



Public Use of USGS Web Data During Floods

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Overview

- **Very Brief Intro to USGS/Cooperative Program and Data Distribution Tools**
- **Evolution of Web Technologies at USGS**
- **Web Analytics – What? Why? How?**
- **Let's look at some data....**

Credits/Acknowledgements

- **Ramona Neafie (USGS), Joe Vrabel (USGS), Florence Thompson (USGS), Data and Spatial Studies Section (USGS)**

Introduction to USGS

- Dept. of Interior - Founded in 1879
- Six Science Mission Areas
 - **Water Resources**
 - Ecosystems
 - Energy, Minerals and Environmental Health
 - Core Science Systems
 - Climate and Land-Use Change
 - Natural Hazards
- Nationwide about 9,000 employees
- Conduct interdisciplinary scientific monitoring, assessment, and research...
distribute that information to the public

- Federal Agency
- Scientific Mission
- Non-Regulatory

Water Resources Mission –

...to provide hydrologic information and understanding needed by others to achieve the best use and management of the Nation's water resources. **USGS accomplishes this mission in cooperation with State, Local, and Other Federal Agencies.**

USGS Data Distribution Outlets

- **Publish Research** – USGS report series via Pubs Warehouse (<http://pubs.usgs.gov>), journal articles, conference presentations-papers
- **Media** – Press releases, information products, in-person interviews, public outreach
- **Map/GIS** – National Map, ScienceBase, Data.gov, Geodata.gov, US Topo
- Many more websites (earthquakes, volcanoes, climate change, oil/gas, [water...](#))

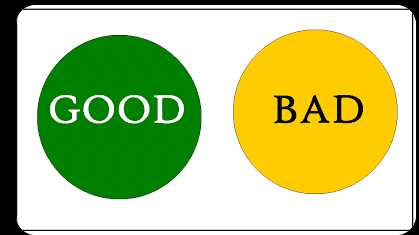


Delivery of Water Data???



- NWIS Web – <http://waterdata.usgs.gov>
 - Current and historical data (SW/GW/WQ/WU)
- Water Watch – <http://waterwatch.usgs.gov>
 - Realtime conditions
- Water Alert – <http://water.usgs.gov/wateralert>
 - Text message system to get notifications
- TXWSC homepage – <http://tx.usgs.gov>
 - Connections to NWIS and local water information
- Web services – <http://waterservices.usgs.gov>
 - Data delivery for application developers

The challenge (good/bad)



- Incredible variety in data products
- Many, many websites and outlets
- Feedback from data users is sparse and sporadic
- For an agency that relies data integrity and informatics, we have limited information on how users are interacting with our webpages
- Made major changes to webpages over the years...

World Wide Web – Early 2000s :)

- **Static Web Pages**
 - Lots of text, out of date information?
- **Detailed Science Information**
 - Too many details
 - Small audience
- **Mapping Applications**
 - Replicate Desktop GIS Capabilities
 - Slow, Poor Performance
 - Few Opportunities to Customize



What happened in the last 5-7 years?

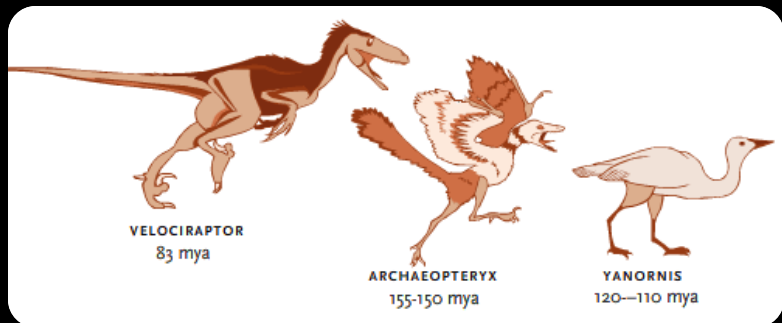
- Revolution/Evolution
- Google Maps/Earth
- Mobile technology
- Open source tech
- Maps everywhere
- Infographics
- Use of social media
- **Focus on communicating to both technical and non-technical audience**



Transition at USGS TXWSC

- Over the last 5 years, have slowly transitioned from data production shop to web visualization and geospatial analysis
- Utilized and developed staff talent to build a team with diverse set of skills, infrastructure to sustain growth in this arena
- Significant R&D to add new tools and capabilities

