

WATER USE ANALYSIS FOR SHALE DEVELOPMENT IN THE UNITED STATES

Authors:

J. Daniel (Dan) Arthur, P.E., SPEC

H. William (Bill) Hochheiser

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ALLCONSULTING

Agenda

- Water Sourcing Considerations
- FracFocus Overview
- FracData
- U.S. Data Overview
- Water Use Analysis
 - Plays
 - States
 - Operators
 - Time trends
- Summary



Water: An Array of Considerations

- **Logistics:** Methods for transporting water and resultant wastes can carry wide variations in costs, liabilities, manpower, community relations, and environmental implications.
- **Sourcing:** Choosing options for sourcing that is best suited to a particular play or region is critical.
- **Availability:** Many factors affect the availability of water – precipitation, seasonal variation, ground water availability, water law, transportation, water needs, completion, other uses, etc.
- **Laws/Regulations:** State water laws vary substantially, water withdrawal, tracking and reporting requirements vary and may change quickly
- **Volume:** How much water is needed?

Fresh Water Facts

- **Relative Use:** Most discussion of water includes little in the way of relative use or actual cumulative impacts relative to availability.
- **Comparative Use:** Most unconventional plays will amount to a fraction of one (1) percent of overall uses in a region.
- **Preferred:** Use of fresh water (surface or groundwater) is generally preferred as it is most desired by landowners (in general), offers adequate capacity, is typically the least expensive option, and offers the best results for drilling & fracturing.
- **Alternatives:** Other options often do not provide the same results and are more expensive.

Data on actual water use can help with understanding future needs and impacts.

FracFocus Overview

- FracFocus 1.0 launched in April 2011.
- Voluntary industry HF chemical disclosure system – Excel-based
- FracFocus 2.0 Launched in November 2012; both versions active
- FracFocus 1.0 turned off on June 1, 2013
- FracFocus 2.0
 - Uses Extensible Markup Language (XML) files
 - Searchable data options added (CAS #, Ingredients, Dates)
 - Better data validation/error checking



FracData

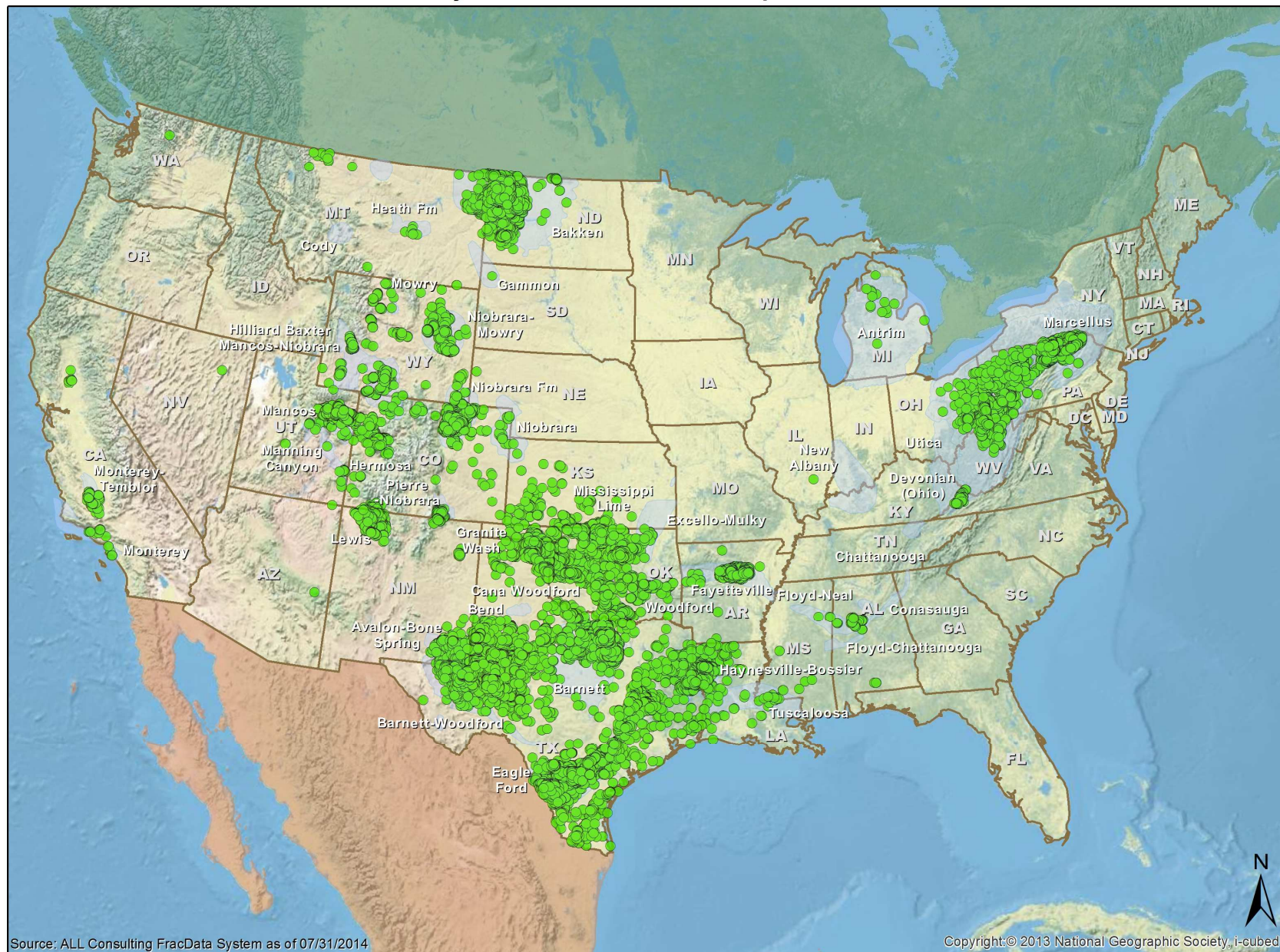
- FracFocus is owned by the Ground Water Protection Council & Interstate Oil & Gas Compact Commission. ALL developed the system and maintains it.
- To facilitate a variety of analyses, ALL developed the “FracData” system. This system allows connectivity to other data sets (e.g., regulatory agency databases, GIS data sets, etc.) for more diverse analyses.
- The data for this presentation comes from ALL’s “FracData” system.



