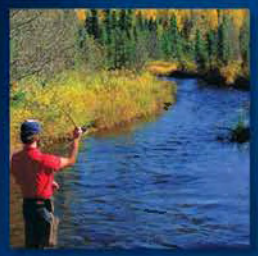
Hydrography TWG

September 13, 2018

IDAHO Department of Water Resources



Hydrography TWG

September 13, 2018

AGENDA

- **The National Water Use Compilation Report**
  - Molly Maupin, USGS
- **NHDPlusHR Update**
  - Al Rea, USGS
- **Other Updates**
- **Other Business**
- **Upcoming Events**
- **Next TWG**

  March 14, 2019

USGS
science for a changing world

Water Use in Idaho:

2015

September 13, 2018

Presented by: Molly Maupin

Compilation by: Erin Murray

What is the Compilation?

Mission: The National Water-Use Summary is responsible for compiling and disseminating the nation's water-use data.

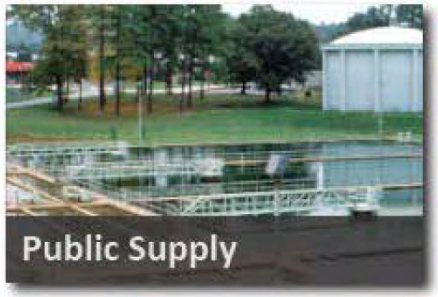
Goals:

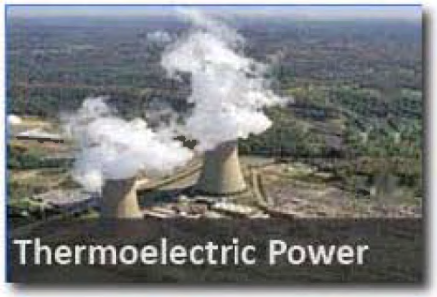
* Analyze the source, use, and disposition of water at different scales
* Document trends in water use in the United States
* Cooperate with state and local agencies on projects
* Develop water-use data bases
* Publish local, state, and national water-use data reports
* Reply to water-use information requests from the public

USGS

Overview of categories

Data collected at county level scale in every state, every 5 years.





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The data are public:


1950


1955


1960


1965

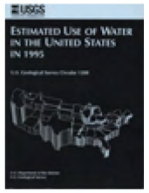

1970


1975

1980


1985


1990

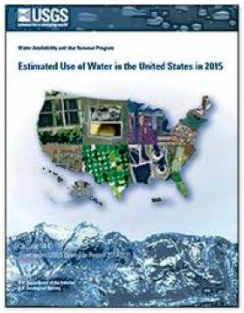


1995

2000

2005

2010



2015

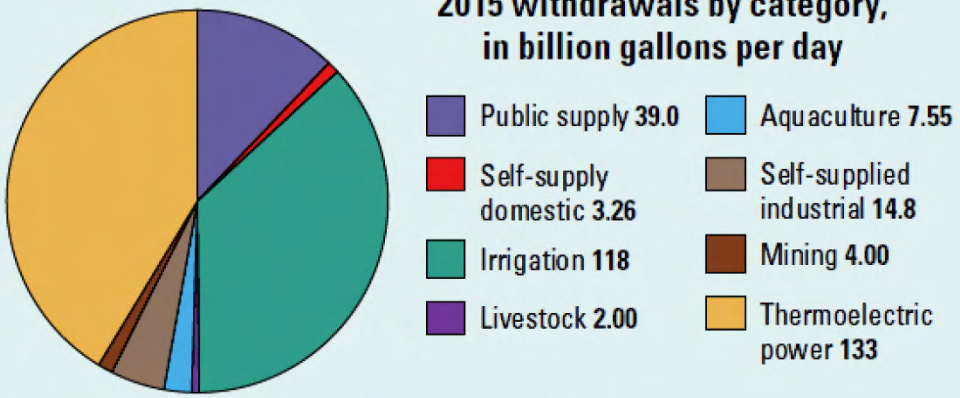
Link to Download Reports:
http://water.usgs.gov/watuse/50years.html

Link to Download Data:
http://water.usgs.gov/watuse/data/index.html
https://waterdata.usgs.gov/id/nwis/water_use/

Link to visualize water use:
https://owi.usgs.gov/vizlab/water-use/

USGS

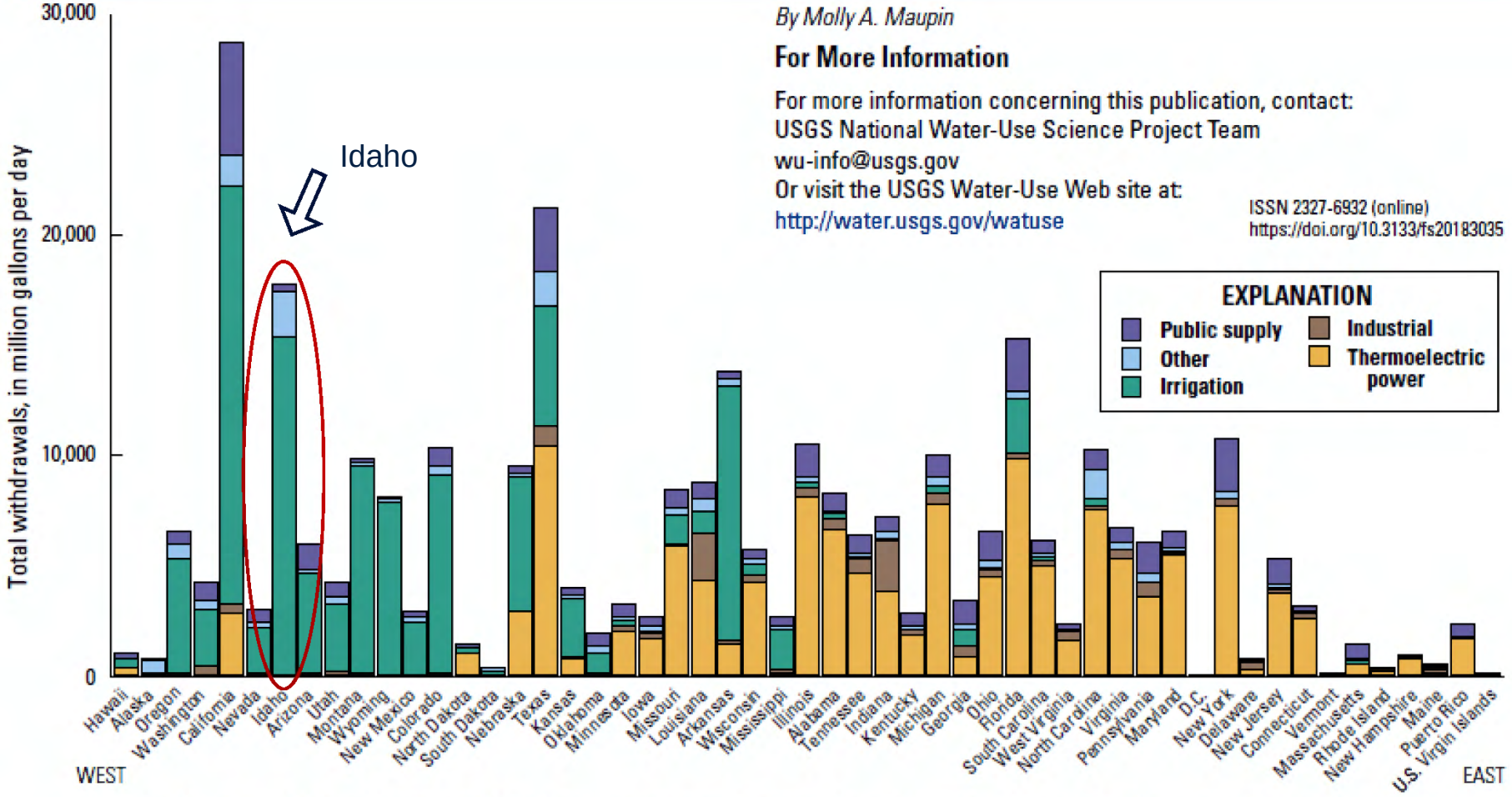
U.S. Total Water Use



- Total withdrawals in 2015, were **322** billion gallons per day (Bgal/d), resulting in a **9** percent decrease since 2010
- Since 2010, population increased **4** percent and total domestic use decreased **3** percent, which reduced per-capita use to **82** gallons per day
- Consumptive use accounted for **62** percent of water used for irrigation, and **3** percent of water used for thermoelectric power in 2015
- Withdrawals for thermoelectric power, irrigation, and public supply accounted for **90** percent of total withdrawals in 2015

USGS

Water Use and Idaho's Rank



By Molly A. Maupin

For More Information

For more information concerning this publication, contact:
USGS National Water-Use Science Project Team
wu-info@usgs.gov
Or visit the USGS Water-Use Web site at:
http://water.usgs.gov/watuse

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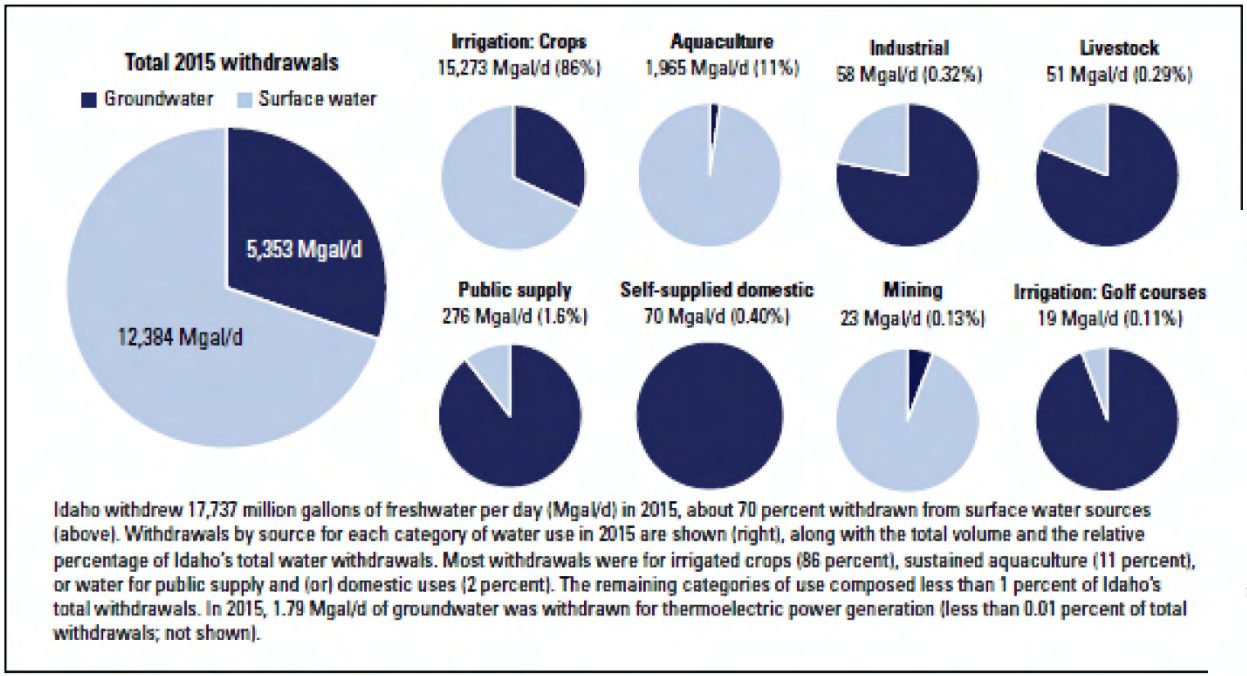
https://doi.org/10.3133/fs20183035

Figure 1. Withdrawals by category in 2015. States are arranged geographically from west to east. Units are in million gallons per day (Mgal/d); 1 billion gallon per day is equal to 1,000 Mgal/d.

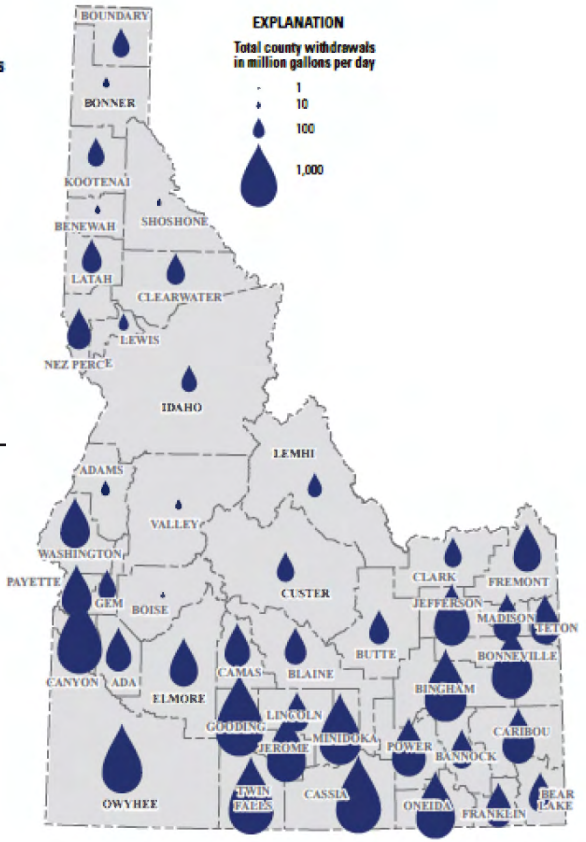
USGS

Idaho Water Use, 2015



Idaho withdrew 17,737 million gallons of freshwater per day (Mgal/d) in 2015, about 70 percent withdrawn from surface water sources (above). Withdrawals by source for each category of water use in 2015 are shown (right), along with the total volume and the relative percentage of Idaho's total water withdrawals. Most withdrawals were for irrigated crops (86 percent), sustained aquaculture (11 percent), or water for public supply and (or) domestic uses (2 percent). The remaining categories of use composed less than 1 percent of Idaho's total withdrawals. In 2015, 1.79 Mgal/d of groundwater was withdrawn for thermoelectric power generation (less than 0.01 percent of total withdrawals; not shown).

Figure 1. Withdrawals by source and category in Idaho, 2015.

