

# Tracking Drought Impacts

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MONITORING AND REPORTING DROUGHT IN ARIZONA, MARCH 6, 2019

# What is a drought impact?

“An observable loss or change that occurred at a specific place and time because of drought.”



# Why track drought impacts?

**RESEARCH:** IMPROVE OUR UNDERSTANDING OF HOW BIOPHYSICAL INDICATORS RELATE TO SOCIAL AND ENVIRONMENTAL INDICATORS. NEED TIME SERIES DATA!

**RESPONSE & RECOVERY:** TO KNOW WHERE TO DIRECT RELIEF (INPUT, REGIONAL REPRESENTATION FOR U.S. DROUGHT MONITOR)

**PLANNING:** IMPACTS POINT TO UNDERLYING VULNERABILITY. TRACKING DROUGHT IMPACTS CAN HELP DECISION MAKERS FIGURE OUT WHERE TO FOCUS EFFORTS TO REDUCE VULNERABILITY TO THE NEXT DROUGHT.

**VALIDATE:** MODELS AND SATELLITE DATA NEED VERIFICATION TO MAKE SURE THEY MATCH REALITY ON THE GROUND (SANITY CHECK)



# Inventory of drought impact data

## BY SECTOR

Agriculture

Hydropower

Tourism & Recreation

Ecosystems: plants & animals

Public health

- Domestic wells
- Environmental health

## BY TIME

Cumulative, end-of-season vs.

Real-time, “condition-monitoring”



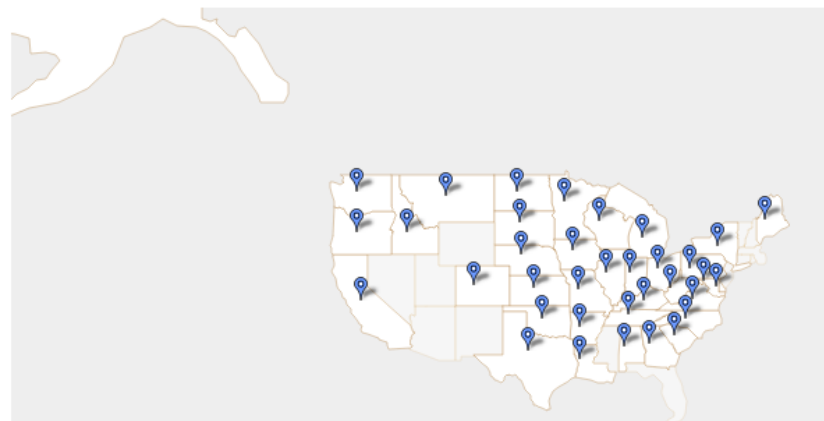
# Agricultural Sector: Data exists, but is it enough?

Could always be better, but fairly well-represented. Some quantification possible, depending on USDA's National Agricultural Statistics Service data collection for particular crops and places.

- NASS data: Not all crops, and not always timely release, to protect proprietary information.
- Farm Service Agency reports: Valuable field-level reports at weekly time intervals, but sometimes aggregated to large spatial area. Requires finding and reading each one individually. Not convenient.
- Risk Management Agency crop indemnity losses: Good source of annual losses to commodity crops due to drought.

## AgWeb Crop Comments

Select Crop Category



## United States Department of Agriculture National Agricultural Statistics Service

Find Data and Reports by:



[Find a Regional or State Field Office](#)



### Cause of Loss Historical Data Files

Summarized participation information broken down by the cause of loss. The data is provided in compressed data containing pipe (|) delimited flat-files that can be used as a CSV and/or database for further analysis. Record description file located in the same directory as the data files.

# Hydropower & Energy:

Data exists. Do decision makers need more or something more different?

