Water Resources

Smart Management through Machine Learning

Presenting

Brian Reynolds
Data Scientist
&
Natural Resources Consultant

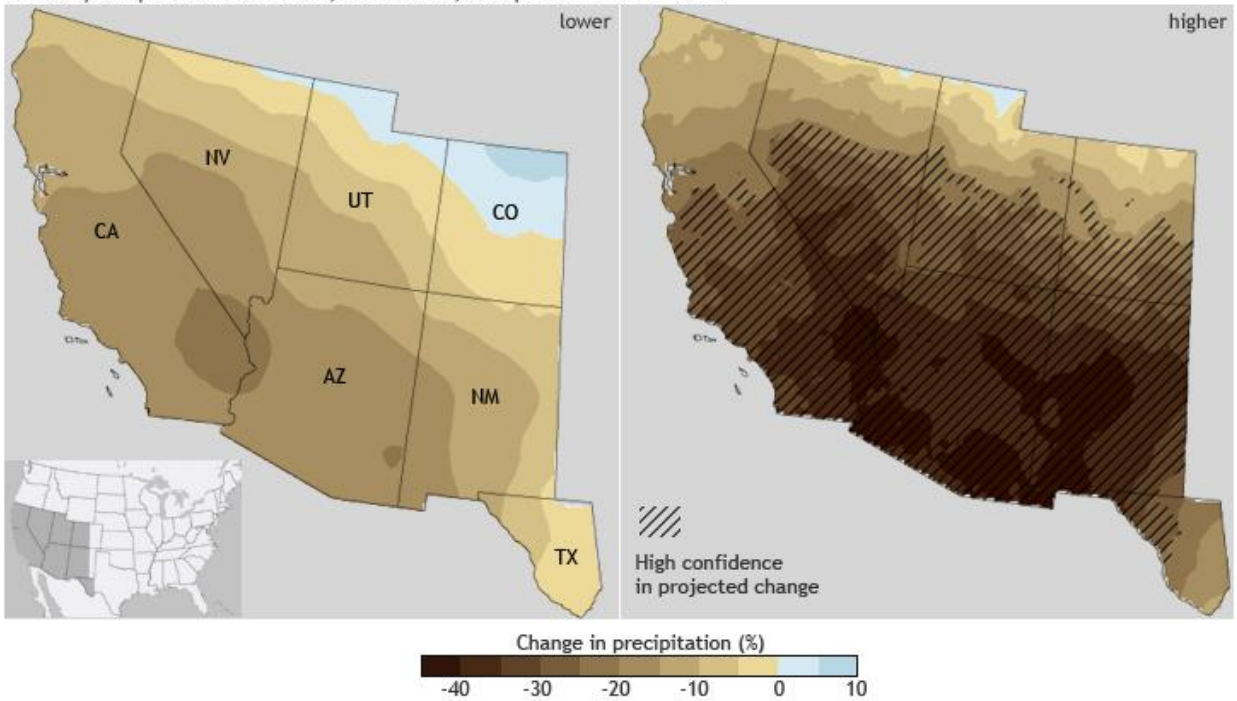
LinkedIn
GitHub

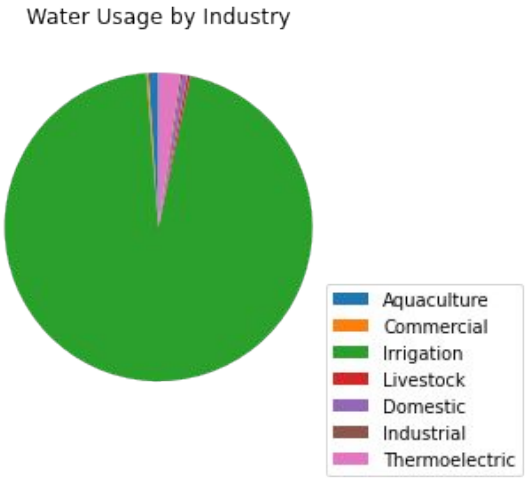
Agenda

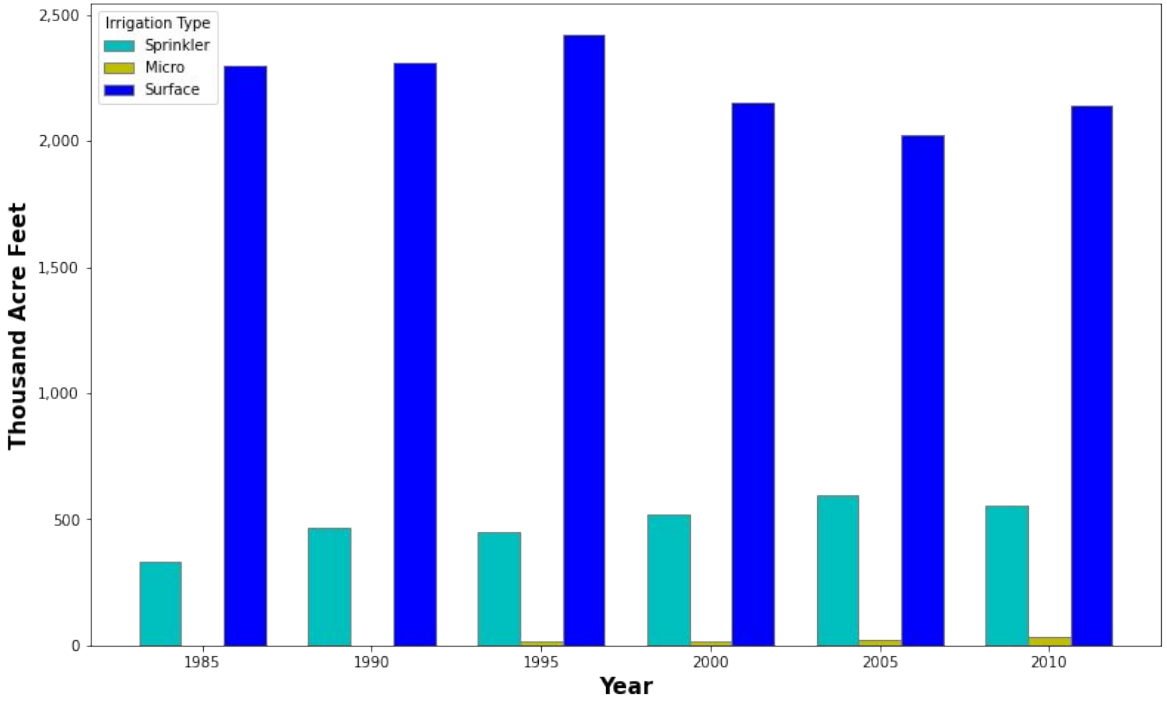
