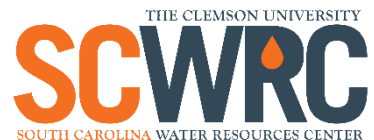# TRENDS IN WATER USE IN THE FACE OF CLIMATE UNCERTAINTY

C. Alex Pellett, SCDNR Hydrologist

- Overview of SC Water Demand Projections Study
- Summary of proposed methods for each sector
- **Participatory scenario development**

Projections are not forecasts

Forecast

- Educated guess.
- Based on expected conditions and actions.
- Timeframe limited by predictability of future conditions.
- Aim to be accurate.

Projection

- Extrapolation of trend.
- Based on hypothetical scenarios.
- Timeframe can extend beyond the limits of effective forecasting.
- Aim to be informative.

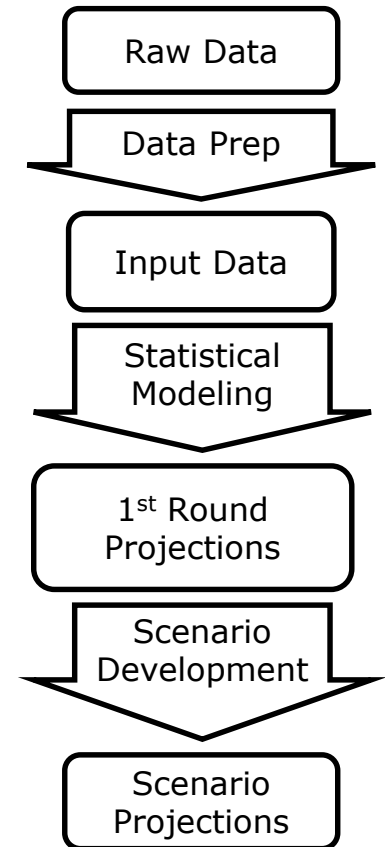# 2018-2019 SC Water Demand Projections Study

Scope

- Develop methods to project water demands for 50 years
- Categories of off-stream water demand:
  - Thermoelectric Power, Public Supply, Industry, Agriculture, Golf, Domestic
- Total withdrawal and consumptive use.
- Savannah basin pilot

Timeline

- Methods Report in February
- Pilot Report in May

More info: www.scwatermodels.com
Send feedback: scwatermodels@clemson.edu

Raw Data

Data Prep

Input Data

Statistical Modeling

1st Round Projections

Scenario Development

Scenario Projections

DNR

US Army Corps of Engineers

THE CLEMSON UNIVERSITY
SCWRC
SOUTH CAROLINA WATER RESOURCES CENTER

Projecting Water Use: Manufacturing

26 participants on August 15, 2018.

Method:

Assign EIA projected annual sectoral growth rate to each manufacturer's average water use from 2015-2017.

Limitations:

Does not fully account for shifts to manufacturing high value, specialty products which require less water per product value.

Does not account for new manufacturers.

First round projections will be adjusted based on stakeholder and water user feedback.

Projected Annual Growth Rate 2017-2050

Paper Products	0.7%
Wood Products	1.7%
Chemical Manufacturing	1.7%
Bulk Chemicals	1.6%
Inorganic	-0.1%
Organic	2.1%
Resin	1.6%
Plastics and Rubber Products	2.5%
Other Chemical Products	1.7%
Other Petroleum and Coal Products	-0.8%
Textile Mills and Products	-2.2%
Primary Metals Industry	1.0%
Iron and Steel Mills and Products	0.4%
Alumina and Aluminum Products	1.2%
Other Primary Metal Products	1.5%
Fabricated Metal Products	2.3%
Machinery	2.3%
Cement and Lime	1.9%
Food Products	1.7%
Miscellaneous Manufacturing	2.8%

Source: U.S. Energy Information Administration
https://www.eia.gov/outlooks/aeo/data/browser/#
Accessed Aug 7, 2018

Projecting Water Use: Thermoelectric Power

25 participants on August 29, 2018.

Method:
Assign projected electricity production in IRP documents to existing and proposed generators, then multiply by water consumption factor.

Limitations:
IRPs collected only for Duke, SCE&G, and Santee Cooper.

Photovoltaics have recently been growing faster than thermoelectric production.

Table 1. Water Use Factors for Thermoelectric Generation in Texas

Prime Mover	Fuel	Cooling System	Water consumption (gal/KWh)
Steam turbine	Nuclear	Any	0.60
	Gas	Cooling tower	0.70
	Coal		0.60
	Gas	Once-through	0.35
	Coal		0.35
Combined Cycle	Gas	Cooling tower	0.23
		Once-through	0.23
Gas Turbine	Gas	Cooling tower	0.05
		Once-through	0.05

(From presentation by Stuart Norvell)

Projecting Water Use: Public Supply

1. Separate industrial purchases where information is available.
2. Model outdoor use as function of weather.
3. Project indoor use using projected county population growth rates.

Limitations:

Does not incorporate increasing efficiency in indoor use. System losses and system interconnections can complicate estimation of per capita water use.

Projecting Water Use: Agriculture

1. Develop irrigation suitability index.

2. Estimate irrigation expansion rate.

3. Assume same crop portfolio.

4. Estimate crop irrigation needs during a drought.

Limitations:

Does not incorporate potential changes in crops, technology, or economics of irrigation.

Golf Technical Advisory Meeting: 11/7/2018

- If you have RSVP'd for email updates, you will receive a copy of the complete draft report in January.
  - Send comments within 30 days for consideration in the final draft methodology report.
- Upcoming discussions for each basin as we apply the methods.
- You may receive a brief, optional survey regarding this stakeholder engagement process.

More info: www.scwatermodels.com
Send feedback: scwatermodels@clemson.edu (RSVP for email updates)

Participatory Scenario Development

What factors could influence water use in each sector?

Which factors might be most important?

How can the factors be clustered in to relevant scenarios?

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