

# Virtual Training: Implementing a Common Location Reference for Daily and Disaster Operations

March 15<sup>th</sup>, 2016

# Instructor Introductions



## **District Chief Michael J. Barakey**

Virginia Beach Fire Department

Plans Team Manager for VA Task Force II Urban SAR



## **Captain Ray Irizarry**

Virginia Beach Fire Department

Search Team Leader for VA Task Force II Urban SAR



## **Richard Butgereit, GISP**

Information Management Section Head

Florida Division of Emergency Management

# NAPSG: Who We Are

- **Our Vision** - A Nation of emergency responders and leaders equipped with the knowledge and skills in applying technology and data to change the outcome for survivors.
- **Our Mission** - To equip emergency management & public safety with the knowledge, skills, and resources to apply decision support technology and data in enhancing preparedness and building a more resilient nation.

# Background

- 501 (c) (3) Not-for-Profit Organization
- Board of Directors are public safety practitioners
- NAPSG formed in 2005 as informal alliance of national associations
- Evolved to a formal organization to better serve public safety



**ICMA**



**NACCHO**  
National Association of County & City Health Officials  
*The National Connection for Local Public Health*



# Training Purpose

In this virtual training, participants will gain **hands-on skills** and **awareness-level knowledge** on how the US National grid (USNG) serves as common reference system for guiding operational decision making day-to-day and in large-scale catastrophic events.

# Training Objectives

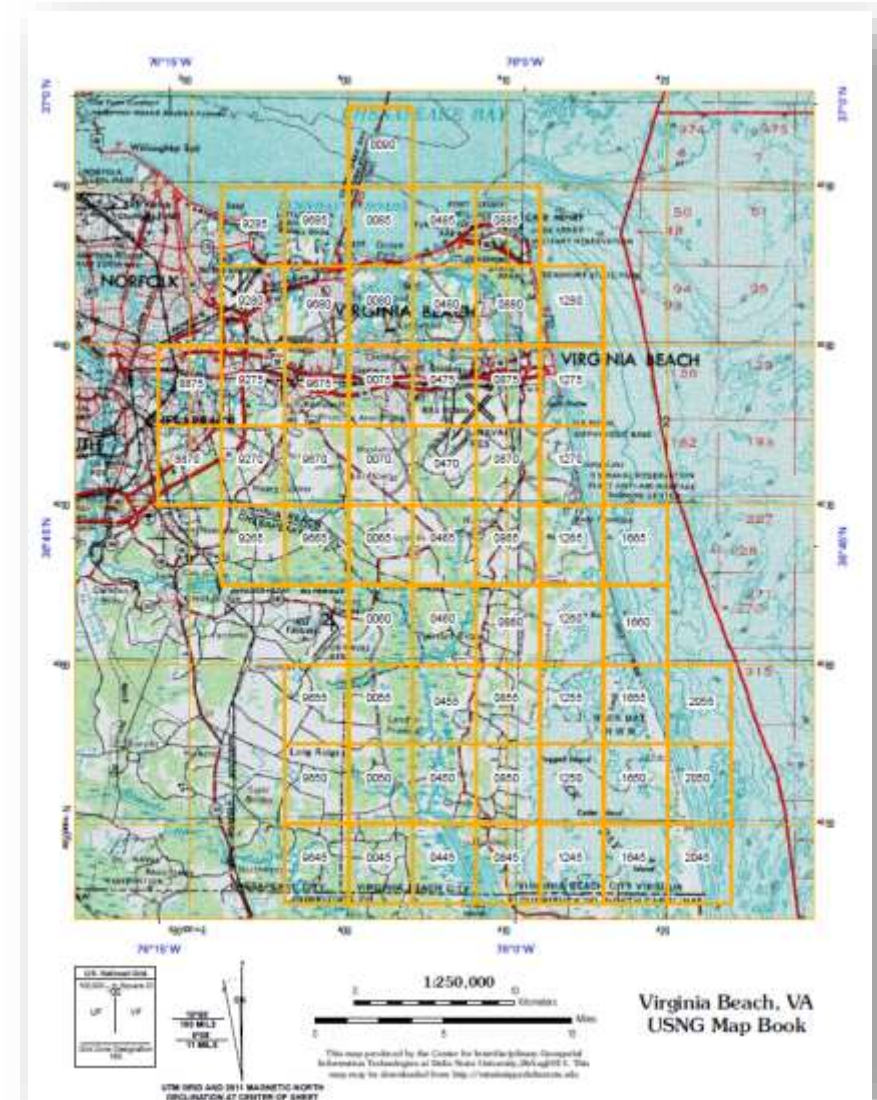
- **Learn how** to apply USNG-enabled decision support tools to enhance coordination during daily operations with GPS, mobile devices, and paper maps.
- **Gain insight** from the field where USNG is being used to support both daily and disaster operations.
- **Explore** resources that are available to you now to aid in equipping and preparing your team with USNG-enabled geospatial decision support tools

# Key Terminology

- **US National Grid (USNG):** A common location area and point reference language for ground and ground/air operations.
- **Geographic Information Systems (GIS):** a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.
- **Global Positioning Systems (GPS):** is a space-based navigation system that provides location/ time information, where there is an unobstructed line of sight to four or more GPS satellites.

# Agenda

- **Review: Why Use US National Grid (USNG)?**
- **Learn how to apply USNG**
  - Instruction: USNG and GPS
  - Case Studies
    - South Carolina Flood
    - Florida Division of Emergency Management
- **Questions and Answers**





# Why Use the US National Grid?

Review

# Problem

- Haiti
- Japan
- Joplin



- Irene
- Sandy
- Colorado Floods
- Capstone 2014

Implementing A Common Frame of Spatial Reference For  
Homeland Security, Emergency/Disaster Response,  
Recovery, and Mitigation  
The U.S. National Grid (USNG)

From the Hurricane Andrew GIS Coordinator's after-action report to the Center for  
Army Lessons Learned, 10/06/92

"General information type maps with no UTM grid, in a disaster environment without  
street signs, few recognizable landmarks with no response specific data were very  
nearly useless... An actual accounting of all the requests for emergency assistance that  
went without, or the delay encountered by the countless movements of personnel, food,  
and equipment will likely never accurately be tallied...."

(USNG is based upon UTM.)

**The Same (Map) Sheet of Music:** Following the troubled 1992  
Hurricane Andrew response, the U.S. Military in its 1993 "capstone  
doctrine" for domestic support operations (FM 100-19) termed the

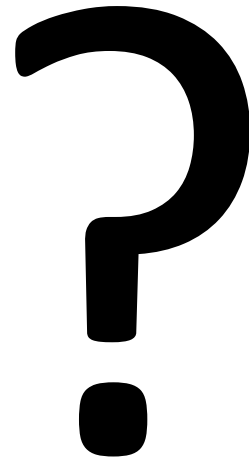
Nearly every after action  
report, post any large scale or  
regional disaster clearly  
indicates the need for a  
common grid

# Problem

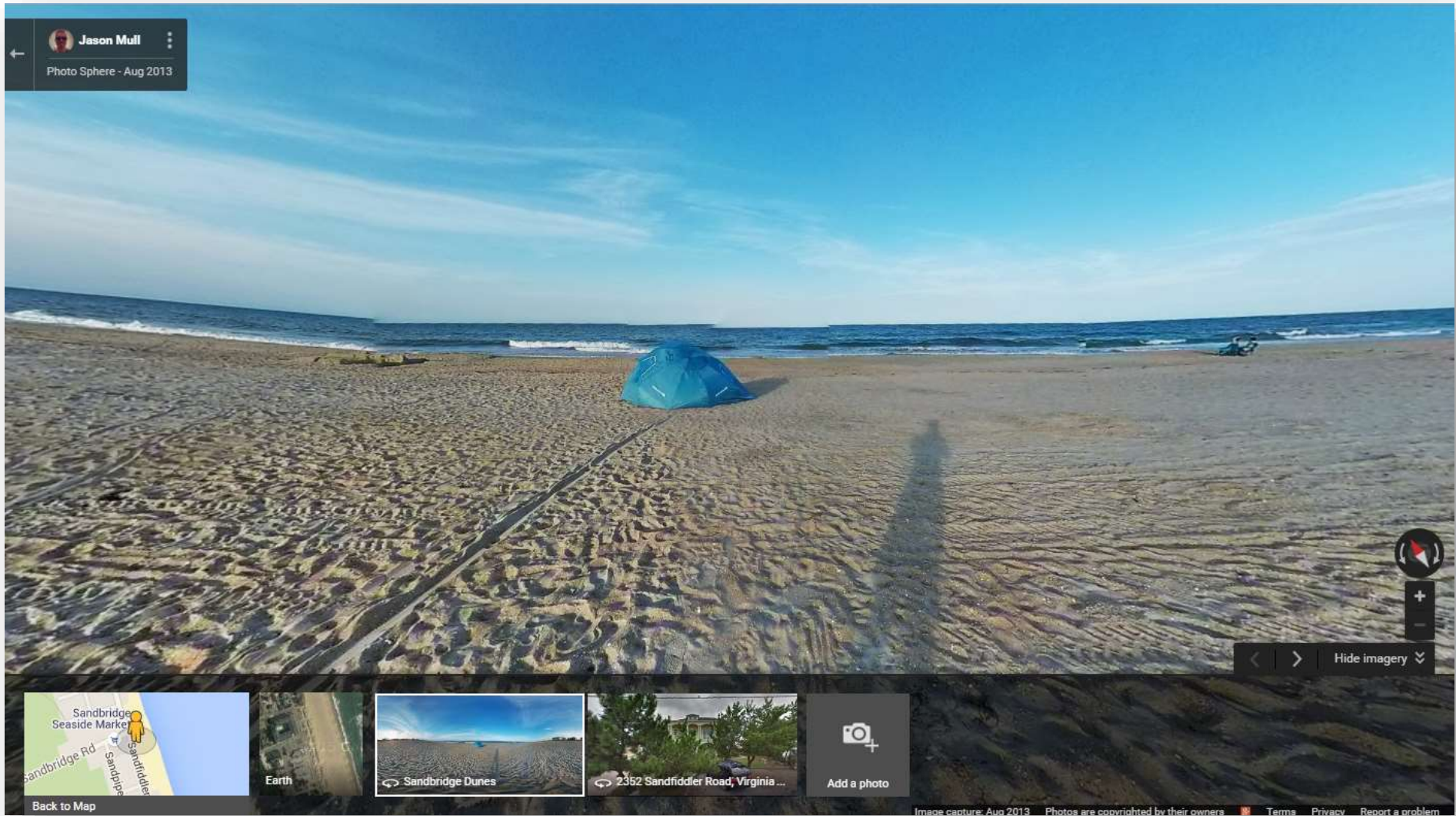
“Possible drowning near 2400  
block of Sandfiddler Rd”

