

Accelerating Disaster Mapping:

THE NEXT-GENERATION TOOLKIT FOR #PHOTOMAPPERS

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What Is #PhotoMappers?

#PhotoMappers is a collaboration between the GISCorps and NAPSG Foundation



Operating under the auspices of the Geospatial Professional Network (GPN), GISCorps coordinates short-term, volunteer-based GIS services to communities in need worldwide.

<https://www.giscorps.org/>



National Alliance for Public Safety GIS (NAPSG) Foundation provides resources at no cost for the public safety community to implement effective solutions to common problems.

<https://www.napsgfoundation.org/>



WEAR ABC 3 @weartv · Sep 28, 2022

IAN DAMAGE: Strong winds in Southwest Florida from **Hurricane Ian** have already tossed cars, damaged homes and knocked trees into **buildings**.

These photos show **damage** across Delray Beach --

weartv.com/news/local/hur...



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Problem Statement

During and immediately following an emergency or disaster, information on the extent of impacts are limited.

Often the first reports are from citizens and news outlets posting hazard impacts and images of damage to social media.

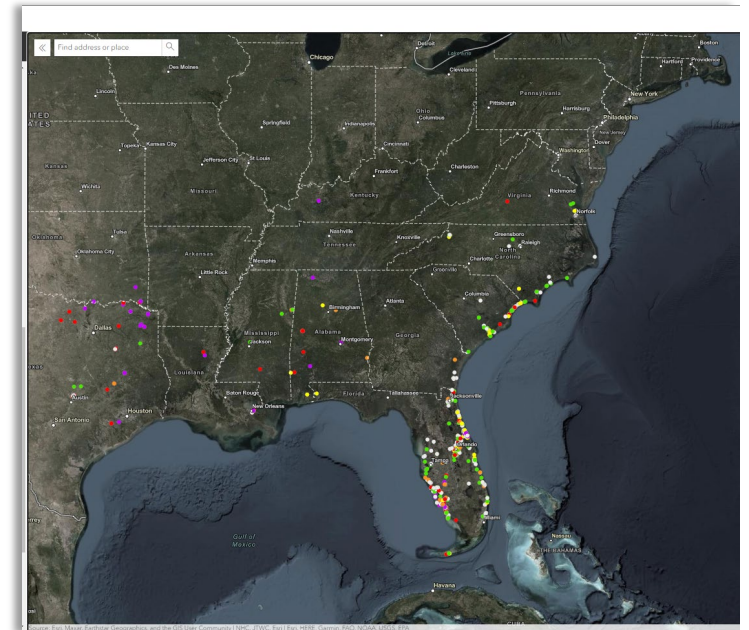
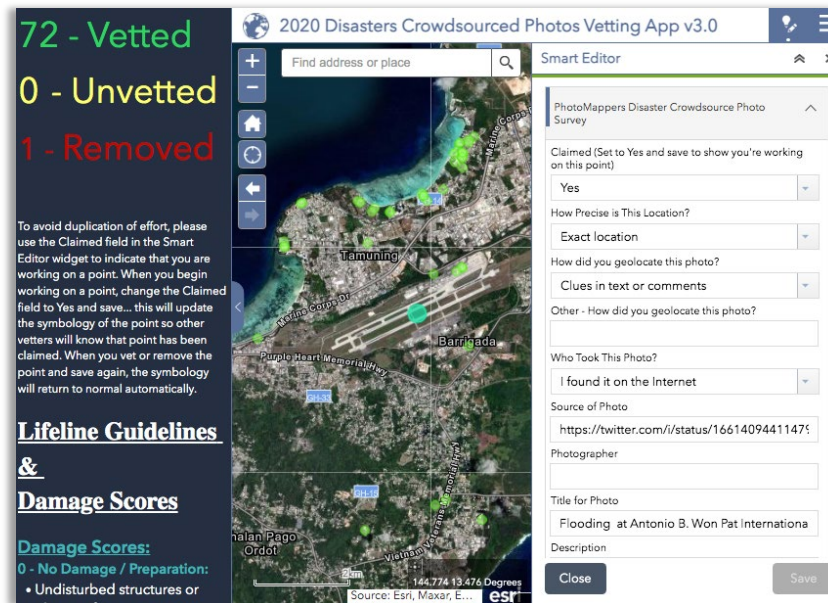
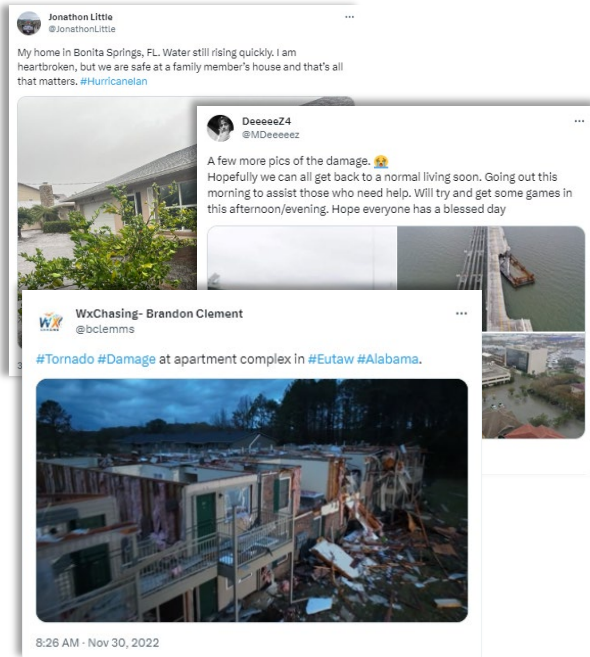
This information is valuable but scattered across multiple platforms, hindering any ability for response agencies to firmly grasp the location, size, and scope of damage.