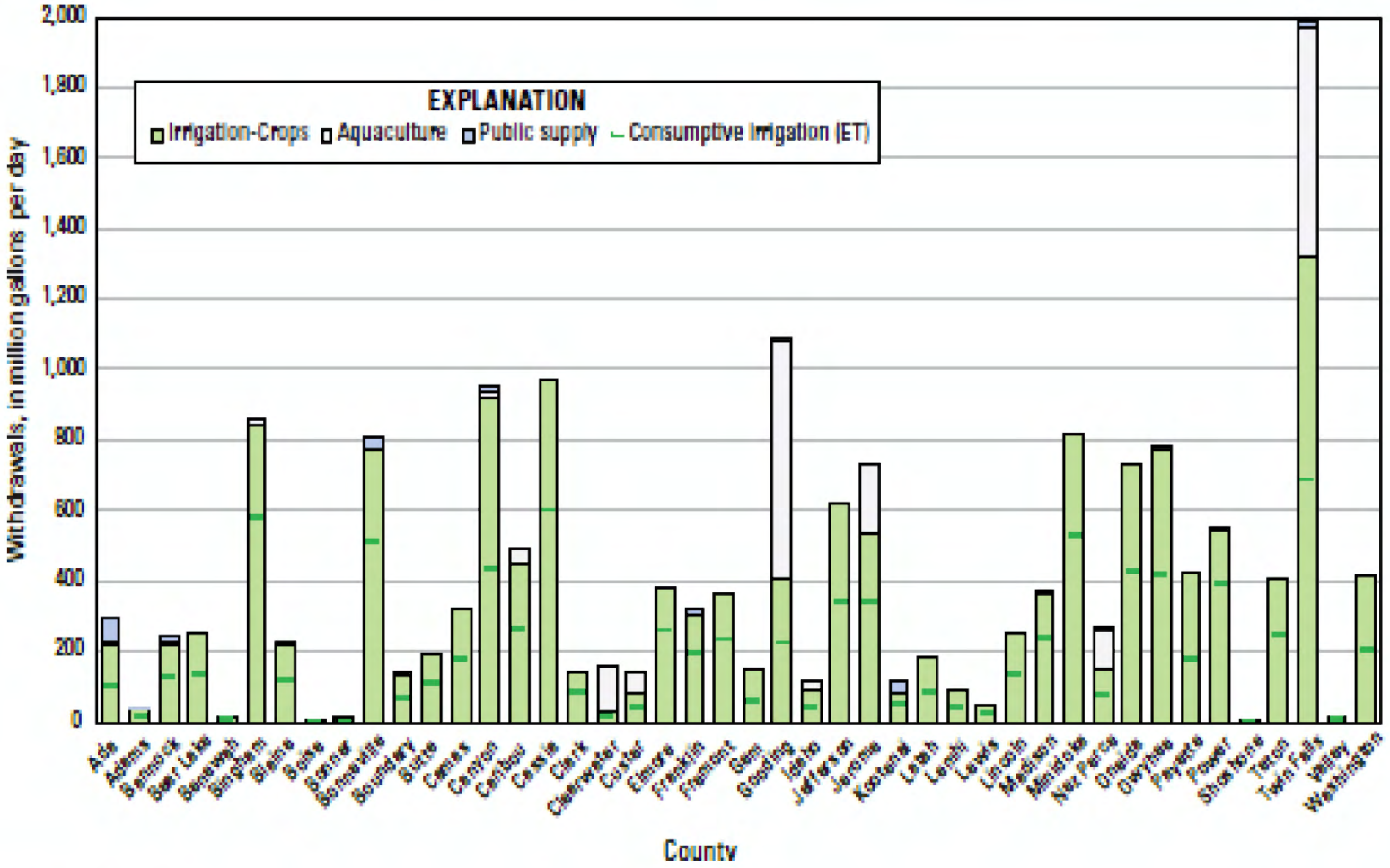


Irrigation, Aquaculture, Public Supply = 99% total withdrawals, mostly irrigation (86%).

Aquaculture used a lot of surface water, but returns via flow-through raceways.

USGS

2015 Idaho Results



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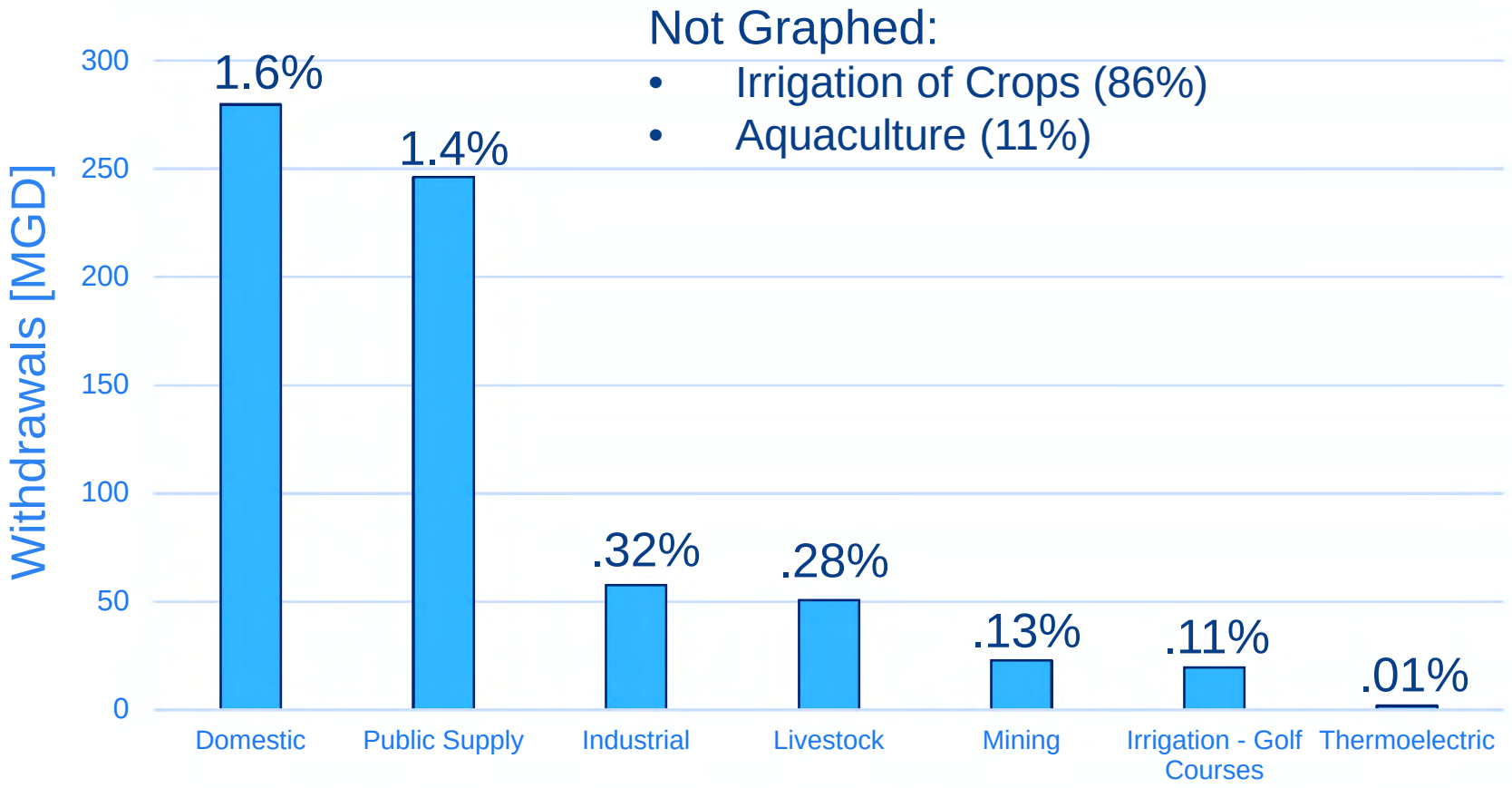
2015 Idaho



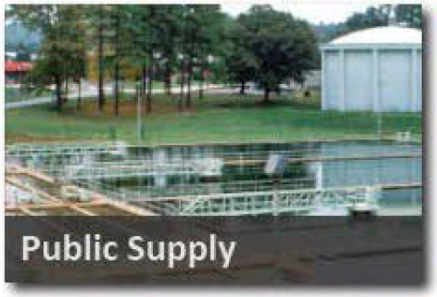
USGS

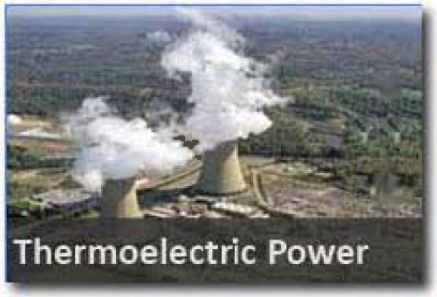
The data have limitations

* Methods improvement is incremental -- time & data availability are the most limiting factors.
* Methods can vary county-to-county.
* Methods can vary year-to-year.
* Measured data isn't always available and estimates have unknown uncertainty.

USGS

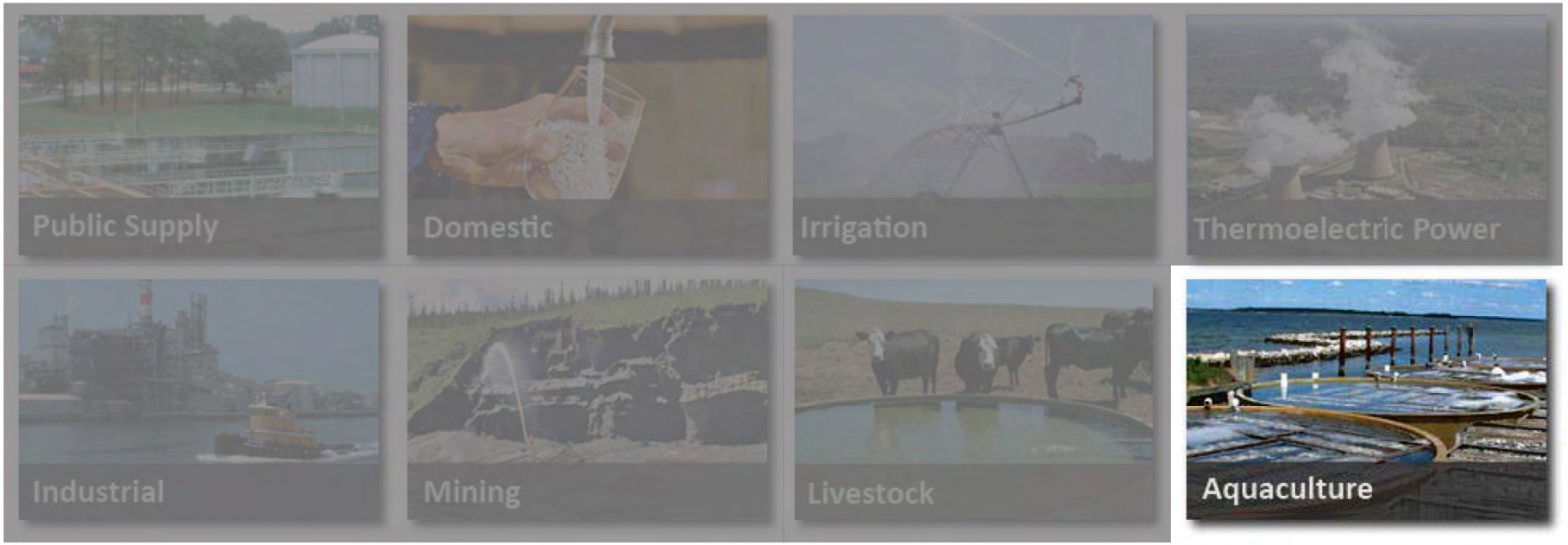
2015 Results by Category





USGS

2015 results by category



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Methods

- State and National fish hatchery data was obtained directly from hatchery managers.
- Private hatchery information was derived from discharge records from the Discharge Monitoring Report (DRM) Pollutant Loading Tool

USGS

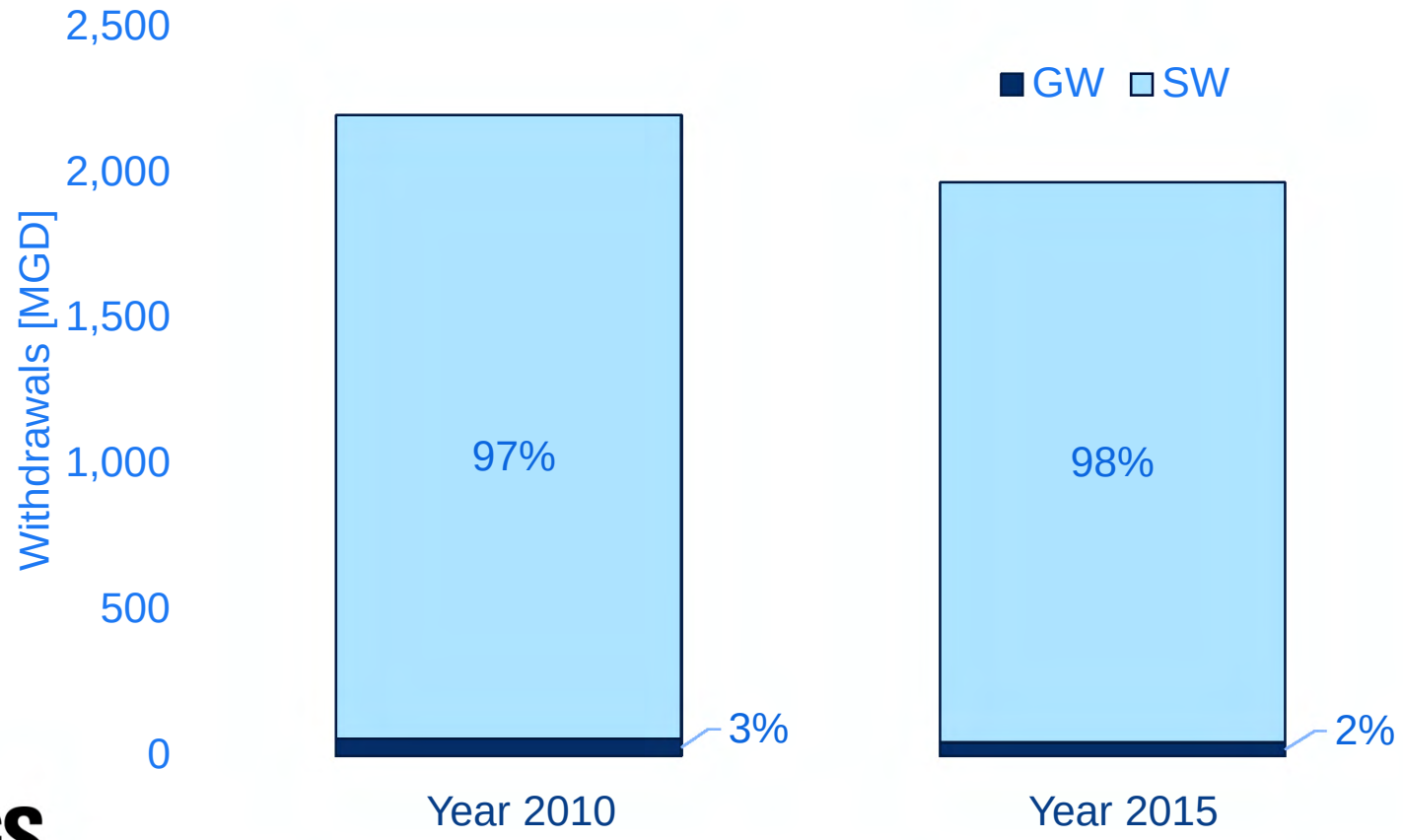
Data Elements

* Total Groundwater Withdrawals
* Total Surface Water Withdrawals

USGS

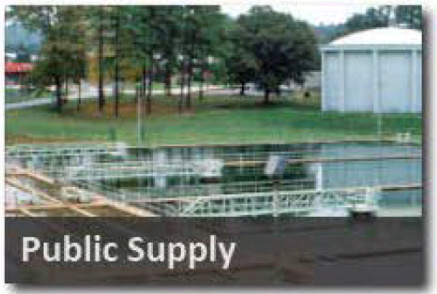
Results

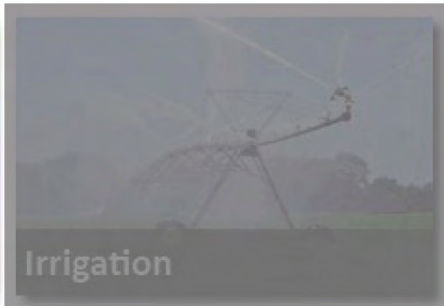
Aquaculture withdrawals declined ~10% (2010-2015)

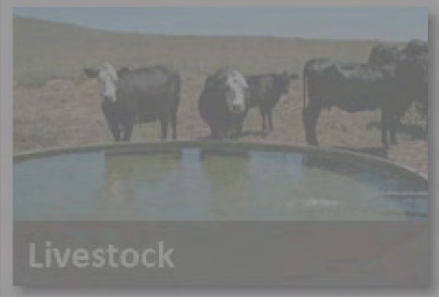


USGS

2015 Idaho Results







USGS

Methods

* Survey sent by IDWR to community water systems (CWS)
    * Response rate of 71 out of 736.
    * 10% of systems; serve 61% of Idaho population.
* “Per Capita Estimate”
    * Estimate per capita coefficient at CWS level.
    * Average these coefficients within a county.
    * Sum all data elements at the county level.