OR

18S VF 15781 67170

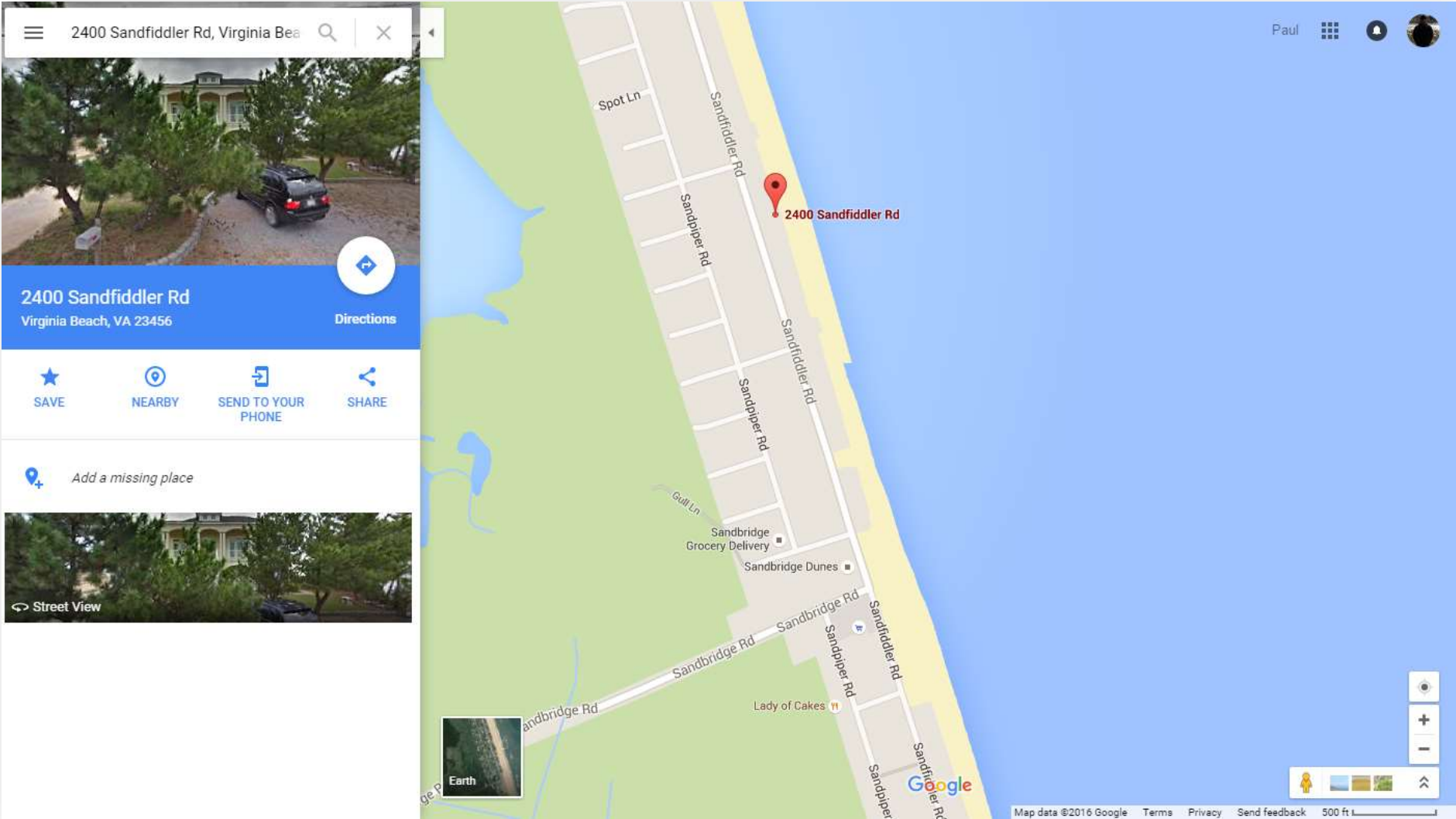


# On-Scene

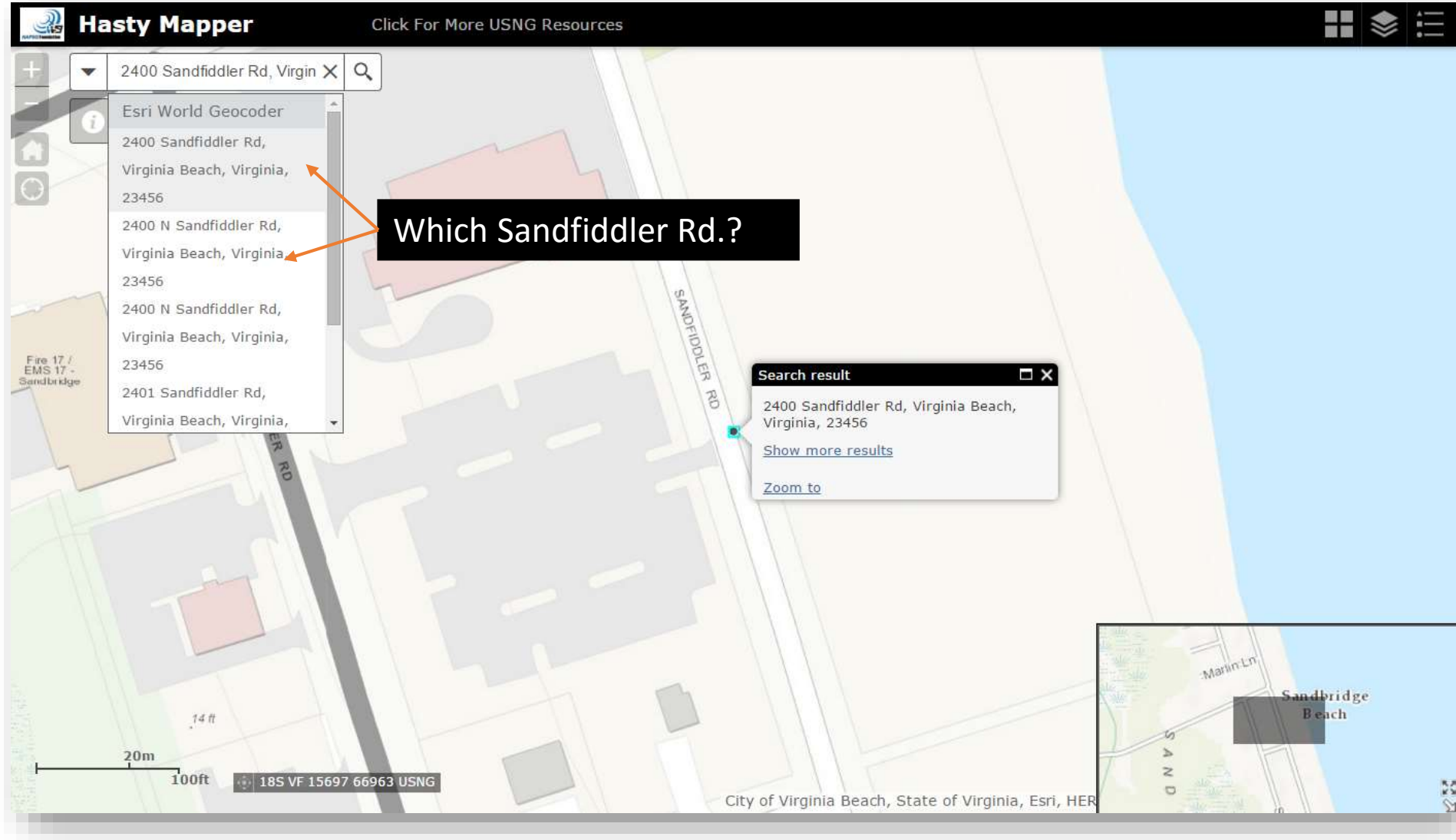




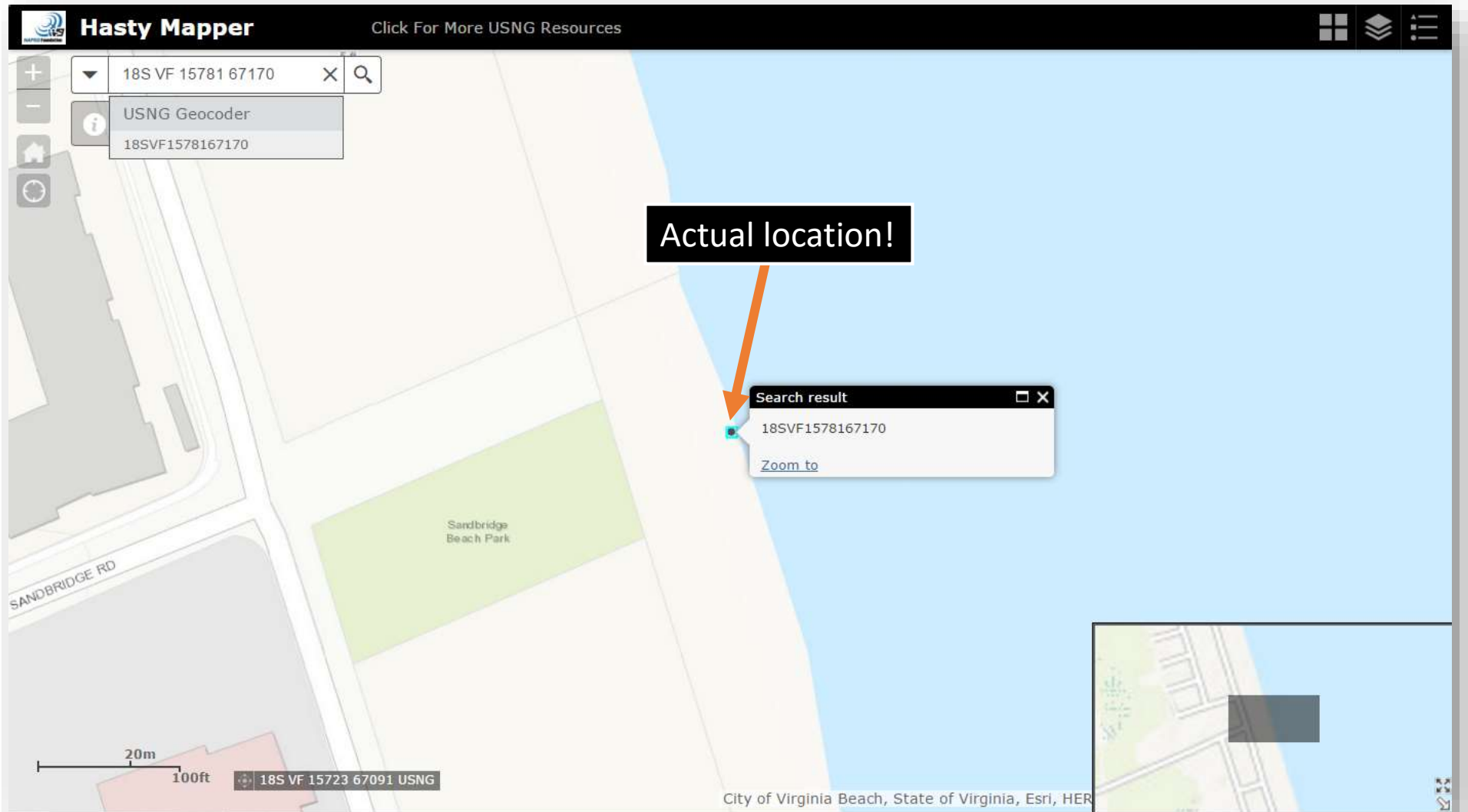
# Google Maps via Address



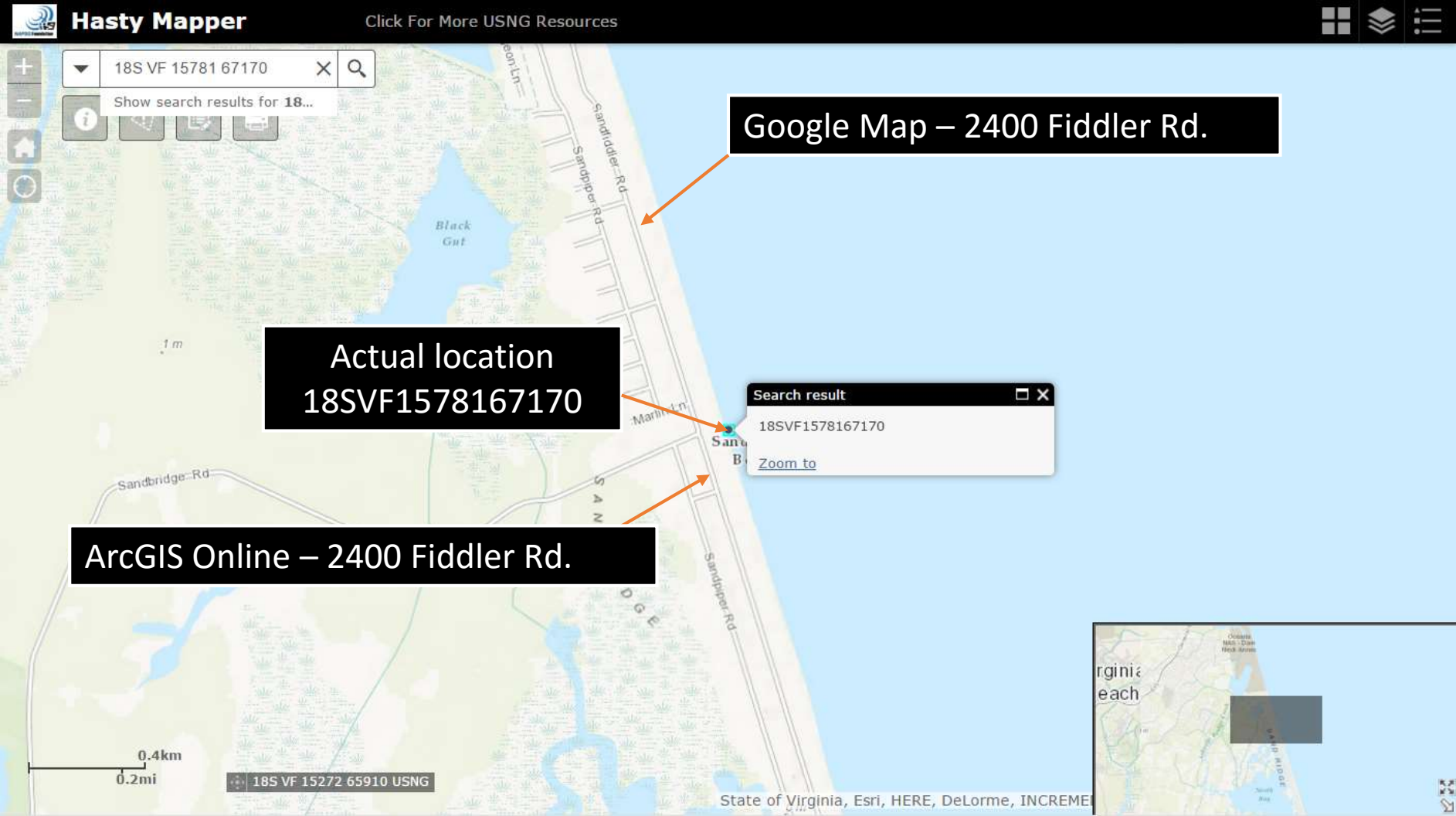
# ArcGIS Online via Address



# ArcGIS Online via US National Grid



# Address versus US National Grid





# Paper Map



# Solution

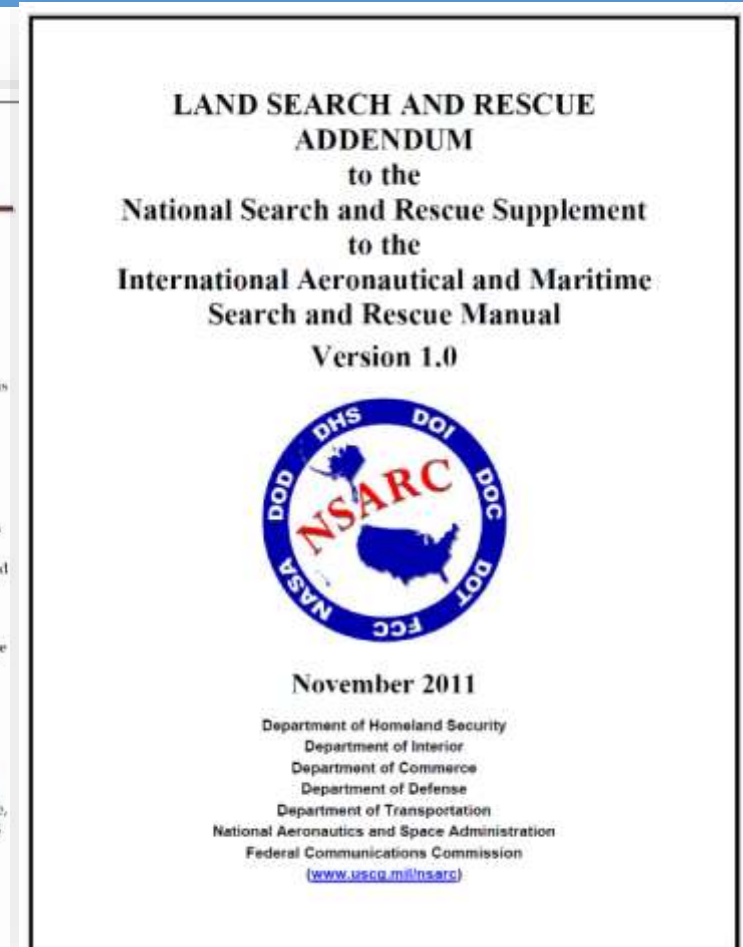
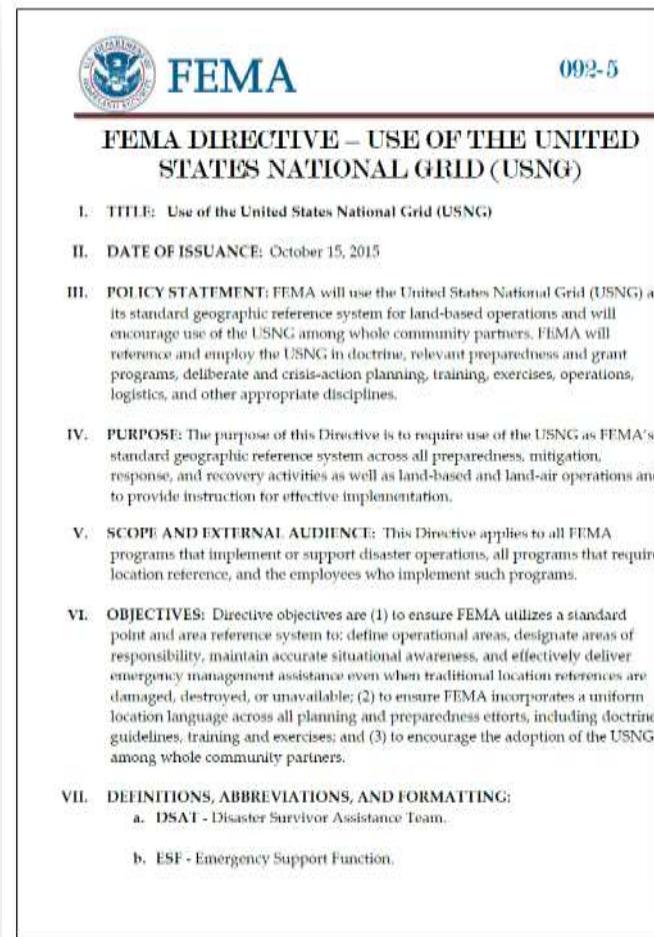
- Use the US National Grid for all operations and trainings
- Capacity to quickly access USNG enabled maps
- Engage with GIS Specialists\* to help you with day-to-day operations

# Why Use USNG?

- The USNG:
  - Provides a **UNIFIED** language for defining areas of interest, reporting, planning, and navigation.
  - Transforms data to **ACTIONABLE** information in a **UNIFORM** format.
  - Provides a **CONSISTENT** situational awareness across jurisdictions, disciplines & all levels of operations.
  - **INTEROPERABILITY** in both connected and disconnected environments

# Why Use USNG?

- It is a Standard
  - Land SAR Addendum
  - National Search and Rescue Manual-Catastrophic Incident Search and Rescue (CIS) Addendum.
  - FEMA 092-5

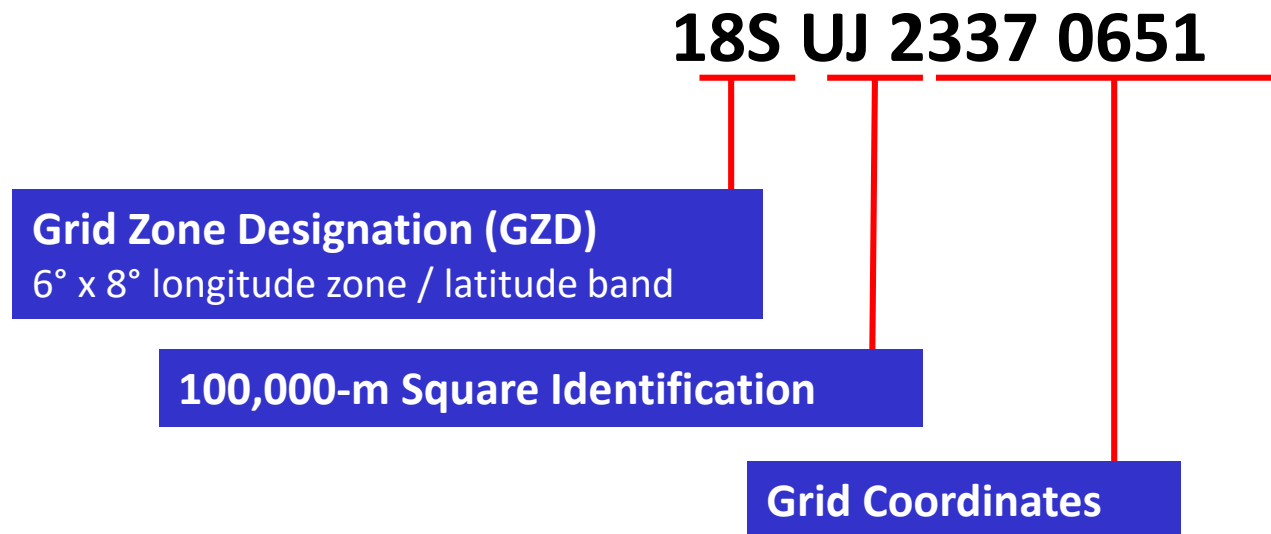


# What is the US National Grid?

Instruction

# Review

## The Three Components of USNG Coordinates

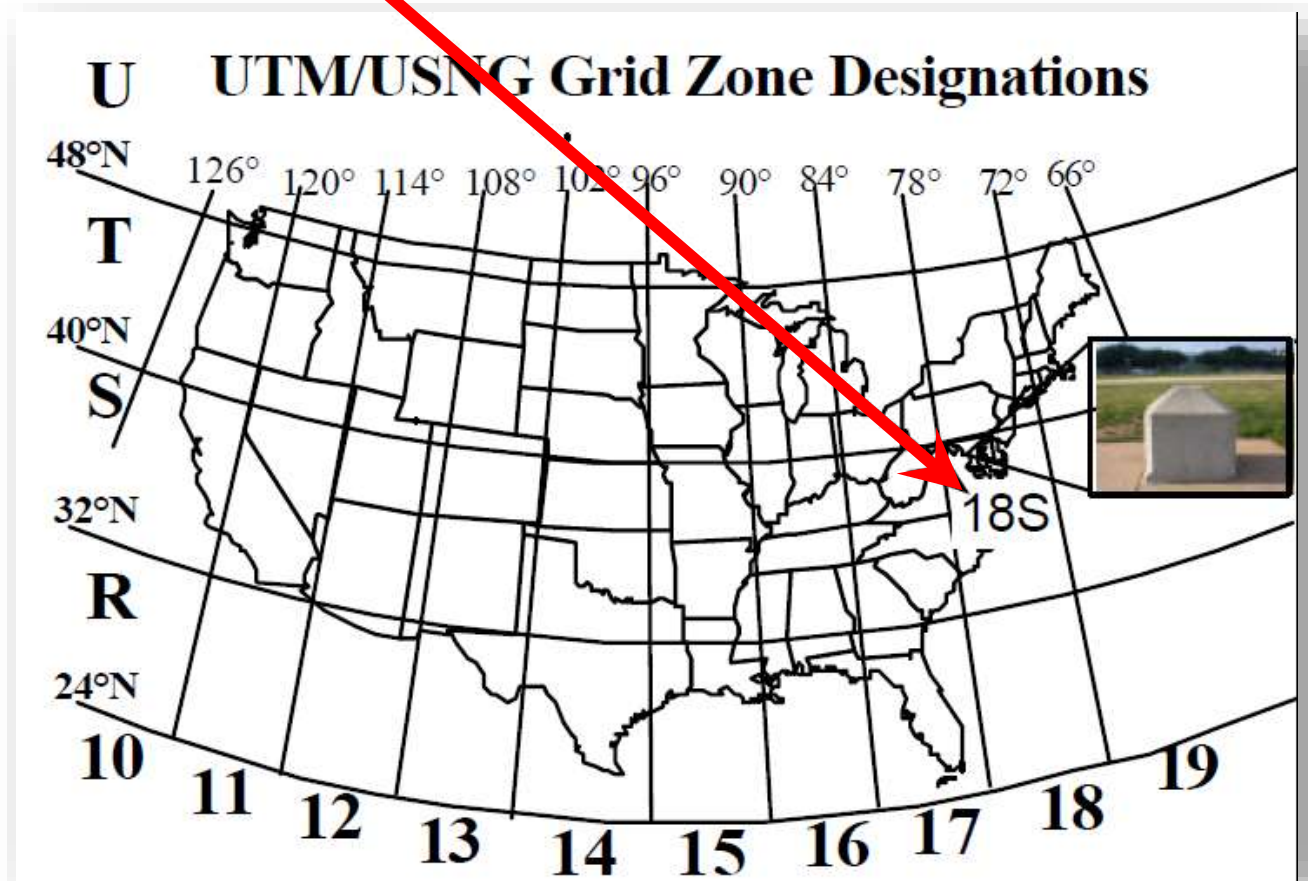


Remember – USNG is functionally equivalent to the Military Grid Reference System

# Review

- The World is divided into 6 - degree wide longitudinal zones designated by a number and 8-degree latitudinal bands designated by a letter.
- United States is within Zones 10 thru 19 and Latitude bands of R thru U.

Example: **18S**

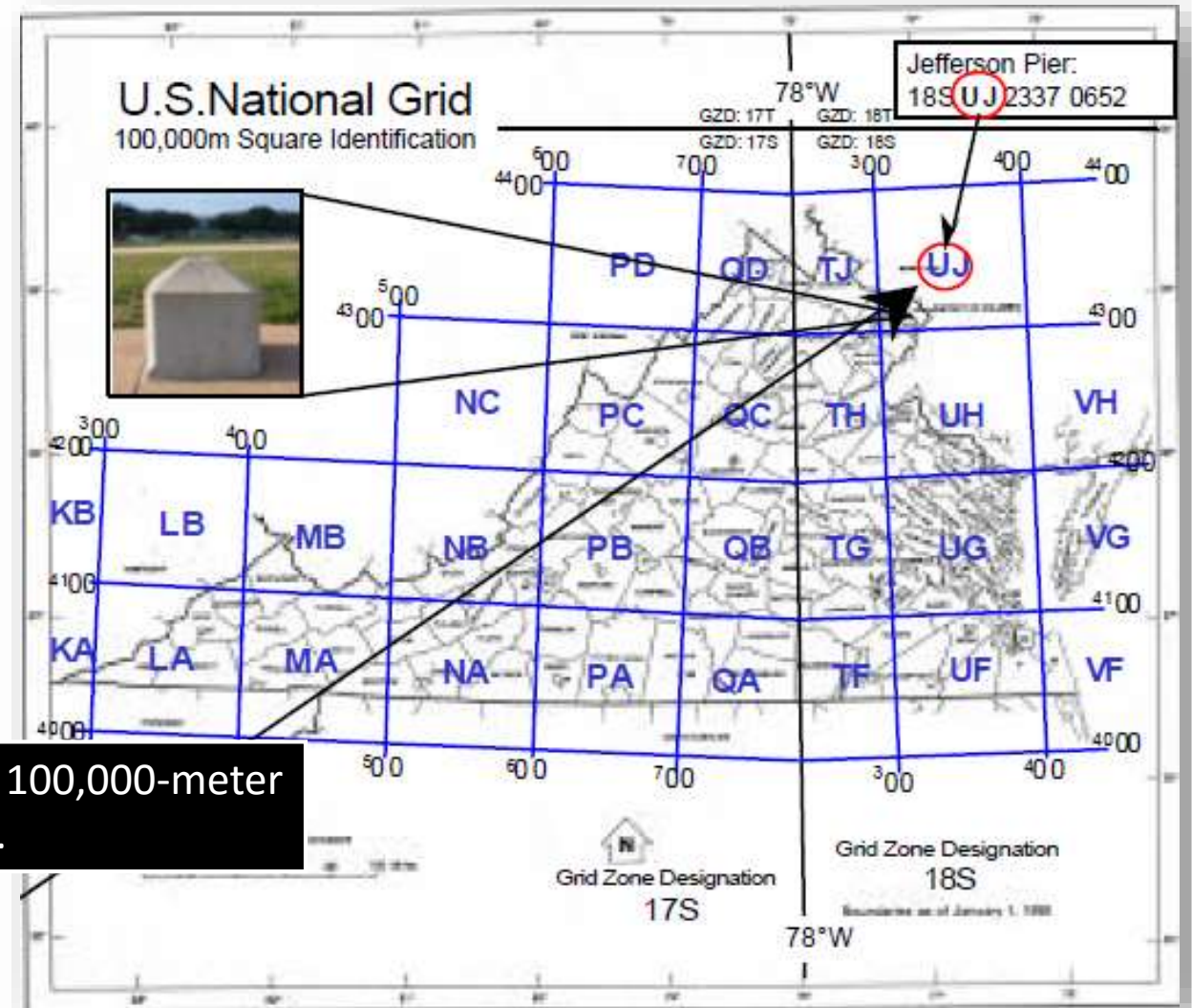


*USNG allows us to measure distances an area on the ground without any special calculations or tools*



# Review

- Each GZD is further broken into 100,000-meter squares where a two-letter designator that identifies each square.

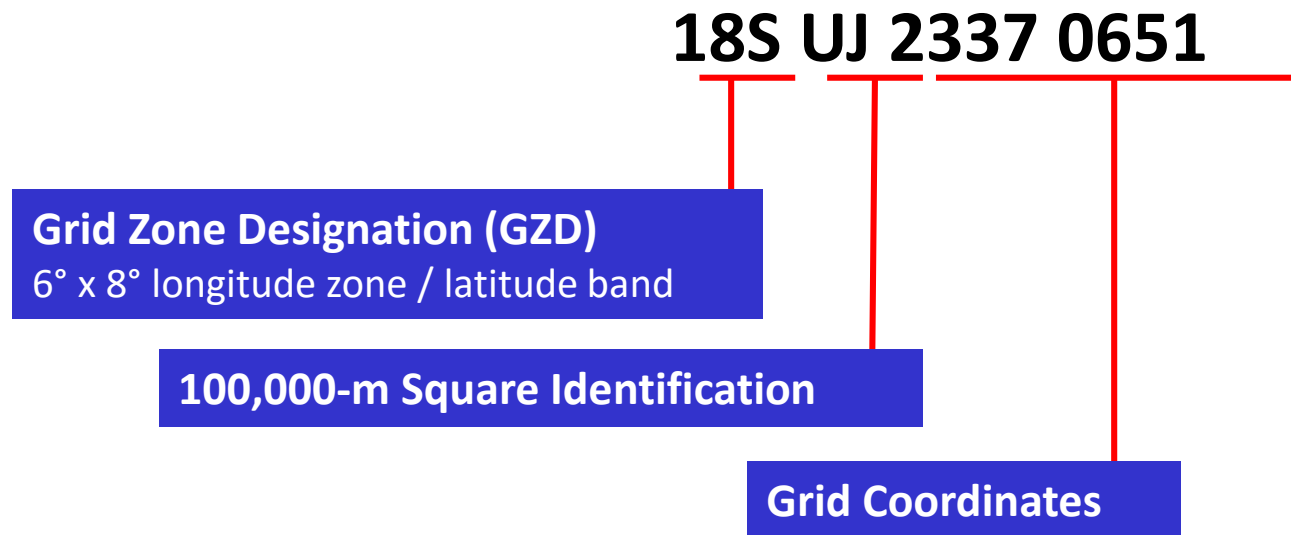


18S UJ – Identifies a specific 100,000-meter square in the specified GZD.