#PhotoMappers volunteers geolocate disaster images posted to the internet during the first 24-48 hours.

1) Find photos posted to social media in real time.

2) Geolocate photo with context clues, categorize images, and vet metadata.

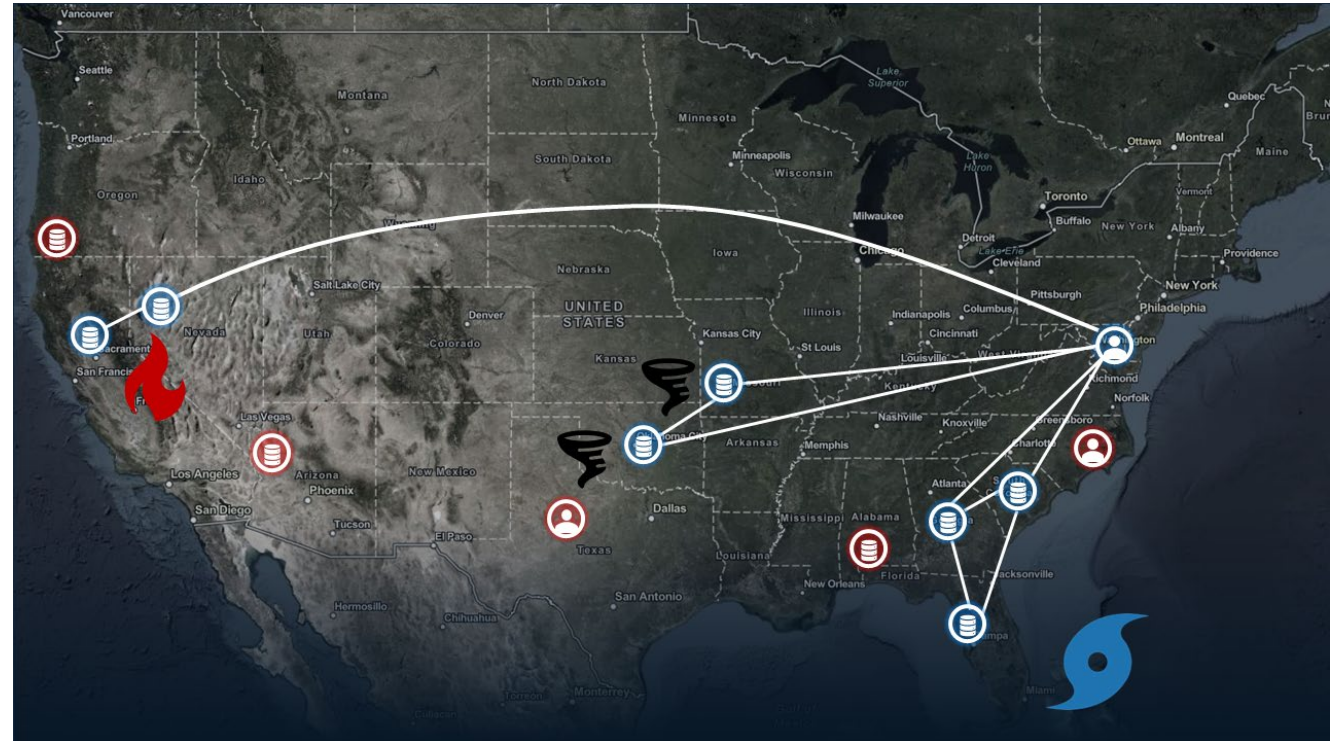
3) Visualize on maps, apps, and dashboards.