80,000+
Disclosures

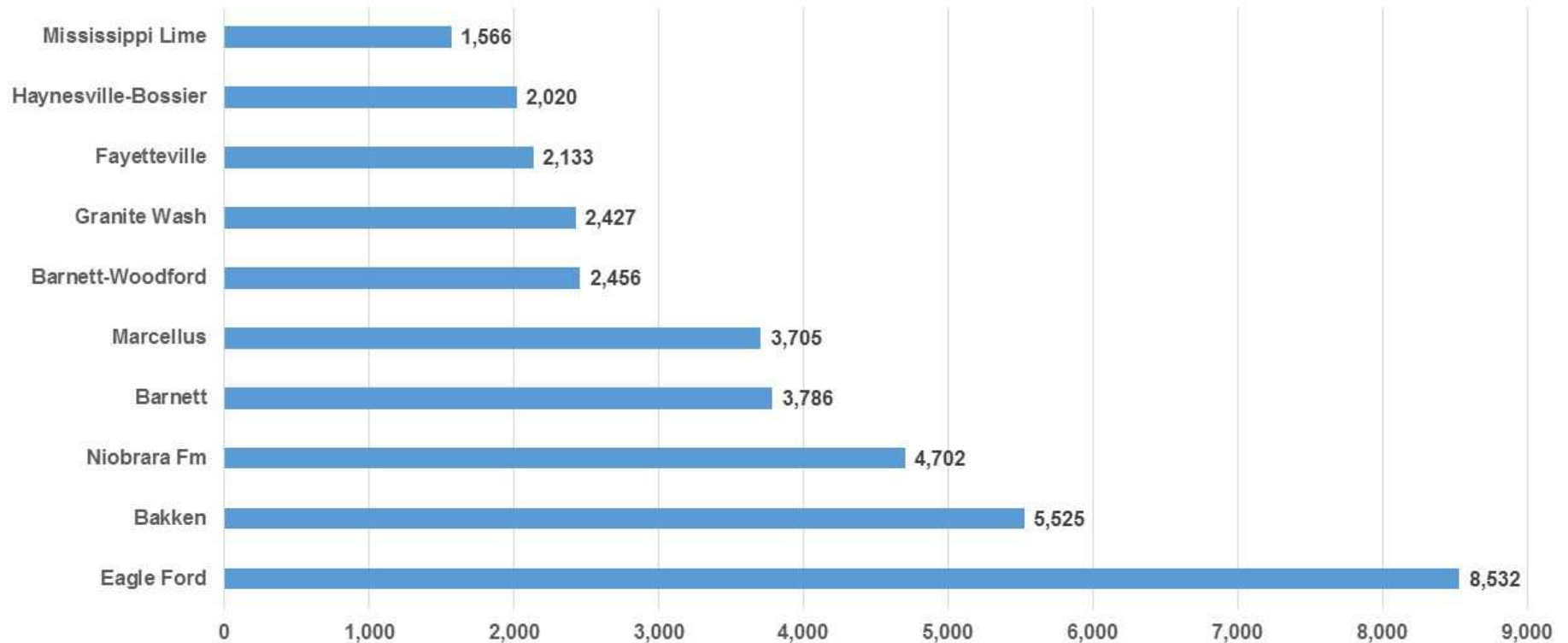
U.S. FRACFOCUS DATA OVERVIEW

FracFocus Wells: Well Site Locations by Disclosures: Jan 2011 - April 2014



Disclosure Summary: Shale Plays

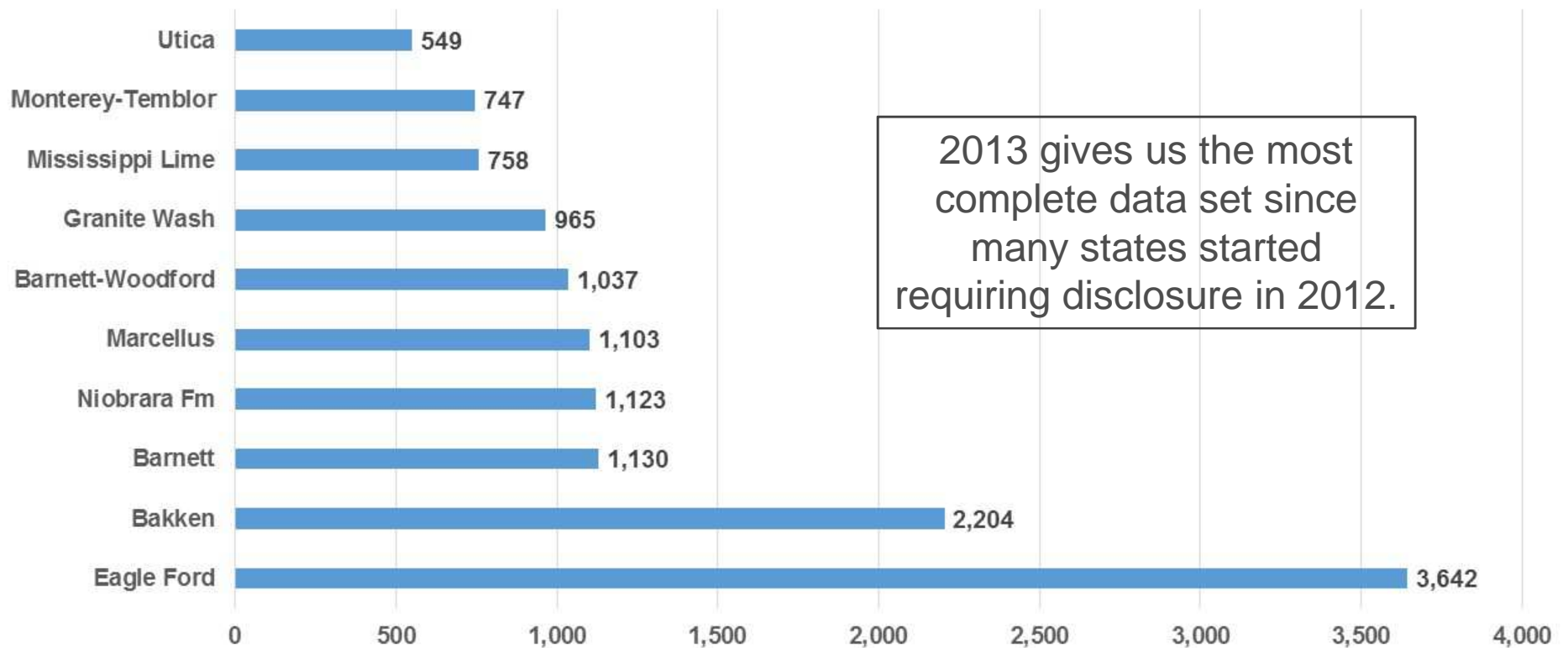
Top 10 Plays Number of Disclosures Jan 2011 to July 2014



Source: ALL Consulting FracData system as of
10/12/2014

Disclosure Summary: Shale Plays (2013)

Top 10 Plays Number of Disclosures Jan 2013 to Dec 2013

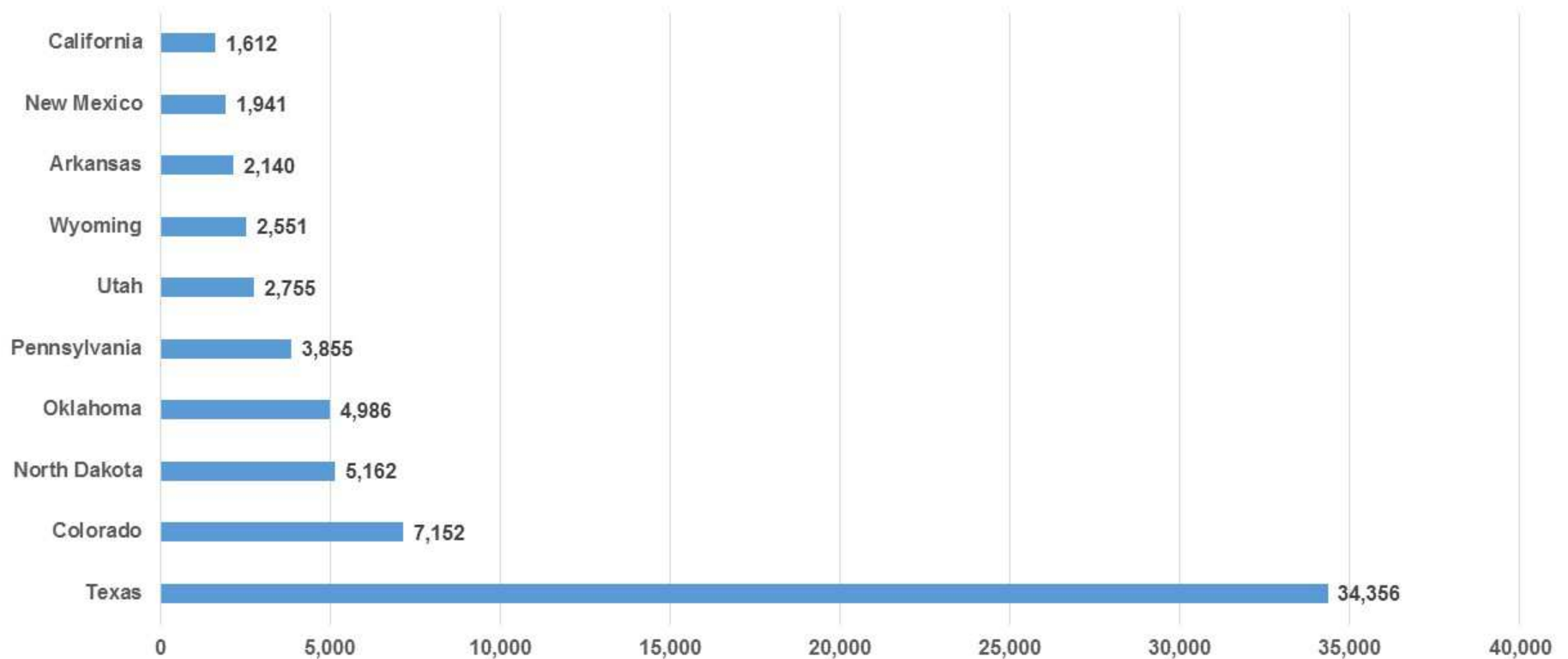


2013 gives us the most complete data set since many states started requiring disclosure in 2012.

Source: ALL Consulting FracData system as of 10/12/2014

Disclosure Summary: States

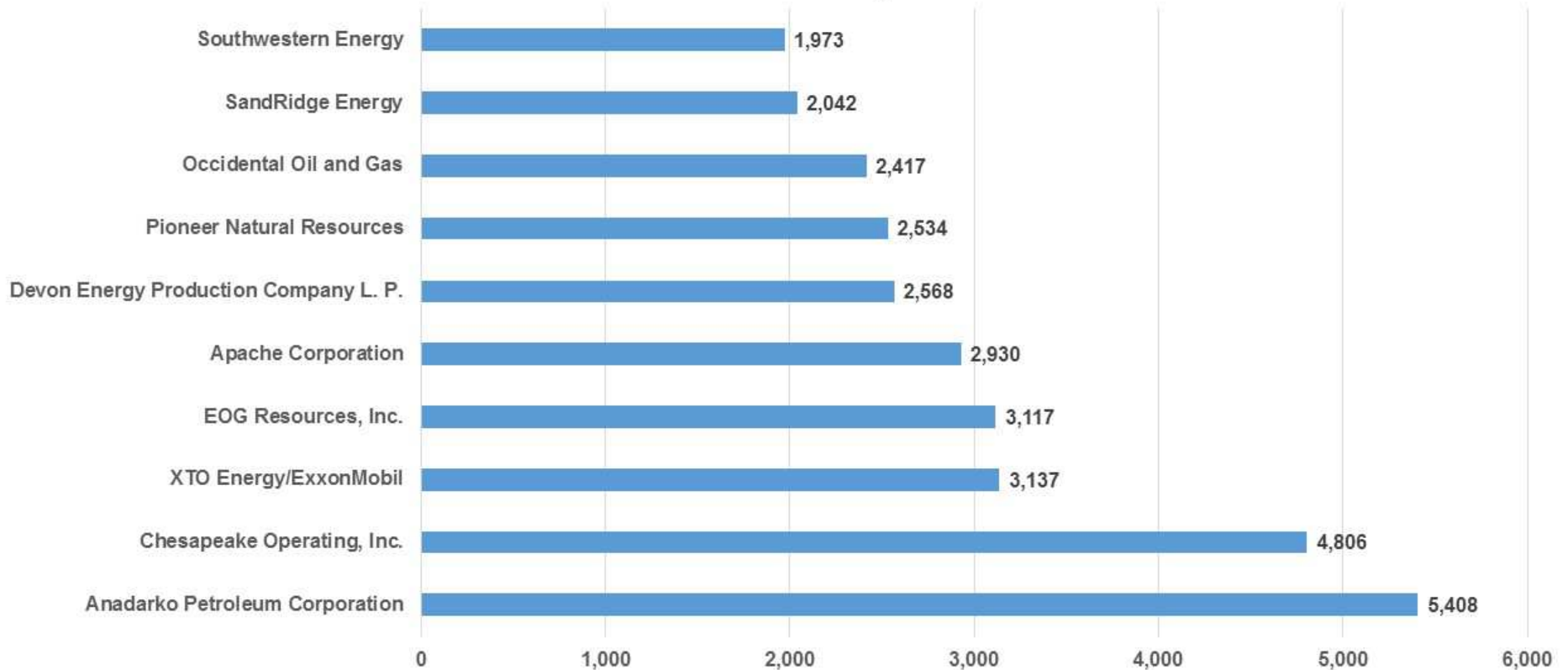
Top 10 States Number of Disclosures Jan 2011 to July 2014