# Review

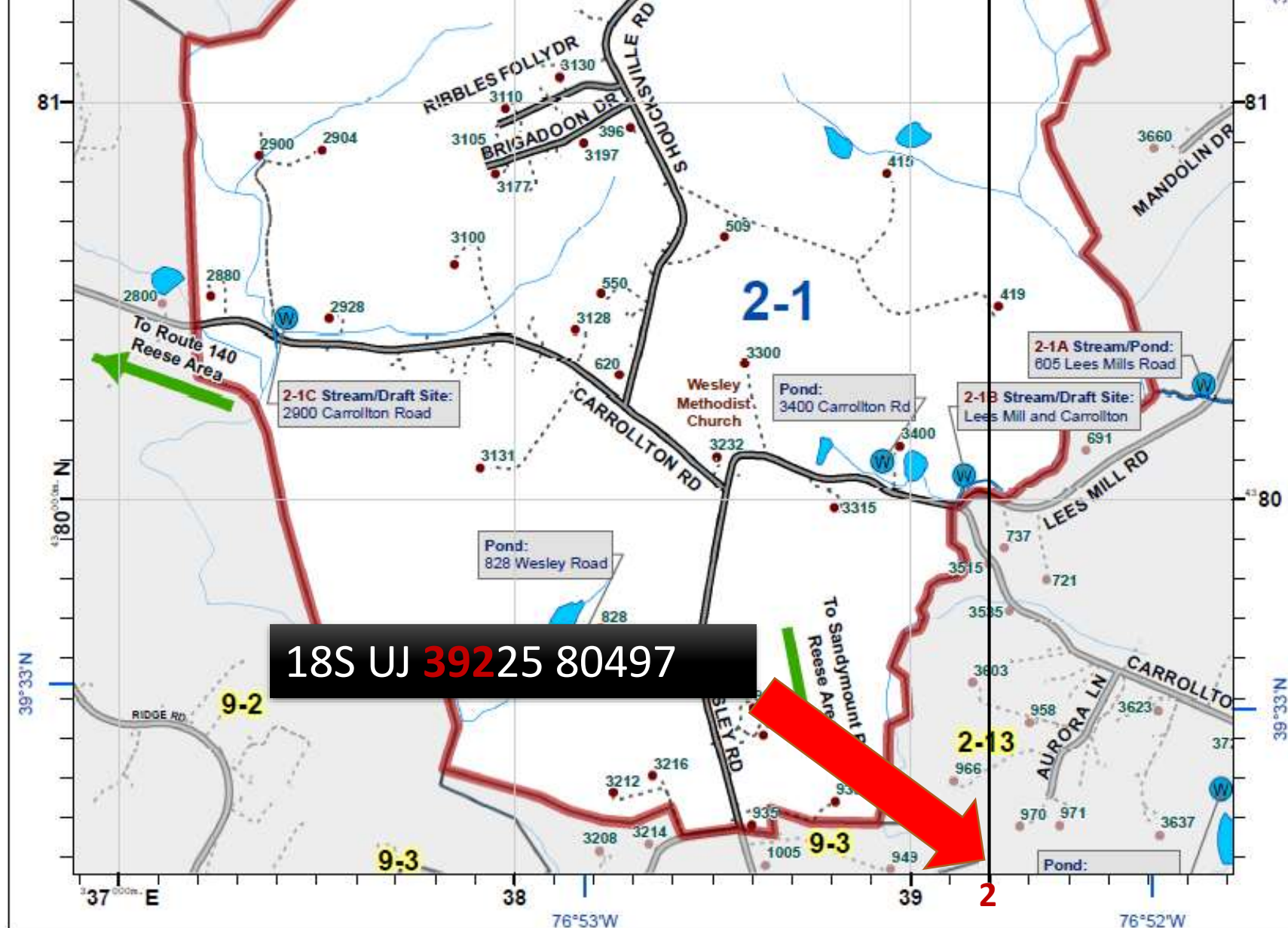
## The Three Components of USNG Coordinates



**Read Right – Then Up!**  
**39225                      80497**



2. Read Right  
39225 80497  
→

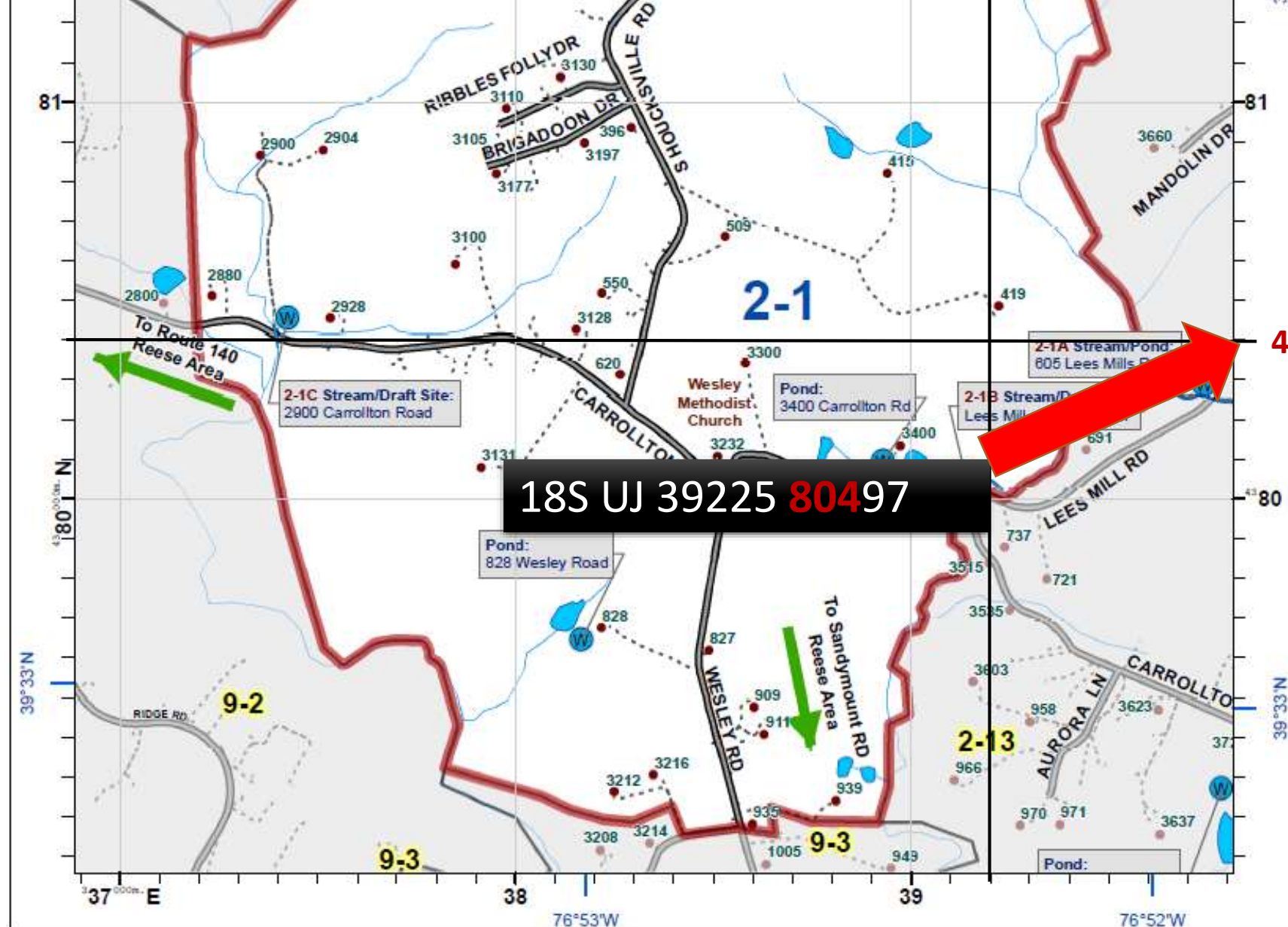


18S UJ 39225 80497

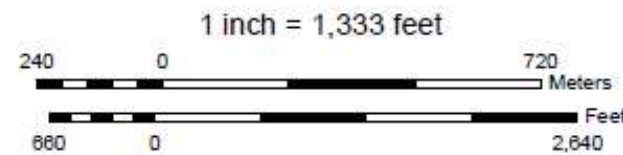


3. Read Up  
39225 80497  
↑↑↑↑

Map courtesy of  
Cole Brown HVFD



US National Grid  
100,000-m Square ID  
**UJ**  
Grid Zone Designation  
**18S**



Revised: 02/15/2013



**BOX:**  
**2-1**

# Resources

## January 2016 USNG Virtual Training

<http://bit.ly/USNGTraining21Jan16>

### VIRTUAL TRAINING: APPLYING USNG FOR SEARCH AND RESCUE

On January 21, 2016 the National Alliance for Public Safety GIS Foundation co-hosted a virtual training seminar with the National Association for Search and Rescue to provide awareness level training on applying the US National Grid (USNG) as a decision support tool for Search and Rescue (SAR). The USNG is a point and area reference system that provides for actionable location information in a uniform format. Through this seminar participants were able to:

- Learn how to apply USNG-enabled decision support tools to enhance coordination during SAR operations.
- Gain insights from real-world incidents where USNG was successfully used to support SAR operations in the field.
- Explore the use of USNG and GIS in SAR operations such as assignment tasking, incident spatial analysis, and map production.
- Learn about the suite of USNG and GIS decision support tools already available to support SAR missions.

**Provided below is a link to the materials used in the training, and a recording of the full training seminar.**

- [Full Recording of Virtual Training on Applying USNG for SAR](#)
- [Slidedeck for USNG for Search & Rescue Virtual Training](#)
- [USNG Training Materials Gallery](#)

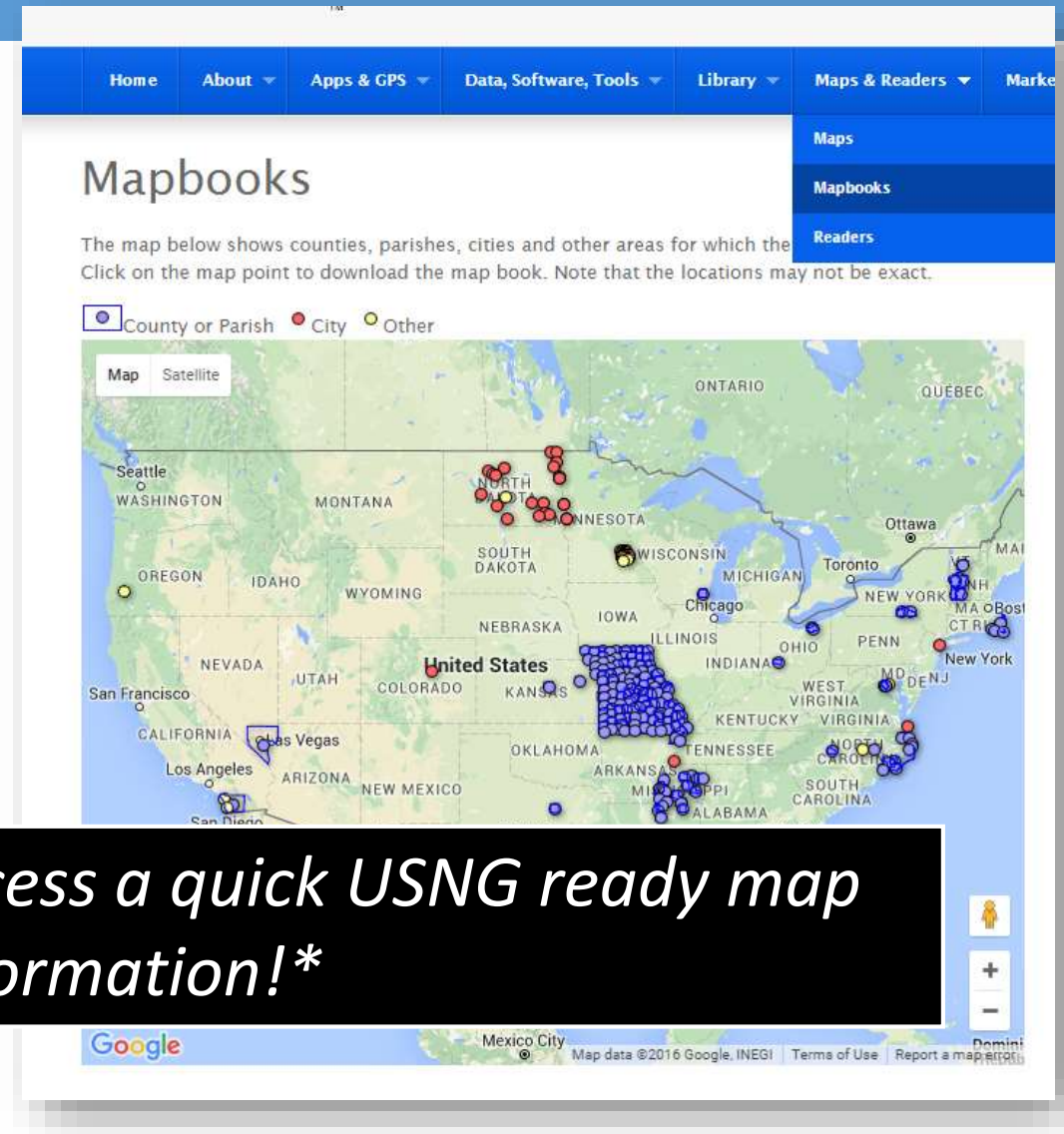
**Looking for more USNG resources to get started?** Check out our [USNG Resources](#) page.

# Resources

## ❖ USNG Center

<http://usngcenter.org/>

## ❖ USNG Map Books



*Responders should be able to access a quick USNG ready map as soon as they have incident information!\**



# Resources

- 1:24,000 USNG Map Package
- USNG Map Book Templates

[http://bit.ly/NAPSG\\_USNG](http://bit.ly/NAPSG_USNG)

## US NATIONAL GRID RESOURCES

The US National Grid (USNG) is a point and area reference system that provides for actionable location information in a uniform format. Its use helps achieve consistent situational awareness across all levels of government, disciplines, and threats & hazards – regardless of your role in an incident, NAPSG makes several resources available to help public safety agencies get started using the USNG.

### Why Use the USNG? Background Resources

1. [Applying the USNG for Enhanced Situational Awareness](#)
2. [Applying the USNG for Pre-Scripted Missions](#)

### How to Get Started? Basic Implementation Guidance

1. [Implementation Guide to the USNG](#)
2. [Video on Introduction to the USNG for Public Safety](#)
3. [How to Read the USNG](#)
4. [USNG Grid Card Reader Template](#)

### What tools are available? Technical Resources

1. [Map Template for Creating 1:24k USNG Maps](#)
2. [Guideline for Building USNG Polygons](#)

For additional USNG-related resources and tools, also take a look at the following resources:

- [USNG Center](#)
- [FGDC USNG Resources](#)
- [FEMA's Directive on the Use of the US National Grid](#)
- [USNG Map Book Templates](#)

### Still have questions or need assistance?

NAPSG also offers fee-for-service USNG Technical Assistance for public safety agencies interested in using the USNG in operations. For more information contact [services@publicsafetygis.org](mailto:services@publicsafetygis.org) or by phone at 202-895-1711.

# US National Grid and GPS

Instruction



# USNG and GPS

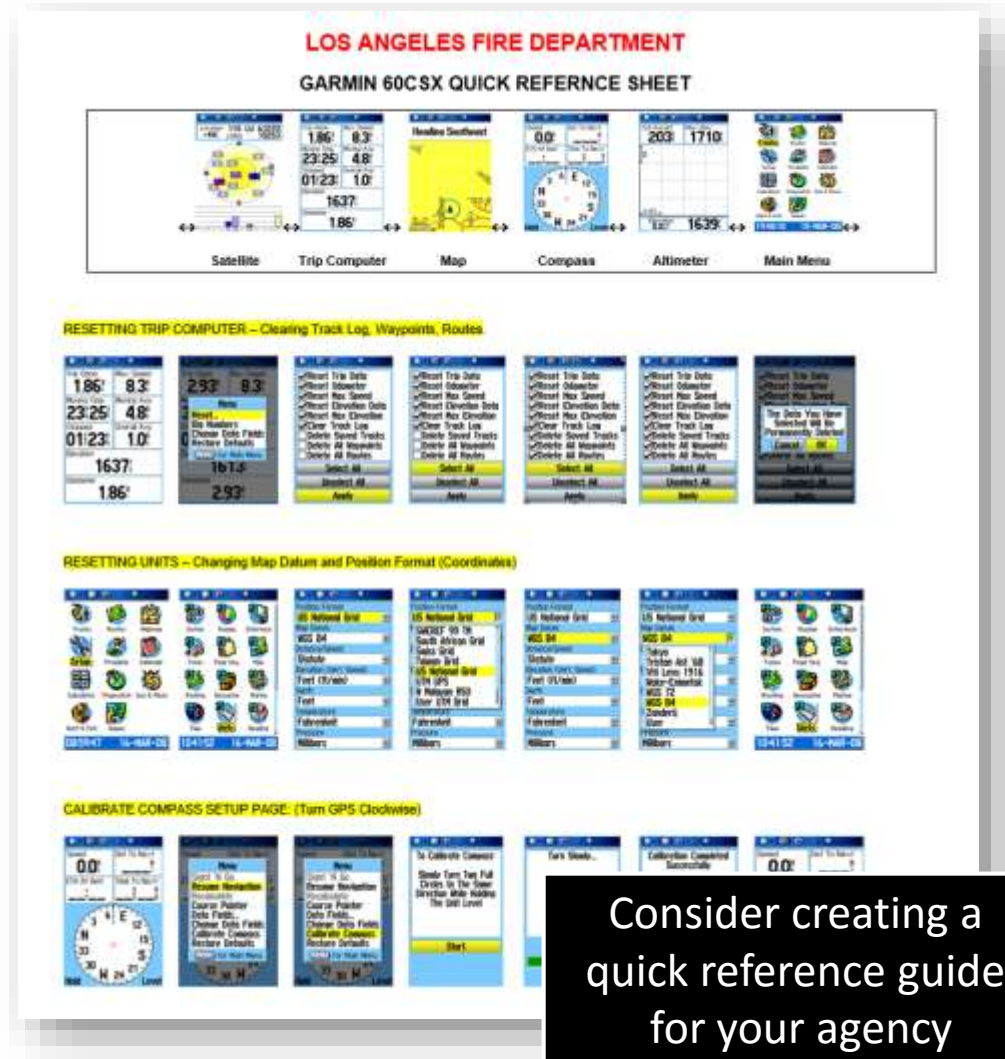
- ❖ The Global Positioning System (GPS): A worldwide radio navigation system
  - A constellation of +24 orbital satellites
  - Funded by DoD
  - Originally made for military to launch submarine based missiles more accurately

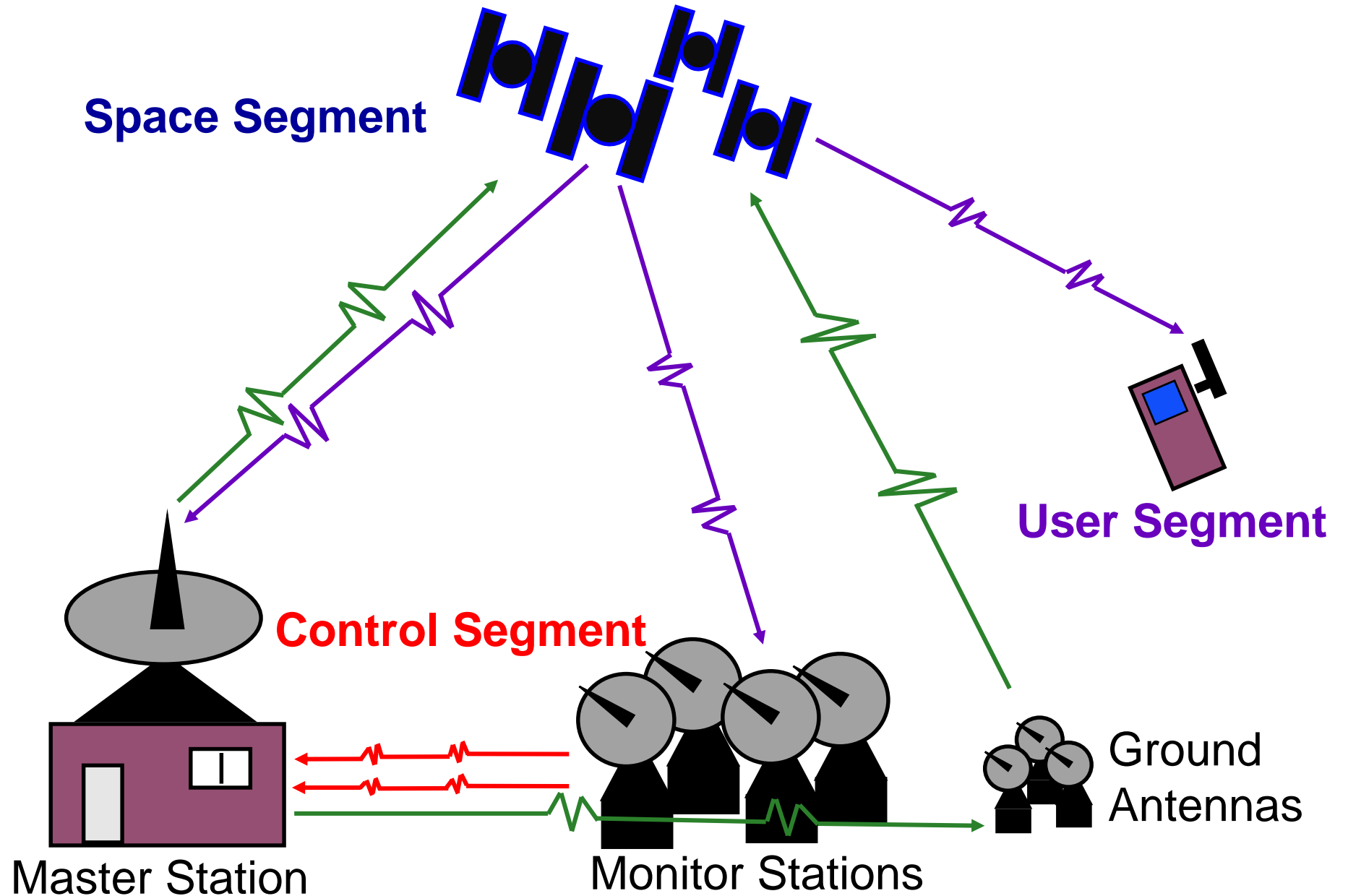


# USNG and GPS

## Primary functions of GPS

1. Position and coordinates
2. The distance and direction between any two points
3. Travel progress reports
4. Accurate time measurement