Machine Learning
Future Considerations
Data Collection
Water Resource Management
Climate and Water

Climate & Water in the Southwest

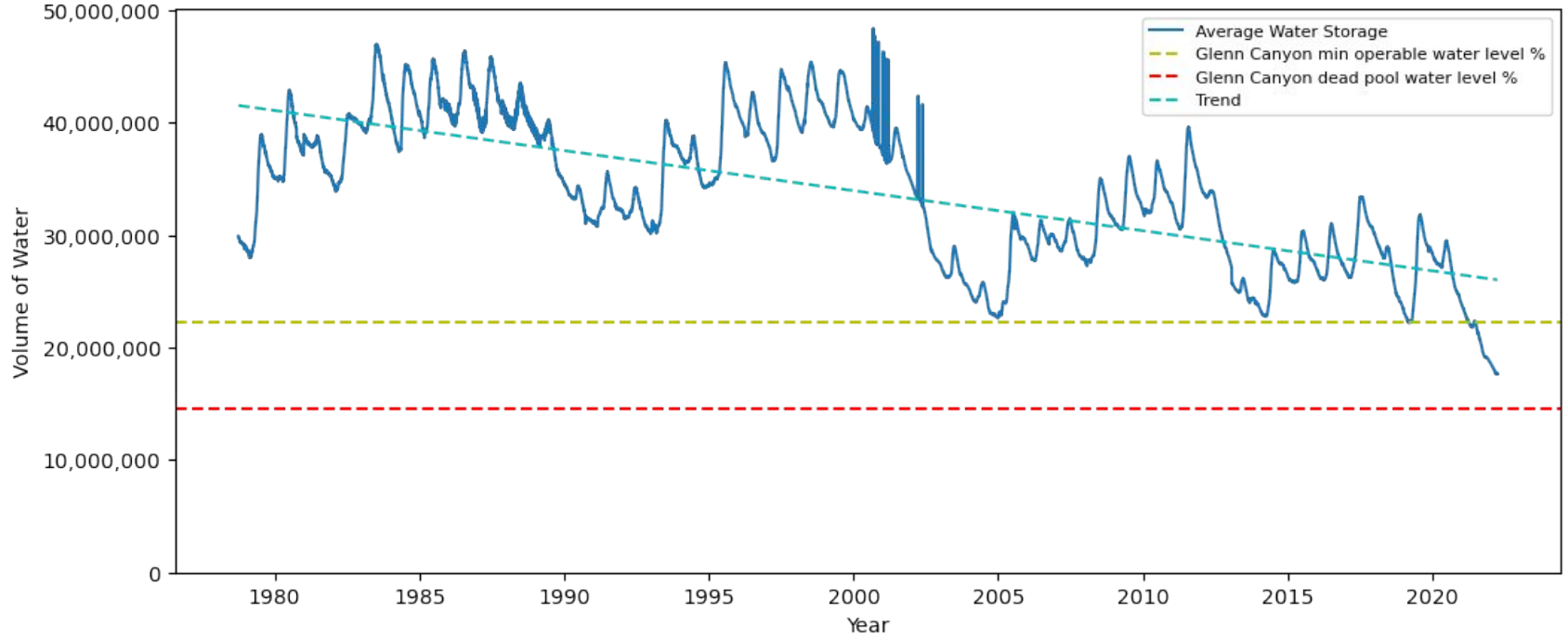
Future precipitation scenarios, 2080-2099, compared to 1961-1979