Source: ALL Consulting FracData system as of
10/12/2014

Disclosure Summary: Operators

Top 10 Operators Number of Disclosures Jan 2011 to July 2014



Source: ALL Consulting FracData system as of
10/12/2014



FRACFOCUS WATER USE ANALYSIS

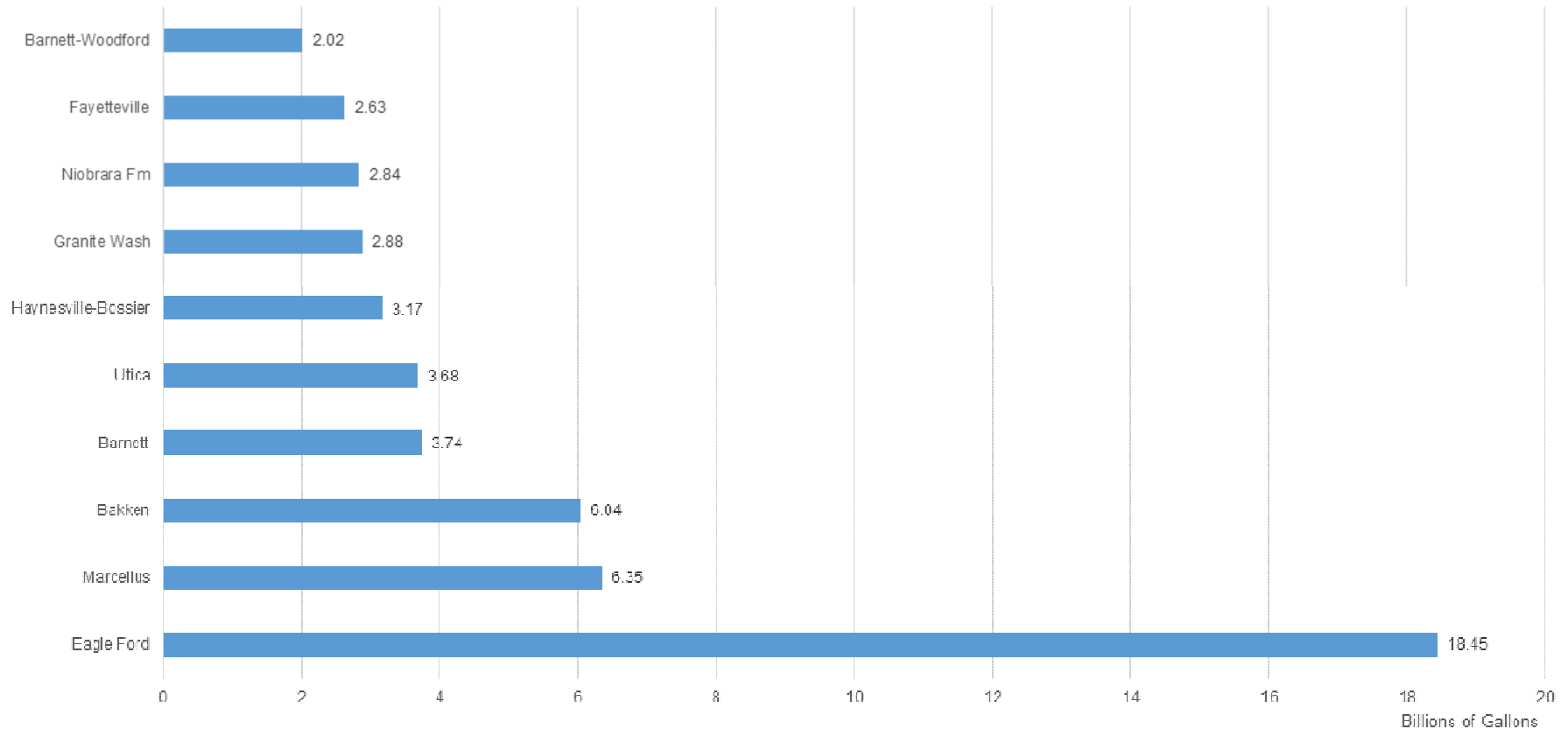
October 2014

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13

Water Summary: Plays Total Use

Top 10 Plays Total Water Use Jan 2013 to Dec 2013



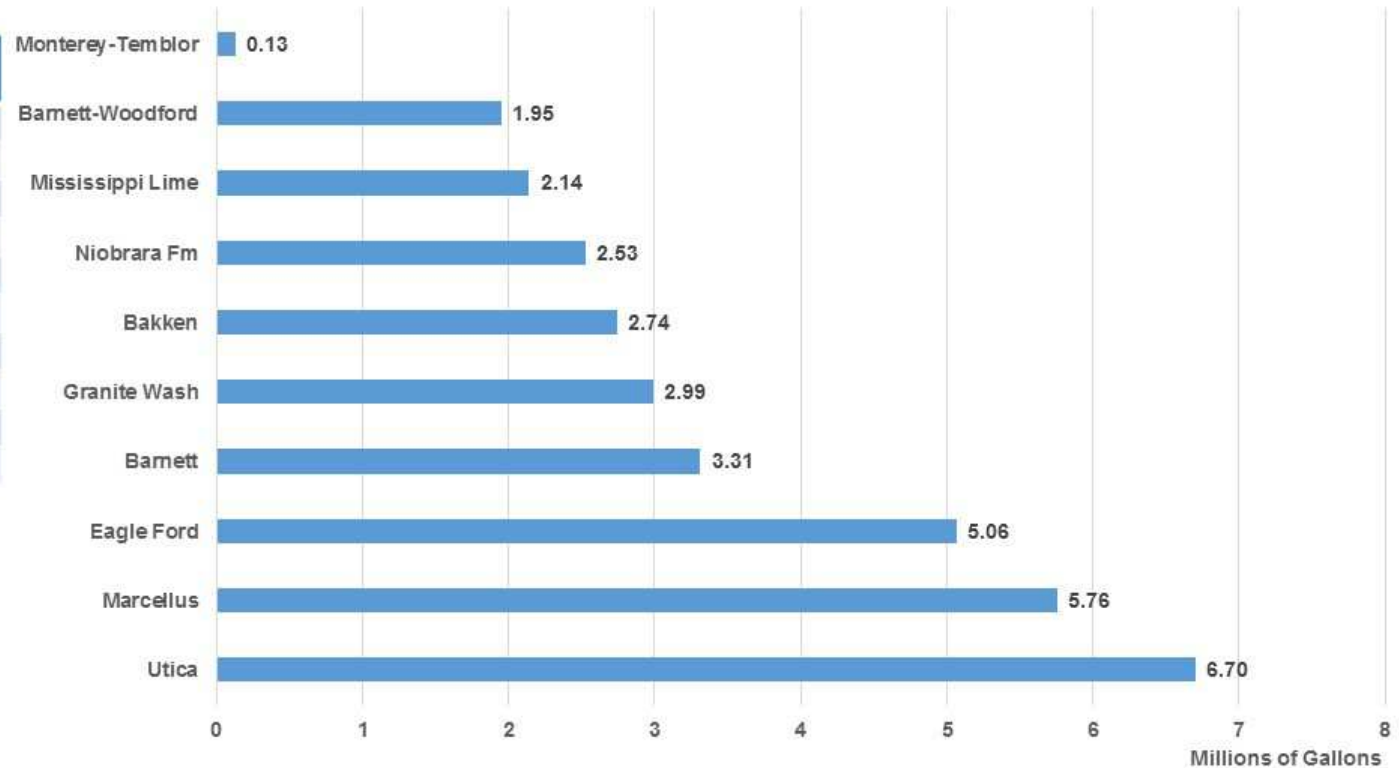
Data Range For Disclosures: Jan 2013 to Dec 31st 2013

Source: ALL Consulting FracData system as of
10/12/2014

Water Summary: Plays Average Use

Average Water Use per Job Top 10 Plays Highest Number of Disclosures Jan 2013 to Dec 2013

Play	Number of Disclosures
Eagle Ford	3,642
Bakken	2,204
Barnett	1,130
Niobrara Fm	1,123
Marcellus	1,103
Barnett-Woodford	1,037
Granite Wash	965
Mississippi Lime	758
Monterey-Temblor	747
Utica	549