Volunteers from across the United States respond upon request

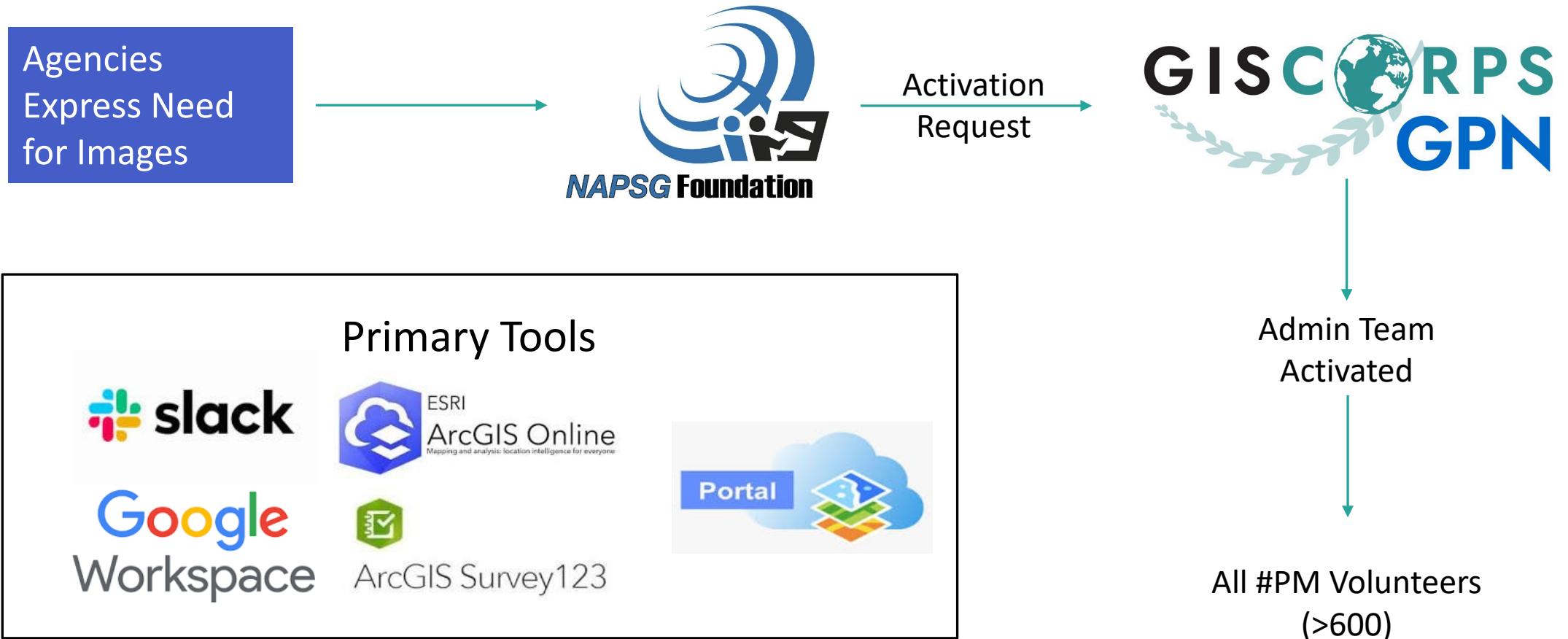
2017 - 2026 Statistics

Number of Incidents	53
Photos Mapped	11,847
Volunteer Hours	5,148.15
Estimated 2026 Value	\$159,119.50



This is a volunteer crowdsourcing project made possible by the generous donation of volunteers' time, effort, and ingenuity. Machines cannot yet do what we do...but we'd like their help!

Activation Steps



What Gaps Does #PhotoMappers Fill?

#PhotoMappers provide early situational awareness

“A great source for hyper local imagery that allows field staff at State Parks, Aquatic Preserves, National Estuary Research Reserves, and field offices to better understand