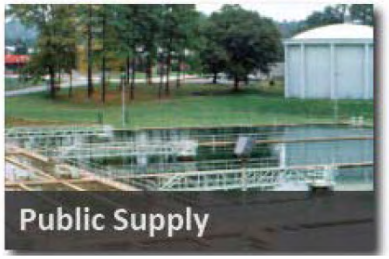
USGS

Data Elements

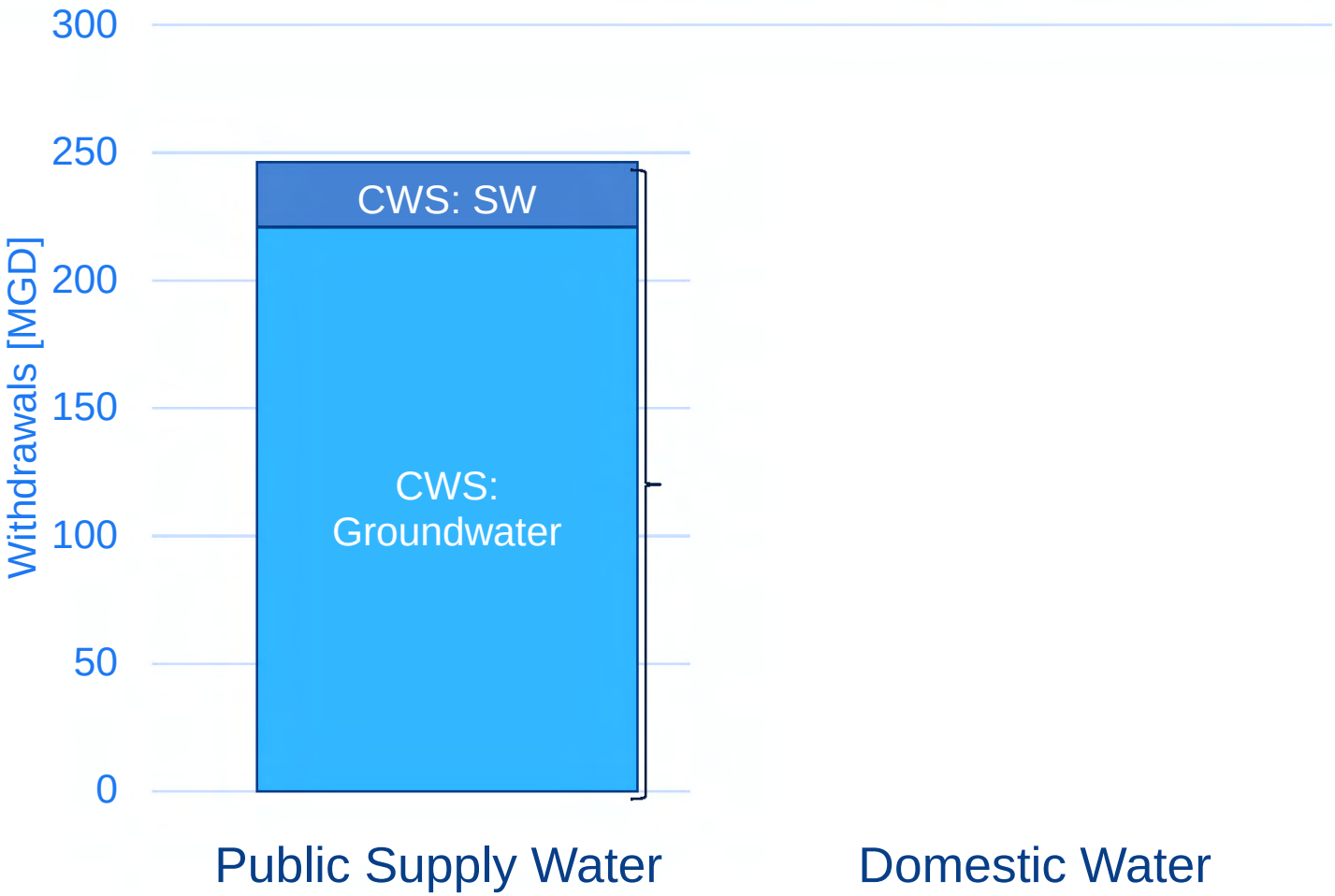
* Public Supply – Total Groundwater Withdrawals
* Public Supply – Total Surface Water Withdrawals
* Public Supply – Reclaimed Wastewater
* Public Supply – Number of Facilities
* Public Supply – Total Domestic Population Served
* Idaho Total Population
* Domestic – Self Supplied Withdrawals
* Domestic – Deliveries from Public Supply

USGS

* Survey Data

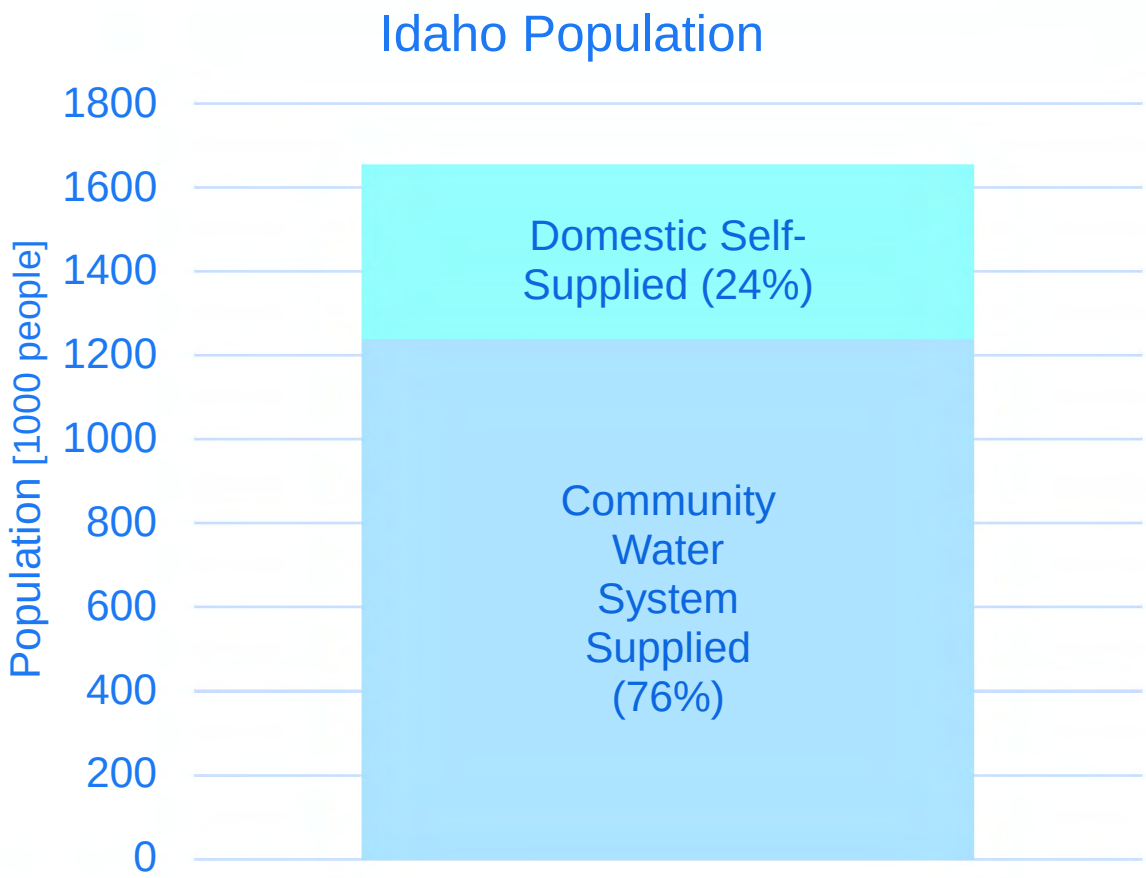


Results



USGS

Results



Idaho's Domestic Per Capita:

***184* gallons**

per person per day

2010 Top 3 were – Utah, Idaho, Arizona

USGS

Population and Per-Capita

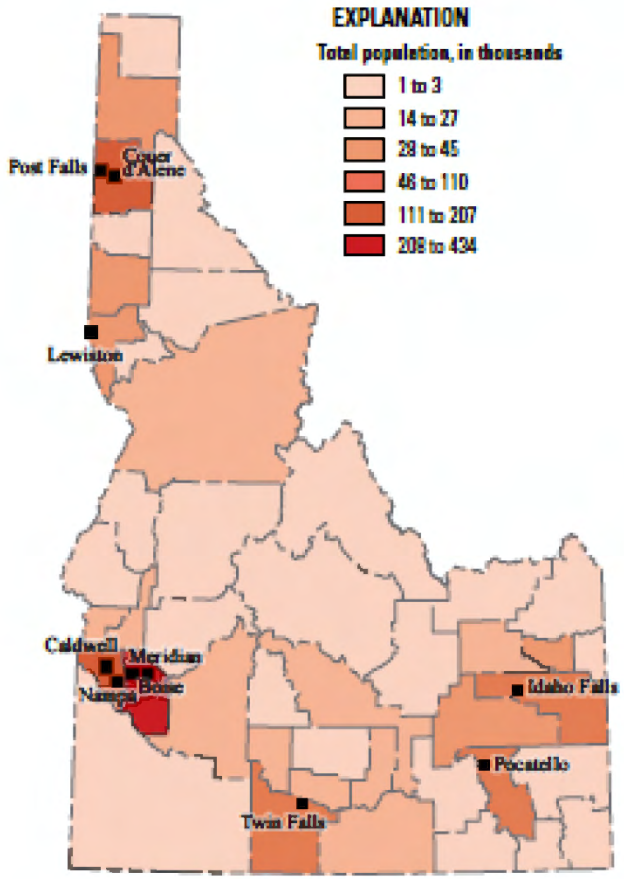


Figure 5. Total population of Idaho in 2015.

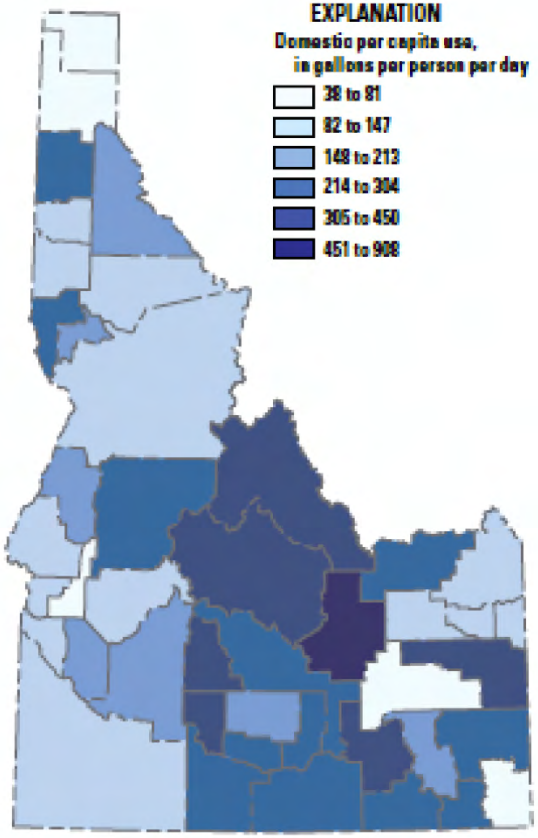
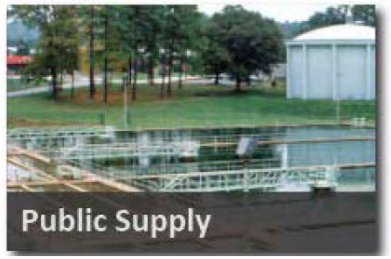


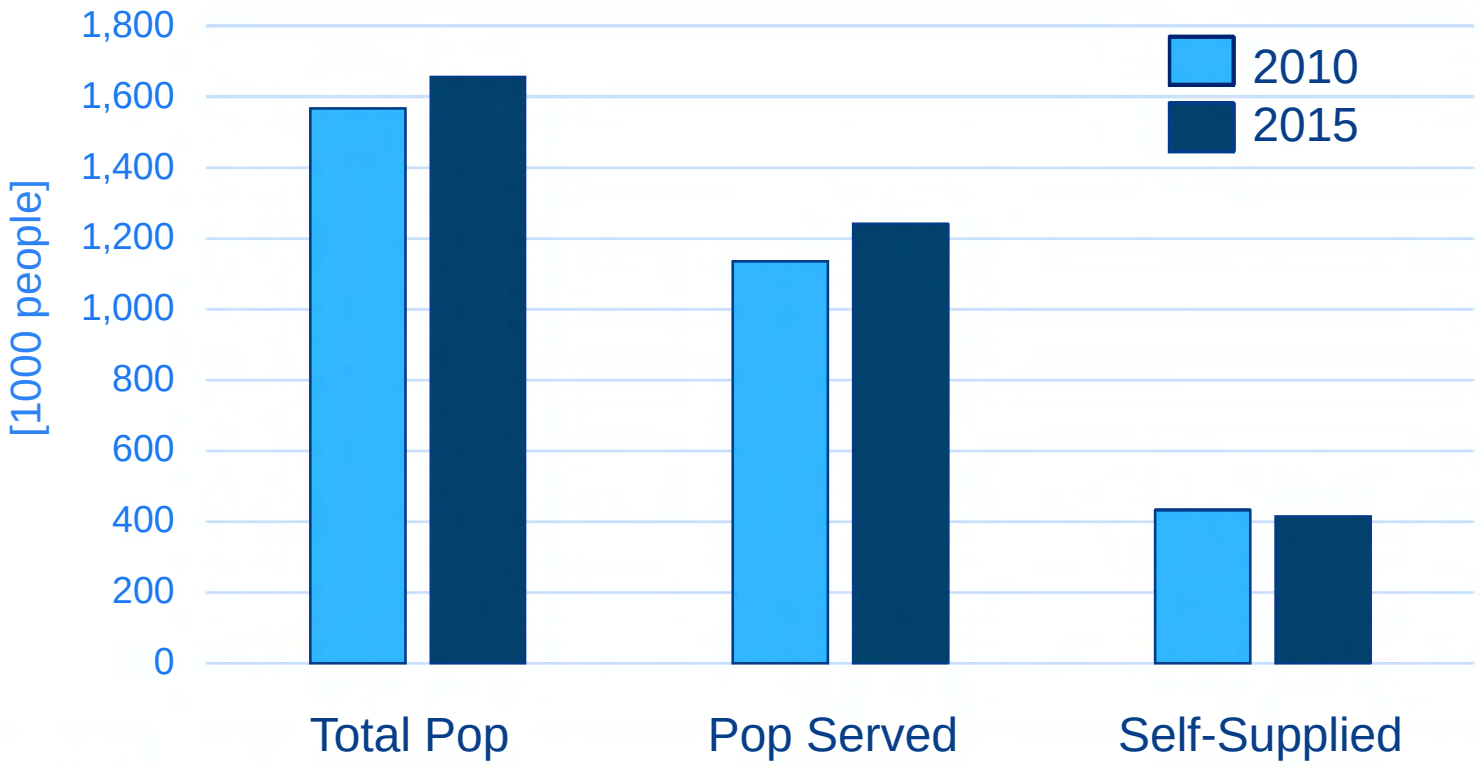
Figure 4.—Gross per capita domestic water use in Idaho, 2015.

