were given one of the following three ratings, described as follows:

- Met Expectations – the objective criteria was met
- Not Applicable – the objective was not tested or was not applicable
- Needs Improvement – the objective criteria was not met or was only partially met

| Objective 1: Incident Data Population	
Rating	Met Expectations
Justification	• Incident data was able to be placed on the map from local and other jurisdictions. Incident data included staging area locations, bridge status, structural collapse, and shelters active. • Though not many local jurisdictions placed data using the edit data tools, those that utilized the system indicated important location data.
Areas for Improvement	Only 7 of the 36 counties contributed information within RAPTOR. It would be beneficial for the other local jurisdictions to contribute map data during exercise play and actual events.

Objective 2: Data Coordination and Storage	
Rating	Met Expectations for data coordination, Not Applicable for storage
Justification	• The process of storing data did not occur as many of the datasets utilized during the exercise were from other web services. Additionally, data obtained from ODOT GIS on a thumb drive was later evaluated in comparison with their ArcGIS Online web services, which were utilized as they were more up-to-date. • OEM coordinated with FEMA GIS to provide them with data related to our incidents, community points of distribution (CPODs), road network status, and posted their divisions and branches data to our server for inclusion in their mapping system. • Data from outside agencies was able to be consumed within RAPTOR. This included data from ODOT GIS indicating the transportation network status, City of Salem's damage assessments, Ardent Sentry damage assessments from NGA, friendly forces tracking of military assets, and ShakeMap information from FEMA (from the US Geological Survey analysis). • According to the FEMA representatives, Oregon had the best set of data for situational awareness as the feeds included road/rail network status, EOC activation status, and incident information at the local level. Sharing with these entities was easier as OEM had the data posted on their GIS server and only a REST services URL was needed to share that information with FEMA and other partners.
Areas for Improvement	• Data storage will need to be tested during future exercises and events to determine capabilities. • There were issues initially trying to gain access to the FEMA ArcGIS Online organization, which was later resolved by the RAPTOR position searching for the FEMA GIS group and being asked to be added.

Objective 3: Disconnected Environment	
Rating	Met Expectations
Justification	• The paper map process utilized during the exercise yielded positive results. Information received from amateur radio was able to be relayed onto the paper map using the adopted symbol sets for RAPTOR incidents. a. Data placed on the paper map included activated EOC locations as well as the local jurisdictions with a

	declaration of emergency (which the boundaries were drawn with blue marker to highlight those with declarations).
	• The functionality for indicating jurisdictions with emergency declarations was not in place for mapping on RAPTOR, but was instead continually updated on the paper map in the ECC.
Areas for Improvement	None at this time

Objective 4: Decision Making Support	
Rating	Needs Improvement
Justification	• The planning section within the ECC had challenges implementing map data for forward planning efforts, such as the development of the ECC Action Plan (EAP) and other materials. • Map data was utilized for display (as a screenshot) at the end of the SITREP, but was not utilized in any other planning efforts. a. The first SITREP did not include the RAPTOR image. • However, map information was utilized by FEMA to determine the proper routes to utilize for delivery of assets to support local jurisdictions. • Map data was utilized for visual display of shelter data for ESF 6 and 11. Consistent updates of this data were included, which were obtained directly from the lead ESF for mass care.
Areas for Improvement	Further development of essential elements of information (EEIs) that describe what data is necessary, why it is necessary, and how it will be used. This will assist in determining data requirements in what the agency is requesting from partners and how the agency utilizes that data for decision making and planning.

5 ISSUES IDENTIFIED

This section highlights the issues/questions/comments/concerns mentioned during exercise play.

1. RAPTOR is running slowly or crashes ("oregonem.com is not responding due to a long running script").
2. Where are the (*layer name*) data from IRIS?
3. Who is posting data in my jurisdiction? The editor information was not populated.
4. The edit data templates do not include severity of damage – we shouldn't have to click on the data placed within RAPTOR to get the status (ie visual display based upon severity).
5. The attributes for the edit data templates are inconsistent.

6. The attributes extracted from RAPTOR did not include the name of the incident resource/infrastructure placed or any other location information.

7. The edit data templates are not alphabetized.

8. The edit data templates do not reflect appropriate incident types for our area and were inconsistently applied.

9. The symbols for the RAPTOR incidents clutter up the map – there is too much information on the screen.

10. What maps are needed for a SITREP?

11. At times, this position did not receive notifications of critical data – activations, declarations, etc.

12. RAPTOR was not utilized for ECC planning efforts.

13. Data was inconsistent between sources (NGA damage assessments on bridges vs. ODOT bridge status data).

6   RECOMMENDATIONS

This section highlights recommendations and steps forward to help resolve issues identified from user feedback.