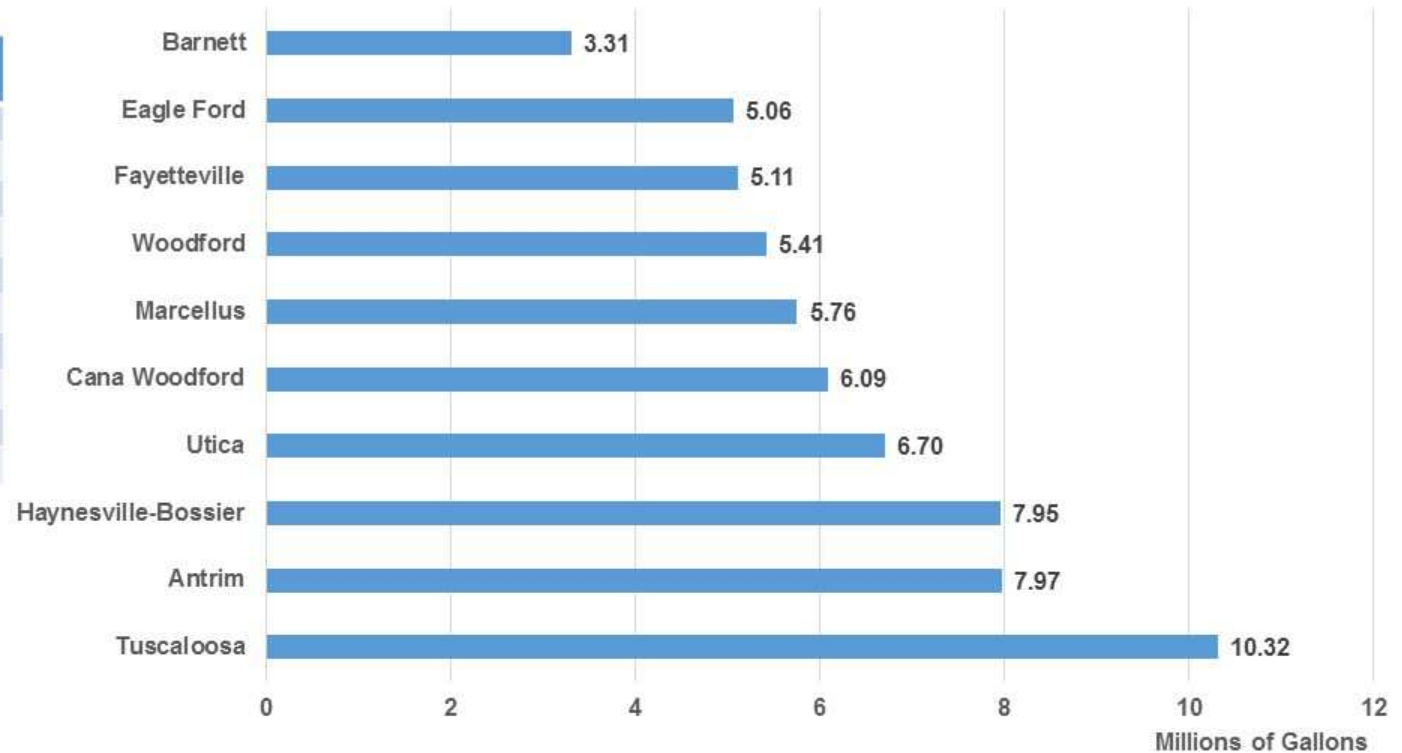


Source: ALL Consulting FracData system as of 10/12/2014

Water Summary: Plays Average Use

Average Water Use per Job Top 10 Plays with the Highest Average Jan 2013 to Dec 2013

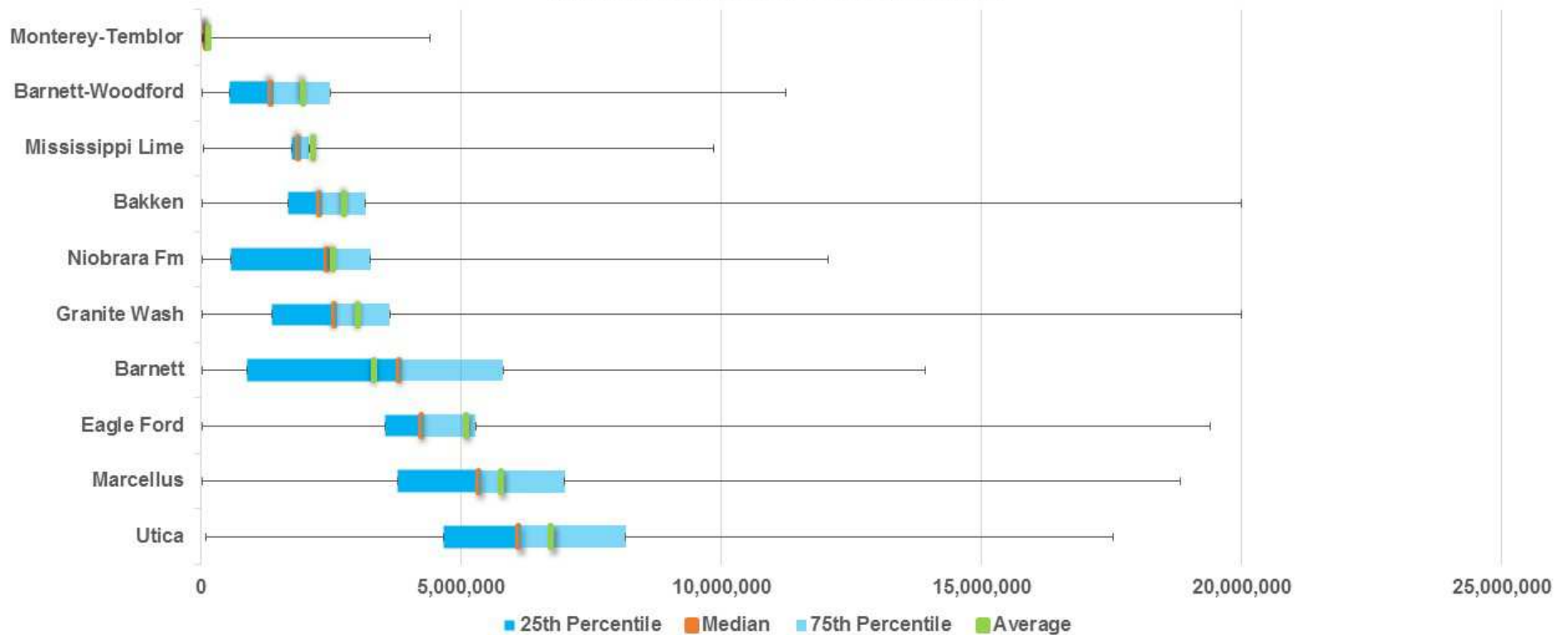
Play	Number of Disclosures
Tuscaloosa	14
Antrim	4
Haynesville-Bossier	398
Utica	549
Cana Woodford	256
Marcellus	1,103
Woodford	228
Fayetteville	514
Eagle Ford	3,642
Barnett	1,130