*Developed and powered by the
USGS Texas Water Science Center*



Web Analytics

- **Wikipedia** – *“...is the measurement, collection, analysis and reporting of web data for purposes of understanding and optimizing web usage.”*
- **Newer concept for many agencies, although business has been taking advantage**
- **Key Words:** Collection of web data to better understand web usage



Web Analytics – Common Tools

- **Google Analytics (Free)** – Commonly used for web analysis
- **Yahoo Web Analytics (Free)** – Like Google but more commerce based analysis
- **Crazy Egg (\$)** – Heat maps and clickable usability analysis
- **ClickTale (\$)** – Record user interactions in detail
- **Optimizely (\$)** – User testing-scenario development
- **ForeSee** – User comments and surveys

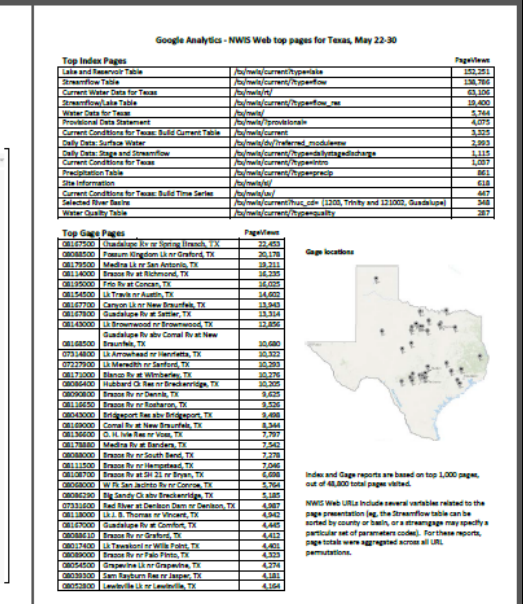
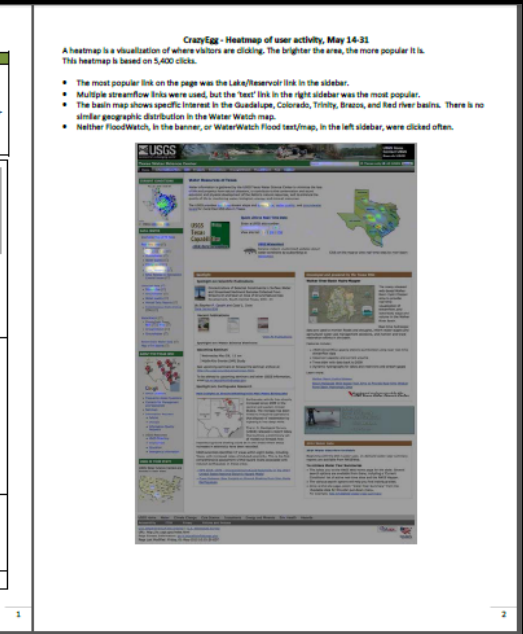
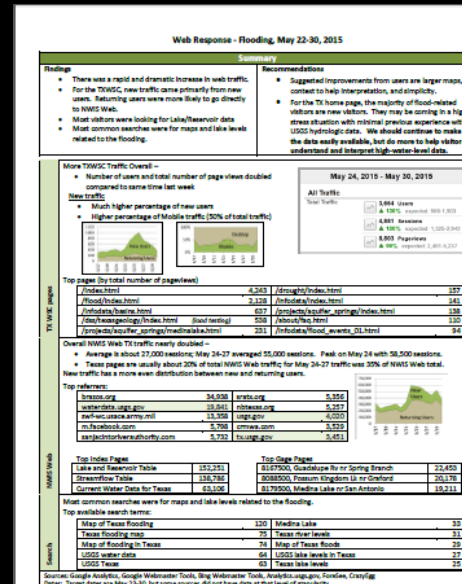


What can we learn?

- The setup – described by Jeff East
- Saturated ground from early May, followed by extreme, concentrated rainfall event produced historic flooding in the Blanco/San Marcos watershed
- Who came to our website, what did they look for, what information was accessed, and what feedback did they provide?