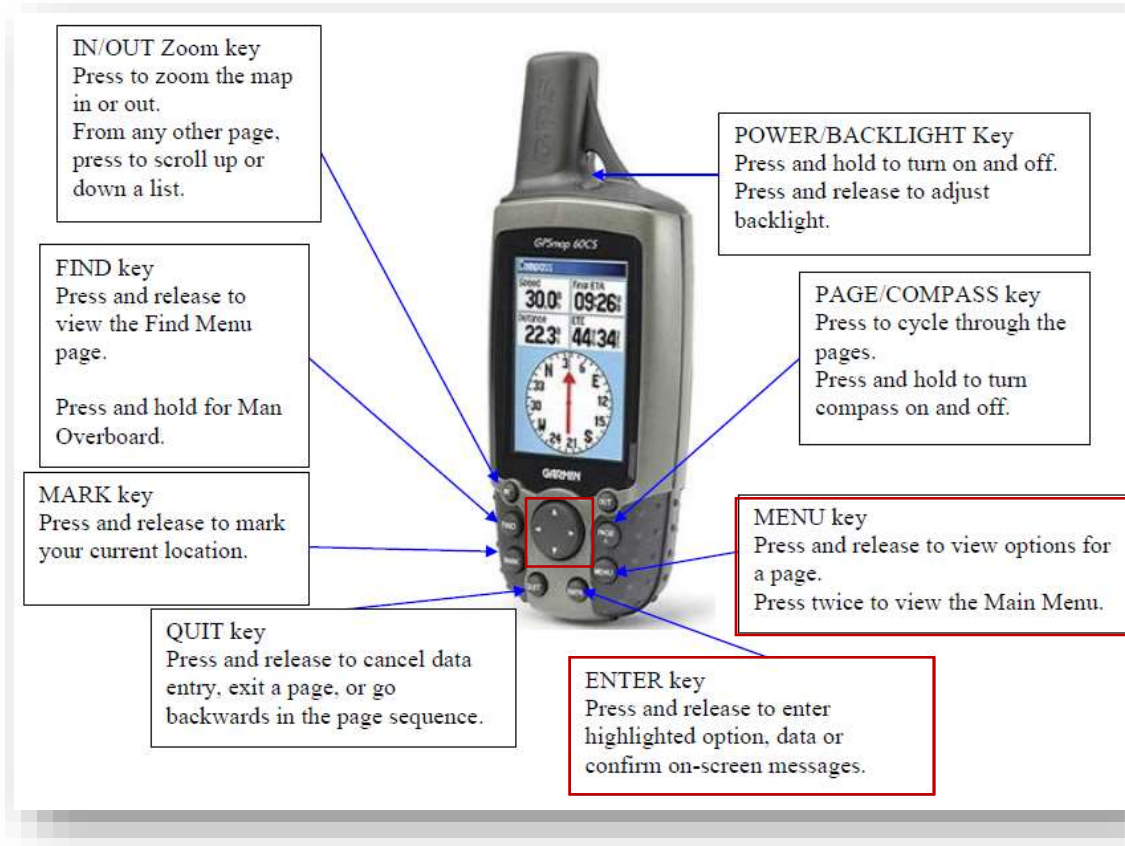


## Challenges with User Segment

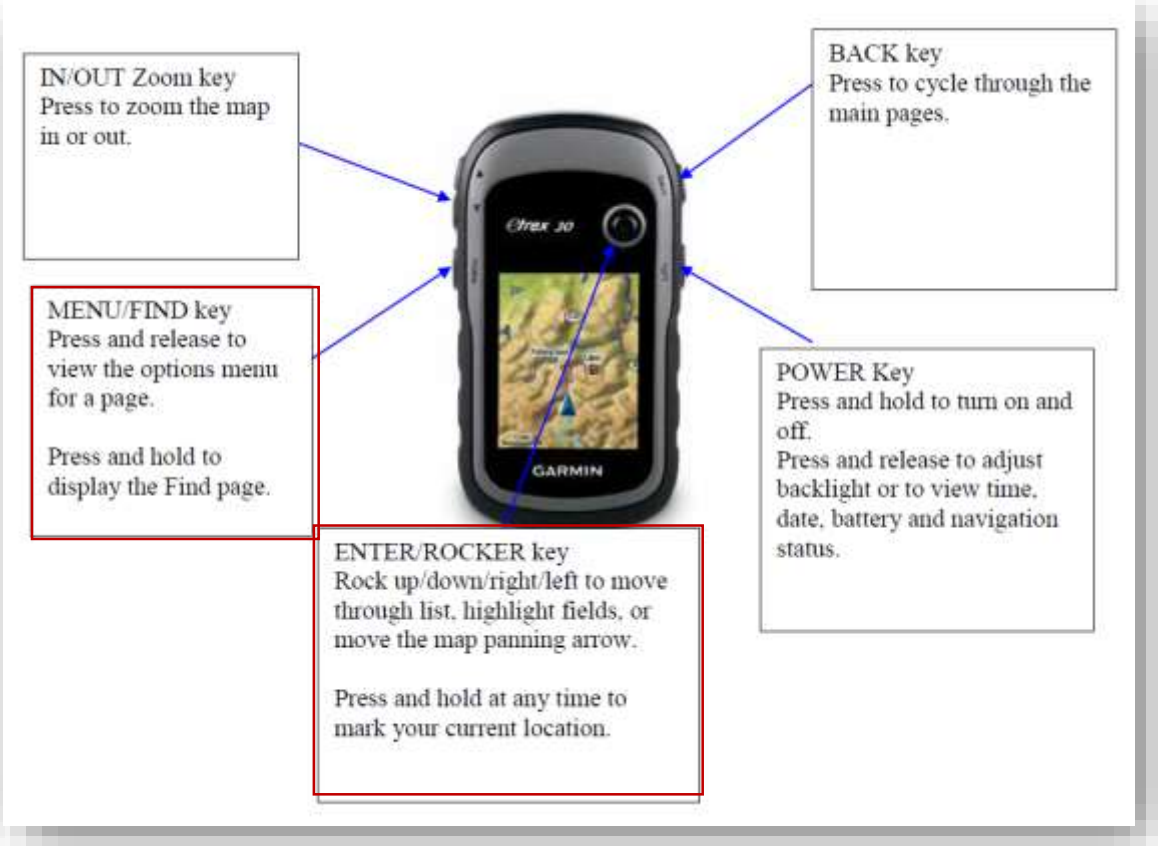
- Common Map Datum
- GPS Almanac Updates
  - Control segment orbital corrections need to be downloaded
- Moving the GPS while turned off
  - If moved more than 300 miles need to either
    - Re-Initialize
    - Allow unit time to self-update (can take up to 20 minutes)

# GPS Setup for USNG

## Garmin GPSMap 60



## Garmin eTrex 10/20/30





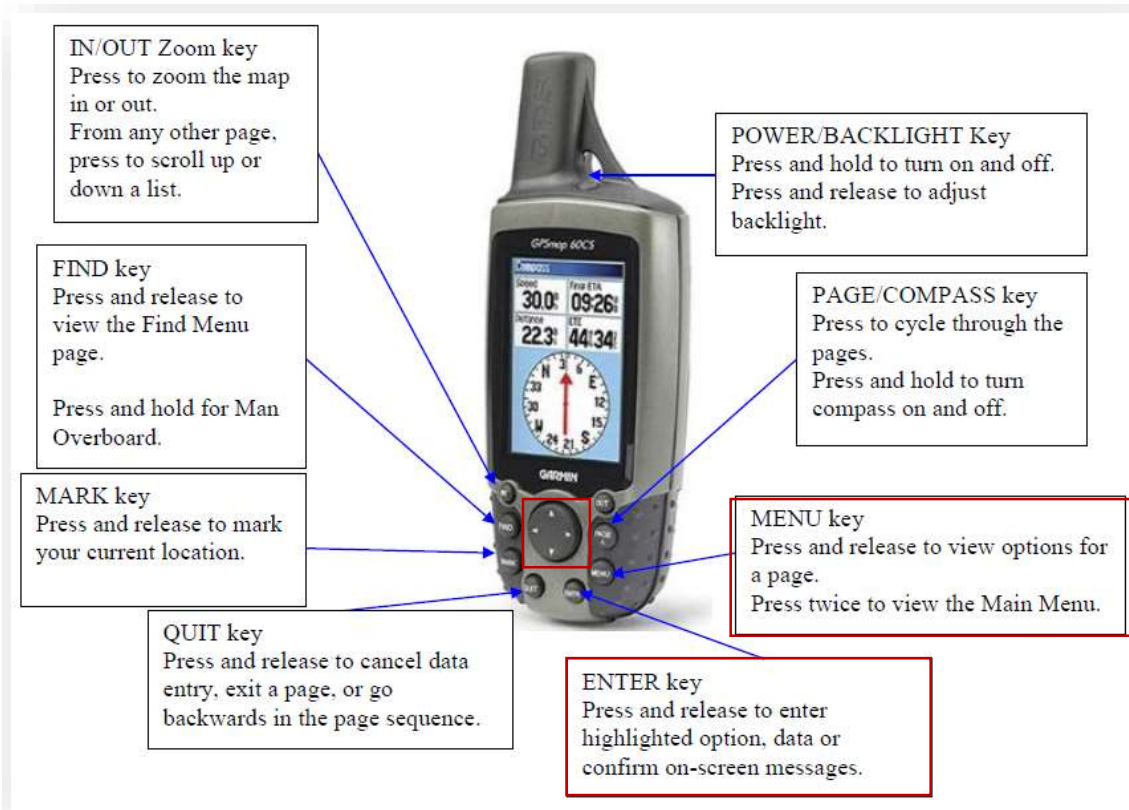
# 1. Setup Page

Use the ROCKER to select Setup and press ENTR.

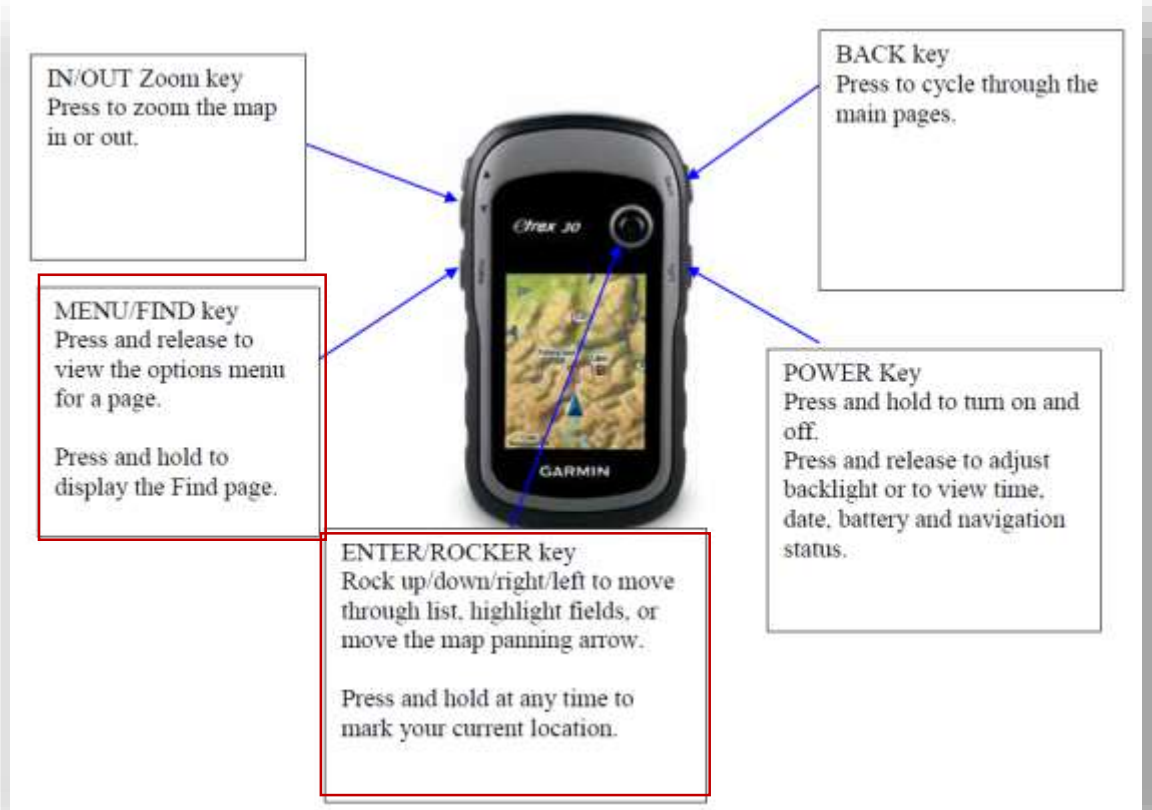


# GPS Setup for USNG

## Garmin GPSMap 60



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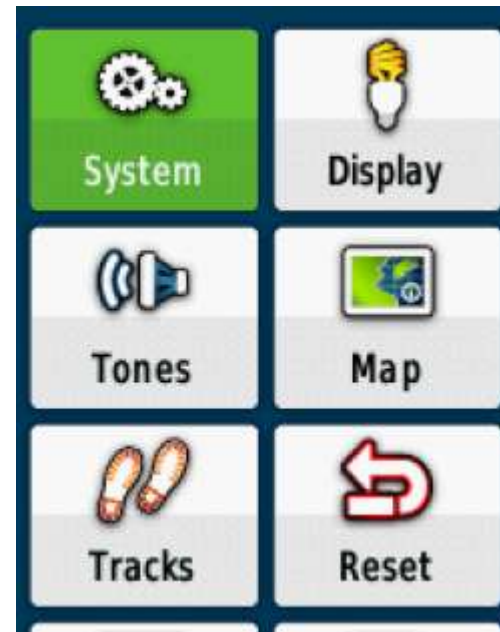


## 2. Units / Position Format

Use the ROCKER to select Units and then press ENTER.



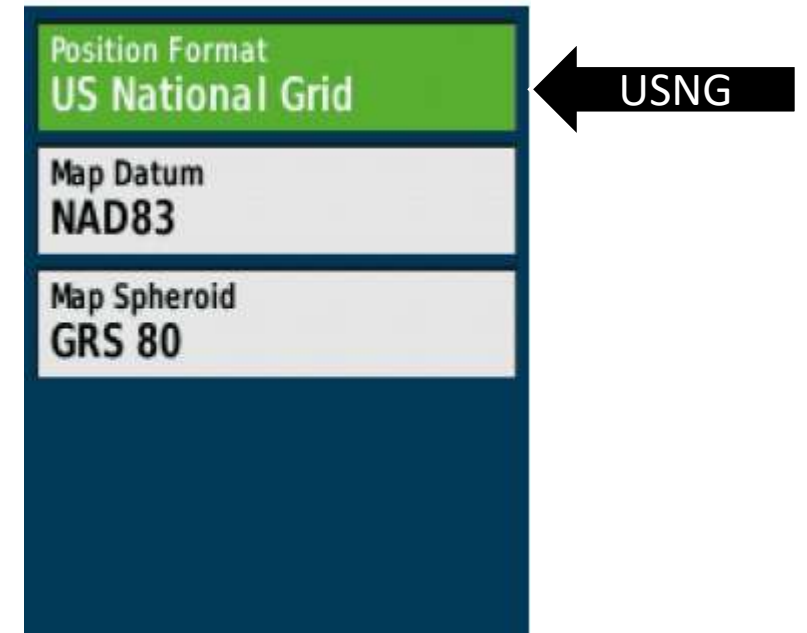
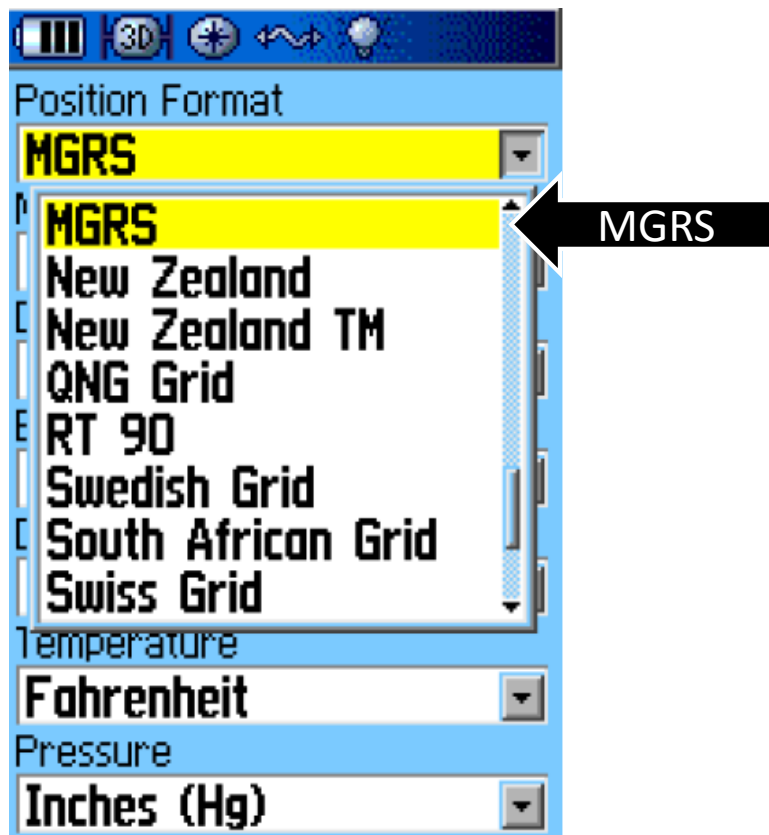
Use the ROCKER to select system, then Position Format and then press ENTER.





### 3. Position Format

Use the ROCKER to select Position Format and then press ENTR.



## 4. Map Datum

The standard datum for USNG coordinates is North American Datum 1983 (NAD 83) or its international equivalent, World Geodetic System 1984 (WGS 84)



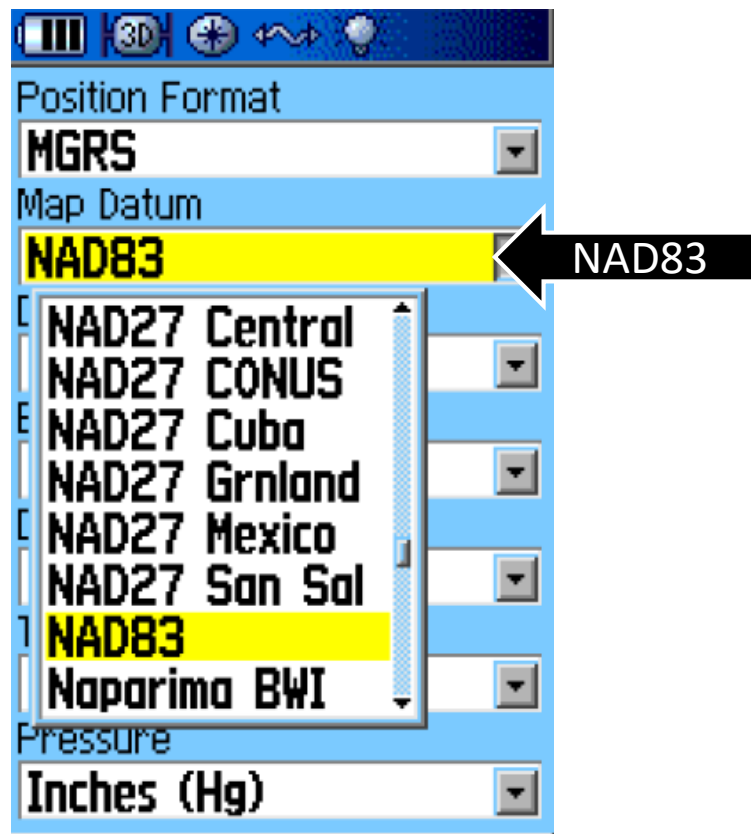
### Map Datum

North American Datum 1983 (NAD 83) and World Geodetic System 1984 (WGS 84) are equivalent at scales smaller than 1:5000.

USNG = MGRS

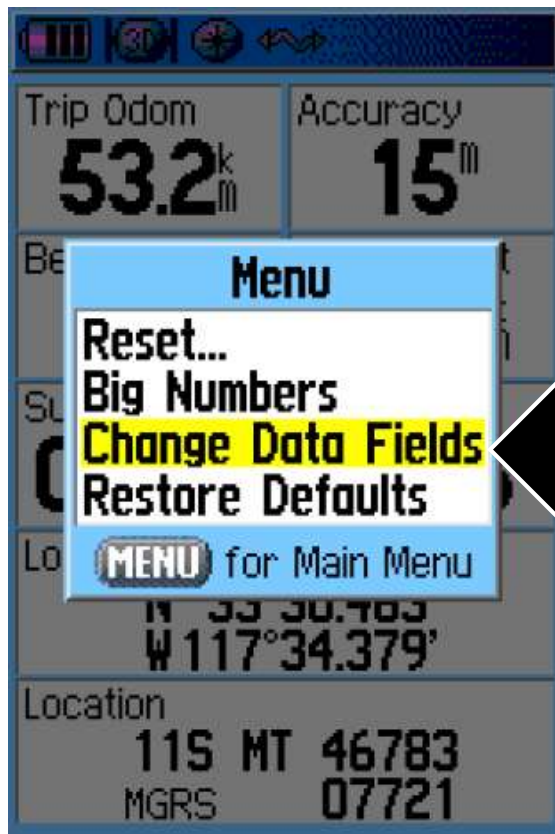
## 4. Map Datum

Use the ROCKER to select Map Datum NAD83 and then press ENTER.

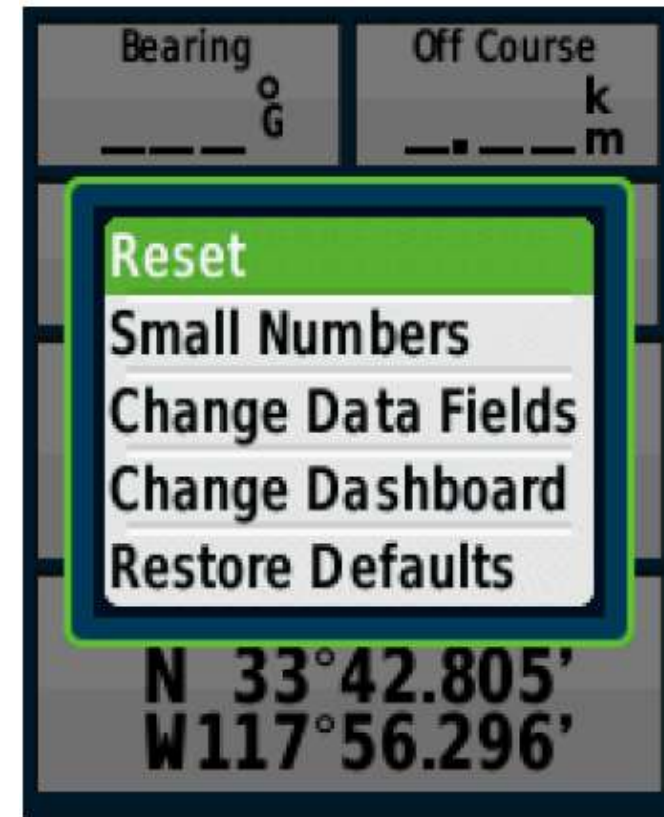


## 5. Trip Computer Page

Selecting Change Data Fields will allow you to select what is displayed in each field.