Source: ALL Consulting FracData system as of 10/12/2014

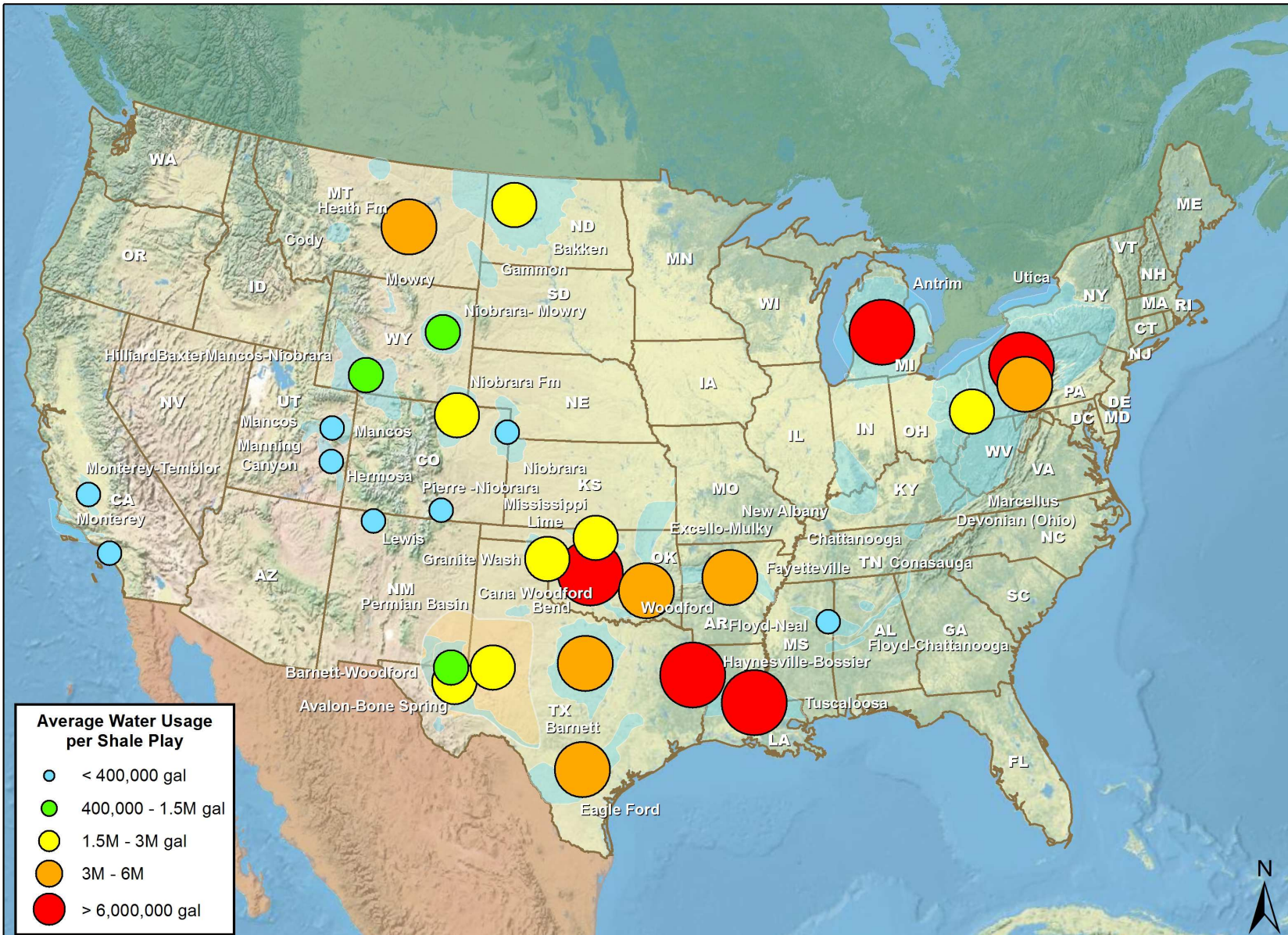
Water Summary: Range of Use per Well

Top 10 Plays Highest Number of Disclosures Water Use Range Jan 2013 to Dec 2013



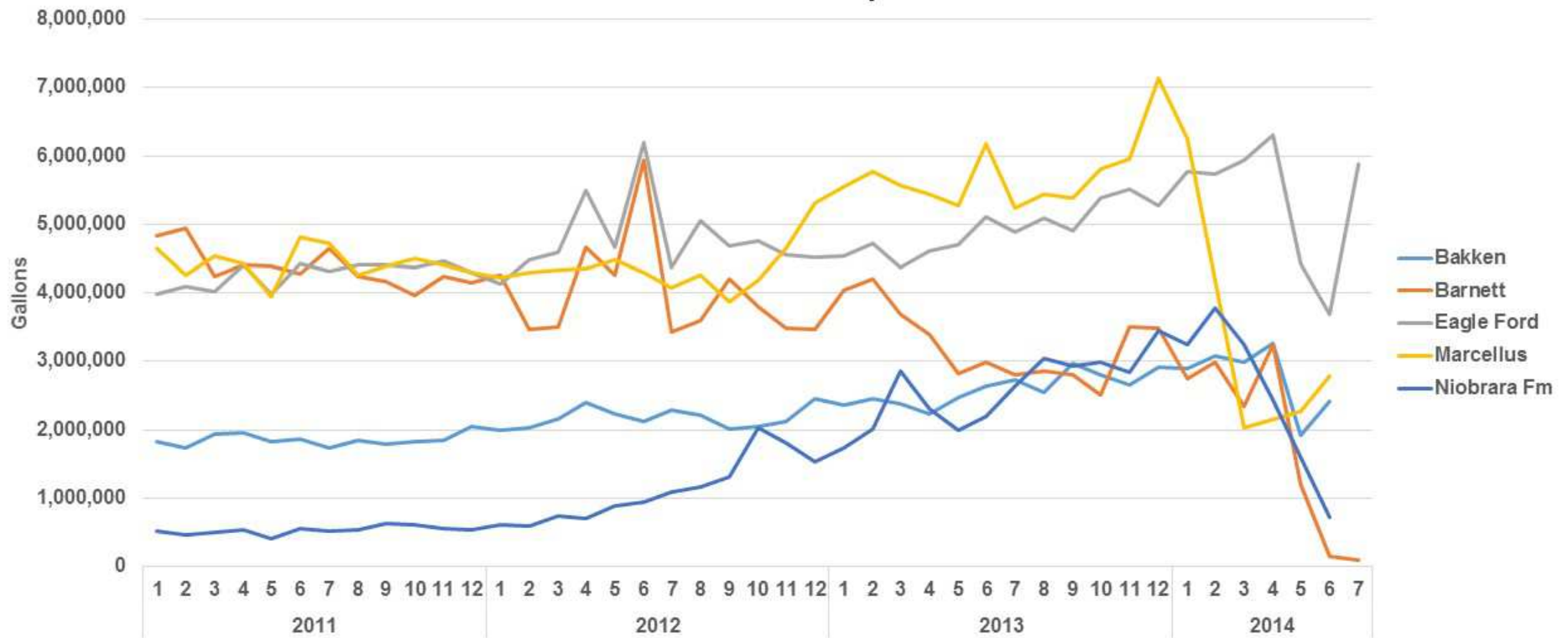
Source: ALL Consulting FracData system as of
10/12/2014

FracFocus Wells: Shale Plays by Average Water Usage: Jan 2013 - Dec 2013



Water Use Trends by Play

Top 5 Plays Highest Number of Disclosures
Average Water Use per Job
Jan 2011 to July 2014



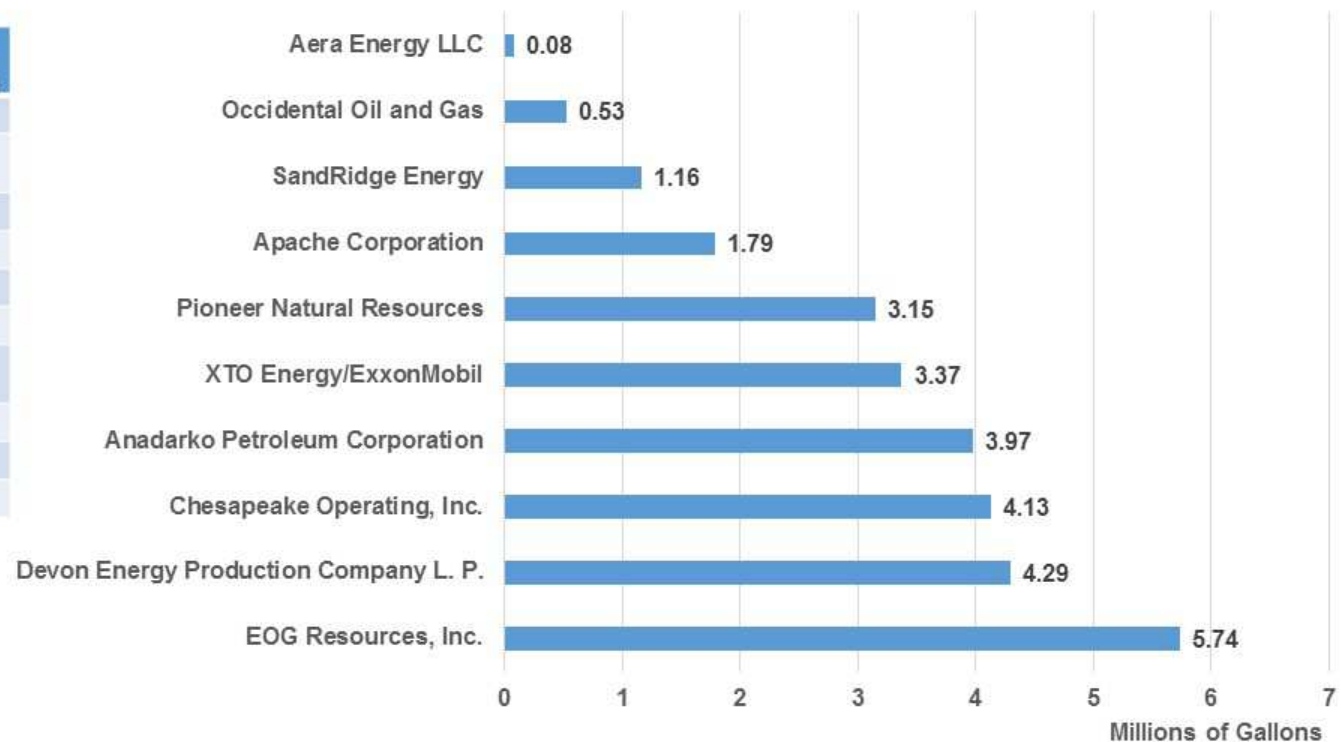
Source: ALL Consulting FracData system as of 10/12/2014

Water Summary: Operators' Average Use

Average Water Use Per Job

Top 10 Operators with Highest Number of Disclosures Jan 2013 to Dec 2013

Operator	Number of Disclosures
Chesapeake Operating, Inc.	1,337
Anadarko Petroleum Corporation	1,316
Apache Corporation	1,037
EOG Resources, Inc.	924
Occidental Oil and Gas	881
XTO Energy/ExxonMobil	877
Devon Energy Production Company L. P.	851
SandRidge Energy	666
Pioneer Natural Resources	648
Aera Energy LLC	580