USGS



Results

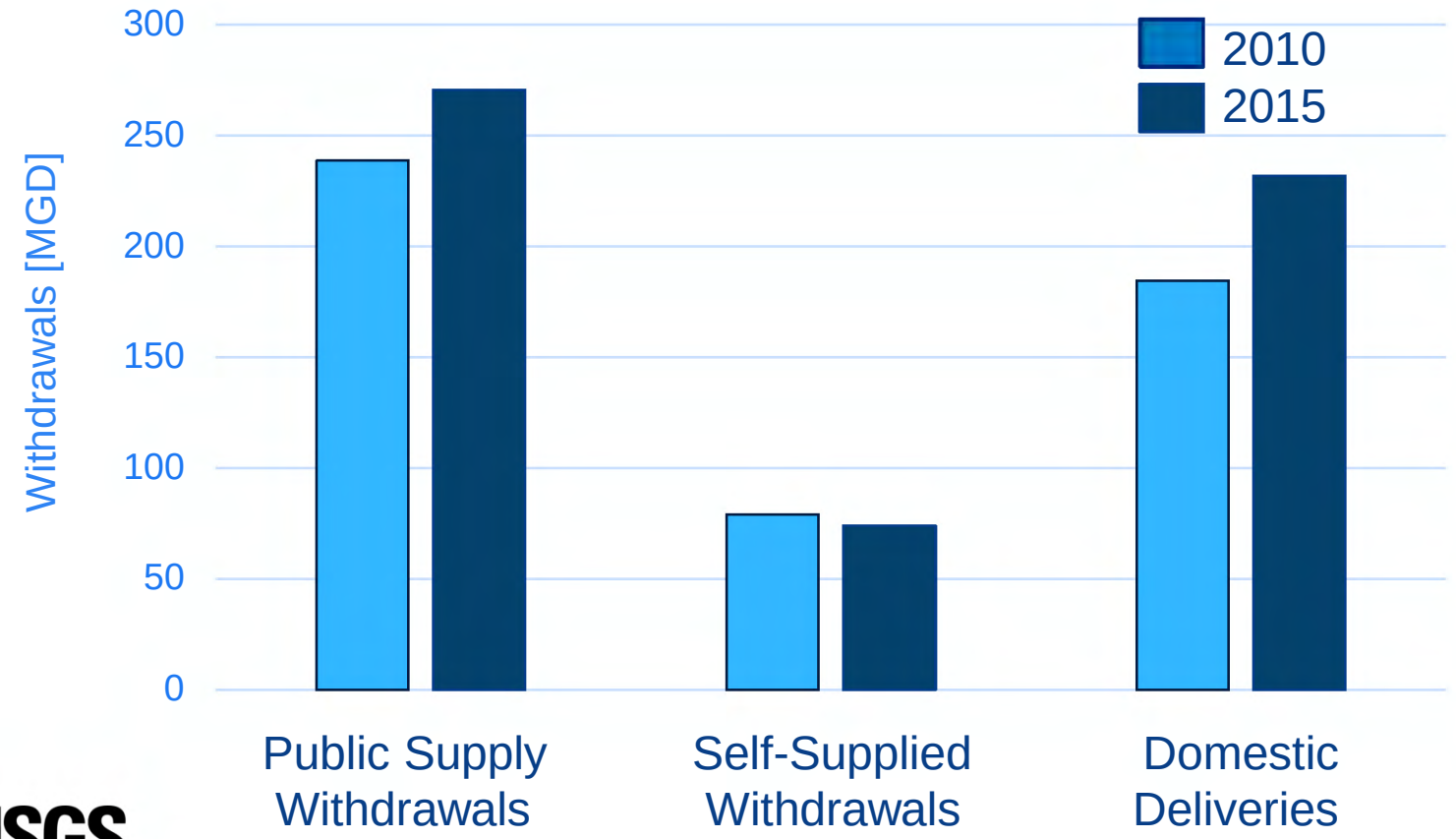
Population increased ~6% (2010-2015)



USGS

Results

Withdrawals increased ~10% (2010-2015)



USGS

2015 results by category

USGS

Crop & Golf Courses

* Data Elements estimated separately for Crops & Golf Courses
  * Surface water withdrawals
  * Groundwater withdrawals
  * Total consumptive use (New in 2015)
  * Irrigated Acres
    * Sprinkler, Surface (flood), Micro (drip/sub),

USGS

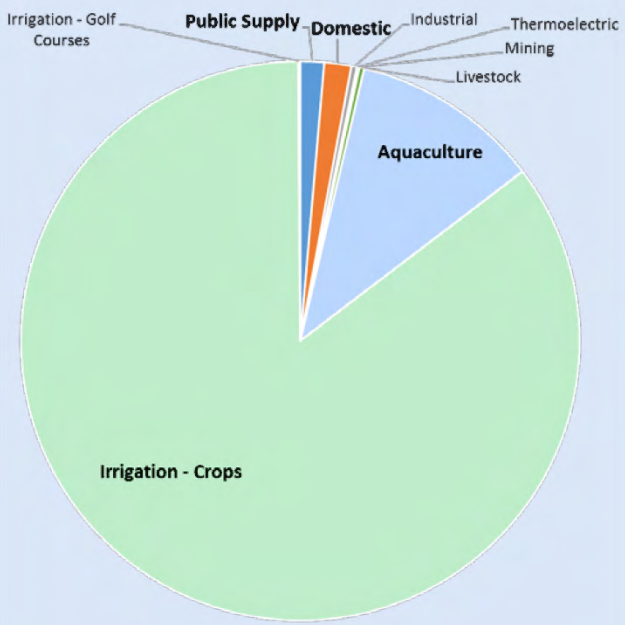
Golf Course Methods

* Survey sent by Idaho's Golf Course Superintendents Association of America
    * Response rate of 6 out of 115 courses.
* Regional Water Use Coefficient
    * North, East, South, Central
    * Withdrawals per "hole"
    * Coefficient used to estimate other courses.

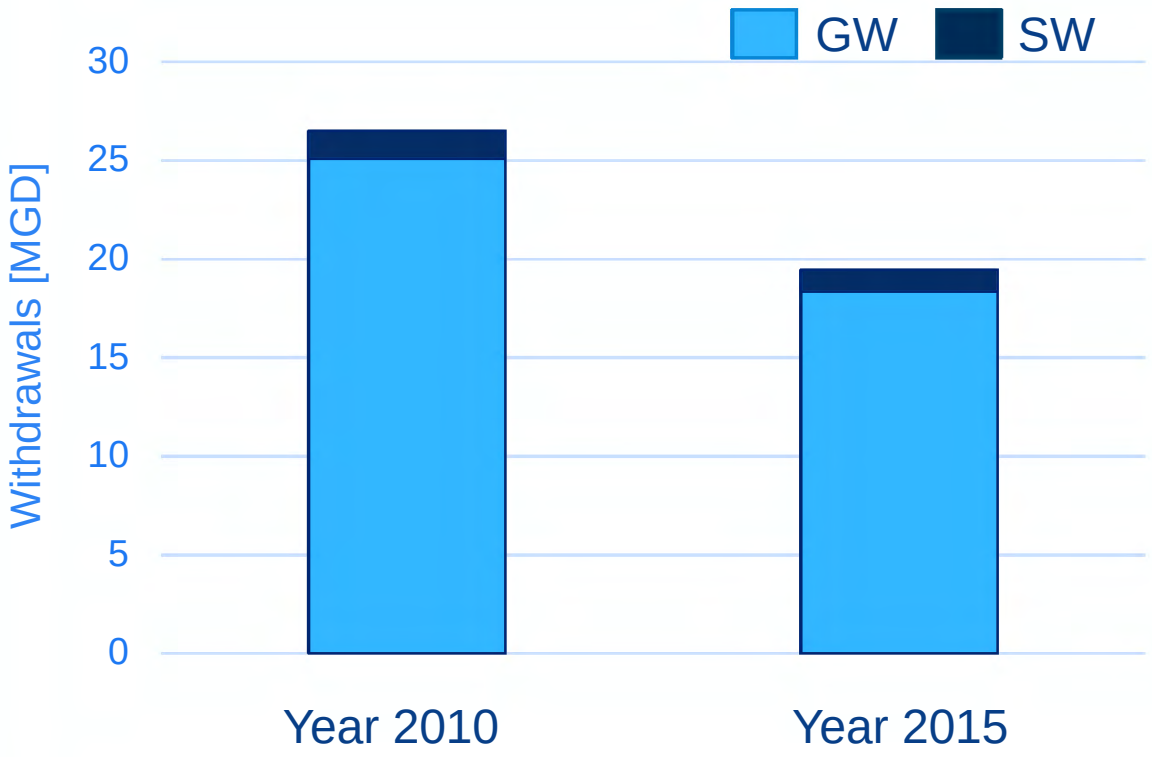
USGS

Golf Course Results

0.11% Total Withdrawals



Withdrawals decreased ~30% (2010-2015)



USGS

Crop Methods

Withdrawals are calculated by adding system inefficiencies to the irrigation requirement.

$$Withdrawals\ [volume] = \boldsymbol{Crop\ Irr\ Requirement} + \boldsymbol{Inefficiencies}$$

$$Crop\ Irr\ Requirement = \{Agrimet\ Plant\ ET\ - Effective\ Precip\} * Irrigated\ Acres$$

$$Inefficiencies\ = Crop\ Irr\ Requirement * Percent\ of\ system\ type * Efficiency$$

USGS

Crop Methods

$$Crop\ Irr\ Requirement = \{Agrimet\ Plant\ ET\ - Effective\ Precip\} * \boldsymbol{Irrigated\ Acres}$$

Total acres were derived from the 2015 Cropland data layer.

Not equal to irrigated acres!

USGS

Crop Methods

$$Inefficiencies = Crop\ Irr\ Requirement * Percent\ of\ system\ type * Efficiency$$

System Type:	Sprinkler	Flood	Drip/Micro
Application Efficiency: (% of water available to crop)	0.75	0.40	0.91

Howard Neibling, pers. Comm.

USGS

Crop Methods

$$Inefficiencies = Crop\ Irr\ Requirement * \mathbf{Percent\ of\ system\ type} * Efficiency$$

System Type:	Sprinkler	Flood	Drip/Micro
Application Efficiency: (% of water available to crop)	0.75	0.40	0.91

Howard Neibling, pers. Comm.

The same ratio of system type (flood:sprinkler:micro) within each county was used from 2010. We were only able to update the ratio for Twin Falls County.

USGS

Crop Methods

Withdrawals are calculated by adding system inefficiencies to irrigation requirement.

$$Withdrawals\ [volume] = Crop\ Irr\ Requirement + Inefficiencies$$

- GW versus SW separated using the percentage of water rights in 2000 (IDWR)
- Performed QA check that we were not reporting more surface water withdrawals than diverted.

USGS

Crop Methods

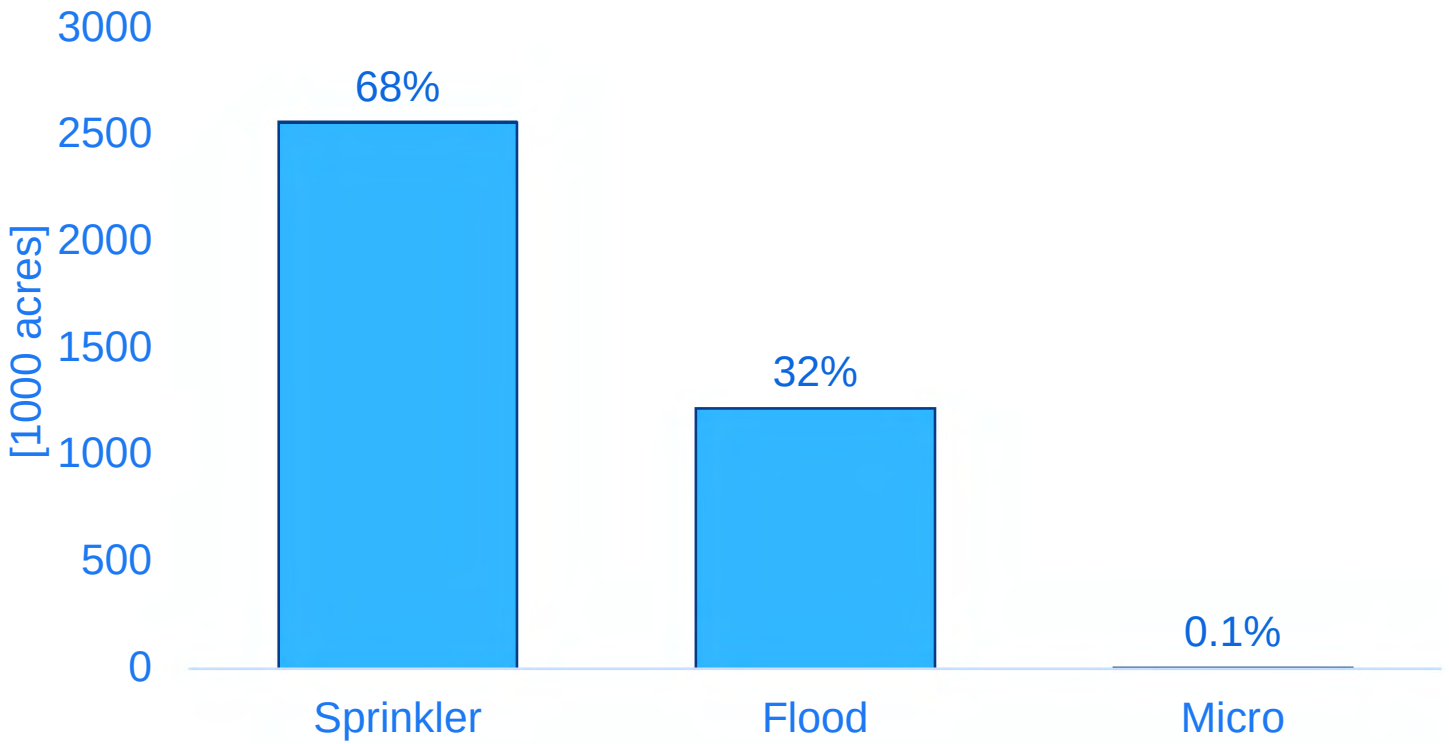
Consumptive Use: NOT REPORTED SINCE 1995

- National estimate for consumptive use clipped to irrigated acres.
- Estimated using the SSEBop model, a land surface temperature model with 1-km resolution, year 2015 (Senay *et. al*)

USGS

Crop Results

Irrigated Acres By System Type



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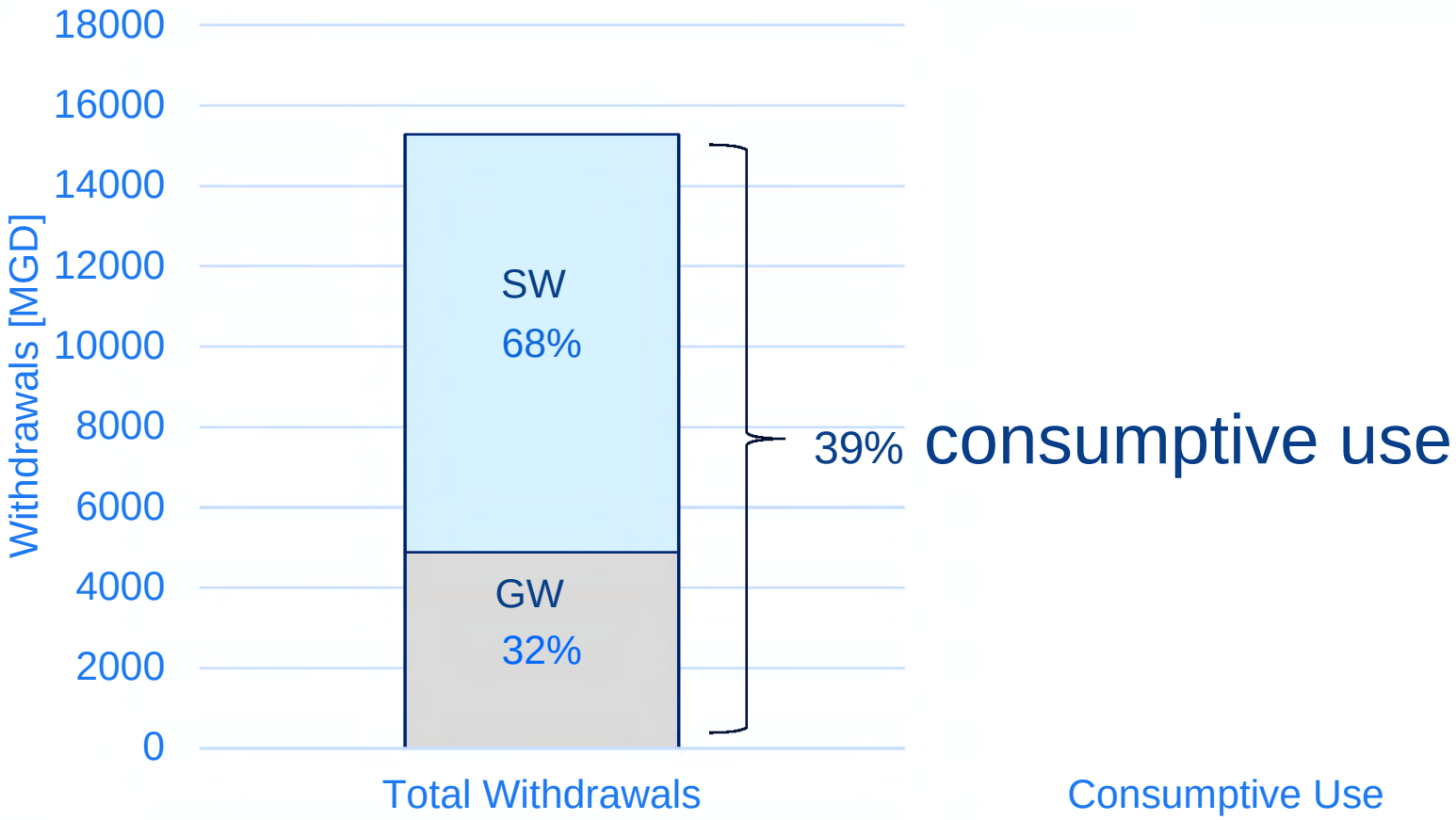
Crop Results