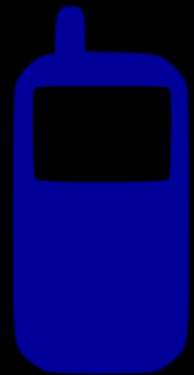
Reporting out

- Provided to management and web team for analysis
- Covers an executive summary of the event or new application release



Memorial Day Findings (May 22-30)

- There was a **rapid and large** increase in web traffic (2X weekly average)
- For the TXWSC, **traffic came primarily from new users**. Returning users were more likely to go directly to NWIS Web
- Most visitors were looking for **Lake/Reservoir data** over streamflow
- 37% of users were on a mobile device!



Stats of interest

- **Approx 350,000 sessions on NWISWeb Texas accessed/downloaded data**
- **Peak on May 24 with 58,500 sessions**
- **35% of the total national traffic to NWISWeb came from Texas, typically around 20%**
- **Top search terms (in order): Maps of Texas flooding, Texas flooding map, Map of flooding in Texas, USGS water data, USGS Texas, Medina Lake, Texas streamflow**

Crazy Egg

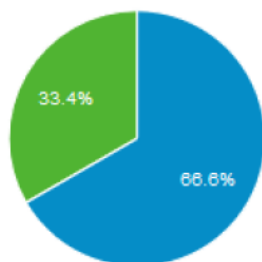
- Heatmap is a visualization of where visitors are clicking. The brighter the area, the more frequently this area is selected



Google Analytics

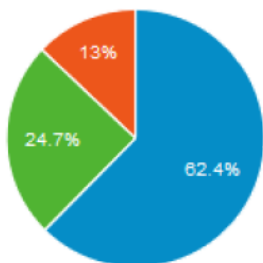
New vs Returning

■ New Visitor ■ Returning Visitor



Device

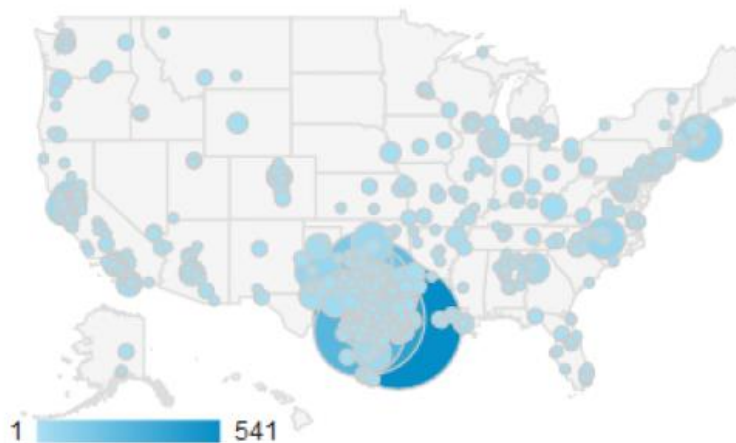
■ desktop ■ mobile ■ tablet



Top Cities

City	Sessions
Houston	541
Austin	406
San Antonio	267
Dallas	218
Fort Worth	167
Wichita Falls	139

Top Visitor Locations



Sessions



Users



Pageviews



Foresee – User comments

Suggested Improvements	
Satisfaction	Comment
85	List pool levels on real time lake/reservoir level charts.
89	definitions improvements;ie what does "owc" mean?
89	Allow user to pick 5-10 "favorites" that would come up in a dashboard type report.
93	Zoomable map of Texas and gauge links.
93	designate normal lake level on text portion
96	tutorial for gauge data & interpretation
100	I would like more numbers of cfs flows and times
100	have a tab just for lake levels showing the full capacity level and a + or - feature
100	Advertise more! Everyone needs to know where they can get exact information without waiting for the news.
85	measure precipitation at more locations. when I have the upstream and downstream results, I can more accurately approp for our property.
74	compare flood stage to current data in larger text format
74	easier link to gage descriptions
74	Show results more often than hourly, when heavy weather is occurring.
67	Having the data closer to the top of the page.
63	Clearer links/descriptions to help get to a page quicker
44	Should have lake level relative to normal level.
74	could just spell out flood stage levels to current levels
67	The river basins are not listed in alphabetial order, so I needed to scroll through to find the one I was looking for.
63	Clearer instructions/links to locations
56	Need to know the Ac/Ft in the reservoirs. Only a few sites have this information.
44	cannot tell flood stage of lakes. Should have level relative to normal level.
89	Allow another level of map zooming. It would be helpful for big states (like Texas - where I live) to be able to zoom to an intermediate level such as the county rather than directly from the state to the individual station.