Degree Decimal  
Minutes



# 5. Trip Computer Page

Selecting Change Data Fields will allow you to select what is displayed in each field.

<div><div></div><div>3D</div><div></div><div></div></div>	
Trip Odom <b>53.2<sup>k</sup><sub>m</sub></b>	Max Speed <b>766<sup>k</sup><sub>h</sub></b>
Bearing <b>_____°</b>	Dist To Next <b>_____k _____m</b>
Sunrise <b>06:11</b>	Sunset <b>16:56</b>
Location <b>N 33°30.463' W 117°34.379'</b>	
Location <b>11S MT 46783 MGRS 07721</b>	



Degree Decimal  
Minutes

Bearing <b>_____°</b>	Off Course <b>_____k _____m</b>
Dist to Next <b>_____k _____m</b>	GPS Accuracy <b>3m</b>
Location <b>11S MT 10993 USNG 30001</b>	
Location <b>N 33°42.375' W 117°57.631'</b>	



# Resources

## GPS Training

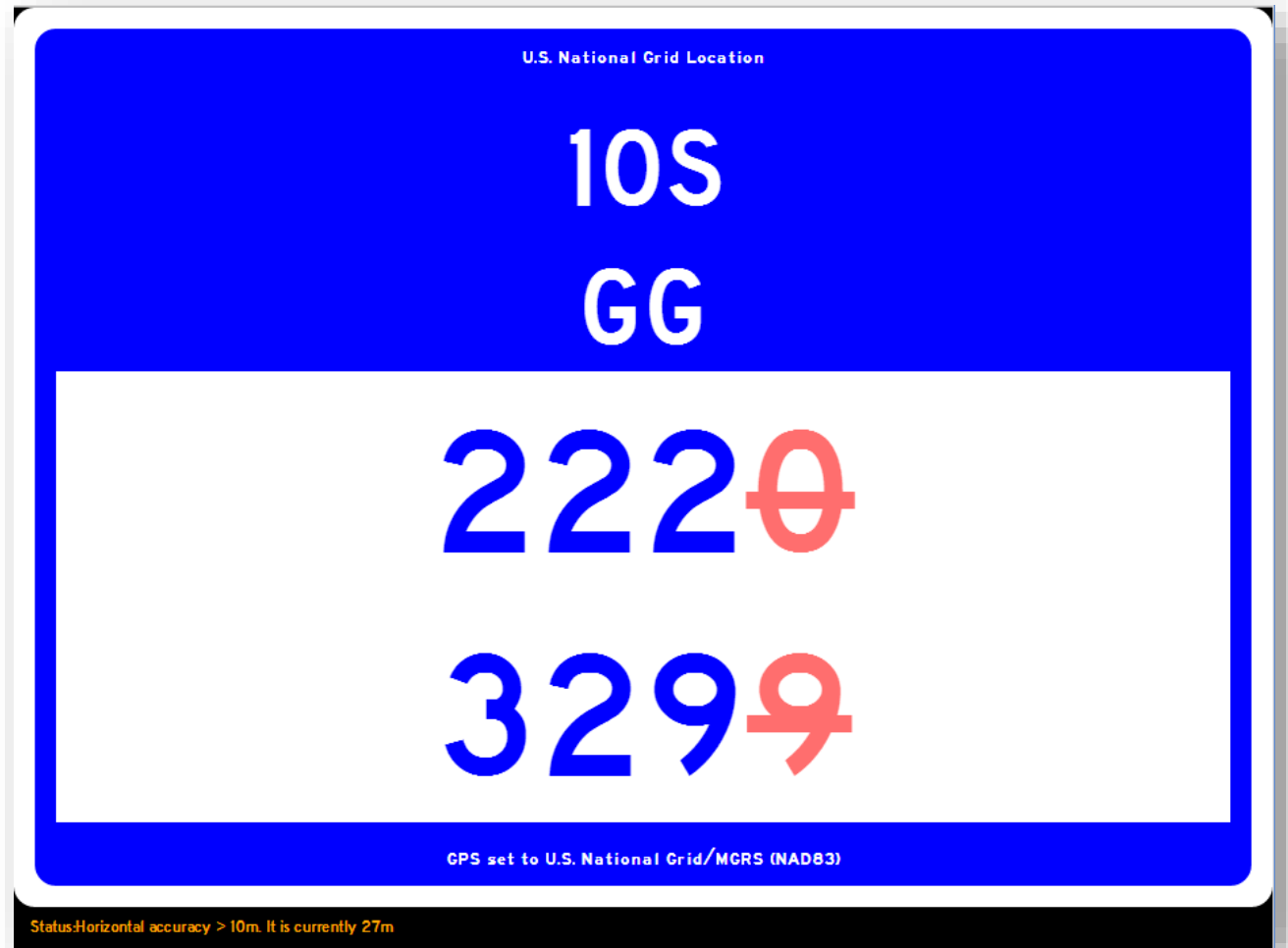
- NASAR Training (Coming soon!)
  - Basic
  - Intermediate
- Develop your own Standard Operating Guidelines
- GPS Information for USAR  
<http://www.responsesystem.org/>



# Resources

- USNG App

<http://usngapp.org/>



# Resources

- PDF Maps

<http://bit.ly/18SVF1265>

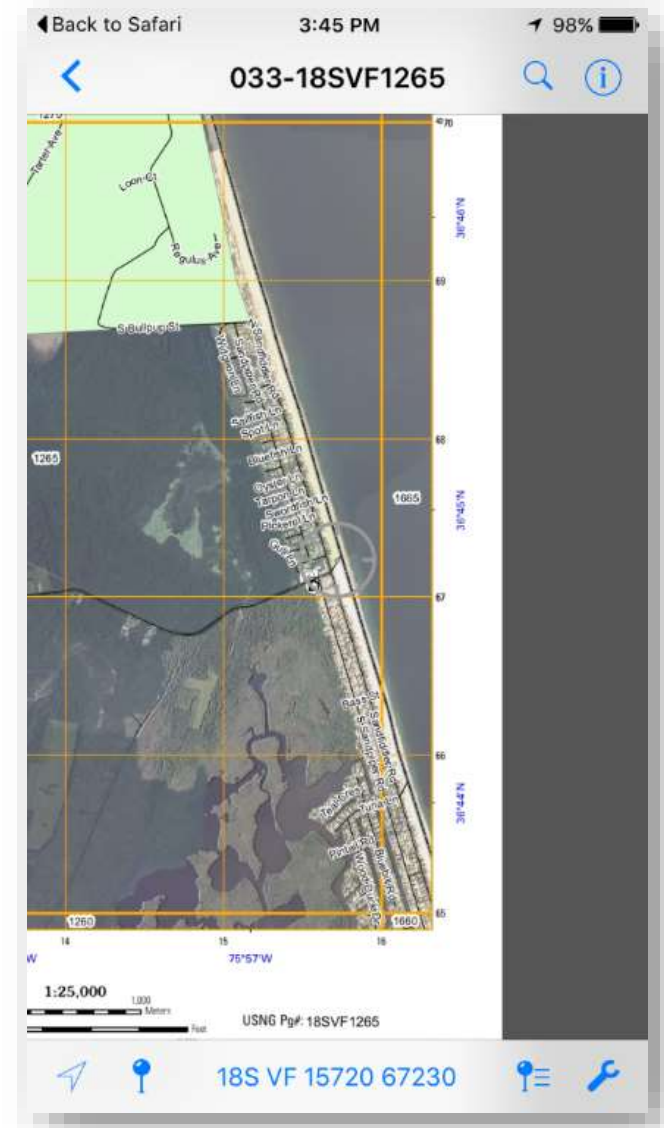


A screenshot of the Avenza Systems Inc. website for the PDF Maps Mobile App. The page features the Avenza logo at the top left, a navigation bar with links for Products, Download, Purchase, Resources, Support, and About Us, and a search bar. The main heading is "PDF Maps Mobile App". Below this is a large graphic of a red location pin on a map, with the text "PDF Maps Get the App. Get the Map.®". To the right of this graphic is a list of awards: "Winner of multiple awards including: Best Map Product Worldwide in 2011, Best Maps for Multimedia Application, New Technology &amp; New Media Award, and Technology Innovation Award for Mobile Mapping". Below the awards is a link to "www.pdf-maps.com". To the right of the main content are three download buttons for the App Store, Google Play, and Windows Phone Store. Further down, there is a section titled "Become a PDF Maps Store vendor" and a "Latest Videos" section with links to various videos. The footer of the page includes the NAPSG Foundation logo and name.

# Resources

- PDF Maps

<http://bit.ly/18SVF1265>



# South Carolina Flood 2015

Case Study





# South Carolina Flood Event, 2015

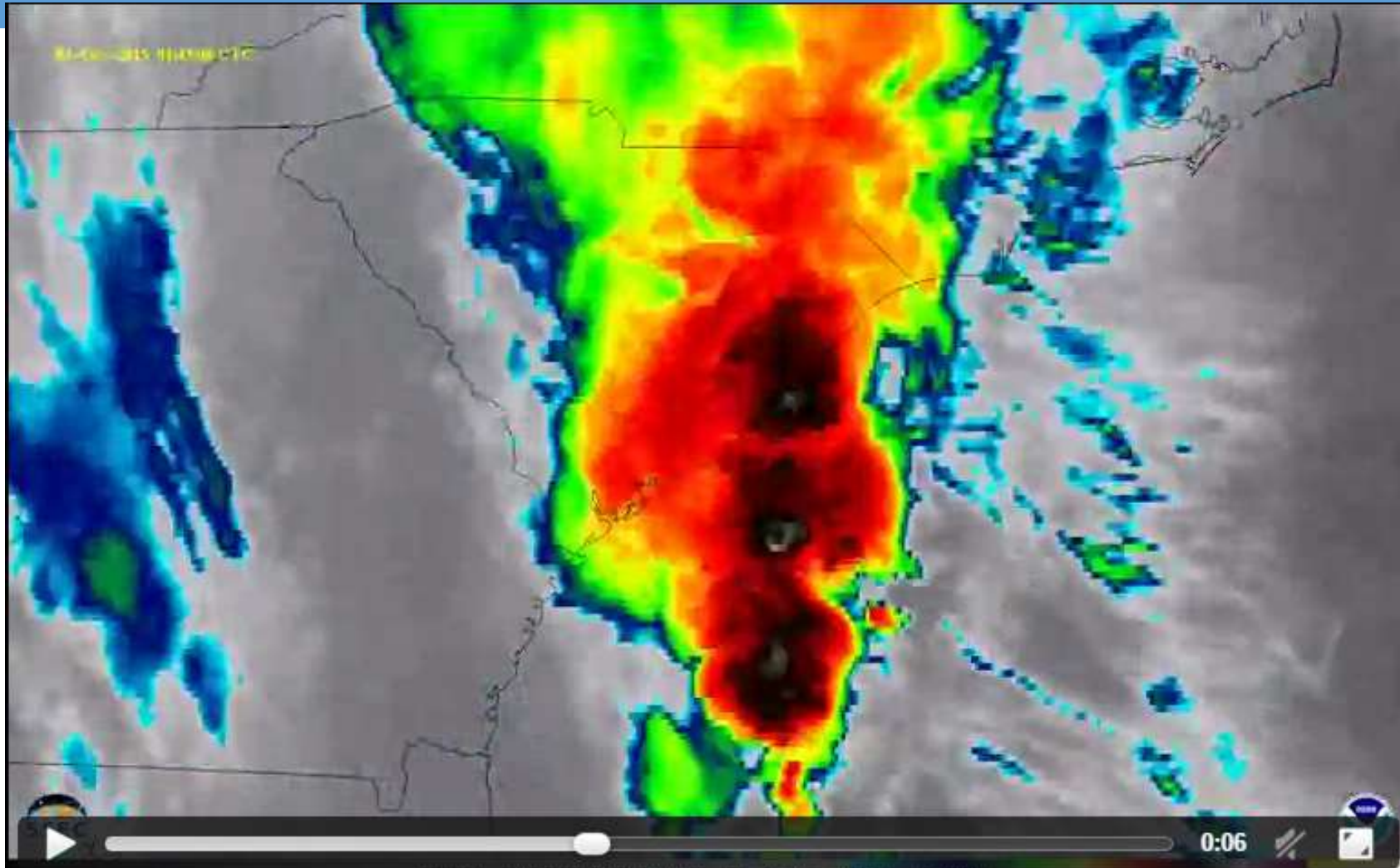
Type	Extratropical cyclone; nor'easter
Formed	September 29, 2015
Dissipated	October 7, 2015
Maximum rainfall	26.88 in (683 mm) near Mount Pleasant, South Carolina <a href="#">(source)</a>
Damage	~\$12 billion <a href="#">(source)</a>
Casualties	At least 25 deaths <a href="#">(source)</a>
Areas affected	East Coast of the United States, Atlantic Canada



A levee breach near Columbia, South Carolina, on 5 October

S. Air National Guard photo by Tech. Sgt. Jorge Intriago/Released - <https://www.flickr.com/photos/scguard/>

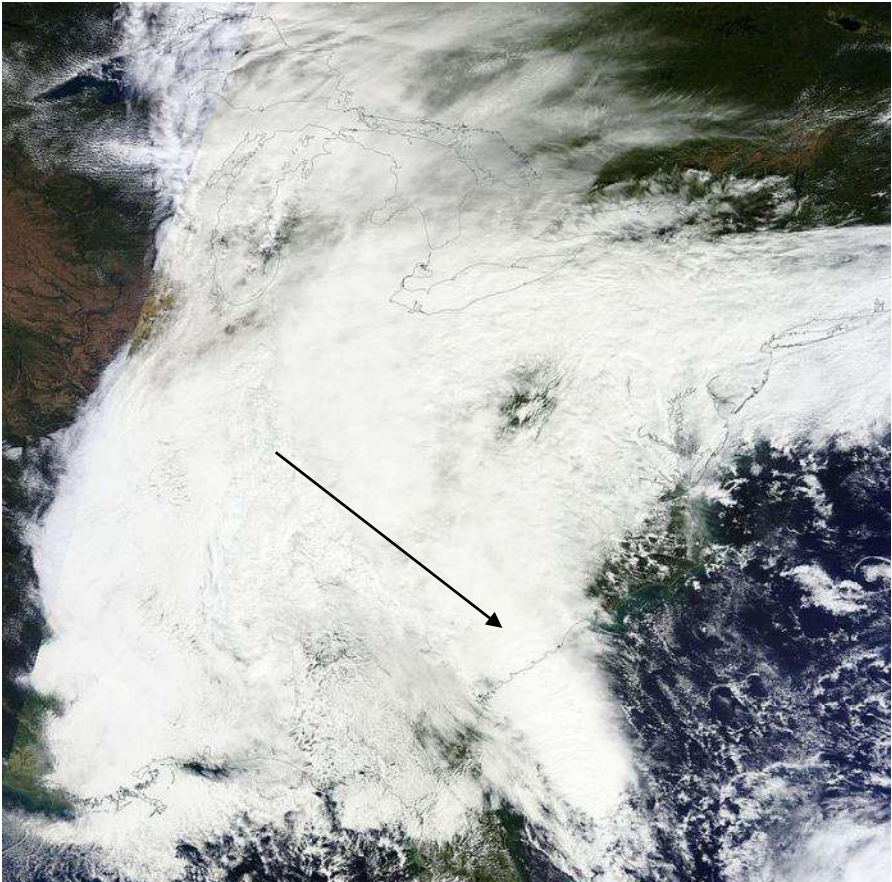
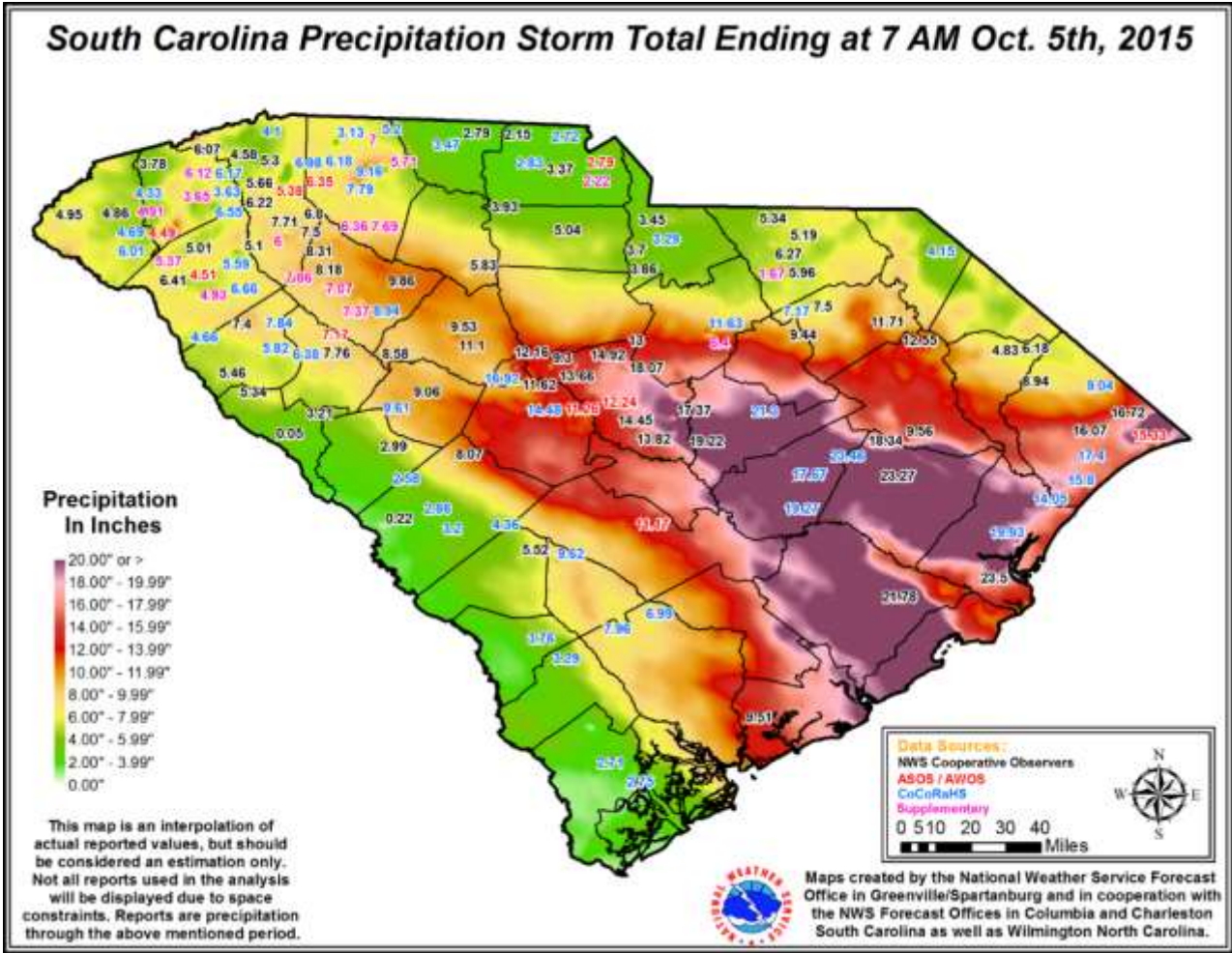
# South Carolina Flood Event, 2015



Infrared satellite animation from October 1–5 depicting the evolution of the rainfall event over South Carolina - National Oceanic and Atmospheric Administration (compiled by the University of Wisconsin-Madison's Space Science and Engineering Center) Date: 5 October 2015 <http://bit.ly/Oct2015SCInfrared>



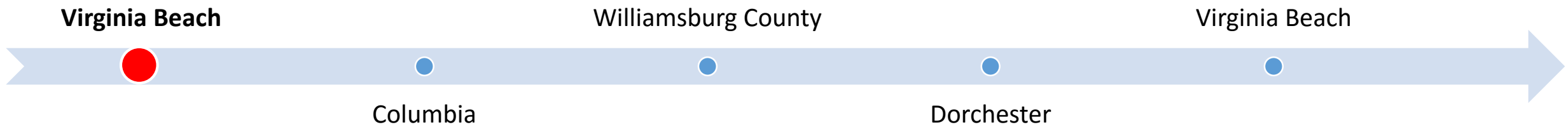
# South Carolina Flood Event, 2015



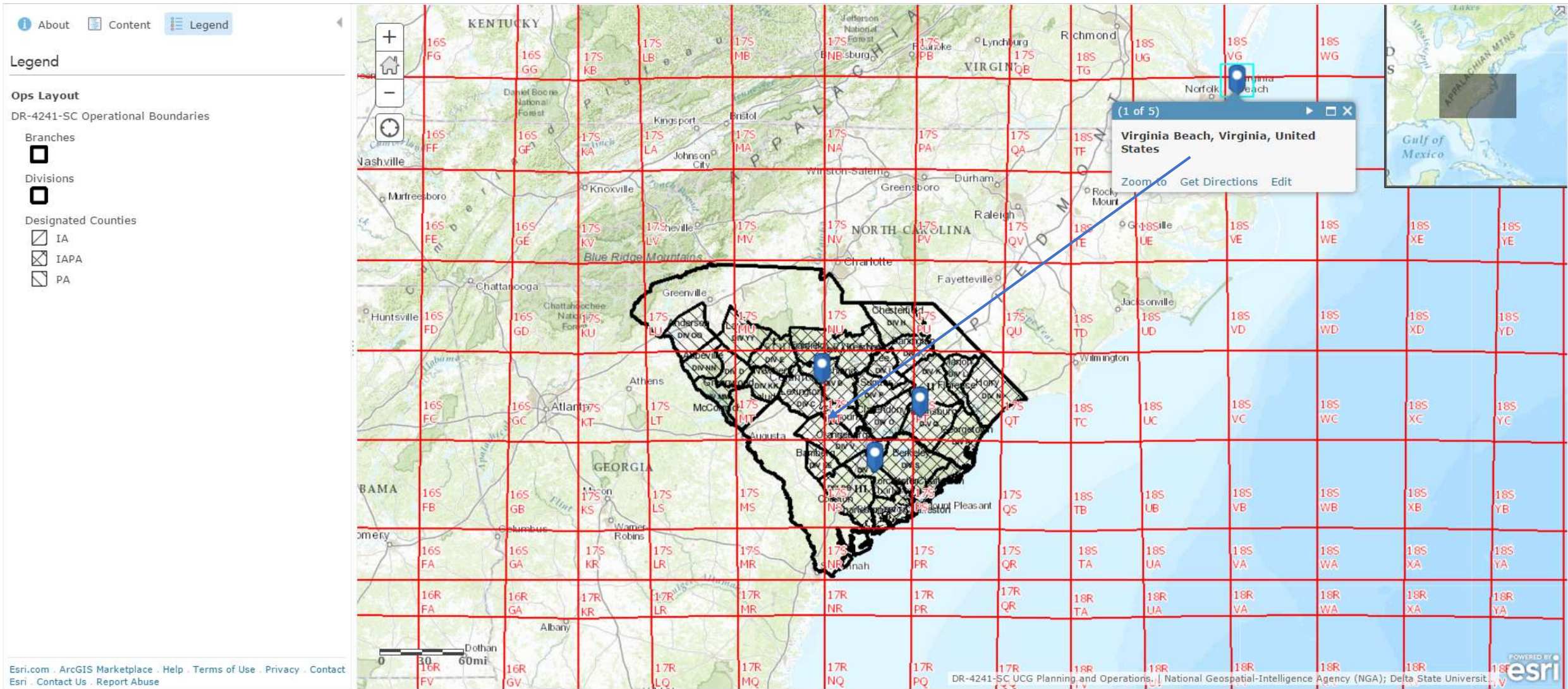
Terra MODIS satellite imagery of a nor'easter responsible for widespread flooding across the Southeastern United States and Hurricane Joaquin at 16:10z on October 3, 2015.