Water Usage by Industry
Aquaculture
Commercial
Irrigation
Livestock
Domestic
Industrial
Thermoelectric

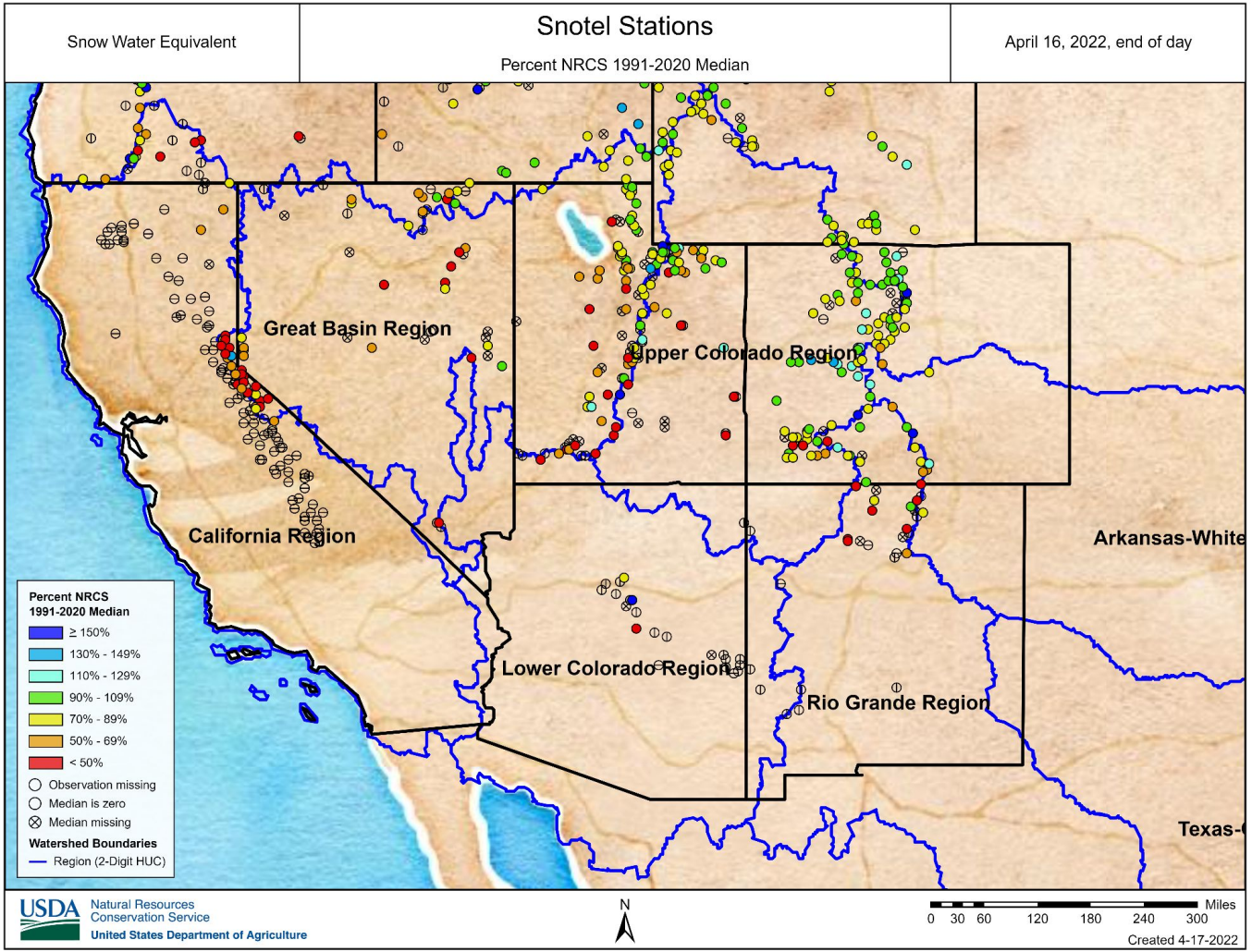

Irrigation Type
Sprinkler
Micro
Surface
Thousand Acre Feet
2,500
2,000
1,500
1,000
500
0
1985
1990
1995
2000
2005
2010
Year