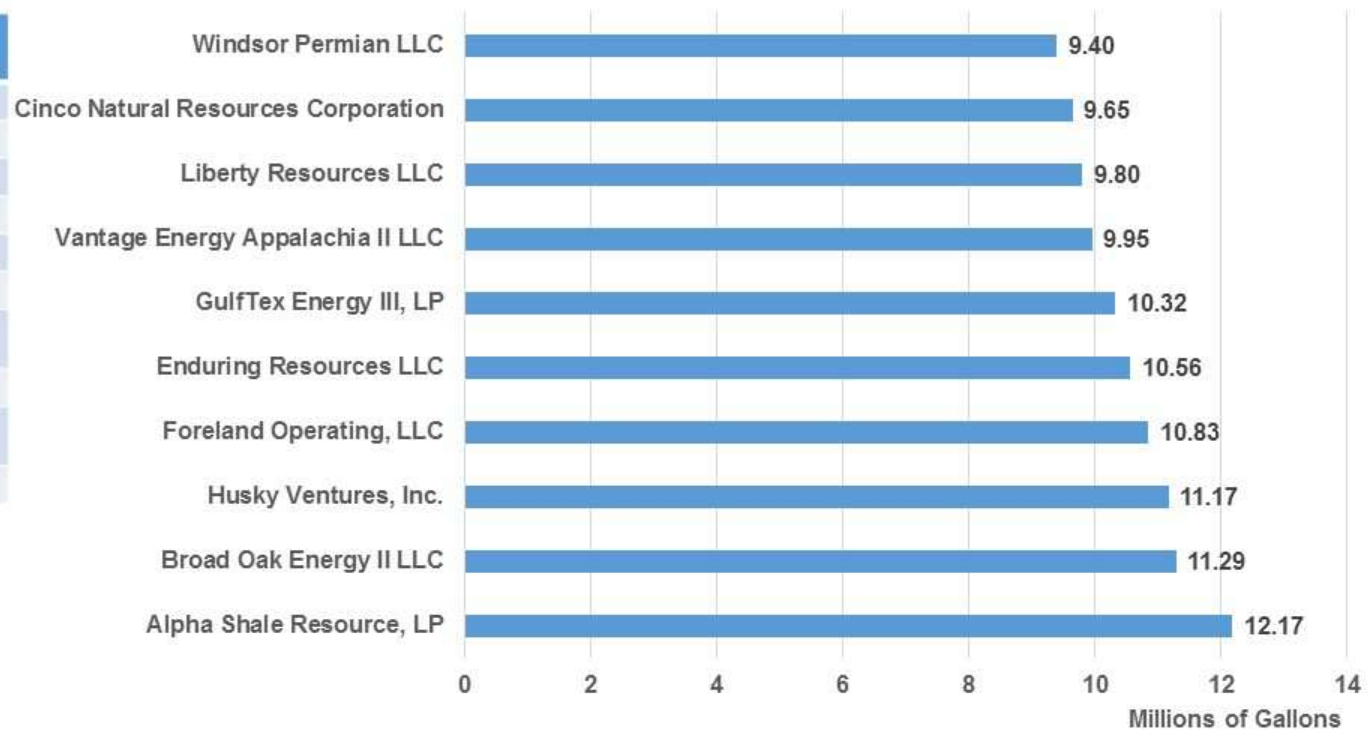


Source: ALL Consulting FracData system as of 10/12/2014

Water Summary: Operators' Average Use

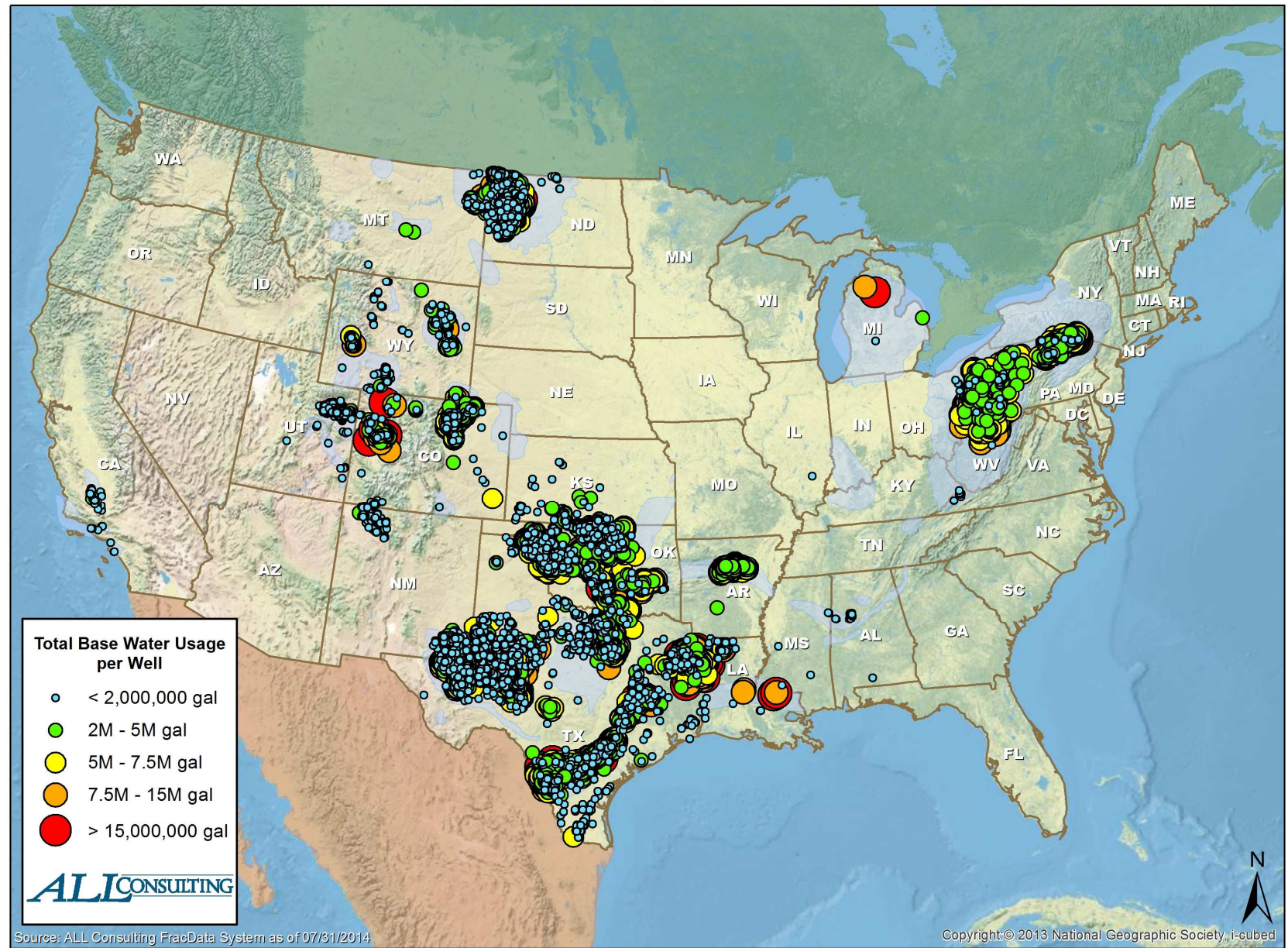
Average Water Use Per Job Top 10 Operators with the Highest Average Jan 2013 to Dec 2013

Operator	Number of Disclosures
Alpha Shale Resource, LP	10
Broad Oak Energy II LLC	3
Husky Ventures, Inc.	11
Foreland Operating, LLC	6
Enduring Resources LLC	34
GulfTex Energy III, LP	1
Vantage Energy Appalachia II LLC	2
Liberty Resources LLC	11
Cinco Natural Resources Corporation	12
Windsor Permian LLC	2