# South Carolina Flood Event, 2015

- What was planned?
  - October 4<sup>th</sup> , 2000h – Activation
  - Type US&R Task Force (80 members)
  - 8 members deployed with the IST







Virginia Beach

Williamsburg County

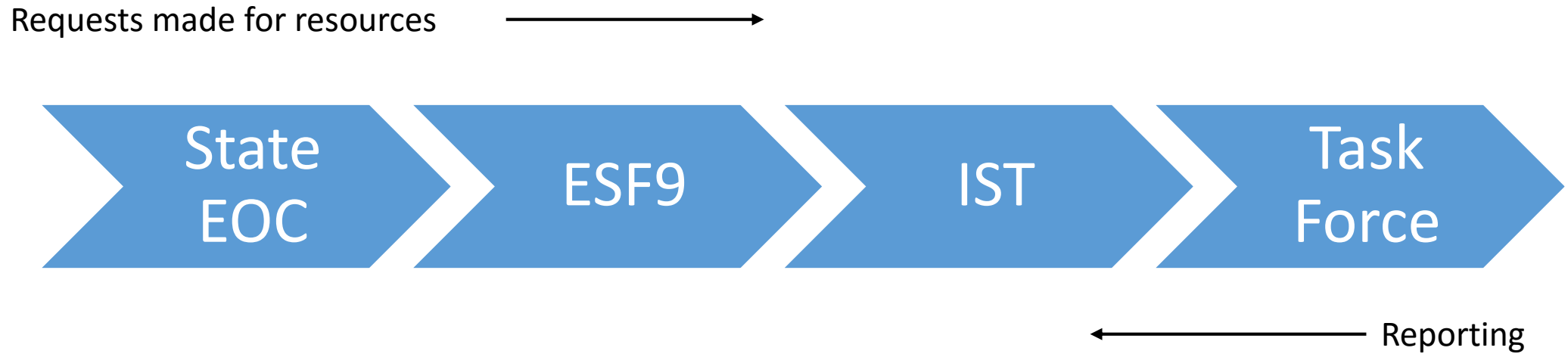
Virginia Beach

Columbia

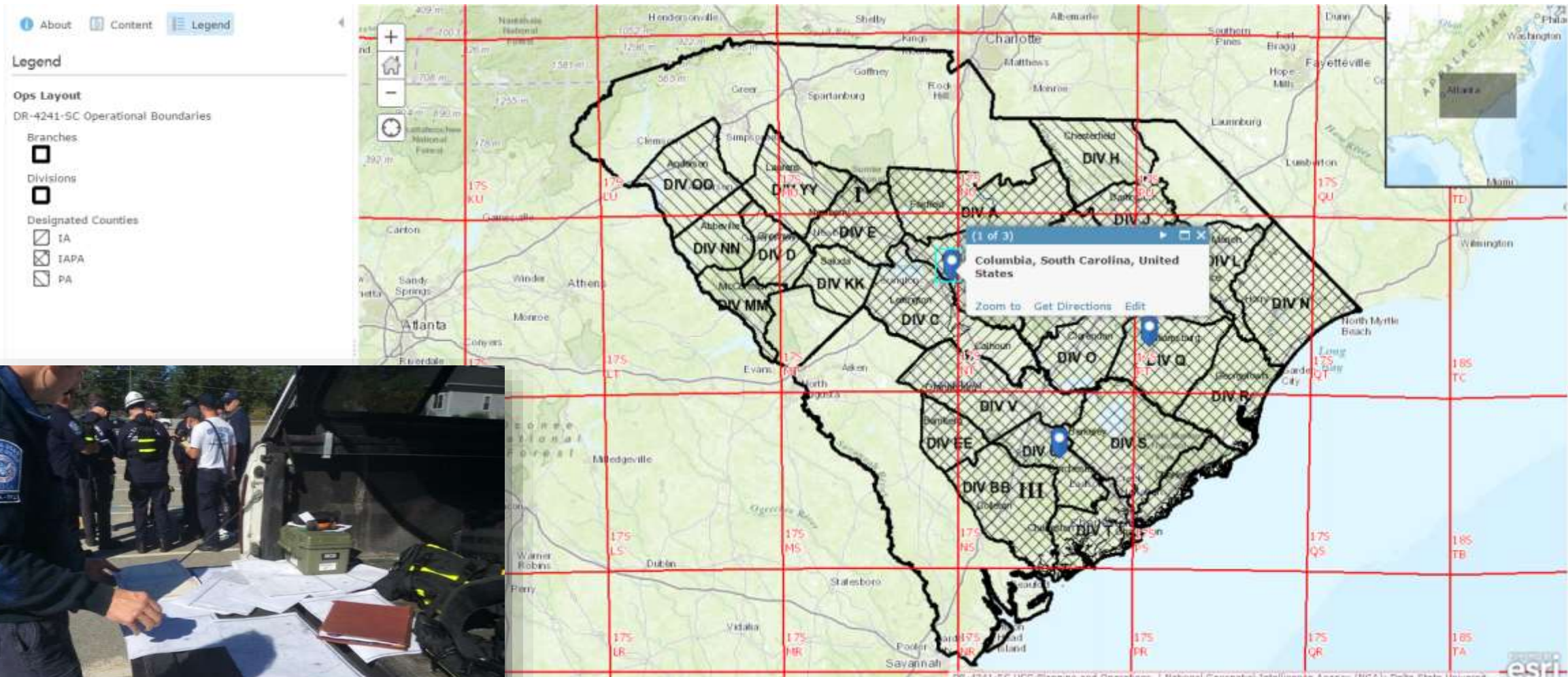
Dorchester



# South Carolina Flood Event, 2015



EOC = Emergency Operations Center  
ESF9 = Emergency Support Function #9 – SAR  
IST = Incident Support Team  
IMT = Incident Management Team



Virginia Beach

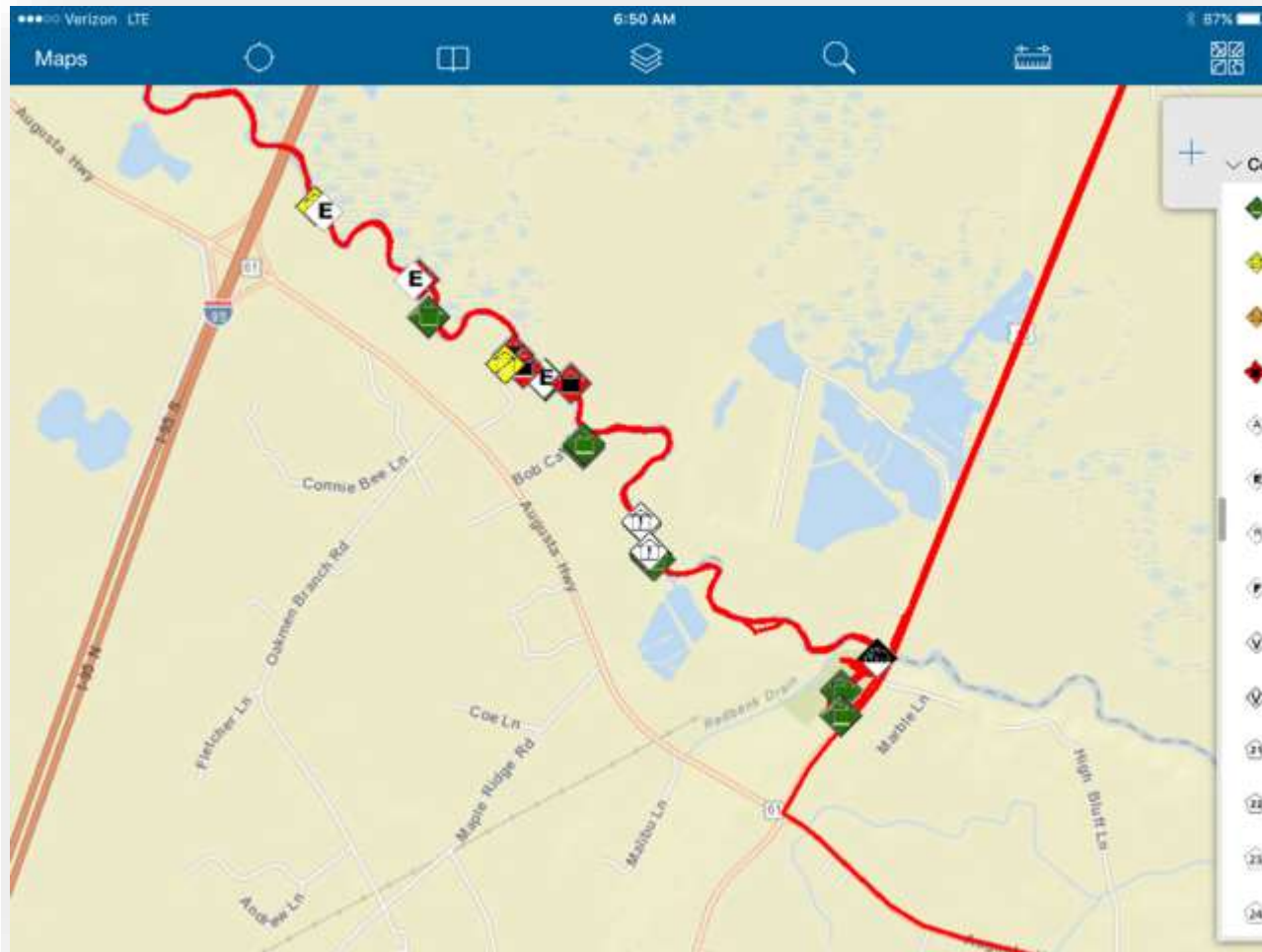
Williamsburg County

Virginia Beach

Columbia

Dorchester





Building marking in South Carolina, 2015



Building marking in Haiti, 2010

Virginia Beach

Williamsburg County

Virginia Beach

Columbia

Dorchester

# South Carolina Flood Event, 2015

- What actually happened?
  - IST Leader redirected one of the squads
  - The squad was transported by two Blackhawk helicopters to an area that was cut off from rising waters.



**VA-TF2 is briefed prior to loading a Blackhawk**

Virginia Beach

Williamsburg County

Virginia Beach

Columbia

Dorchester





17SPT1037120360 X Q

Show search results for 17S...



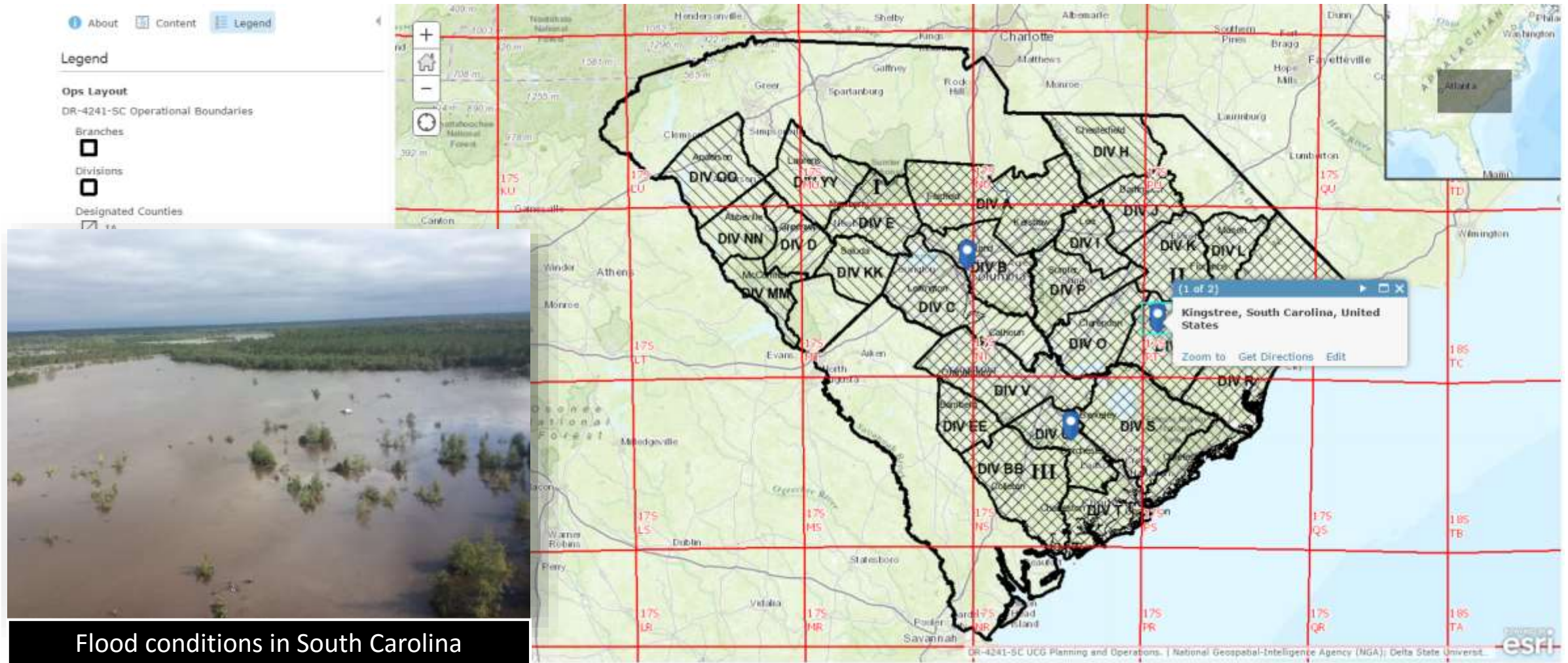
Being dropped off in the middle of a field...

Search result  
17SPT1037120360  
[Zoom to](#)

17S PT 10193 20460 USNG







Virginia Beach

Williamsburg County

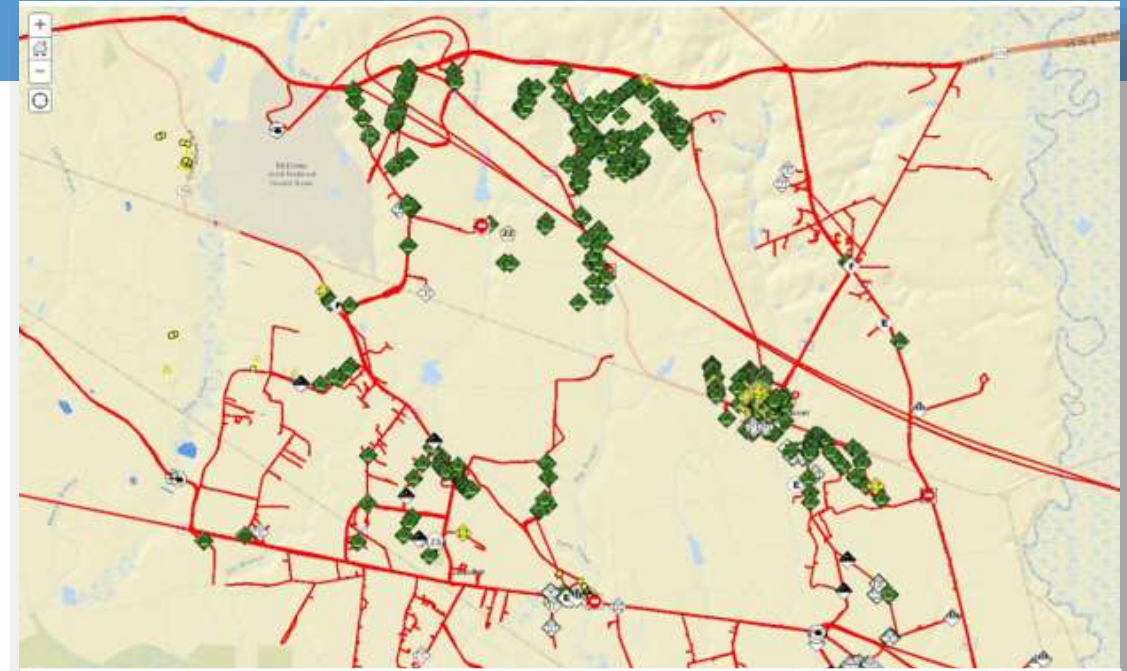
Virginia Beach

Columbia

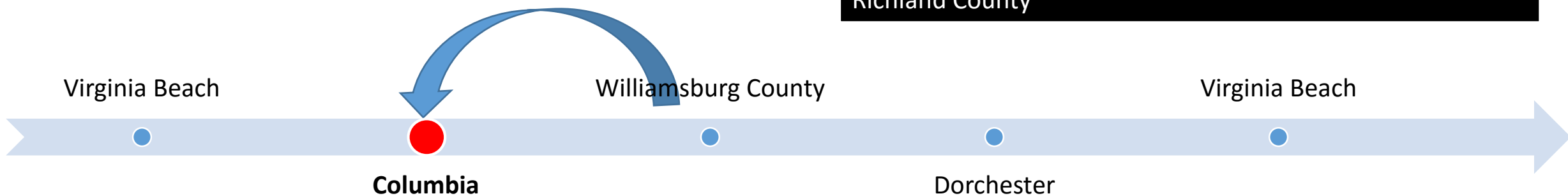
Dorchester

# South Carolina Flood Event, 2015

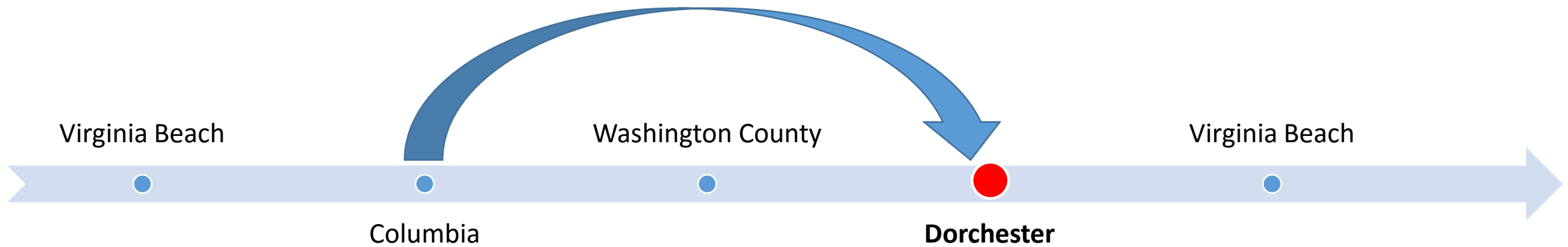
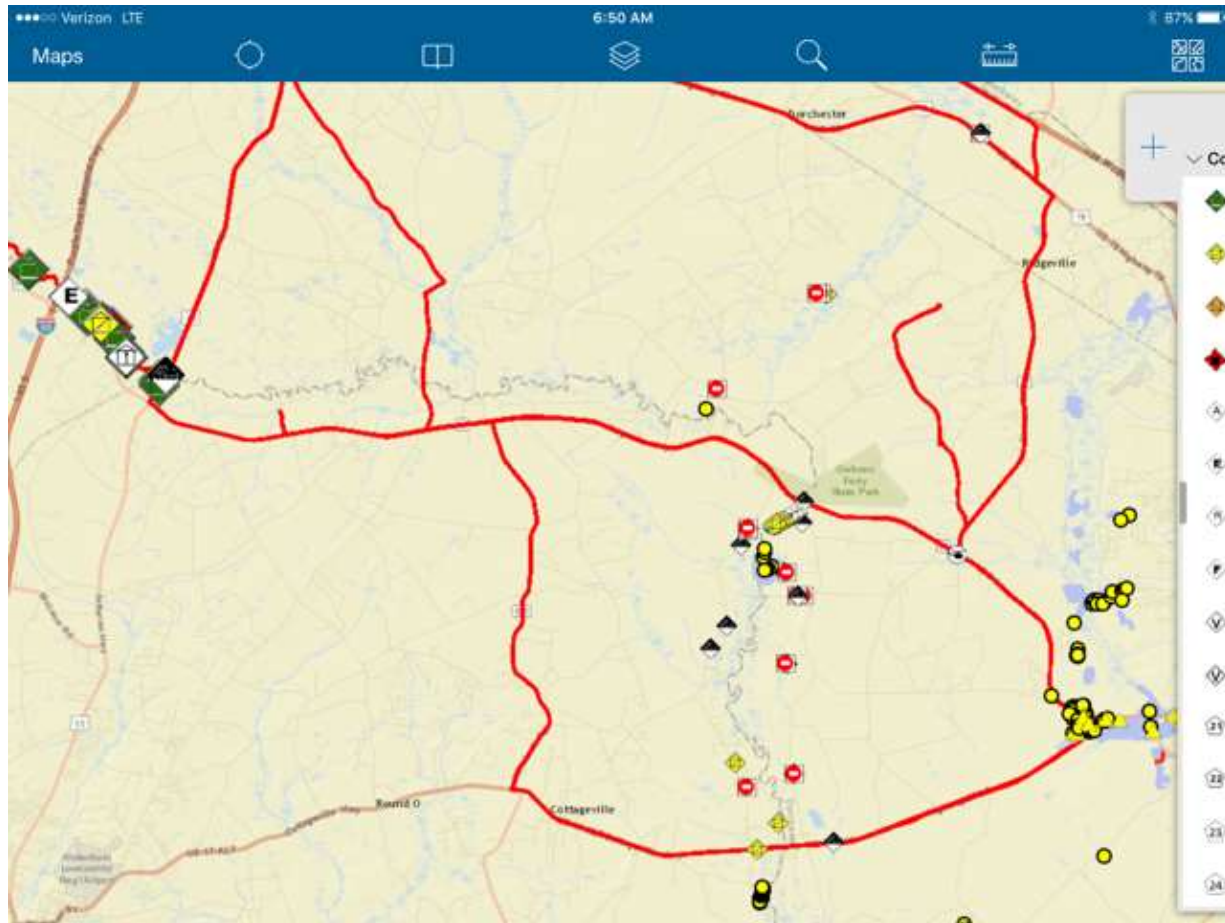
- What actually happened?
  - Visited 1,932 structures
  - 4,222 waypoints
  - 50 sites with special consideration