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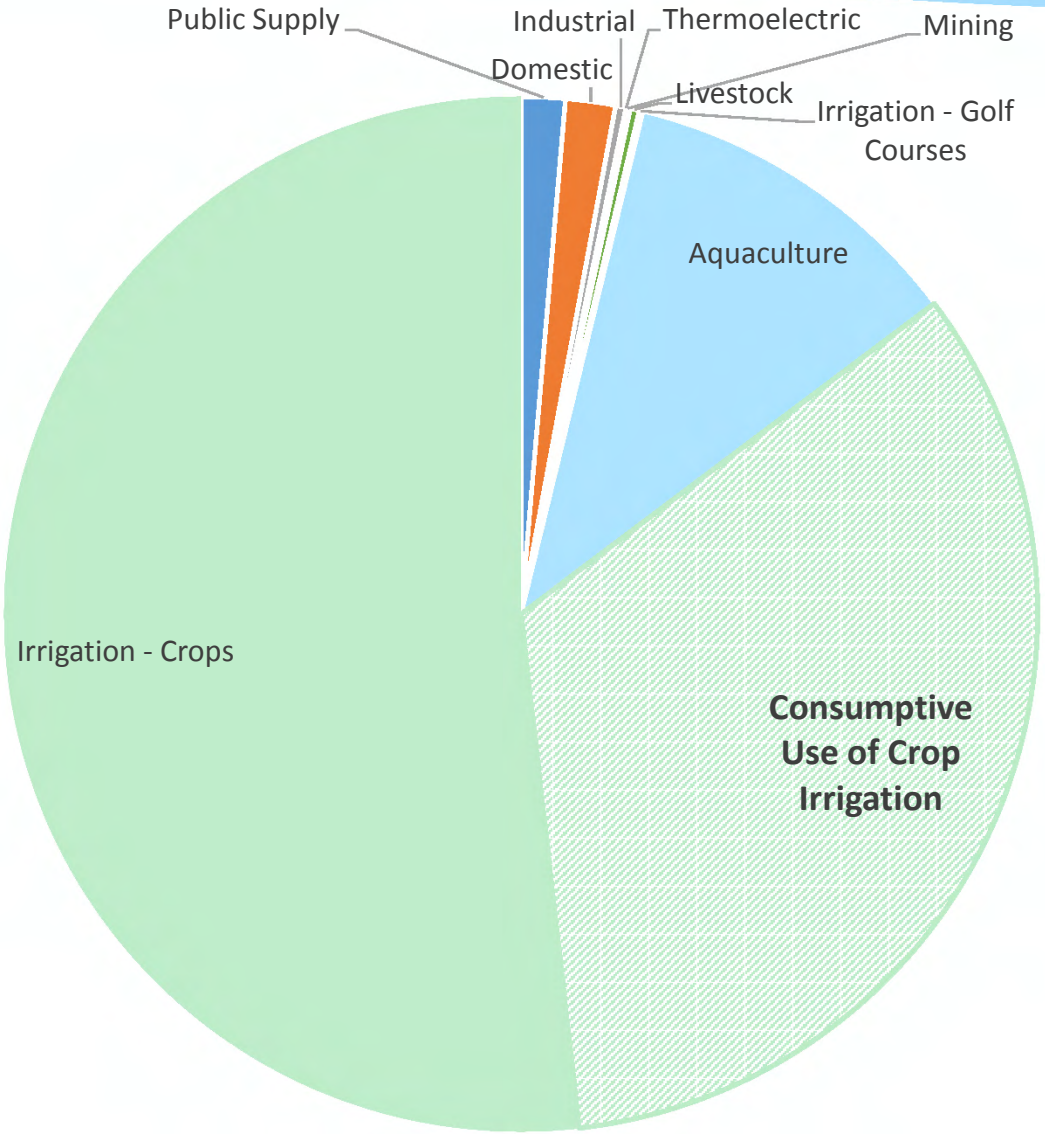
2015 results by category



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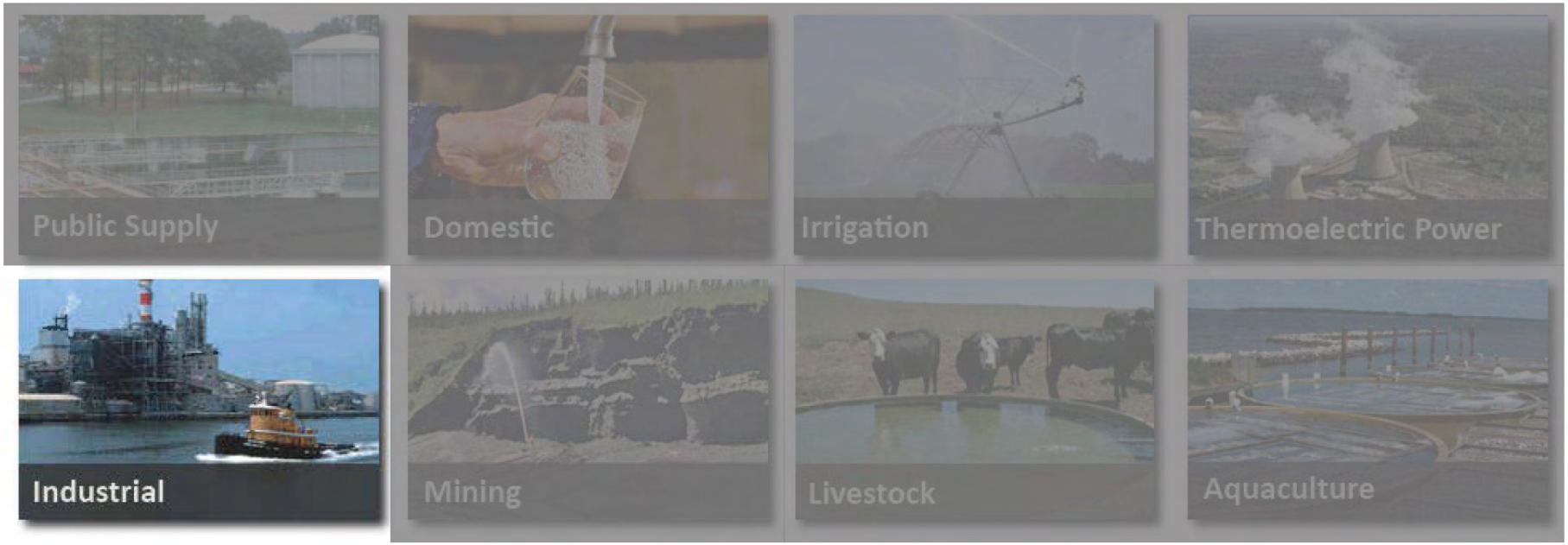
Crop Results

Withdrawals increased ~8% (2010-2015)

USGS

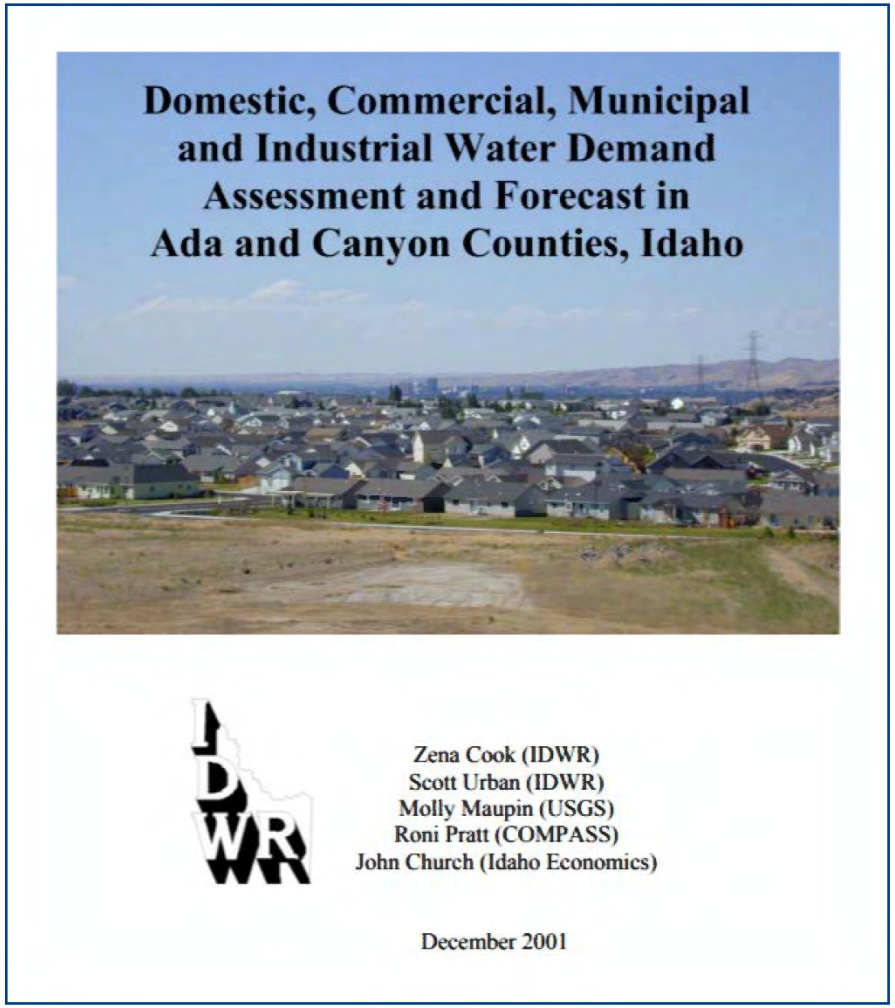
2015 results by category



USGS

Industrial Methods

* Obtained number of employees by industry type (NAICS code)
* Multiplied by coefficient of gallons per day.



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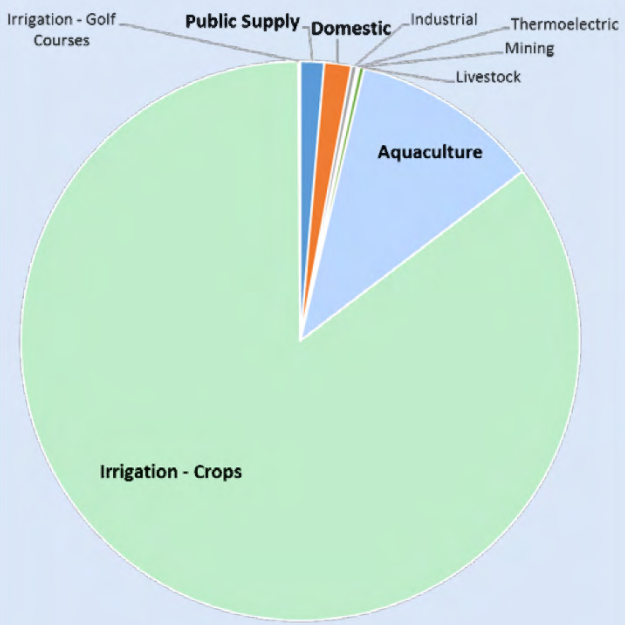
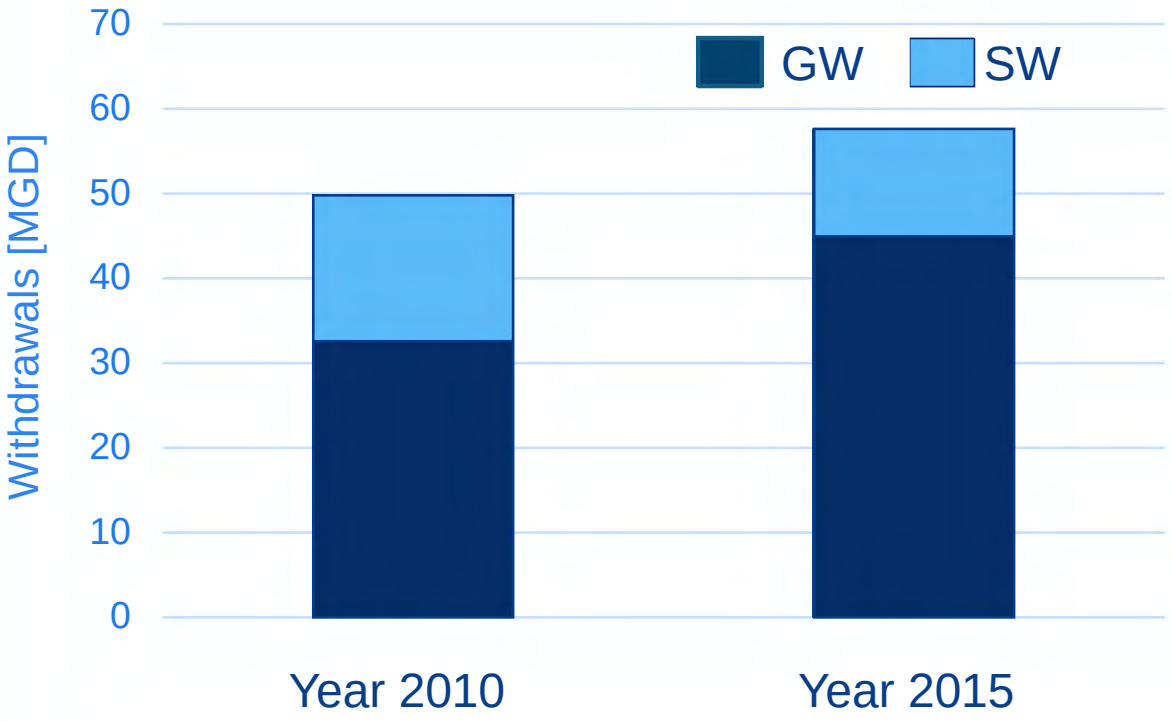
Industrial Results