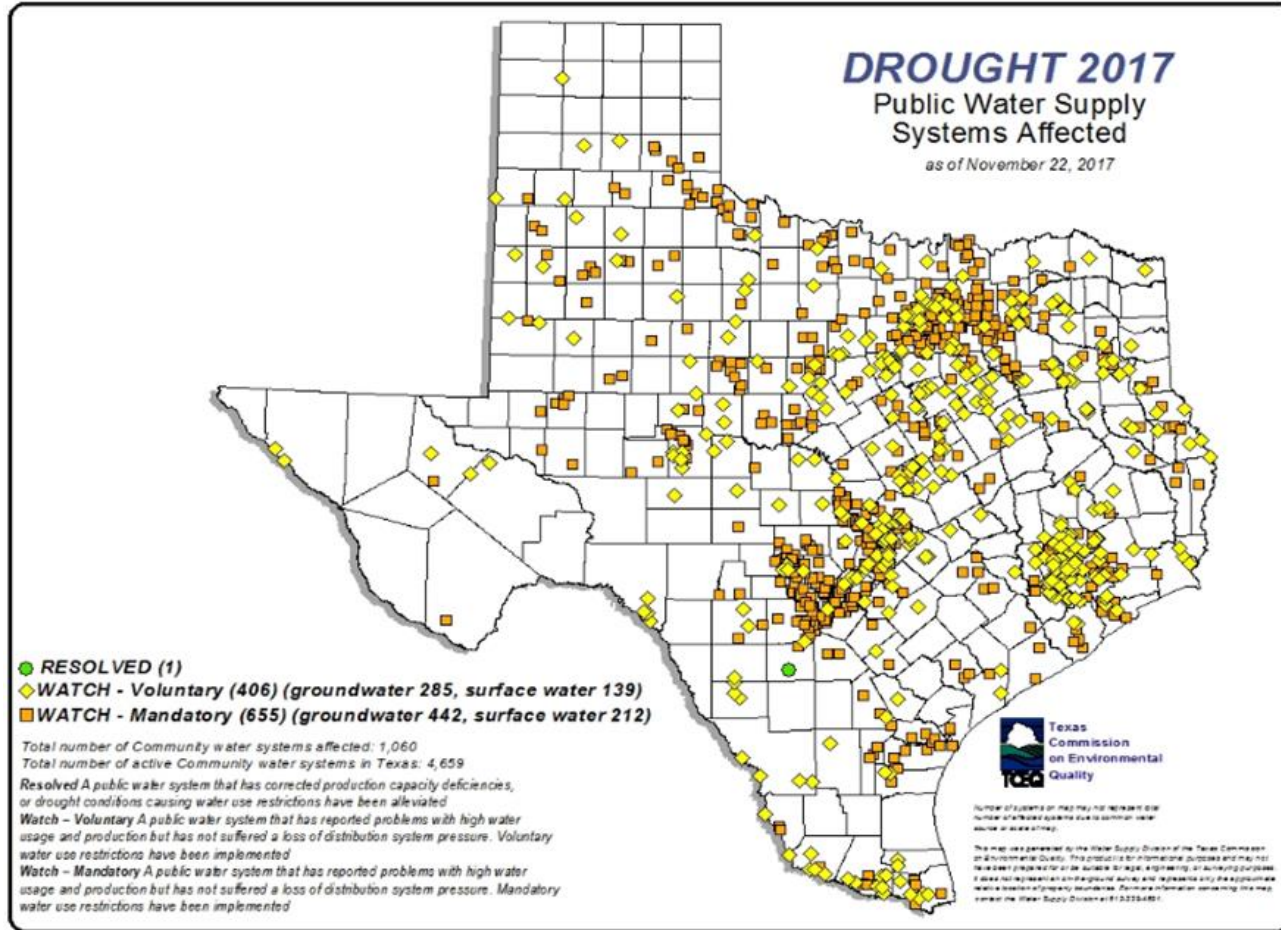
## Monthly Recap of Operations Missouri Main Stem System Nov 2017