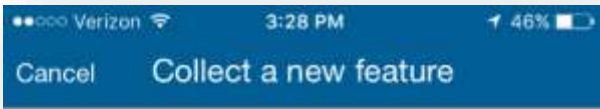
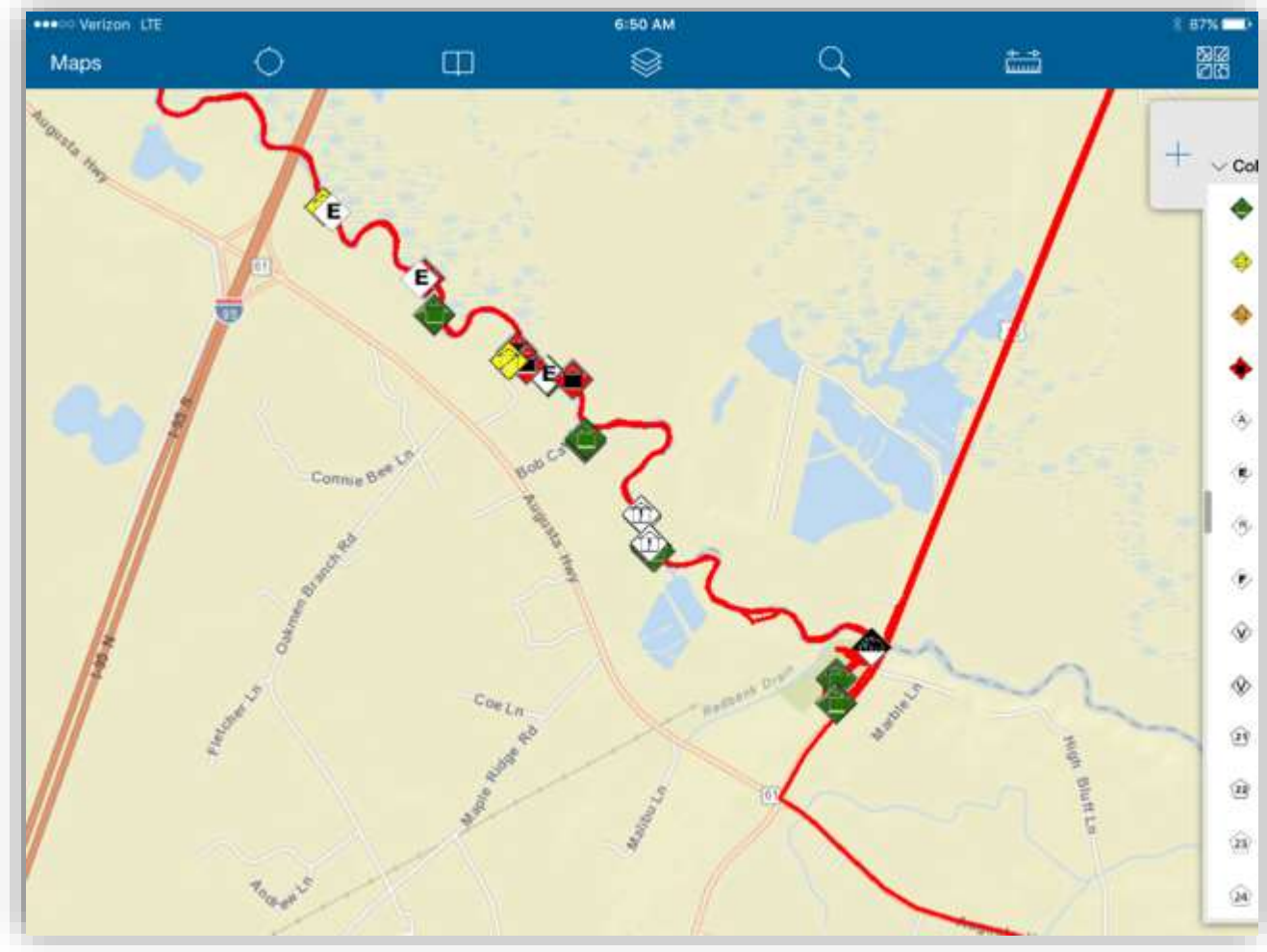
The tracks and waypoints of VA-TF2 while operating in Lower Richland County







# South Carolina Flood Event



Location  
Lat: 37.317038° Long: -120.492538°

**Search Progression Points:**

Event Name >

Search Type >  
Structure No Damage

Task Force >

OP Period >

Squad Leader >

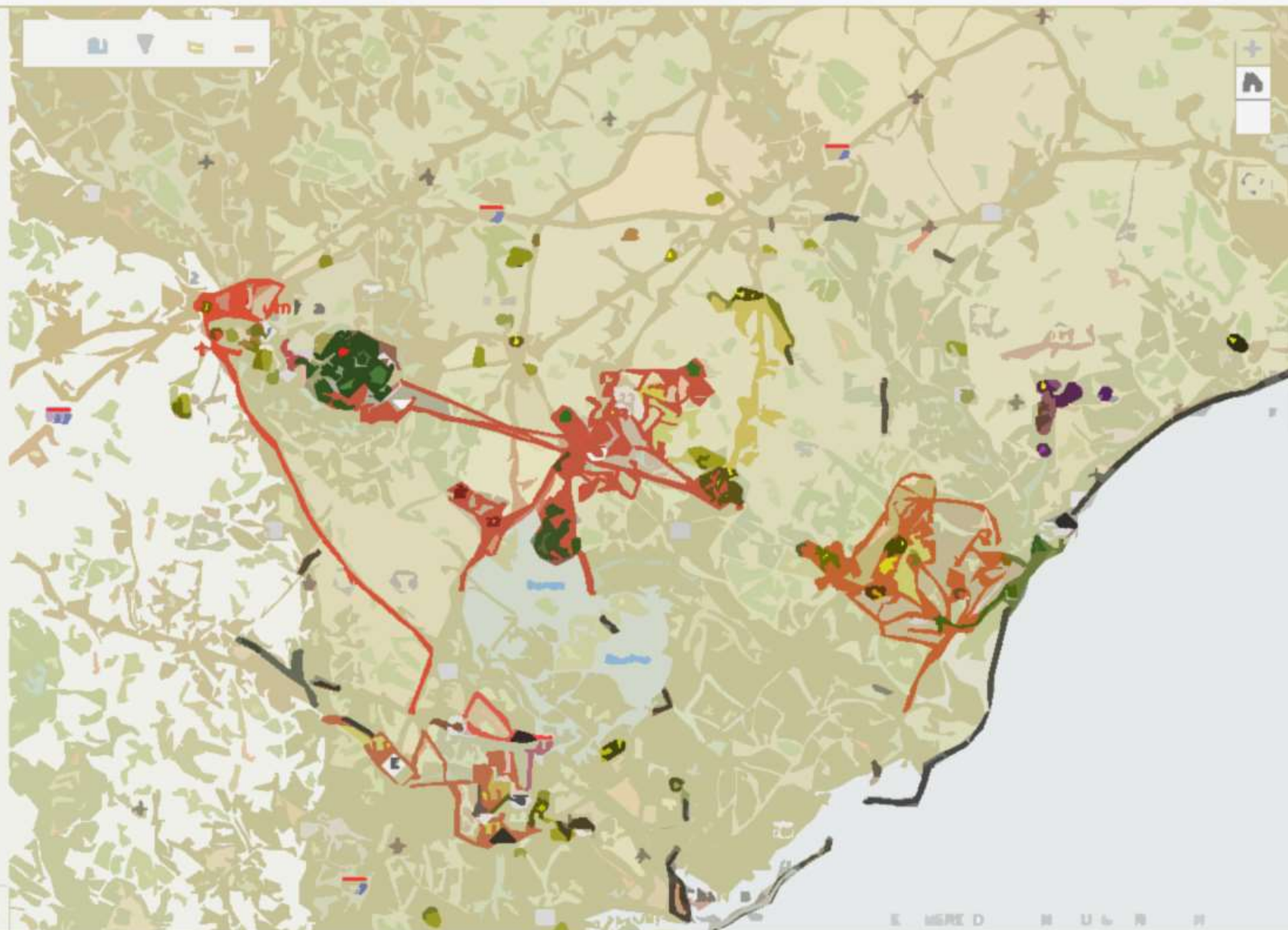
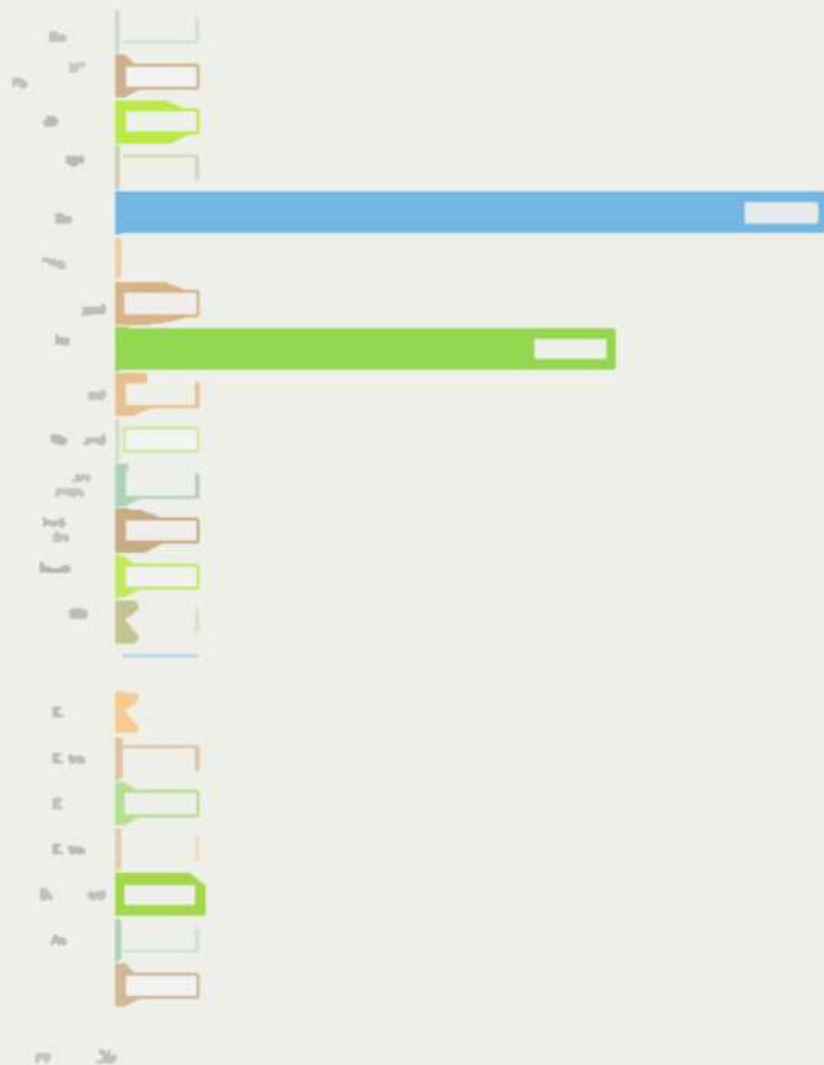
Quantity >

Date Time >

- Structure No Damage  
Search Progression Points
- Structure Damage  
Search Progression Points
- Structure Failed  
Search Progression Points
- Structure Destroyed  
Search Progression Points
- Assisted  
Search Progression Points
- Evacuated  
Search Progression Points
- Rescued  
Search Progression Points
- Follow-Up Form  
Search Progression Points
- Victim Detected  
Search Progression Points
- Confirmed Victim  
Search Progression Points



for 3 gh





FEMA

Flood Journal

2. Declaration

Tab 1. Filter by state or declaration number.

Tab 2. Joint Field Office and Disaster Recovery Center map

Tab 3. National Flood Insurance Policies by jurisdiction, tribe, or special land use area.

3. Population

Tab 1. Population density and demographics: U.S. Counties symbolized by population density. Zoom in to reveal more detailed geographies, like Census Block Groups. Click any County or Census Block Group to view various demographic statistics from Esri and the U.S. Census related to the area.

Tab 2. Social Vulnerability details. Zoom in to see more detail and explore areas by their vulnerability. Click each geographic division for an index detail.

Tab 3. Urban Search and Rescue. Field reporting from the current Urban Search and Rescue operations. If you have an ArcGIS Online account, you can access the [USAR Operations Dashboard web app](#).

Tab 4. aflood. Review social media posts related to flooding from Twitter, Flickr, and YouTube from the past week. Also view select dedicated webcam feeds from across the nation. (Notice: FEMA does not monitor social media content. User discretion is advised.)

4. Building Impacts

Tab 1. Damage Assessments: This map depicts the damage assessments as they are completed and the flood extent as it is updated. Data provided by NGA and FEMA.

Tab 2. Analyze Current Known Flood Extent as compiled by NGA. Use the Analysis button in the upper right of the map window to collect values related to the current known Flood Extent such as estimated total housing

2. Declaration

Declared Counties

JFO/DRC Map

National Flood Insurance Policies

+

-

Find address or place

Layer Legend

Minor flooding

Near flood stage

Declarations (DR)

Designated Counties - General

Public Assistance

Individual Assistance

Individual Assistance and Public Assistance

Declarations (EM)

Designated Counties - General

Public Assistance

Individual Assistance

Individual Assistance and Public Assistance

Virginia Beach

Washington County

Virginia Beach

Columbia

Dorchester

# South Carolina Flood Event, 2015

## Lessons Learned

1. Situational Awareness: Develop a method to provide working responders with real-time information.
2. GPS: Proficient use and understanding of GPS units are essential when responders travel by ground, boat, or aircraft.
3. US National Grid...

# Resources

- Collector for ArcGIS

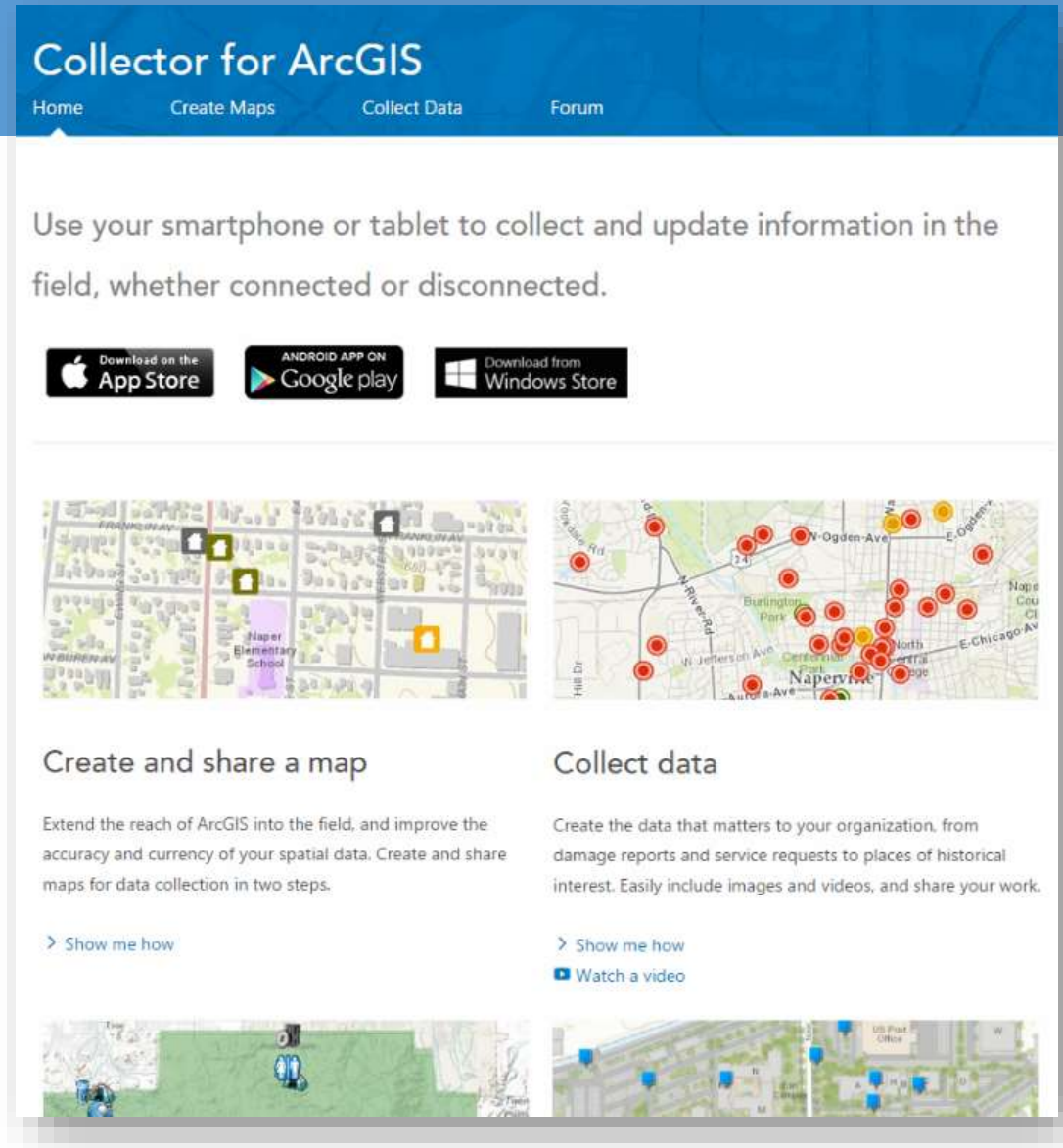
<http://doc.arcgis.com/en/collector/>

- Collector Templates

<http://arcg.is/1Rtc8FH>

- NAPSG Foundation

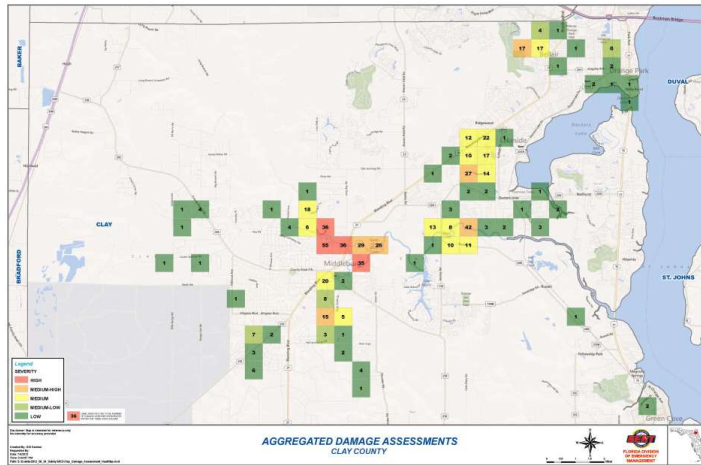
[services@publicsafetygis.org](mailto:services@publicsafetygis.org)



The screenshot shows the 'Collector for ArcGIS' website. The header is blue with the title 'Collector for ArcGIS' and navigation links: Home, Create Maps, Collect Data, and Forum. Below the header, a text block states: 'Use your smartphone or tablet to collect and update information in the field, whether connected or disconnected.' This is followed by three download buttons: 'Download on the App Store', 'ANDROID APP ON Google play', and 'Download from Windows Store'. The main content area is divided into two columns. The left column is titled 'Create and share a map' and includes the text: 'Extend the reach of ArcGIS into the field, and improve the accuracy and currency of your spatial data. Create and share maps for data collection in two steps.' Below this is a link '> Show me how' and a small map thumbnail. The right column is titled 'Collect data' and includes the text: 'Create the data that matters to your organization, from damage reports and service requests to places of historical interest. Easily include images and videos, and share your work.' Below this are links '> Show me how' and 'Watch a video' with a video icon, and another map thumbnail.



# Implementing a Common Location Reference for Daily & Disaster Operations



**Richard Butgereit**

[richard.butgereit@em.myflorida.com](mailto:richard.butgereit@em.myflorida.com)

Information Management Section Head

Florida Division of Emergency Management

850-413-9907



# Florida Adopts the USNG

- Florida Fire Chiefs Association adopts USNG through 2010 Statewide Emergency Response Plan
- State's Comprehensive Management Plan adopts in 2010



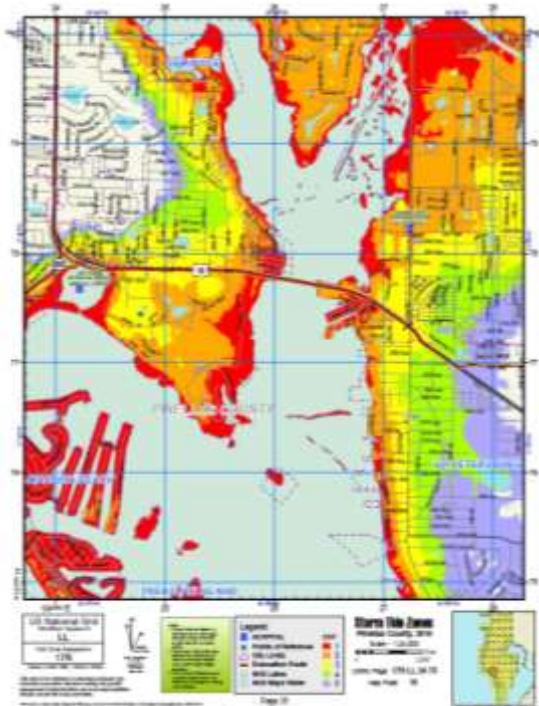


# Florida CEMP

“The State of Florida has adopted the use of the U.S. National Grid (USNG) during response and recovery efforts which allows for both point and area referencing.”