0.32% Total Withdrawals

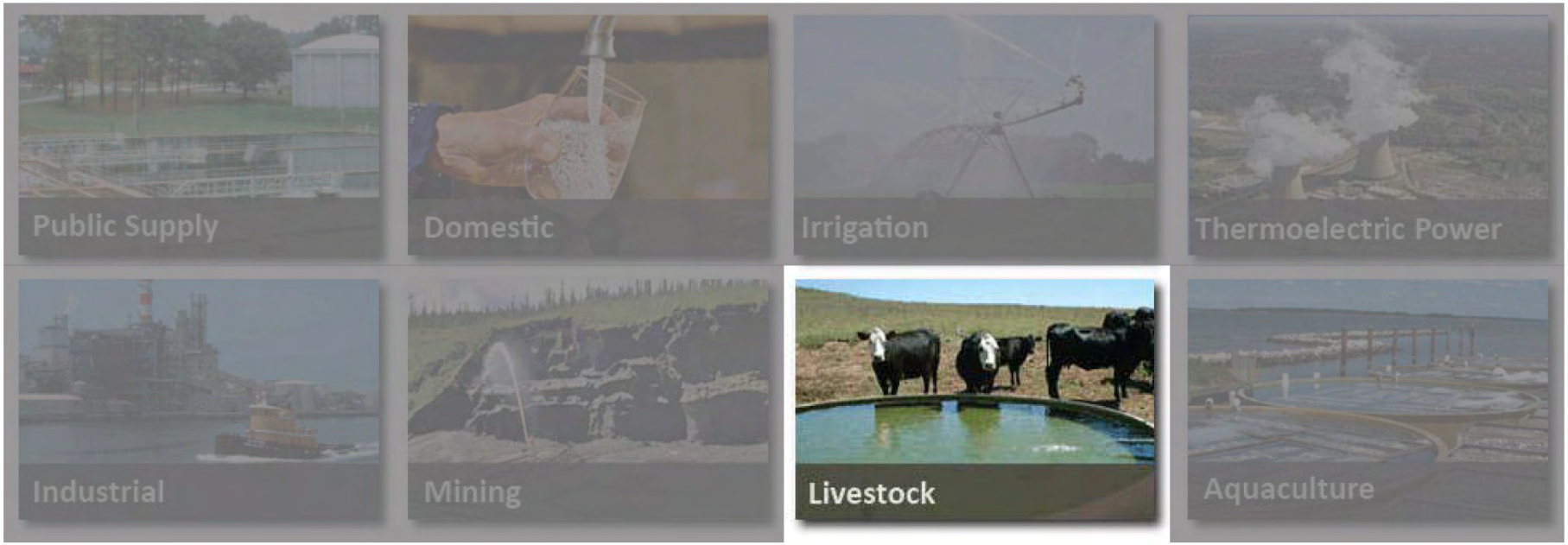


Withdrawals increased ~13% (2010-2015)



USGS

2015 results by category



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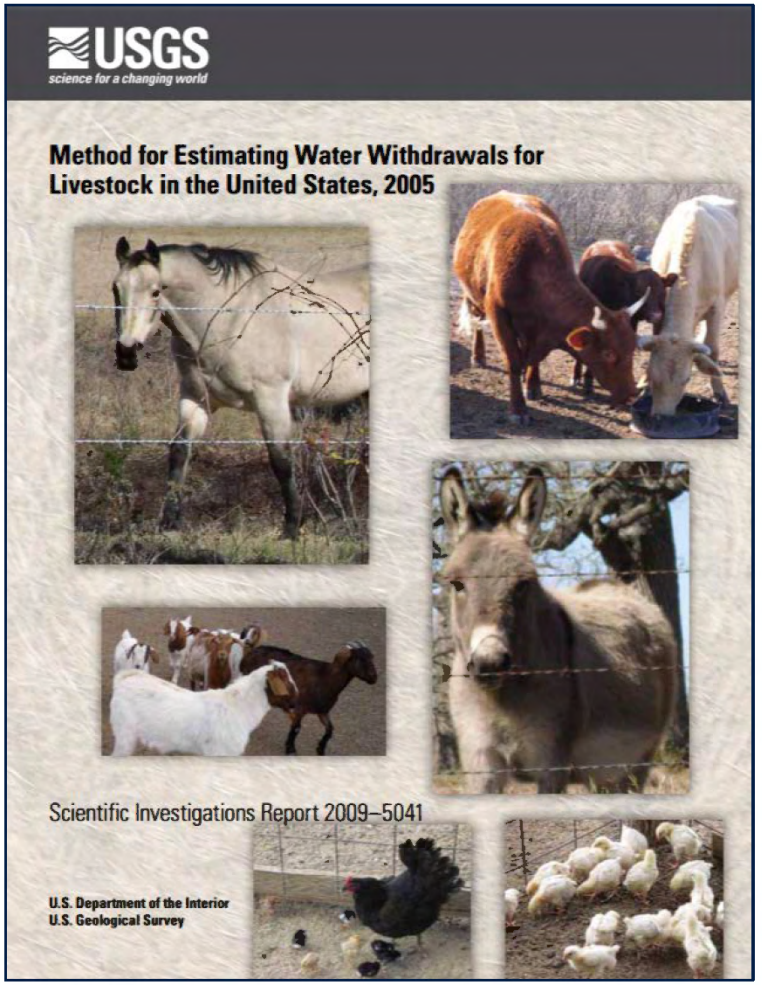
Livestock Methods

* Multiply reported livestock yield by regional water use coefficients.



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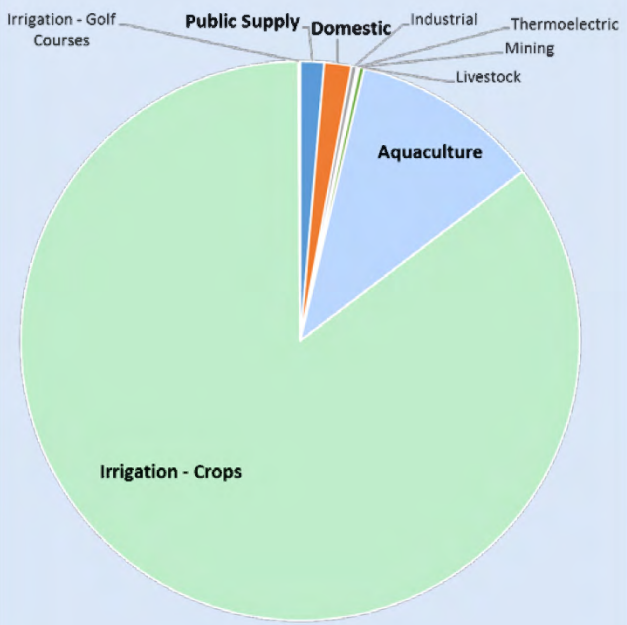
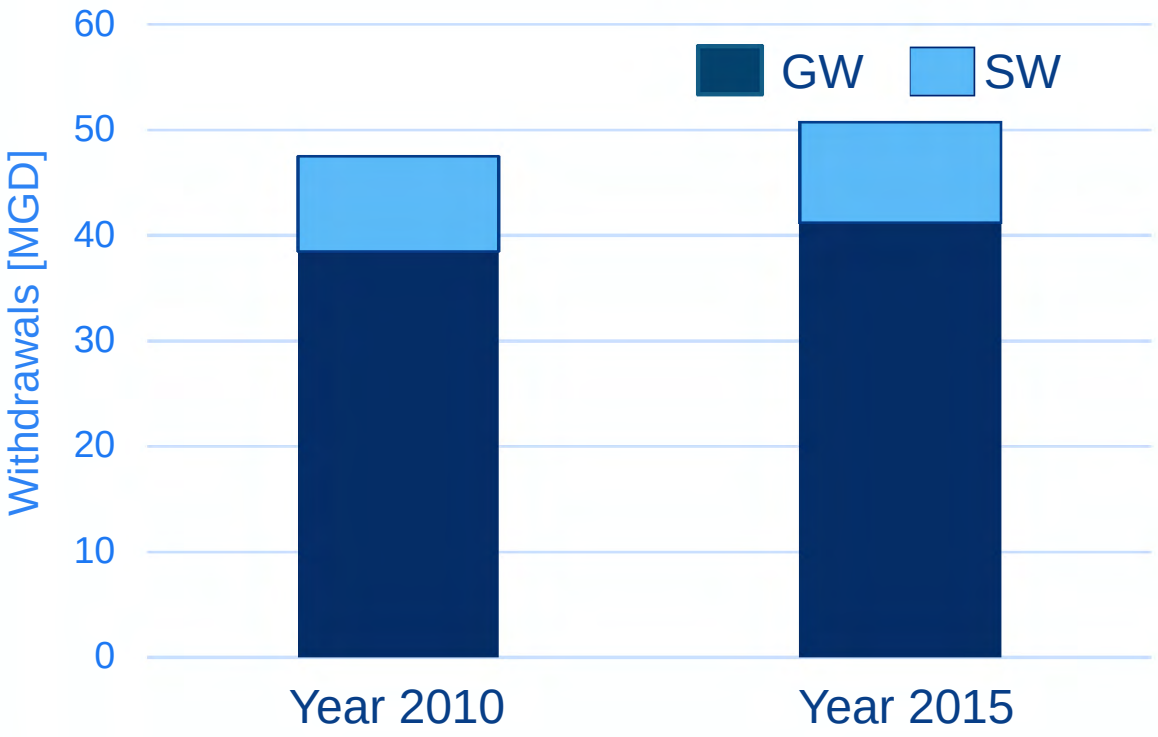
Livestock Results

0.28% Total Withdrawals



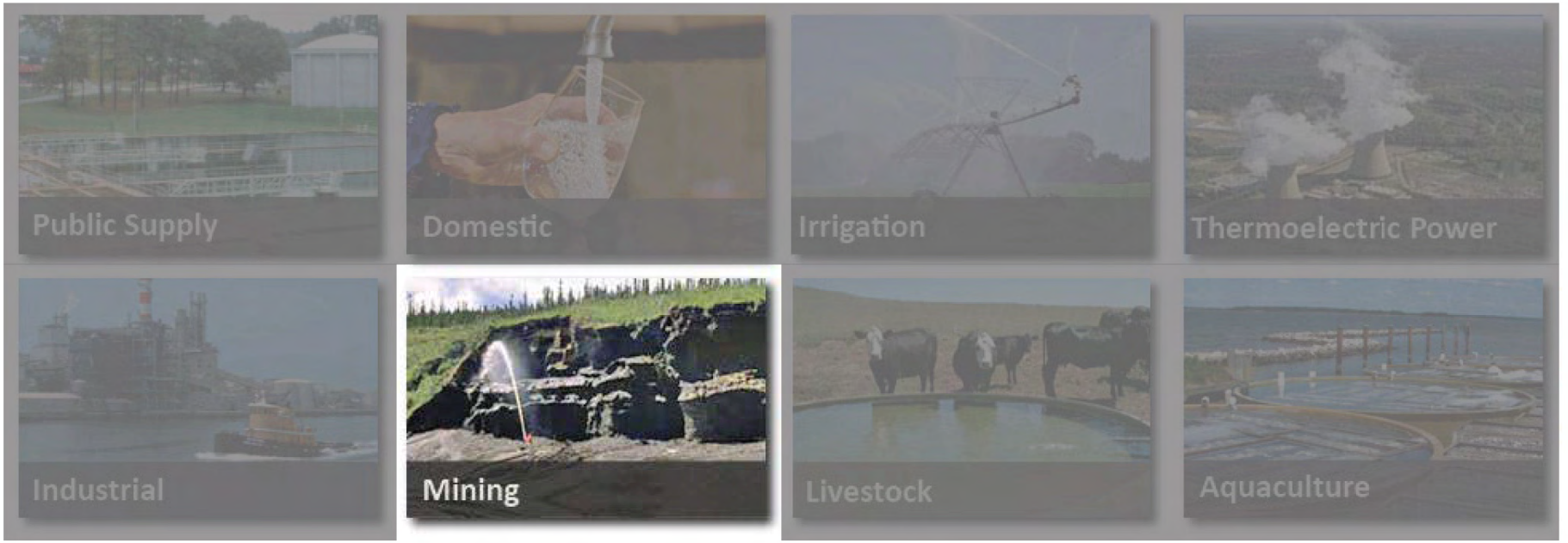
Withdrawals increased ~13% (2010-2015)



USGS

*All data are provisional.

2015 results by category



USGS

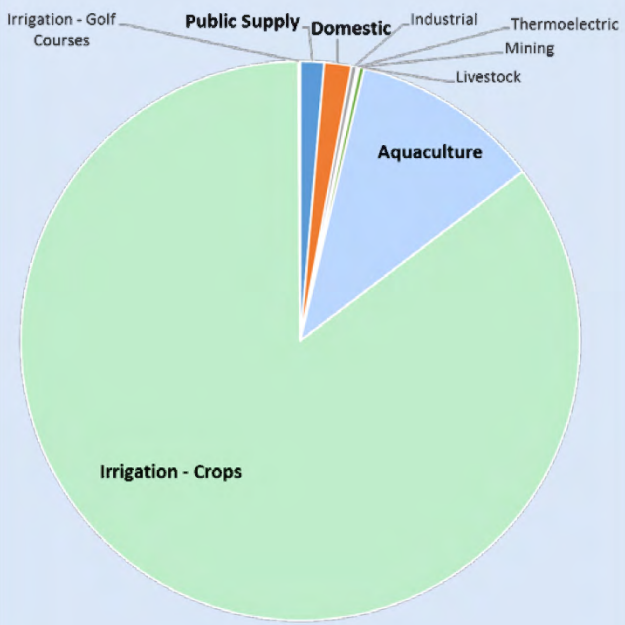
Mining Methods

* Multiply mineral production data (weight/volume) by water-use coefficients

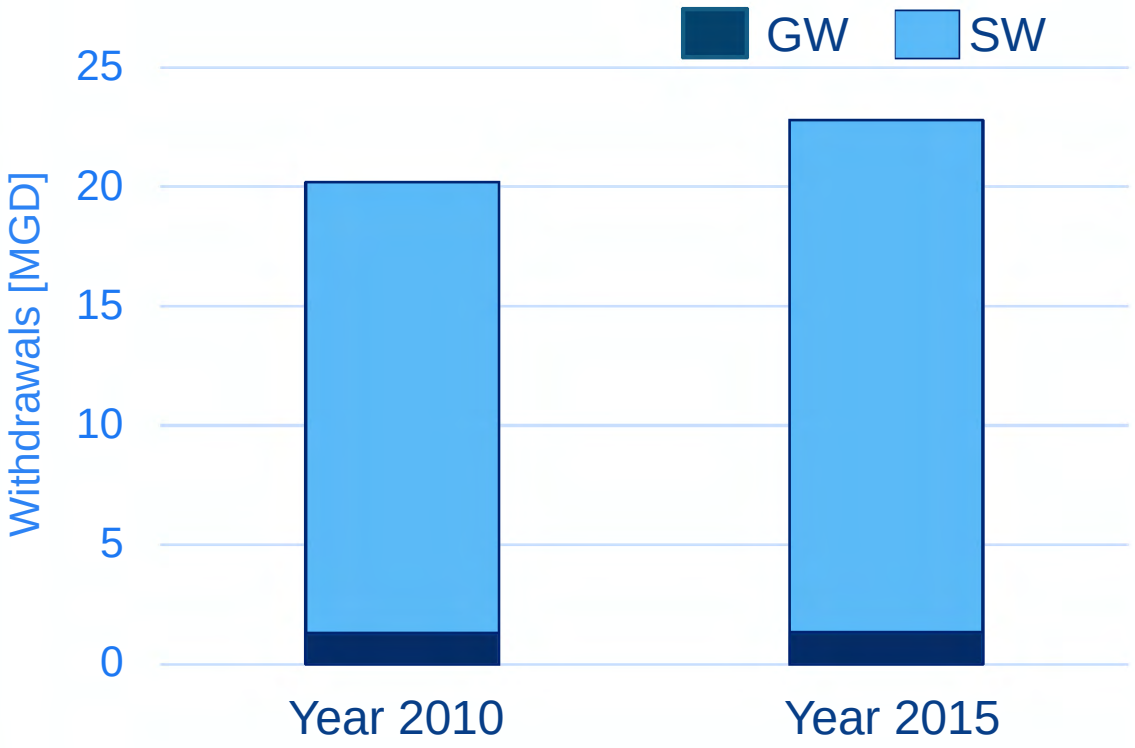
USGS

Mining Results

0.13% Total Withdrawals

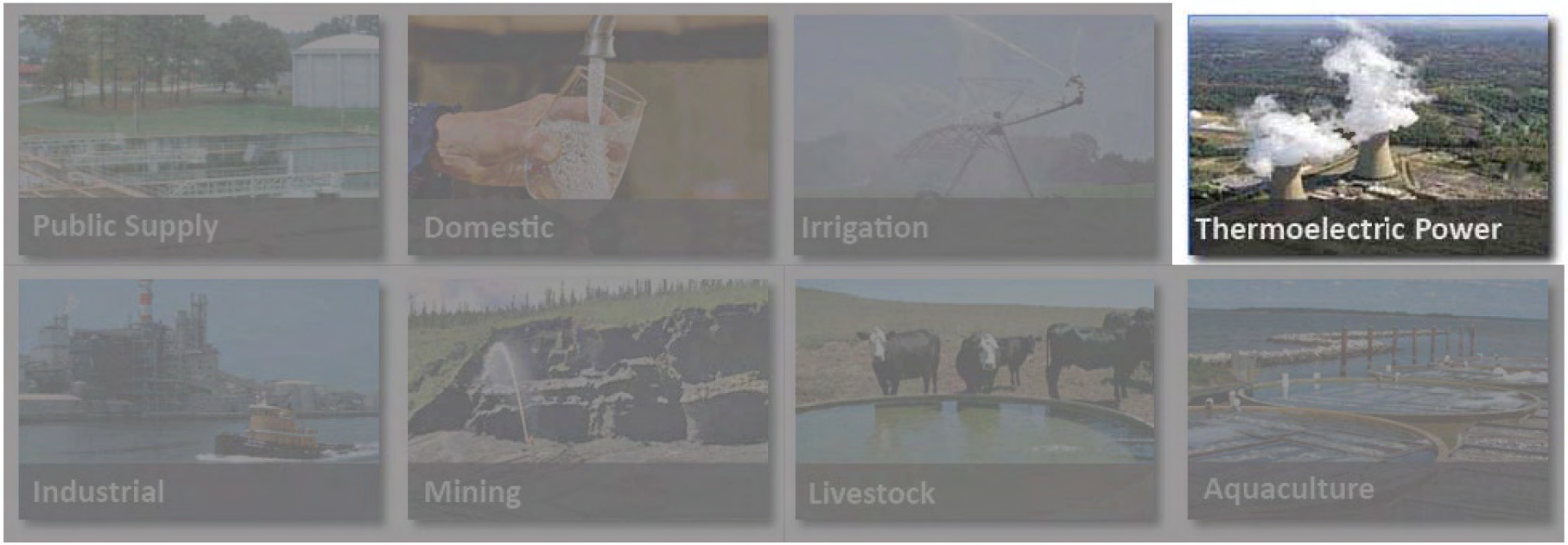


Withdrawals increased ~11% (2010-2015)