1. System Slowdowns:
   a. Description of Issue: A primary issue for the slowdowns appear to be related to the services pulled in during the exercise. In conducting research, slowdowns appeared to be related to services hosted on ArcGIS Online. With that said, system slowdowns were also caused by the number of users accessing the map at the same time and whether or not the user was on Wi-Fi within the ECC (which had noticeable delays).
   b. Recommendation: Analyze layers loaded to ensure there are no delays in loading services. This may involve moving layers to an add data functionality as opposed to loading all data within the layer list, speeding up the process of loading RAPTOR initially. Additionally, revising layer properties refresh rate to an on-demand function will reduce the load on the system.
   c. Responsibility: RAPTOR program coordinator and OEM Information Technology staff

2. IRIS Data:
   a. Description of Issue: Prior to the exercise, IRIS data was moved to a new tool within RAPTOR that removed the entry from the layer list tool and placed it in a header/controller tool that allowed users to add in layers individually. Unfortunately, not all data layers were available in time for the exercise, which left off layers utilized for vulnerable populations and soils data.
   b. Recommendation: Add in all layers from the IRIS datasets into the IRIS data tool.
   c. Responsibility: RAPTOR program coordinator

3. Edit Data Attributes:
   a. Description of Issue: Within most of the current datasets available for populating incident data within RAPTOR (incident resources, infrastructure, manmade hazards, natural hazards, public alerts, routes/closures, public alert areas), there is the ability to populate editor name, email, and phone number. As such, these fields are not currently mandatory, which caused an issue where a particular user was populating data in another jurisdiction, but neglected to identify themselves within the attributes. The templates are not consistent and don't highlight the severity of damage, making it difficult to visually display the damage severity. When the data is extracted from RAPTOR, no location information is present, making it difficult to see what bridge is affected and what county that incident is placed within.
   b. Recommendation: Make editor data attributes mandatory, add in damage severity field, location name field, add county field, and make data schema consistent across all editable layers.
   c. Responsibility: RAPTOR program coordinator
4. Edit Data Templates Alphabetized:
   a. Description of Issue: To find the proper templates, users had to search through the various templates, which were not organized alphabetically.
   b. Recommendation: This is officially a bug in the 10.3.1 version of ArcGIS Server and was resolved in the 10.4 and later versions. The GIS Server software will be updated so as to correct this issue.
   c. Responsibility: RAPTOR program coordinator
5. Edit Data Templates Available:
   a. Description of Issue: Users indicated that the templates to choose from did not adequately reflect the incident details needed and were inconsistently applied. For example, there was no icon for a shelter and road closures were listed differently by different jurisdictions – a lack of standardization.
   b. Recommendation: Survey all RAPTOR users to determine where there are gaps/challenges with the edit data templates in order to determine which symbols are lacking and/or unnecessary in the edit data templates. After completion of the survey, work to revise the edit data templates to display necessary icons and functionality.
   c. Responsibility: RAPTOR program coordinator
6. Too Much Data:
   a. Description of Issue: Many users indicated that there were too many icons on display, which cluttered the screen and made it difficult to decipher relevant data.
   b. Recommendation: The icon size can be adjusted at the server level to reduce it so as not to clutter the screen. Additionally, displaying data based upon damage severity will also enhance the usability of that information. A potential enhancement would be the ability to filter the displays based upon what routes are open/closed/etc. Data visibility could also be adjusted by only displaying key critical data on the main view of RAPTOR, based upon established essential elements of information (EEIs) or emergency support function (ESF) role.

    c. Responsibility: RAPTOR program coordinator

7. SITREP Mapping:
   a. Description of Issue: There was a lack of consistent mapping products produced for each SITREP.
   b. Recommendation: Develop a process and procedure for identifying key EEIs that highlight what is relevant to include in a SITREP map, but also extracts that are beneficial for any planning product within the ECC.
   c. Responsibility: ECC Planning Section and RAPTOR program coordinator

8. Notification Process:
   a. Description of Issue: Information related to activations/deactivations/declarations did not get relayed to the GIS position within the ECC.
   b. Recommendation: Develop a process and procedure for the flow of information within the ECC structure (also highlighted by the statement above regarding EEIs). Having an understanding of what we are collecting, why we collect it, and how we will use it will be immensely helpful in determining the proper routing of information.
   c. Responsibility: ECC Planning Section and RAPTOR program coordinator

9. Planning Efforts for the ECC:
   a. Description of Issue: GIS data was not actioned on by the ECC Planning Section, but was instead included only as screenshots in the SITREP.
   b. Recommendation: In order to provide information critical for the planning section, OEM must define what the EEIs are. Once EEIs are determined, data can be provided in a consistent format, with specifics highlighted for inclusion and can be used as actionable intelligence. Once that is done, RAPTOR can be utilized to produce consistent extracts and other relevant mapping products and/or programs that illustrate what the issues are and recommendations for how to move forward to support local jurisdictions. It is recommended for continued inclusion of ODOT GIS services to illustrate road/rail network status as those were often utilized to show current situation as well as FEMA using that data for determining available routes for delivery of assets.
   c. Responsibility: ECC Planning Section and RAPTOR program coordinator

10. Data inconsistency:
    a. Description of Issue: GIS data from NGA and other sources were not consistent.
    b. Recommendation: In order to facilitate consistency, RAPTOR will pull in the appropriate datasets from the authoritative source (ESF leads/local emergency management staff). ODOT GIS data related to transportation network status will continue to be integrated as it provided critical information from the authoritative source during exercise play. In areas where damage assessments are occurring, it may be beneficial to share that information with the authoritative source for said data to ensure data is properly vetted prior to display on RAPTOR.
    c. Responsibility: RAPTOR program coordinator