Top Gage Pages

PageViews

08167500	Guadalupe Rv nr Spring Branch, TX	22,453
08088500	Possum Kingdom Lk nr Graford, TX	20,178
08179500	Medina Lk nr San Antonio, TX	19,211
08114000	Brazos Rv at Richmond, TX	16,235
08195000	Frio Rv at Concan, TX	16,025
08154500	Lk Travis nr Austin, TX	14,602
08167700	Canyon Lk nr New Braunfels, TX	13,943
08167800	Guadalupe Rv at Sattler, TX	13,314
08143000	Lk Brownwood nr Brownwood, TX	12,856
08168500	Guadalupe Rv abv Comal Rv at New Braunfels, TX	10,680
07314800	Lk Arrowhead nr Henrietta, TX	10,322
07227900	Lk Meredith nr Sanford, TX	10,293
08171000	Blanco Rv at Wimberley, TX	10,276
08086400	Hubbard Ck Res nr Breckenridge, TX	10,205
08090800	Brazos Rv nr Dennis, TX	9,625
08116650	Brazos Rv nr Rosharon, TX	9,526

Positive outcomes...

- USGS is providing access to lots of data and information during events
- USGS database/infrastructure and network bandwidth handle increased traffic well
- Cooperators are handshaking with USGS websites during events – NWS, BRA, USACE, SJRA, SRA, City of New Braunfels, CRMWA, many more... (top referrals)
- TEAMWORK!

Conclusions? My impressions

- Mobile development critical, growing usage
- Deep interest in mapping applications for delivery of water data, expected by users
- Water data too technical at times – enhanced help/tutorials would benefit users
- Lake level information incomplete
- Too many abbreviations, could rethink some layout elements/design
- Even though USGS is distributing more data than ever, users continue to request more data points and higher frequency

Application Release – June 2015

- Texas Geology Web Map Viewer
- USGS Top Story! *“Interactive Geologic Map of Texas Now Available For Online Viewing: Find Extinct Volcanoes, Oil and Gas Formations, and Where Dinosaurs Roamed”*
- National and State Press Release with TNRIS/TWDB partnership
- Source: 1:250,000 Geologic Atlas of Texas (UT-BEG), 38 map sheets were digitized

Purpose and scope

- **Statewide, 1:250K this is the highest resolution available**
- **Audience – General Public, K-12, Universities, Industry, Natural Resource Developers, more**
- **To be able to provide baseline descriptions about surface geology and rock age via web browser in one-stop-shop**
- **Share the “Story of Texas Geology”**