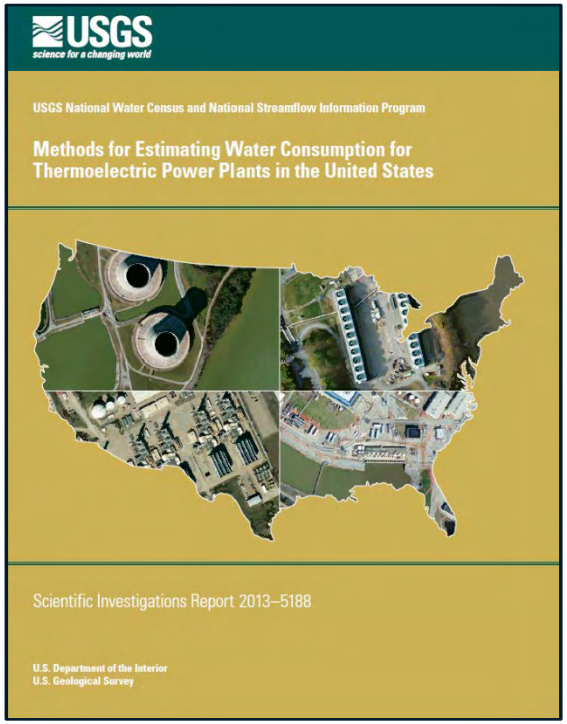
USGS

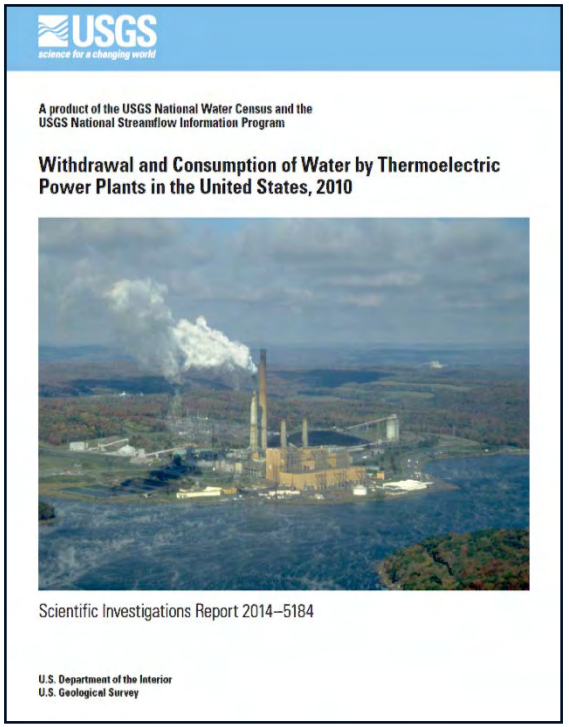
2015 results by category



USGS

Thermoelectric



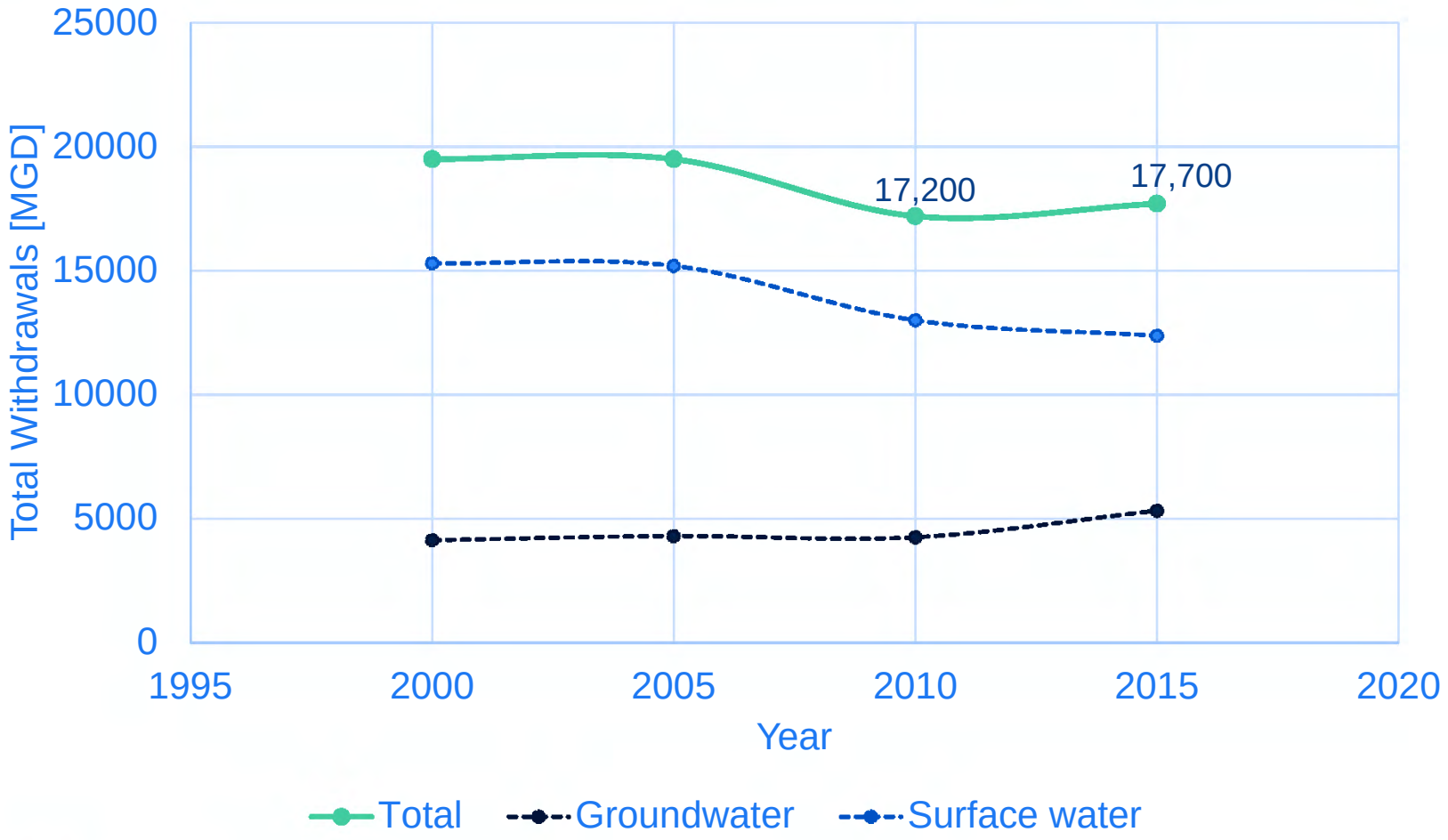


2015 Result: 1.8 MGD

(.01% of Idaho's Withdrawals)

USGS

Idaho Historical Trends



USGS

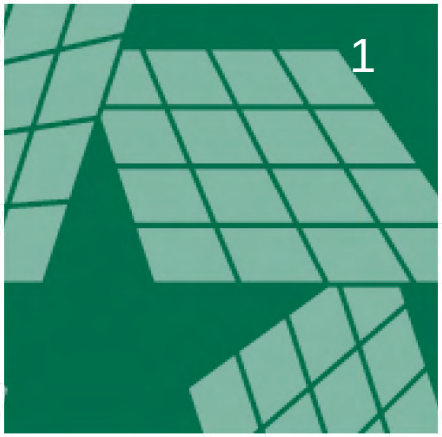
Question

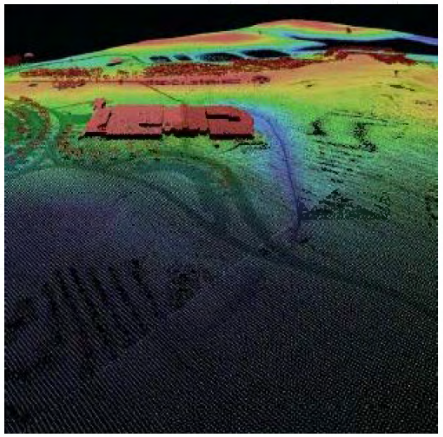
* Molly Maupin, Hydrologist
* Idaho Water Science Center
* 230 Collins Road
* Boise, Idaho 83702
* mamaupin@usgs.gov

USGS

Brief Overview of the National Water Model

Al Rea, USGS National Hydrography Co-Lead





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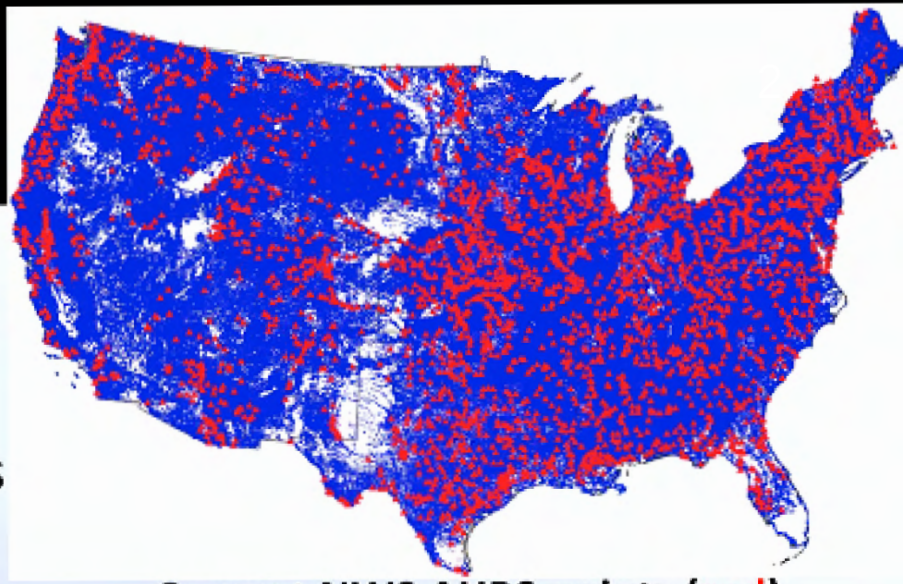
National Water Model
IOC Experimental Output (FY16)

- **Hydrologic Output**
  - River channel discharge and velocity at 2.7 million river reaches
  - Surface water depth and subsurface flow (250 m CONUS+ grid)
- **Land Surface Output**
  - 1km CONUS+ grid
    - Soil and snow pack states
    - Energy and water fluxes
- **Data Services**
  - Public-facing NWC website
  - Data feed to River Forecast Centers
  - NOMADS data service

(slide – Ed Clark, NOAA-NWS)

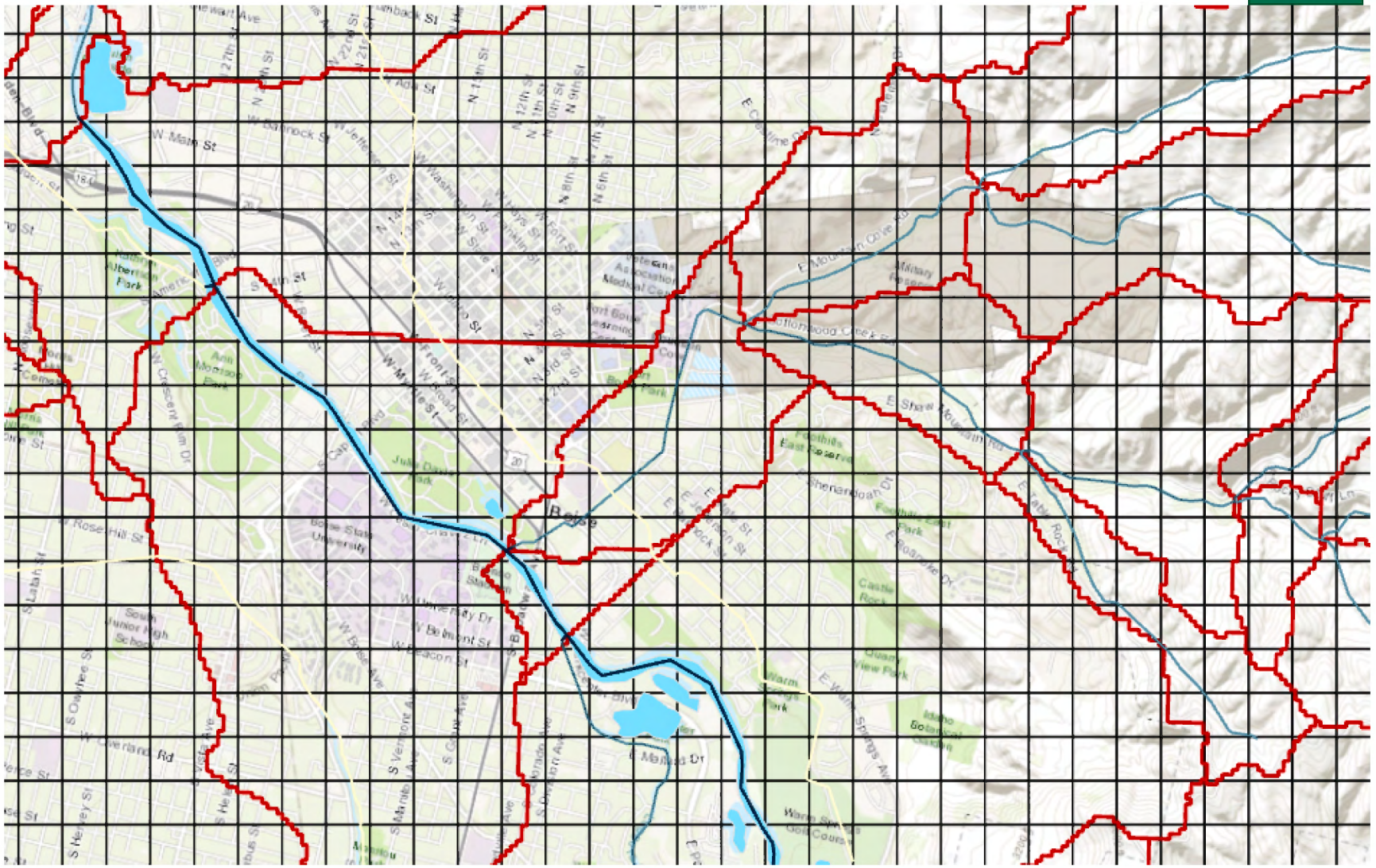


Current NWS AHPS points (red)
NWM output points (blue)