Day	Maximum Generation		Minimum Generation		Daily Generation MWh	MT Daily Generation MWh	% Load Factor
	hr	MWh	hr	MWh			
W 11/1	10	1434	2	526	25360	25357	73.7
T 11/2	19	1435	24	513	25801	25821	74.9
F 11/3	19	1427	3	497	25521	25500	74.5
S 11/4	19	1236	3	522	22598	20531	76.2
S 11/5	21	1157	25	496	21926	#VALUE!	79.0
M 11/6	20	1444	3	594	26479	26467	76.4
T 11/7	8	1502	3	635	25953	25957	72.0
W 11/8	10	1477	3	622	26813	26808	75.6
T 11/9	18	1429	24	575	26479	26476	77.2
F 11/10	18	1416	24	580	26523	26540	78.0
S 11/11	20	1275	24	565	23999	24001	78.4
S 11/12	19	1272	1	530	22492	22452	73.7
M 11/13	20	1258	24	563	23771	23785	78.7
T 11/14	20	1257	24	560	23626	23623	78.3
W 11/15	8	1354	3	595	25530	25540	78.6
T 11/16	9	1297	3	675	25353	25361	81.4
F 11/17	11	1288	2	572	24830	24835	80.3
S 11/18	20	1280	2	569	23076	23047	75.1
S 11/19	19	1269	24	558	22645	22676	74.4
M 11/20	19	1389	3	470	23080	23061	69.2
T 11/21	20	1281	24	461	22896	22912	74.5
W 11/22	10	1227	1	464	22009	21989	74.7
T 11/23	10	1221	24	473	21753	21762	74.2
F 11/24	19	1219	1	475	21783	21782	74.5
S 11/25	21	1110	1	479	20510	20500	77.0
S 11/26	20	1175	24	475	18925	18944	67.1
M 11/27	20	1262	24	470	21945	21922	72.5
T 11/28	9	1249	24	396	21513	21511	71.8
W 11/29	20	1156	3	425	19995	19997	72.1
T 11/30	8	1156	24	415	19974	19984	72.0
<b>Max</b>		1502					
<b>Min</b>				396			
<b>Total</b>					703158	#VALUE!	
<b>Ave</b>					23439	#VALUE!	75

<https://www.eia.gov>



# Public Water Supplies: States track differently...



# Private domestic wells: Most states don't track(?)

Cumulative Household Water Supply Shortages Reported to the State

(as of 11/19/2015)



# Public health (other than domestic water)

Connections in US not well-articulated.  
Anecdotal reports and a few studies on

- Stress
- Mortality
- Hospital admissions due to air quality
- Vector-borne disease



University of Nebraska photo





# Tourism & Recreation

Data exists but it may be proprietary, and/or there may be a disincentive to sharing.

## Other suggestions:

- Transient Room Taxes, collected by the county
- Pacific Northwest Skiers Association (including some proprietary information)
- Travel Oregon



WASHINGTON STATE SKI VISITS (SOURCE: NATIONAL SKI AREAS ASSOCIATION)  
From them Washington State drought plan revision, vulnerability chapter

In the winter of 2004/2005, visitation to Washington State ski resorts dropped by 1.5 million visits from the prior year, a decrease of 77 percent. During the 2014/2015 winter, visitation numbers dropped by more than 900,000 visits from the previous year, a decrease of 59 percent.

# Environment / Ecosystem Services

- Perpetually under-resourced.
- Endangered species well-tracked (?)
- Otherwise, could use more data.
- Where to start?
  - Vegetation reports?