Explore

TEXAS GEOLOGY

1



*Zoom in
to your
area of
interest*

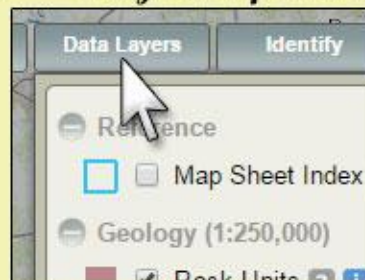
-OR-

*Search for
a specific
location*



2

*Turn on Data
Layers of interest*

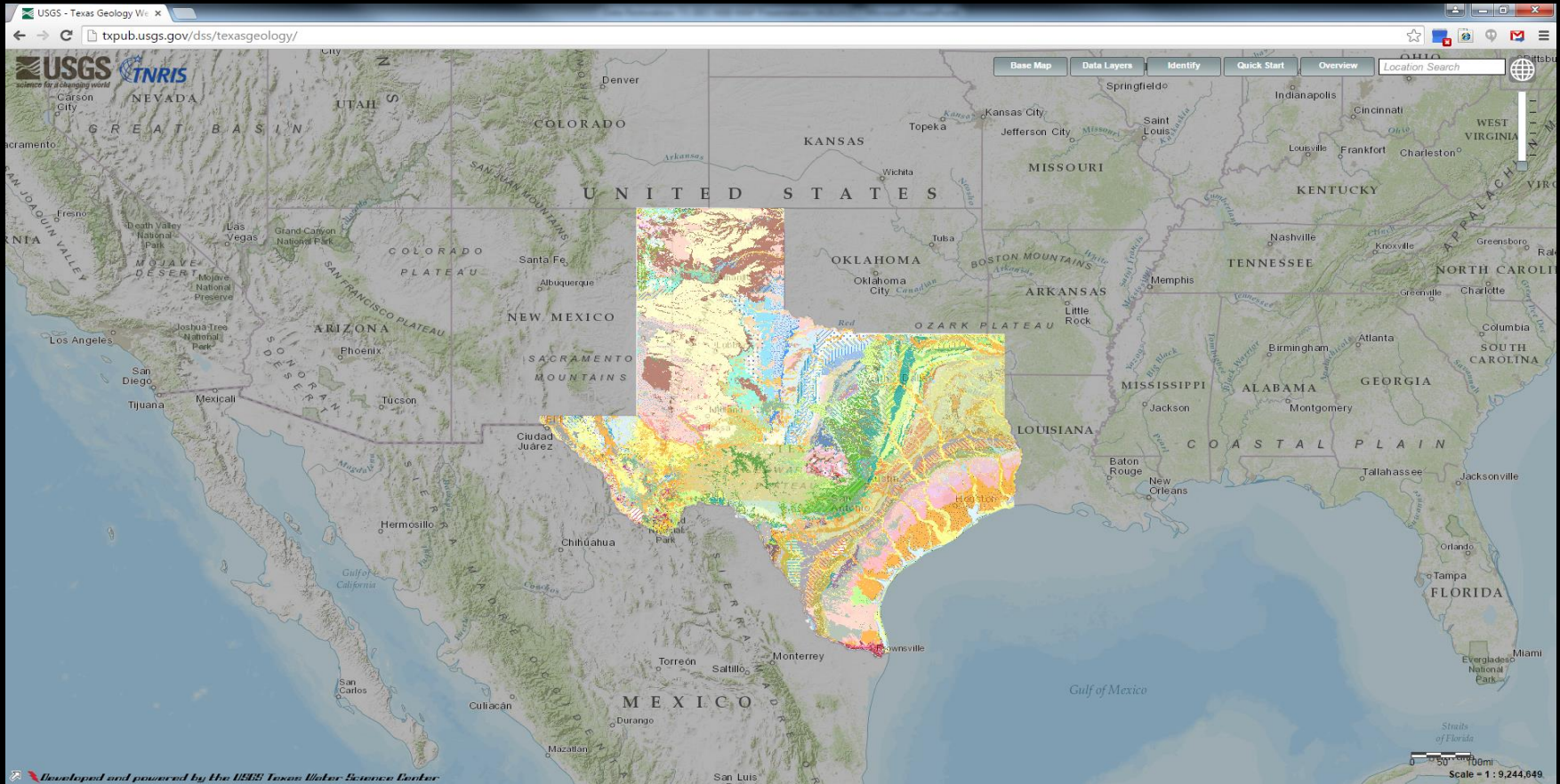


3

*Click the
identify
button to
Explore
Texas
Geology!*



Time for the demo?



<http://txpub.usgs.gov/dss/texasgeology>



Public Response

News Articles

USGS June 2, 10:00 AM	USGS Release: Interactive Geologic Map of Texas Now Available Online	
Daily Mail June 4, 16:48 EST	Explore the REAL Jurassic park: Interactive map lets you dig deep into the history of Texas' rock formations	In-page app shows Viewer directly
Live Science June 4, 7:26am ET	Interactive Map Lets You Find Dinosaur Tracks, Extinct Volcanoes	
Yahoo Science News June 7, 5:10 PM	Interactive Map Lets You Find Dinosaur Tracks, Extinct Volcanoes	redistributed from Live Science
San Antonio Express-News June 8, 2015	New interactive geologic map shows how prehistoric rock formations shape Texas cities & landscapes	Created a 'city quiz' from Viewer
KRMG (Tulsa) June 9, 1 AM	Interactive map lets you see fault lines, oil and gas formations	





Questions or comments?

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