Wyoming’s Water Use
Data Collection and Management

Charlie Ferrantelli
State Engineer’s Office
*Interstate Streams Division*
Groundwater Use Reporting

Climate Data Management

Irrigated Lands Mapping
Groundwater Use Reporting
Groundwater Use Reporting

- SEO GW Division reporting: pumping totals and water levels for certain well types or locations (municipal, industrial, irrigation wells)
  - Historically hard copy scans, some electronic data (if you were lucky)
  - No way to enforce or know whether someone had reported
  - Unable to compile all data
- LCCA Order was the tipping point – 100s to 1000s of permits to require annual and monthly pumping reports. How to enforce?

**CAUTION: BAD DATA**

BAD DATA QUALITY MAY RESULT IN FRUSTRATION AND LEAD TO DROP KICKING YOUR COMPUTER
SEO GW Division, realizing the need, developed an online reporting tool for statewide wells

- Google Forms
- So far ~1900 well permits
- Website or even on smartphone

Now have data for

- Permit compliance/enforcement
- Water right history & disputes
- Hydrologic data
- Saved lots of money
Possible future improvements

- Data available to public through “SEOflow” web-portal (MWs, gauge data)
  - Very cool!
- Internal connections with other permitting database: help with application processing
- Assist applicants with Temporary Water Use Agreements: allows water to be used elsewhere

http://seoflow.wyo.gov
Climate Data Management
Climate Data Management

- Agricultural climate stations – 19 SEO sites
  - Wyoming Agricultural and Climate Network (WACNet)
  - Consumptive use reporting per Upper Colo River Compact, Modified N Platte Decree, Bear River Basin?
  - Regional studies, databases, local public benefits
  - Ability for Penman-Monteith ET calcs

Elk Mountain 6S
Climate Data Management

- WACNet managed by the SEO (4) and WRDS (3)
  - Installation, programming, upgrades, O&M, QA/QC
  - Data transmitted by cell hourly to WRDS website

http://www.wrds.uwyo.edu/WACNet/Stations.html
Climate Data Management

Lots of good things, but some challenges:

- Inconsistent table formatting
- Inconsistent parameters - hourly vs. daily tables
- QA/QC
- Inherited stations poor locations or changing conditions
Improvements:
• Standardized formatting: daily/hourly, between stations, going back to the beginning
• New parameters, calculating missing parameters, where applicable
• QA historical data (soon)
• Automated red flags for data issues (soon)
• Website improvements
  • Could use advice here...!
  • Benefits users and caretakers?
  • Visual data: short- mid- & long-range time scales?
Irrigated Lands Mapping
Irrigated Lands Mapping

Why is this necessary?

Water right boundary

Good water year
Irrigated Lands Mapping

How currently being done at SEO:

• North Platte: acreage inspectors manually map irrigated lands

Decree regulations:

• Acreage cap of intentionally irrigated lands; those that can be controlled.

• 10 yr running average of CU
Compact regulations: Upper Colo River Compact: WY gets 14% of total consumptive use of Upper Division states

Normalized Difference Vegetation Index (NDVI) in Green/Little Snake basins

\[
NDVI = \frac{\text{NIR} - \text{Red}}{\text{NIR} + \text{Red}}
\]
Irrigated Lands Mapping

• USGS EROS & GloVis
  • Challenge was that it required several steps to obtain all the correct scenes, examine the clear dates, compile multiple dates, and mosaic together.
Irrigated Lands Mapping

- ClimateEngine.org
  - Team: DRI and Univ of ID
  - Free, takes care of these issues and other tools
    - Combine scenes
    - Review dates quickly
    - Avg, max, min multiple dates
    - Time series
Irrigated Lands Mapping

NDVI date range

Testing thresholds, e.g., NDVI > 0.5

Time series of NDVI: e.g., useful for cutting dates, season length
Irrigated Lands Mapping

Challenges

• Determining the threshold value
• Masking out non-irrigated areas
  • High elevation
  • Natural vegetation
  • Seepage growth?
• Inter-field boundaries
  • Not annual task
  • Open-ET Wyoming fields
  • How to divide blob using useful polygons

Bridger Valley, WY
The End
The End...