## Range management suggestion:

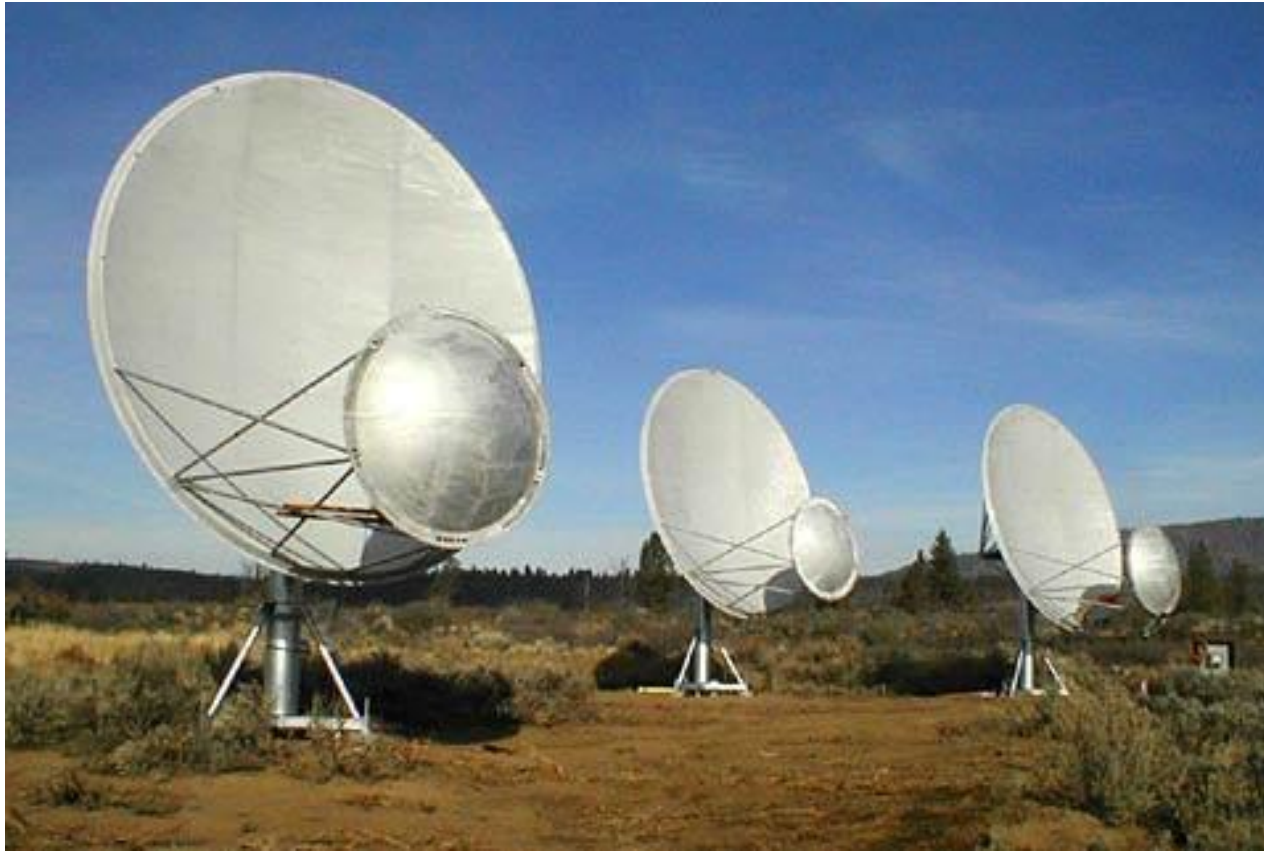
DIR or something similar could be used for monitoring native perennials and invasive annuals, especially cheatgrass and more recently, medusa head. “...someone would take a picture and note that this whole hillside is cheatgrass. Grass is relatively easy to identify, and we if have a georeference for that we could probably figure out which hillside is that and in the office we could create a polygon” (6).



Spring Chinook Salmon. Photo courtesy Michael Humling, US Fish & Wildlife Service

# Looking for the drought signal (“impacts”) in records of human experience

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Allen Telescope Array, courtesy SETI Institute

- “User” reports to DIR
- CoCoRaHS reports
- Media stories
- Social media (tweets, etc.)
- Google Trends



# Droughtreporter.unl.edu

Launched in 2005 as nation's on-line archive of drought impacts: **>66,000 reports and >24,000 impacts in our database.**

Reports from media, individual observers ("Users," CoCoRaHS), agencies

**Searchable** by time, place, scale, category, term

Establish a drought impact **"baseline"**:

- Face of drought
- Risk/vulnerability
- Climate change

**Moderated** @ NDMC

Wilhite, Donald A., Mark D. Svoboda, and Michael J. Hayes. "Understanding the complex impacts of drought: a key to enhancing drought mitigation and preparedness." *Water resources management* 21.5 (2007): 763-774.  
<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1042&context=droughtfacpub>

**NDMC NATIONAL DROUGHT MITIGATION CENTER**

NDMC Drought Impact Reporter

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Refresh

Impacts & Reports | Overlays

Scales

- National
- Multistate
- State
- County
- City

Impacts

Reports

Drought Declarations

Time Period

Customize

Start: 01-01-2012

End: 12-31-2012

Location

State: All States

Categories

Report Types

All States | 01-01-2012 - 12-31-2012 | Impact Counts | Impacts List | Page 1/174 | Report Counts | Reports List | Page 1/324

**County Impacts | All States 1731**

Category	Count	Category	Count
Agriculture	1038	Business & Industry	76
Energy	17	Fire	324
Plants & Wildlife	537	Relief, Response & Restrictions	388
Society & Public Health	187	Tourism & Recreation	143
Water Supply & Quality	579		

**Report Source**

Media	838	User	241
OtherAgency	47	NWS	24
Hawaii	13	CoCoRaHS	579

# THANKS!

## Questions, comments?

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