Howard County, Maryland (300k People)

Current River Forecast Points: Zero
WRF-Hydro Forecast Points: 300+

WRF-Hydro Grid, NHDPlus V2.1 Catchments, Flowlines, Wbodies



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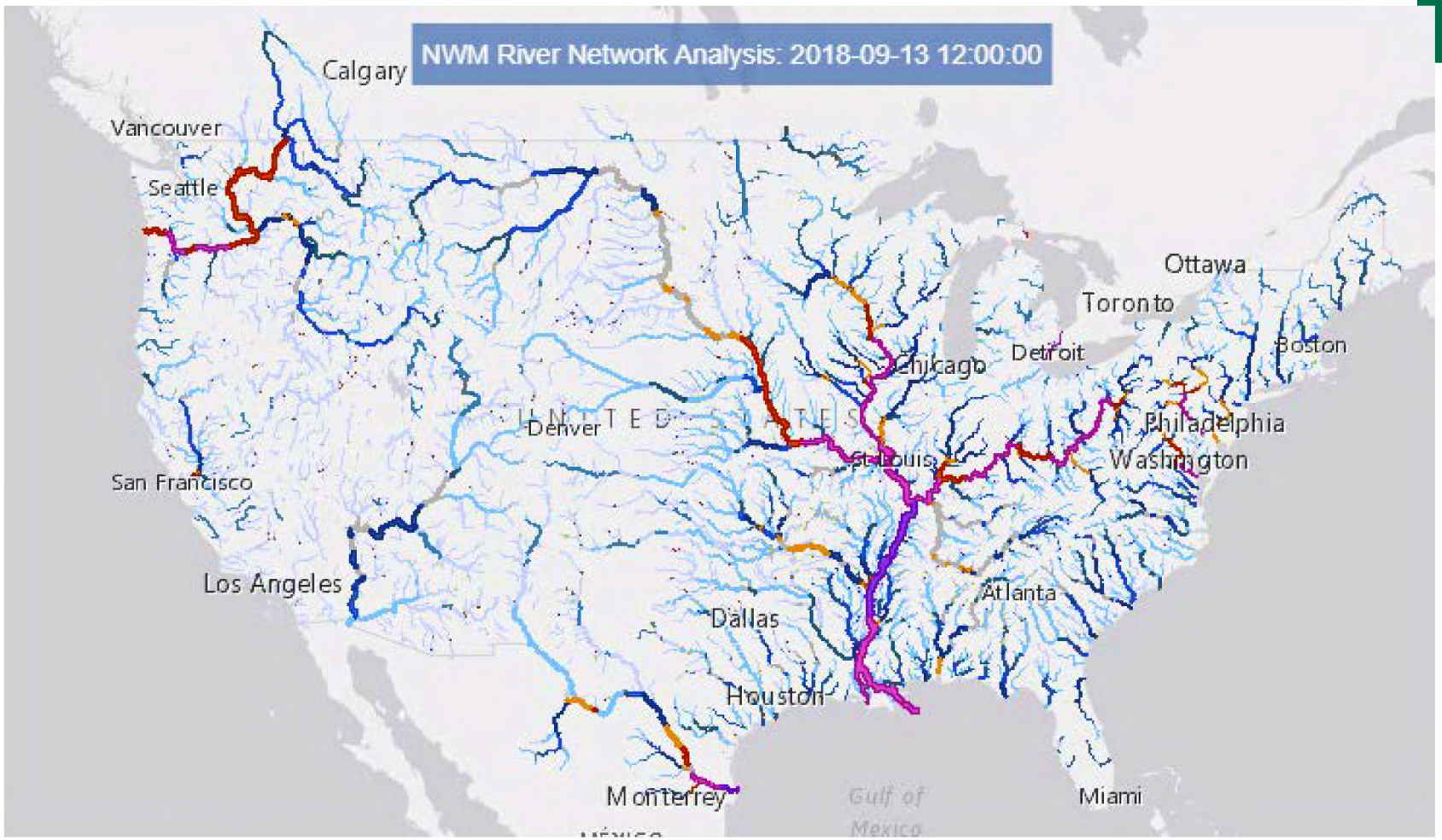
Model Real-time Output http://water.noaa.gov/map



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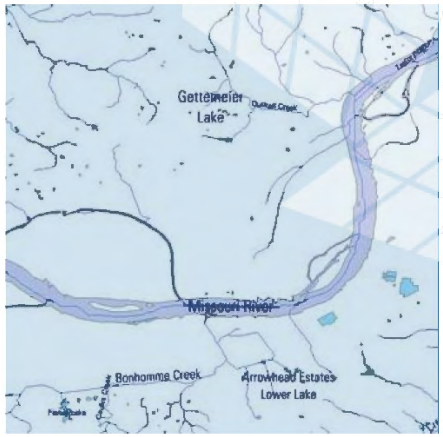
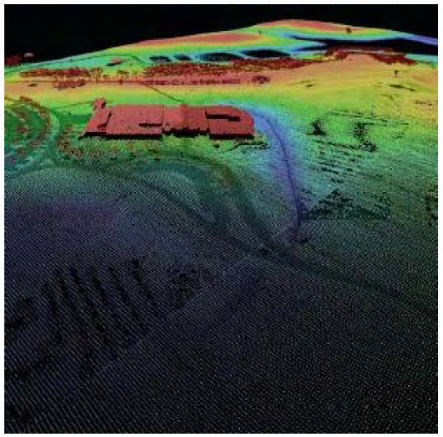
National Water Model Details

USGS National Hydrography

NHDPlus HR





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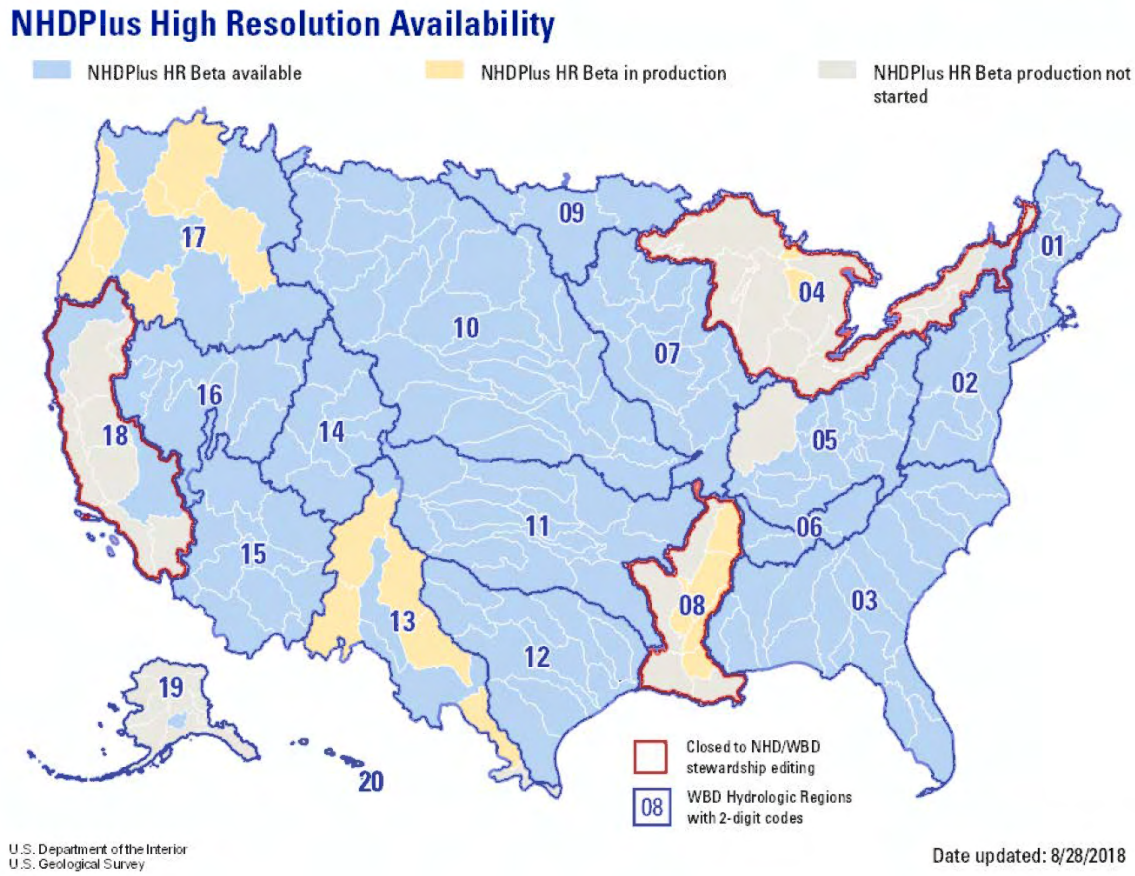
NHDPlus HR Status

First datasets released in April, 2017

- NHDPlus HR Beta will be completed in 2020 for the conterminous U.S., followed by AK, HI, and territories in later years
- Users are invited to review and provide feedback to the Beta version datasets
- Feedback will be used to update and improve the refreshed data release, beginning in 2019



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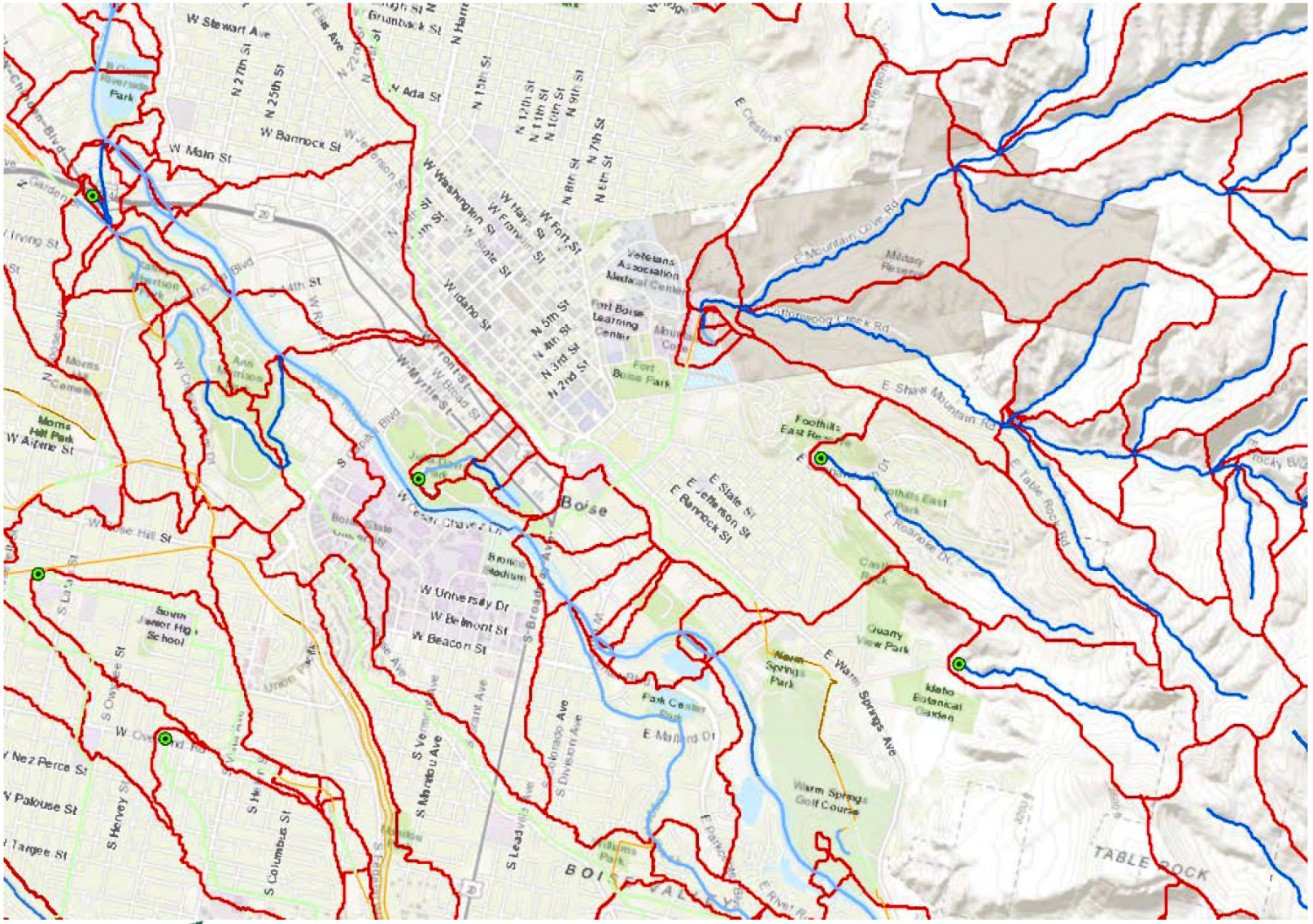
NHDPlus HR – Boise area



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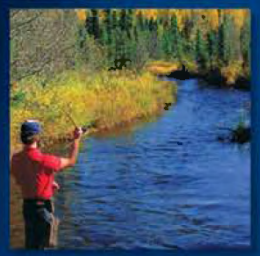
Questions?

Al Rea
USGS National Hydrography Co-Lead
ahrea@usgs.gov

Other Updates

- New NHD Website!
  - nhd.usgs.gov retired!

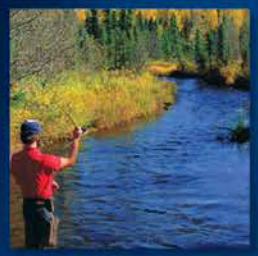
  https://www.usgs.gov/core-science-systems/ngp/national-hydrography

- The NHD Markup Tool
  - Training Video

  https://www.usgs.gov/media/videos/lesson-15d-markup-application

- Danielle Favreau, IDWR

IDAHO Department of Water Resources



Other Updates

NHD/WBD Tools Status

Editor Tools: All require ArcGIS 10.5.1

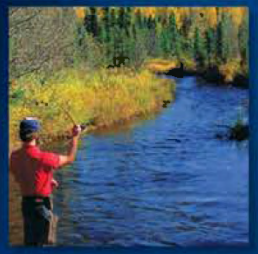
- NHD: version 6.5.0.0
- WBD: version 2.7.0.1
- GeoConflation: 3.2.0.4

Tools available from NHD.usgs.gov

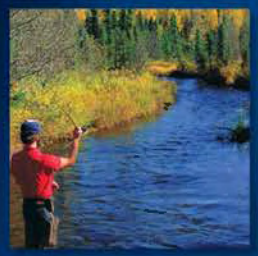
- HEM: version 2.10.0.1
- Utilities: version 3.2.1.1
  - Network Builder Requires ArcGIS Standard or Advanced License

- Metadata Viewer: version 1.0.0.4 still at ArcGIS 10.3.1

- Danielle Favreau, IDWR



Other Business?

Upcoming Events

- **Northwest GIS Conference**
  - October 15-19, 2018 Bremerton, WA
- **URISA GIS/CAMA Conference**
  - February 25-28, 2019 Portland, OR
- **Intermountain GIS Conference**
  - March 25-29, 2019 Boise, ID
- **2019 AWRA Annual Water Resources Conference**
  - November 3-7, 2019 Salt Lake City, UT

Contact Information:

Danielle Favreau, Idaho WBD & NHD Technical Point of Contact Danielle.Favreau@idwr.idaho.gov

Linda Davis, Idaho Principal Data Steward Linda.Davis@idwr.idaho.gov

NHD.WBD@idwr.Idaho.gov

Website Information: http://idwr.idaho.gov/GIS/NHD/

NEXT TWG MEETING: March 14, 2019