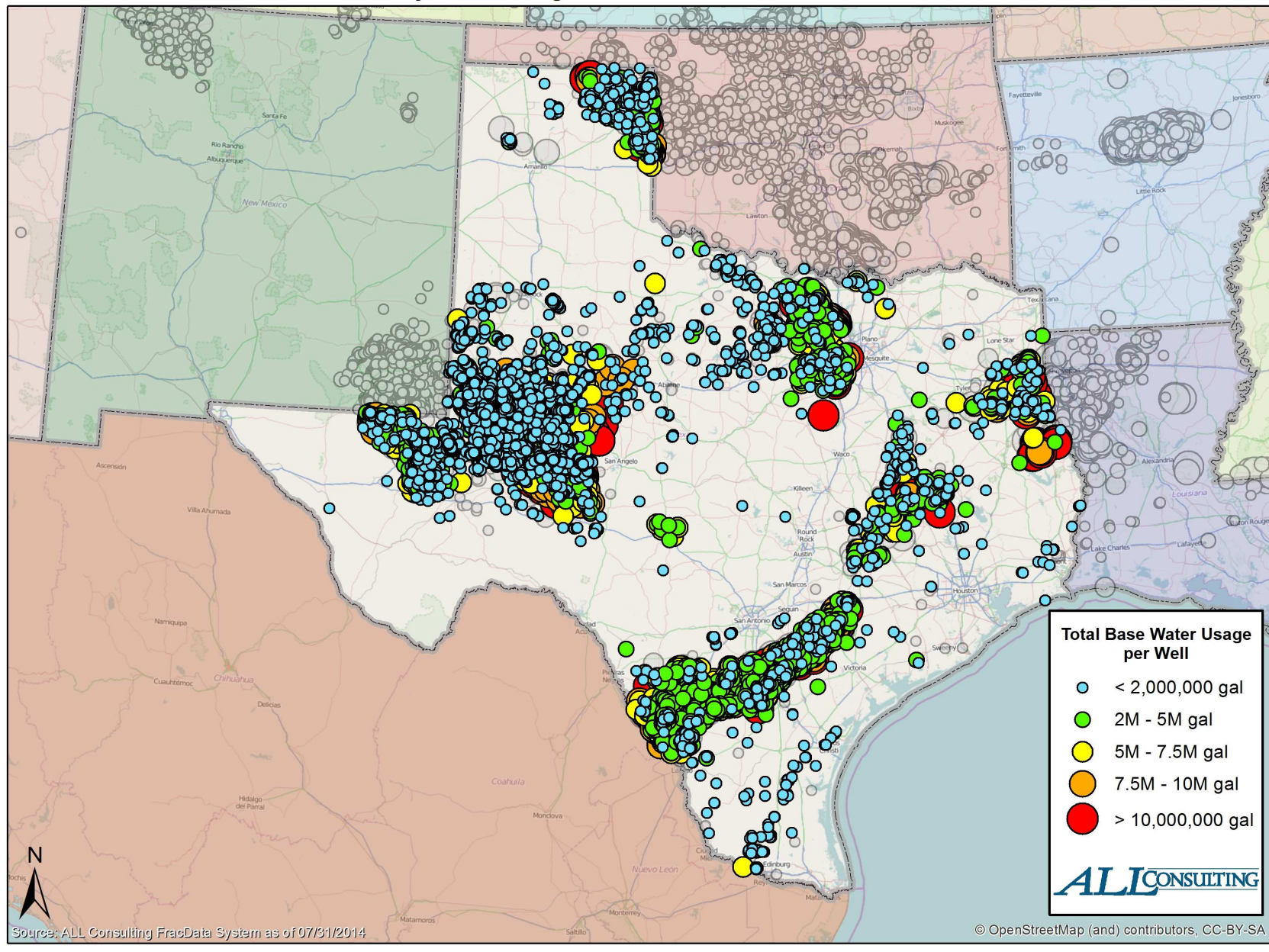


Source: ALL Consulting FracData system as of 10/12/2014

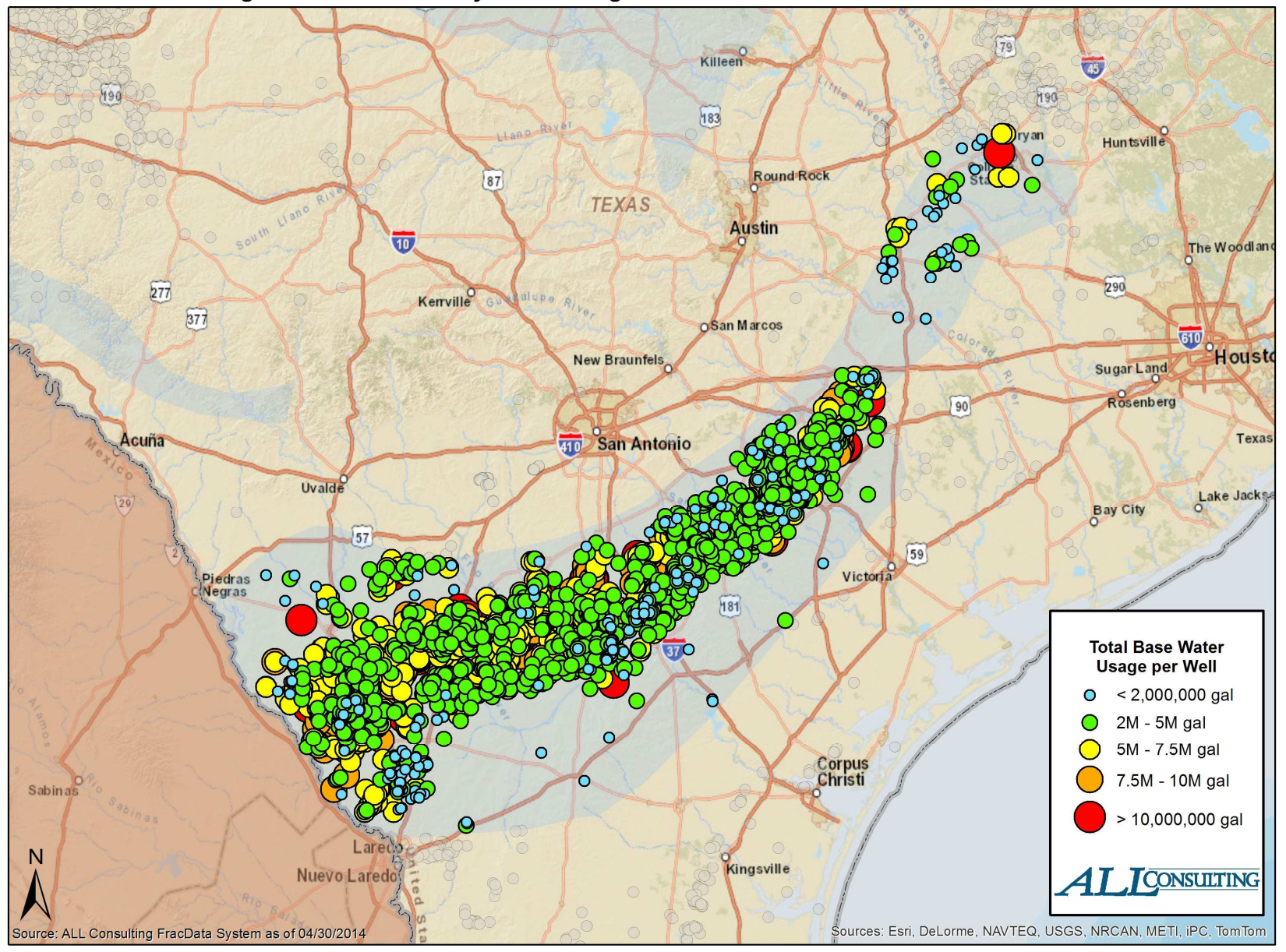
FracFocus Wells: Well Site Locations by Total Water Usage: Jan 2013 - Dec 2013



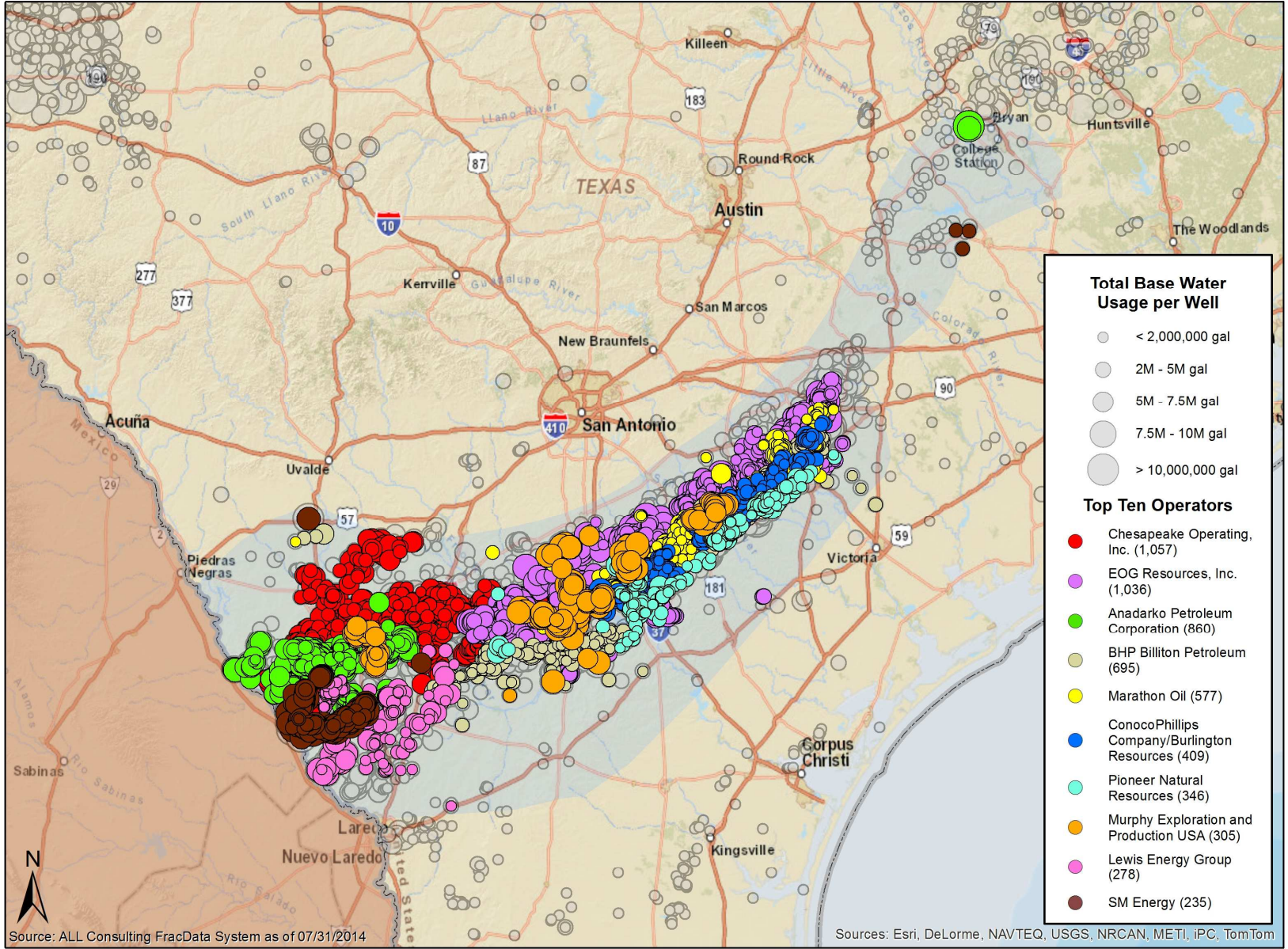
FracFocus Wells: Texas Locations by Water Usage: Jan 2013 - Dec 2013