the impacts of events on their local geography...they are better prepared and more confident going to the field (or not) after having viewed your photos.”

“The turnaround time is one of the best things about your service. It is always at the forefront of timely imagery from across the impacted areas.”

- Kim Jackson, Florida GIO

Crowd-Sourced Landfall Impact Observations over POST Model

DR - 4673 - FL - Hurricane Ian



#PhotoMappers Informs Urban Search and Rescue

“You guys provided great insight for us when information was limited and helped understand the magnitude of the situation.”

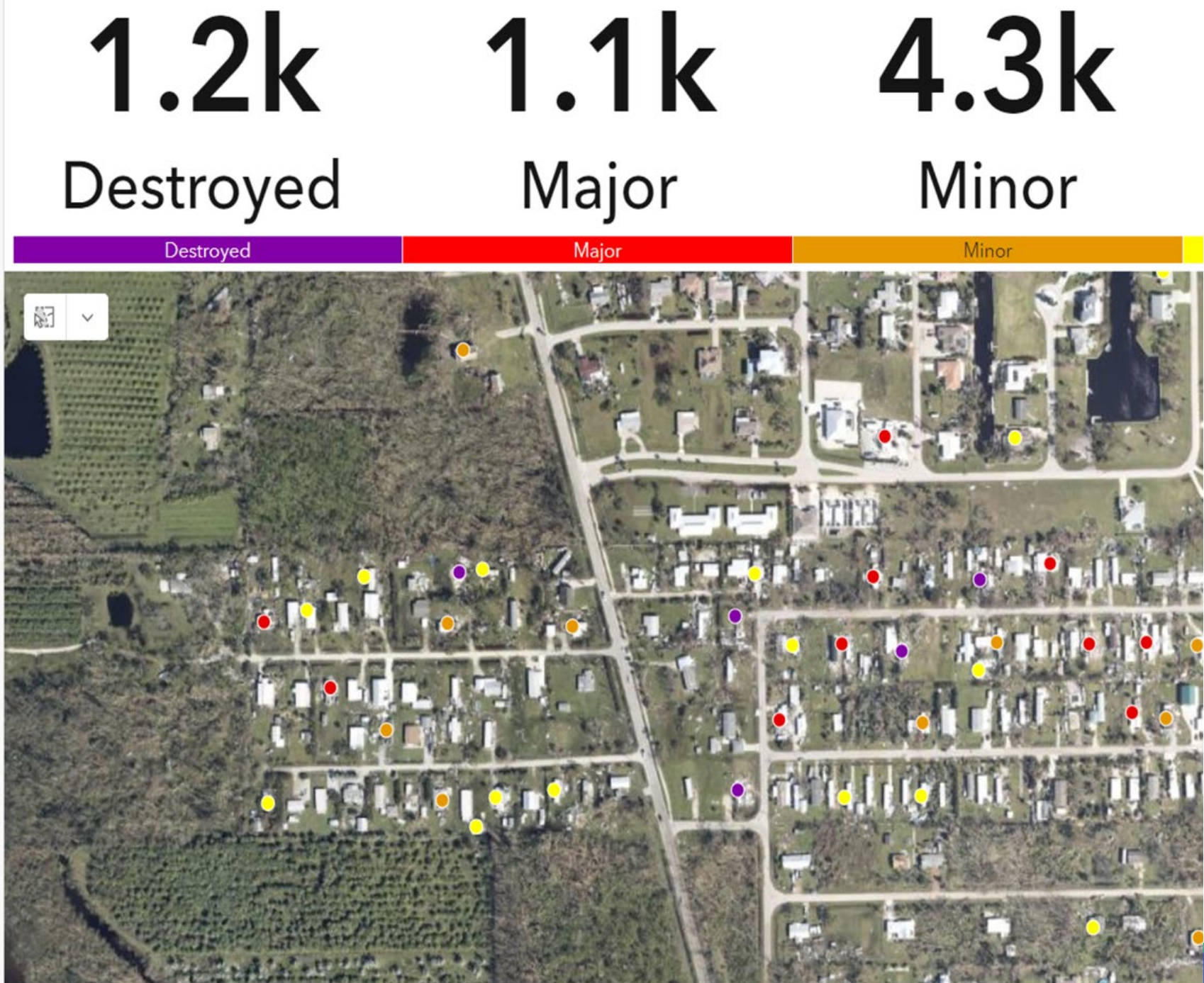
- US&R White IST Situation Unit Lead and Resource Unit Lead