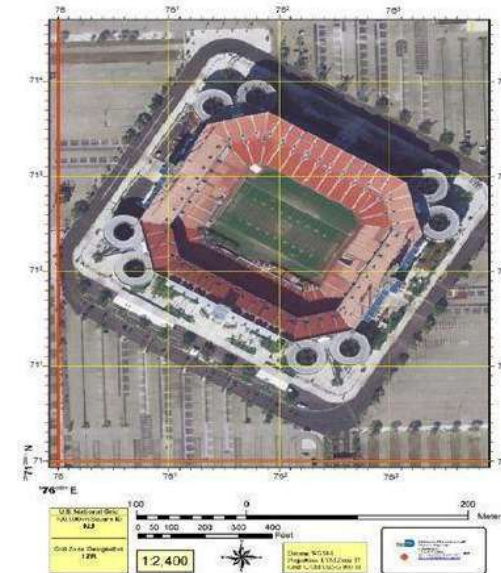
... use of the National Grid has been widely adopted within emergency management for use in preparedness, response, and recovery efforts.



 **@CraigatFEMA**  
Craig Fugate

Are you using the United States National Grid? if not, here is the Executive Summary <http://go.usa.gov/roa>  
<http://www.fgdc.gov/usng>

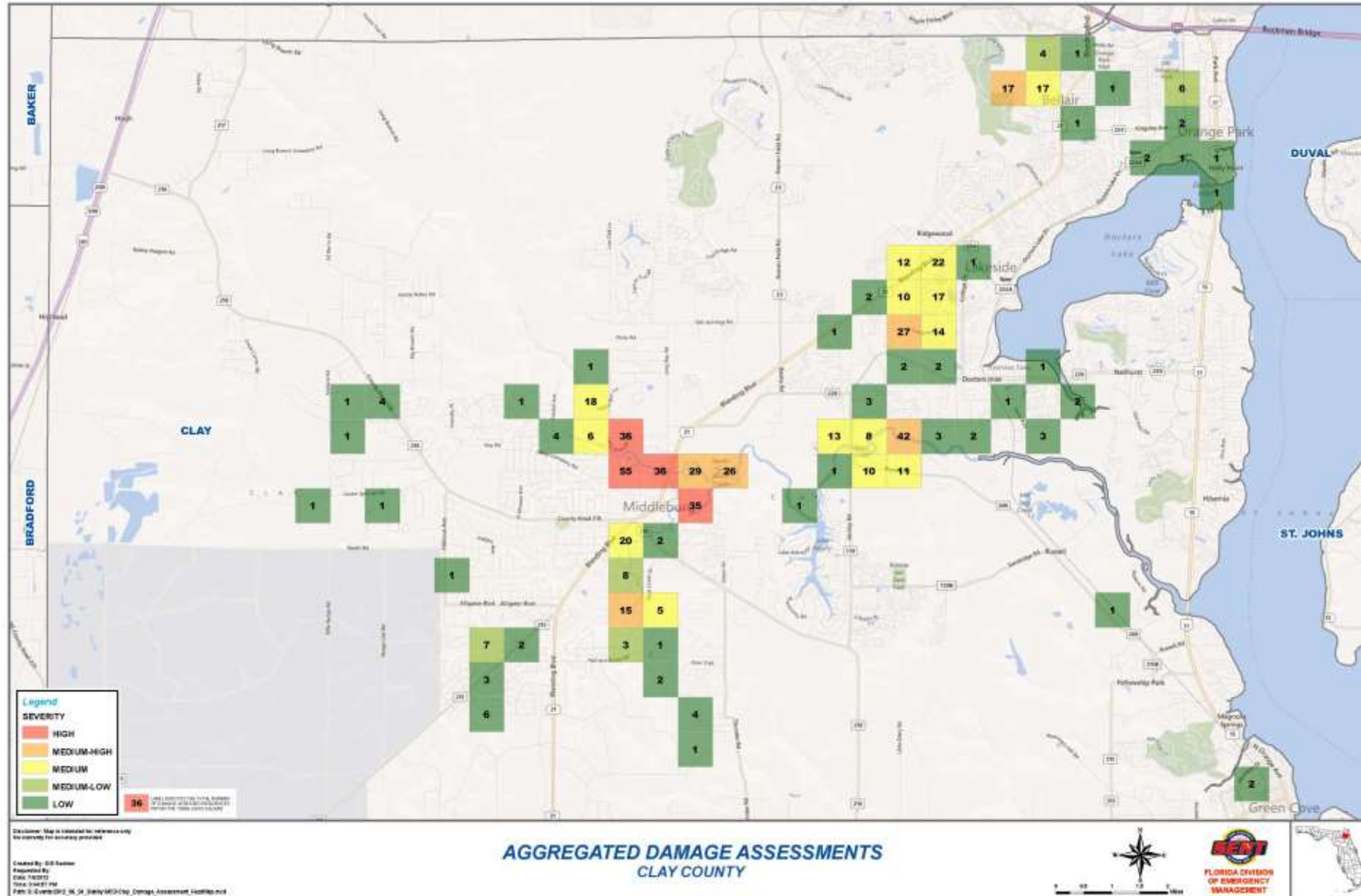
5 Jan via web    Favorite    Retweet    Reply



[illegible]



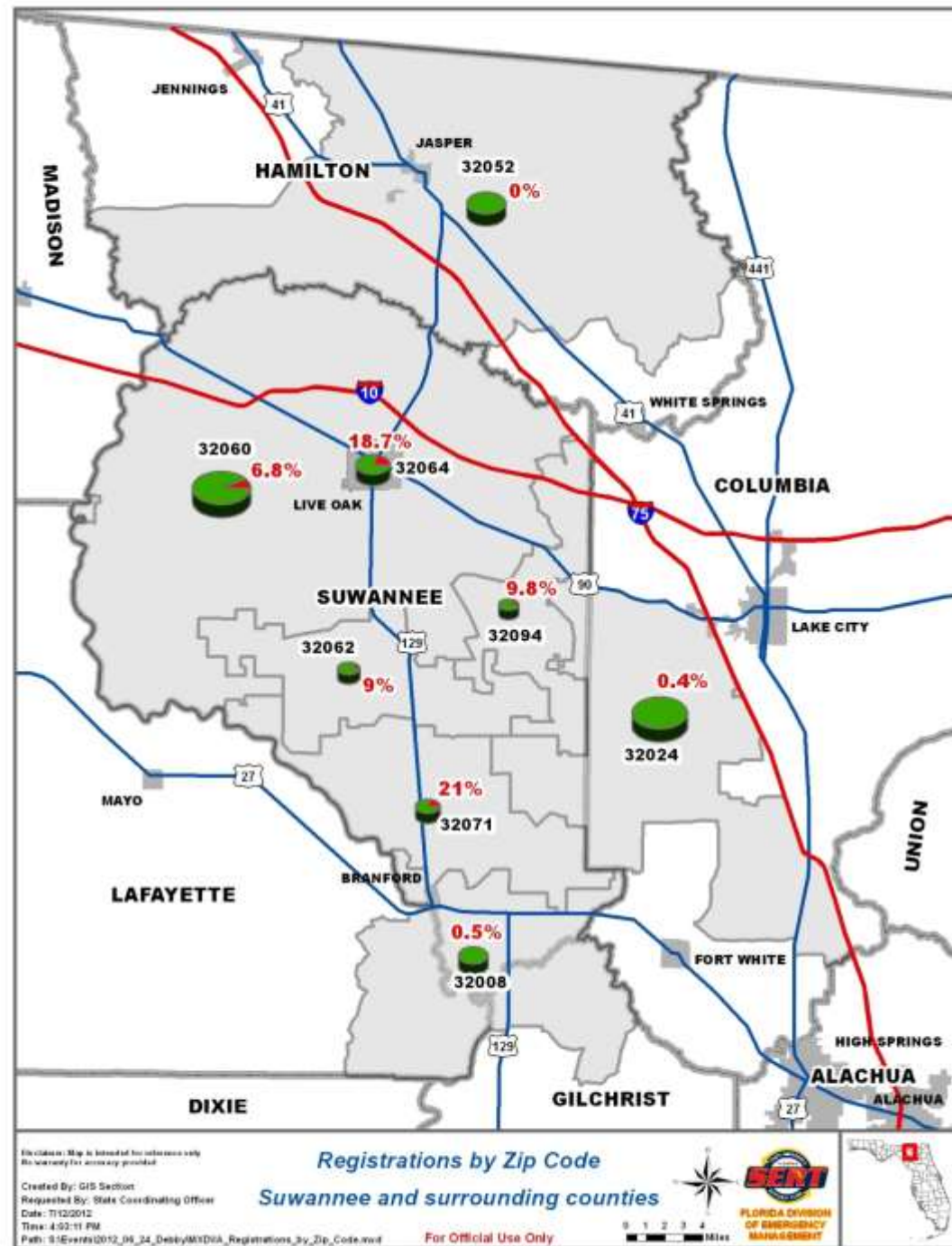
# Aggregated to USNG



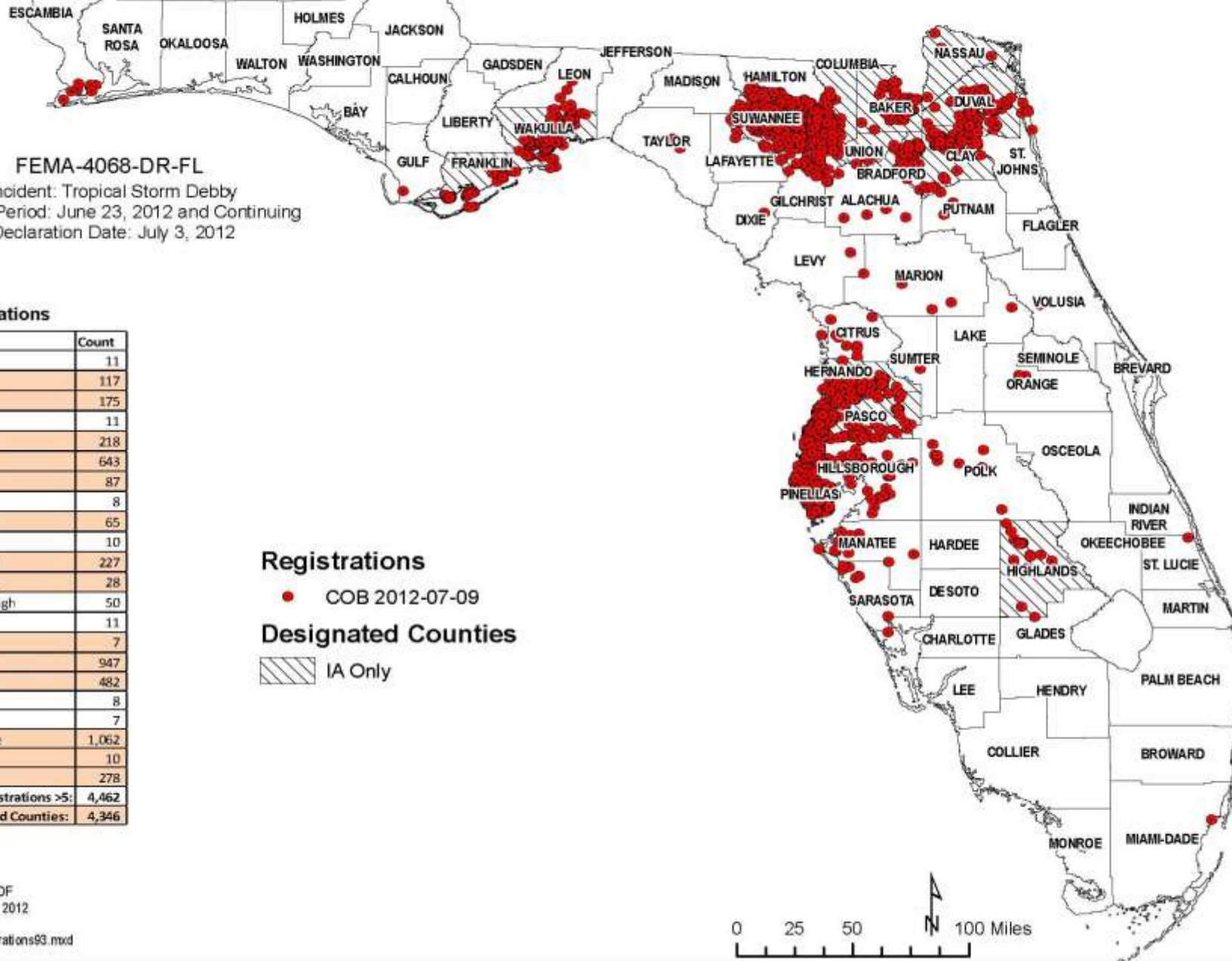
# Zip Code

Not effective...

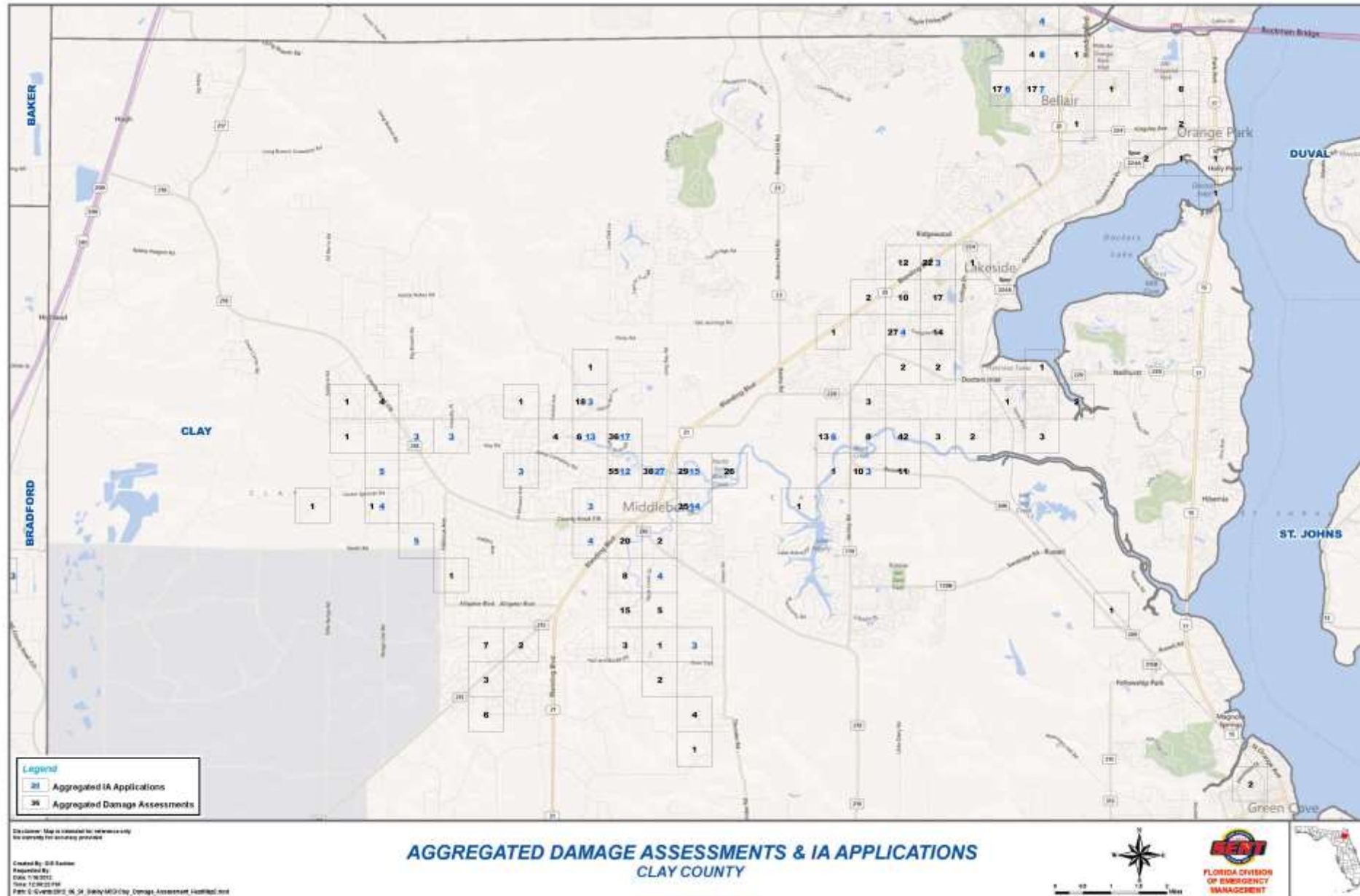
- Zip codes cross jurisdictional boundaries (counties)
- No contiguous







# USNG – Data aggregation



**Legend**

- 21 Aggregated IA Applications
- 35 Aggregated Damage Assessments

**Disclaimer:** Map is intended for reference only. No warranty for accuracy provided.

**AGGREGATED DAMAGE ASSESSMENTS & IA APPLICATIONS**  
CLAY COUNTY

**Inset Map Data:**

Grid Cell	Value
Top Left	4
Top Middle	6 13
Top Right	36 17
Middle Left	55 12
Middle Middle	36 27
Middle Right	29 15
Bottom Left	3
Bottom Middle	35 14





# Conclusion

US National Grid has proven a useful tool for transforming raw data into meaningful and useful information for the Florida State Emergency Response Team

USNG is truly the language of location.



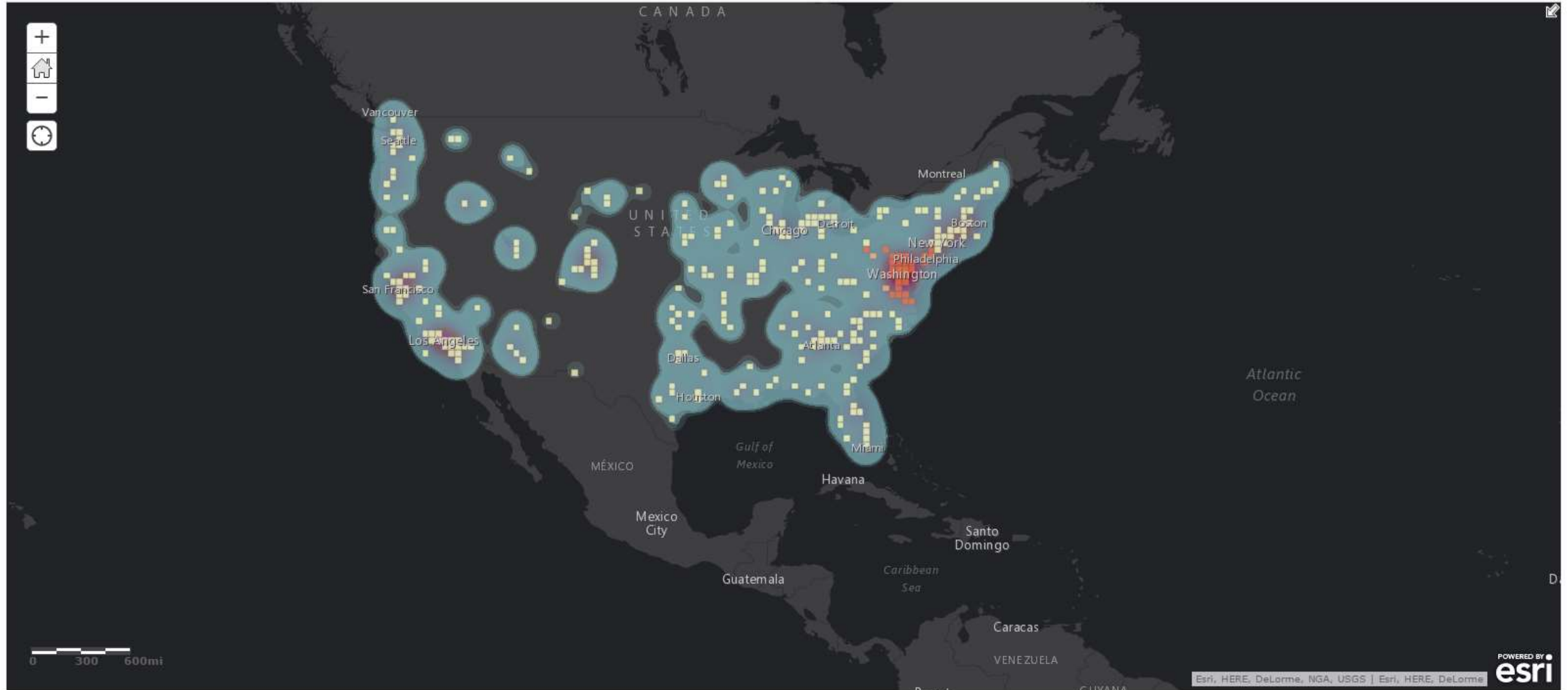


# Why Use USNG?

## The USNG:

- Provides a **UNIFIED** language for defining areas of interest, reporting, planning, and navigation.
- Transforms data to **ACTIONABLE** information in a **UNIFORM** format.
- Provides a **CONSISTENT** situational awareness across jurisdictions, disciplines & all levels of operations.
- **INTEROPERABILITY** in both connected and disconnected environments

# Resources



# Thank You for Content & Support

- Sam Chan
- Dennis Keane
- Lance Gilmore
- National Search and Rescue Committee
- National Association For Search And Rescue
- <http://usngcenter.org/>

NAPSG Contact – Rebecca Harned: [rharned@publicsafetygis.org](mailto:rharned@publicsafetygis.org)

USNG Resources - [http://bit.ly/NAPSG\\_USNG](http://bit.ly/NAPSG_USNG)

# Thank You!