Water Resource Management



Water Resource Management

Data Collection


Snow Water Equivalent
Snotel Stations
Percent NRCS 1991-2020 Median
April 16, 2022, end of day
Great Basin Region
Upper Colorado Region
California Region
Arkansas-White
Lower Colorado Region
Rio Grande Region
Texas-
Percent NRCS
1991-2020 Median
≥ 150%
130% - 149%
110% - 129%
90% - 109%
70% - 89%
50% - 69%
< 50%
Observation missing
Median is zero
Median missing
Watershed Boundaries
Region (2-Digit HUC)
USDA
Natural Resources
Conservation Service
United States Department of Agriculture
N
Miles
0 30 60 120 180 240 300
Created 4-17-2022

Water Storage & Withdrawals

Glenn Canyon Dam

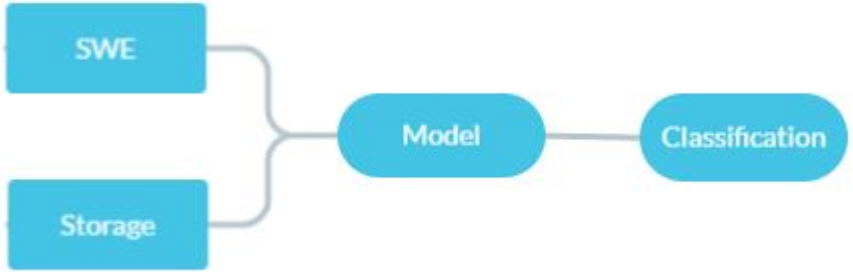
Irrigation Surface Withdrawals

Data Collection

Machine Learning

Using predictive models to drive regulatory policy

Machine Learning



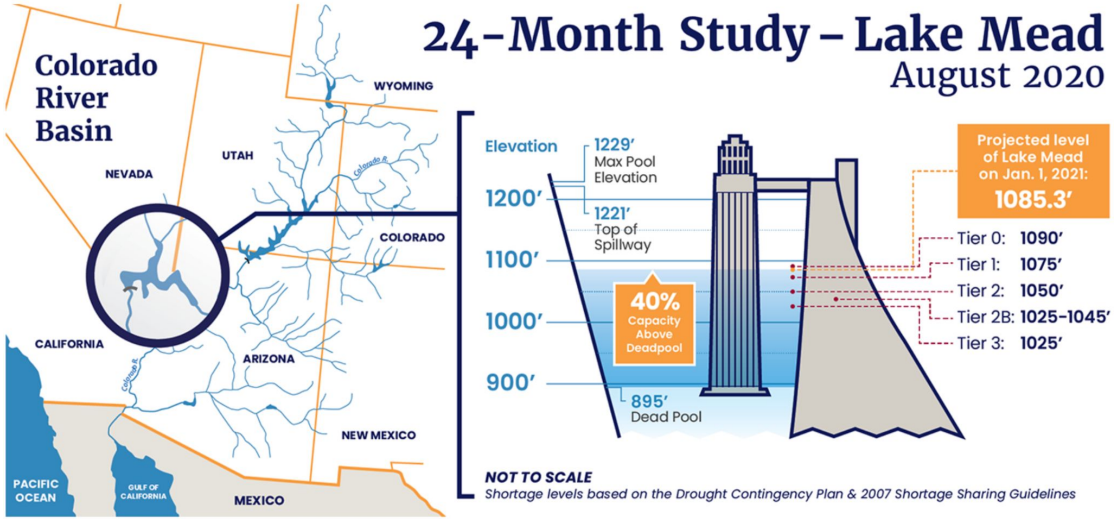
Accuracy: 97.2%

Identifies between:

- Operational water depth
- Non-operational water depth
- Dead-pool water depth

Future Considerations

Future Considerations



Specificity and Customization

- Grouping by downstream reservoir
- Applying model to new basins
- Prepare model classification based recommendations for management

Thank you.