The screenshot displays the SARCOP Photo Gallery interface. At the top, the SARCOP logo is visible on the left, and navigation links for Home, Dashboard Views, Photo Gallery, and Photo Filter are on the right. Below the navigation bar, the page title reads "Photo Gallery - Click on a photo to see details". A dropdown menu is set to "All Points - Current Incident". The main content area is divided into two sections: a grid of photo thumbnails on the left and a map on the right. The photo grid contains ten images showing various scenes of urban search and rescue, including damaged buildings, debris, and emergency personnel. The map on the right shows the Great Lakes region with city labels such as Sault Ste Marie, Sudbury, North Bay, Ottawa, Montreal, Toronto, Hamilton, Buffalo, Rochester, New York, Albany, Detroit, Cleveland, Pittsburgh, Harrisburg, Philadelphia, Washington, Dover, New Jersey, Richmond, Norfolk, and Virginia. A search bar at the top of the map area contains the text "Find address or place". At the bottom of the map, a source attribution reads: "Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | NHC, JTWC, Esri | Esri, HERE, Garmin".

#PhotoMappers Supports Damage Assessments

“Photomappers played an integral part in providing early visualization of impacts & damages...The images found provided sound context to Senior leaders in understanding where impacts were and the level of damage.”

Adriana Lard, FEMA Crowdsourcing Coordinator



#PhotoMappers Supports Research

- **Satellite Tasking**
- **Water Depth Validation**
- **Training Data**
- **Structural Damage Prediction**

Satellite image taken over the incident area showing sediment after Hurricane Ian (Main et al., 2023).



Photos from #PhotoMappers were used to enhance the ability of predictive models to identify high-risk areas following Hurricane Florence (Dahal, O., 2019).