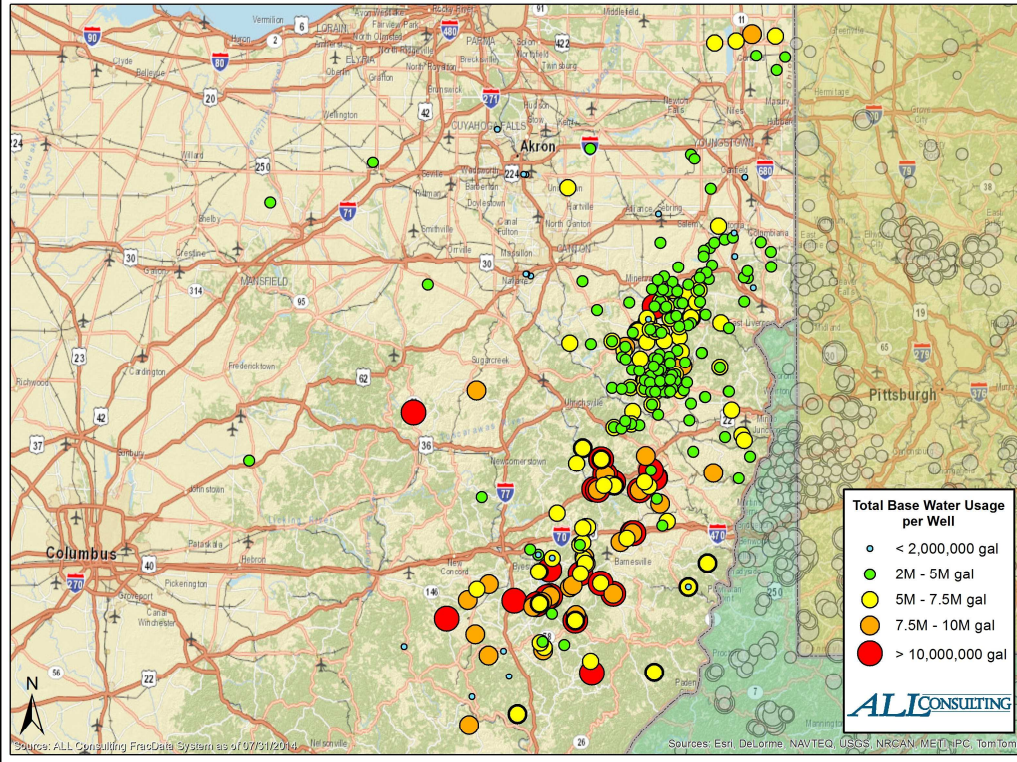
FracFocus Wells: Eagle Ford Locations by Water Usage: Jan 2013 - Dec 2013



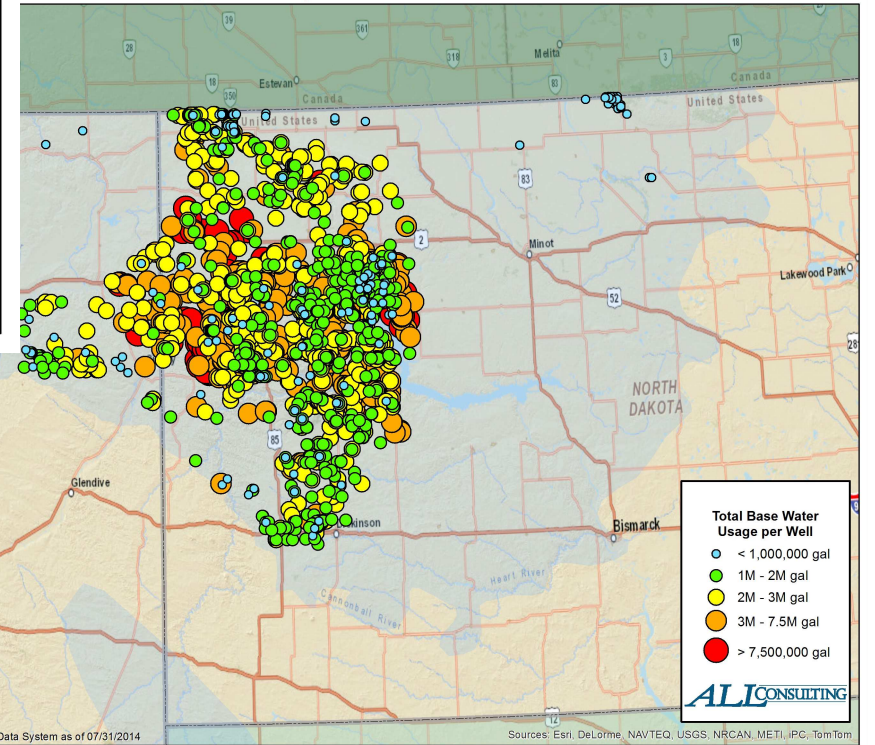
FracFocus Wells: Top Ten Eagle Ford Operators Total Water Usage by Disclosures: Jan 2011 - July 2014



FracFocus Wells: Ohio Utica Shale Locations by Water Usage: Jan 2013 - Dec 2013



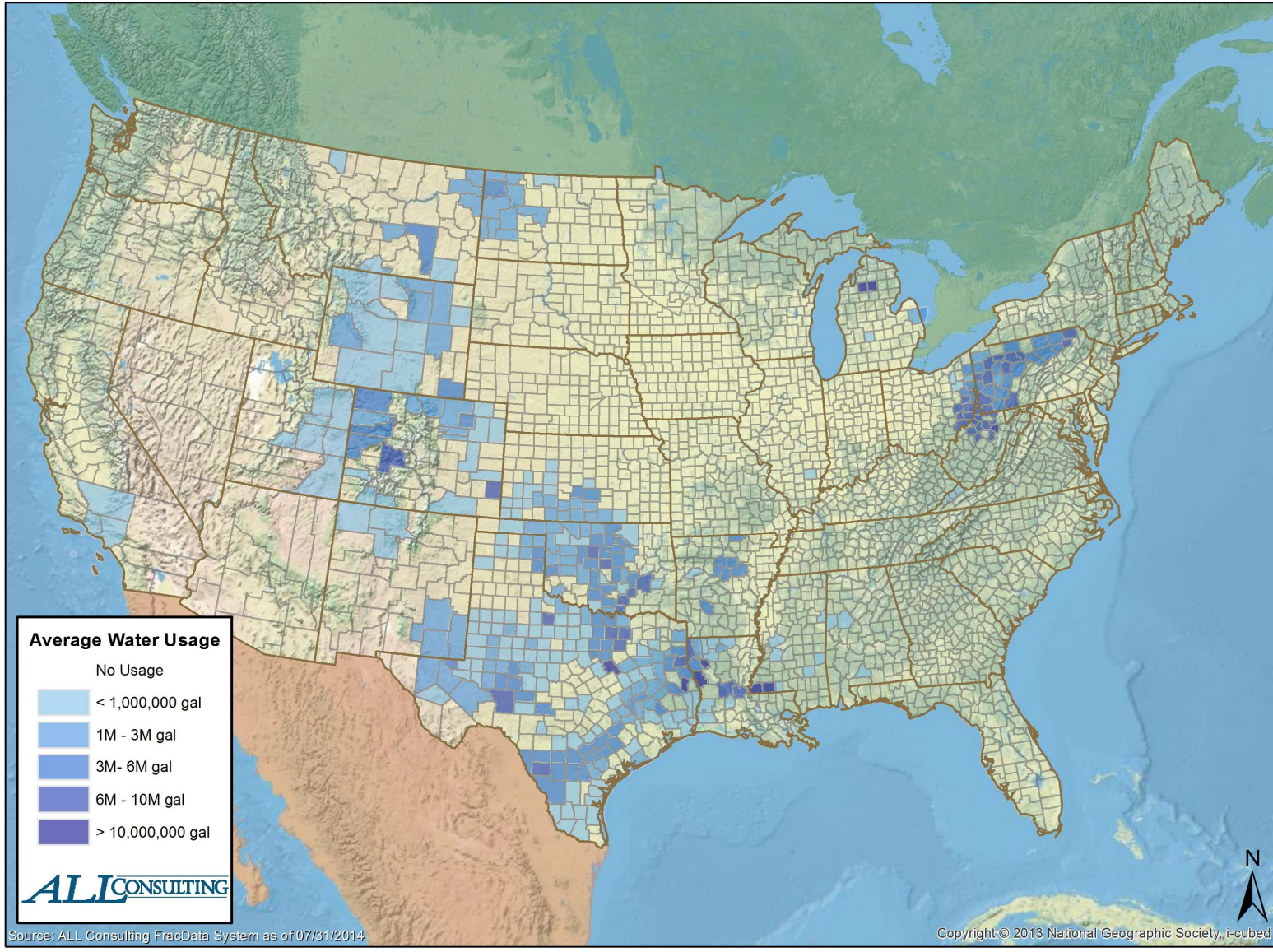
Bakken Locations by Water Usage: Jan 2013 - Dec 2013



Bubble maps can be done by:

- Location
- Operator
- Service company
- Proppants, chemicals
- Over time

FracFocus Wells: Average Water Usage by County: Jan 2013 - Dec 2013



Summary

- More than 80,000 disclosures represent a rich dataset that can be analyzed for industry and public policy use
- This data analysis could be used to project long term needs for industry infrastructure and new regulatory trends.
- This analysis can be used by individual companies to conduct long term planning, and to benchmark to ensure they understand how they compare with peers and that they are getting the most efficiency for their money.
- Combining FracFocus with other data bases, e.g., production reports or well/lateral spacing, can give insights into HF effectiveness, variations, and correlations.



Contact Information

**J. Daniel Arthur, P.E.,
SPEC**

Project Manager

darthur@all-llc.com

ALL Consulting

1718 S. Cheyenne Ave.

Tulsa, OK 74119

www.all-llc.com

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