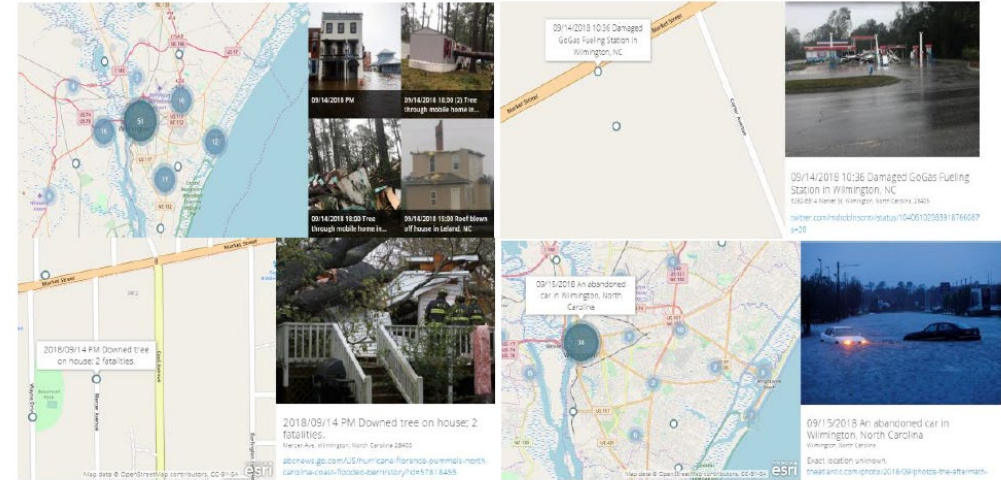
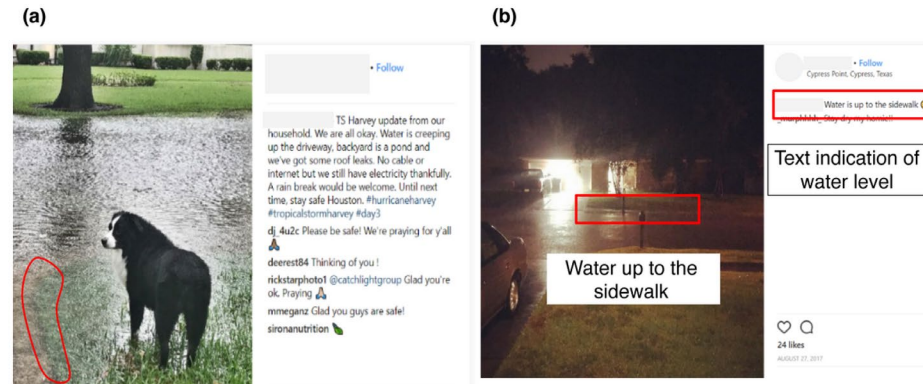
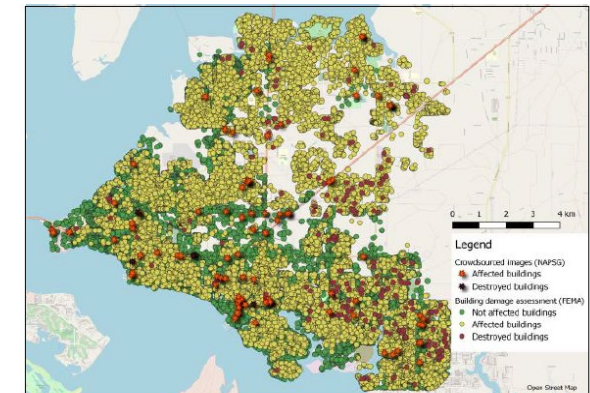


Figure 3 2018 hurricane crowdsourced photos:

An example of explicit (a) and implicit (b) indication of water level indicated in the text of a tweet (Alyaqout et al., 2021).



Spatial distribution of building damage and crowdsourced photos over Panama City



#PhotoMappers of the Future

Vision



Long-term
sustainability

Administrator for GISCorps

System Maintenance for NAPSG



Expanded access and
participation

Expand user group and define requirements

Develop new apps and data backend

Pilot new apps and processes



Adapting to a
changing internet

Adapt to new and changing social media platforms

Leverage AI to facilitate PhotoMappers activations

Manage misinformation

Common Confounders

#PhotoMappers Challenges

- Increasing requests to support incidents
 - State and locals
 - Small and large incidents
- Completely manual process
- Changing social media landscape
- Disinformation
- Generative AI and deep fakes

Activation Challenges

- Format of context clues (visual, text, comments)
- Specificity of context clues
- Similar place names, or lack of names
- Images posted from past events (e.g. Katrina)
- Viral photos
- Translation, slang, references to local knowledge

Interactive Discussion

Discussion Questions

How should #PhotoMappers **leverage new technologies?** (Topics include AI, new social media platforms, newer Esri features, other GIS tools, overcoming the limitations of social)

Religious organizations who do emergency preparedness could spread the word on contributing to #PhotoMappers

Spread public awareness about the hashtag. If more people knew, they would use #PhotoMappers to narrow down content.

Newscasters using #PhotoMappers during disasters to increase public knowledge

Tie S123 into the Slack thread as a way to directly add photos to PhotoMappers

Use AI to help triage photos in social media feeds

QuickCapture might be easier for the public

Post a simplified survey link on social media to solicit photos

Public Access QR Code to either QuickCapture/S123 to public so they can upload. May need to simplify form.

Geotagged Photos Tool in ArcGIS Pro

If this were my project, starting from nothing, I would look at using social media APIs to pull pictures related to search terms and then use some AI agent to deduplicate photos. That would be my starting place. But APIs cost money and I don't know a specific AI agent to do photo work.

Traffic cameras

ZeroGPT identifies AI images

Reddit

Use PM tools to replace Google sheet queue

Esri damage assessments/survey123

Utilizing public notification systems, i.e Everbridge could send a survey link, the #PM hub info for people to share photos, or Everbridge can send polls asking damage questions

Bluesky

Apify Agents (social media image scraping)

Power automate to integrate workflows

Discussion Questions

What **other information or data** could be provided via similar crowdsourcing workflows? Are there information gaps where participants see opportunities for crowdsourced info? (E.g. video, infrastructure points, USAR-specific features? Recovery-specific data?)

Volunteer Organizations Active in Disasters (VOAD)

Citizen App

Add to workflow - send link to community managers for them to post to their community. Community member submit photos themselves

Contact regional GIS groups (utah's is ugif)

Contact universities with GIS programs to recruit + help + awareness

Just serve (create opportunity)

Local public works / special service districts contacts

Community Emergency Response Teams (CERT)

NWS/NOAA partnerships

Discussion Questions

How can #PhotoMappers better support **needs at the state and local level**? (Topics may include engagement/outreach, develop and maintain tools for jurisdictions that want their own “#PhotoMappers” team, workshops/exercises/training)

Ground truth flood models with photomappers data

Working with EMs to connect with private [Facebook] groups

Social media/PIO resources that we can push out at a local level

[partner with] Chapman or another university

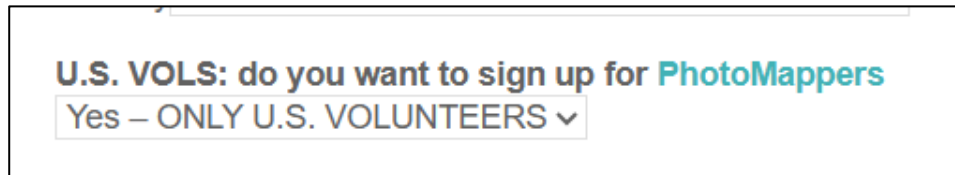
How to Become a Volunteer

Join the #PhotoMappers Team!

To sign up for #PhotoMappers, first joinGISCorps as a volunteer

<https://www.giscorps.org/join-giscorps/>

Under “Do you want to sign up for PhotoMappers” be sure to select “yes!”



U.S. VOLS: do you want to sign up for PhotoMappers

Yes – ONLY U.S. VOLUNTEERS ▾

You'll then receive an invitation to join our slack channel. All information for new volunteers is available in our Volunteer Portal:

<https://experience.arcgis.com/experience/0fb7a0dfdc13402e80554bef2fab03bd/page/Home-Page->

Contact Us



#PhotoMappers

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