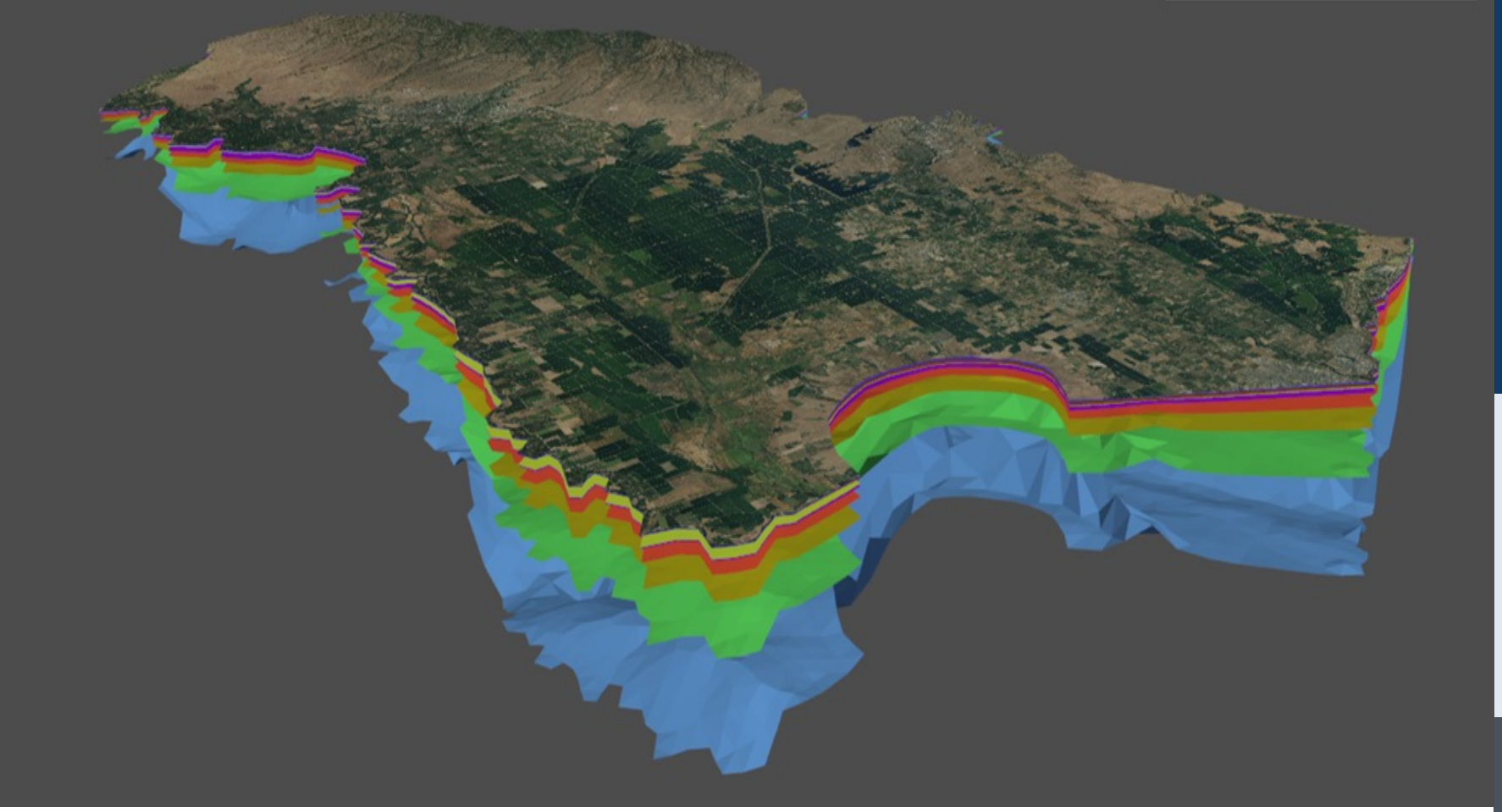

Woodard & Curran

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IWFMTools

A Python Module for Visualizing IWFM Model Inputs

PRESENTED BY

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IWFM Input Tools - Introduction

→ What is it?

- Python module for reading, processing, and visualizing IWFM model input files

→ Why Make It?

- IWFM files are complex, time-consuming to process and difficult to QC
  - » Facilitates rapid analysis of model inputs
  - » Input side, standardization of QC
  - » Efficient data analysis with minimal user input required
- Afford modelers more time for analysis and interpretation
- IWFM has a limited GUI environment

```
C*******************************************************************************
C
C                  INTEGRATED WATER FLOW MODEL (IWFM)
C
C*******************************************************************************
C
C             SURFACE WATER DIVERSION SPECIFICATION DATA FILE
C                          Stream Component
C                        *** Version 4.0 ***
C
C             Project:  CoSANA Model
C                       Cosumnes, South American, and North American Subbasins
C                       Integrated Water Resources Model
C             Filename: CoSANA_DiversionSpec.dat
C*******************************************************************************
C                          File Description
C
C  This data file contains the specification data for surface water diversions.
C
C*******************************************************************************
C                  Surface Water Diversion Specifications
C
C   The following lists the number of surface water diversions and
C   specifications for each diversion that is included in the model.
C
C   NRDV;    Number of surface water diversions included in the model.
C------------------------------------------------------------------------------
C   VALUE                        DESCRIPTION
C------------------------------------------------------------------------------
    145                        / NRDV
C------------------------------------------------------------------------------
C
C   The following lists the specifications for each surface water diversion
C   (skip if no diversions are modeled, i.e. NRDV = 0)
C
C   ID      ; Surface water diversion identification number
C   IRDV    ; Stream node from where the diversion takes place. Enter '0' if
C               the stream node is outside the model area.
C   ICDVMAX ; Maximum diversion amount - this number corresponds to the
C               appropriate data column in the Diversion Data File
C               * Enter 0 if a maximum diversion amount does not apply.
C   FDVMAX  ; Fraction of data value specified in column ICDVMAX to be used as
C               maximum diversion amount
C   ICOLRL  ; Recoverable loss -  this number corresponds to the appropriate
C               data column in the Diversion Data File
C   FRACRL  ; Fraction of the data value that is specified by ICOLRL
C               to be used as recoverable loss
C   ICOLNL  ; Non-recoverable loss - this number corresponds to the appropriate
C               data column in the Diversion Data File
C   FRACNL  ; Fraction of the data value that is specified by ICOLNL
C               to be used as non-recoverable loss
C   TYPDSTDL; Diversion destination type
C                0 = Diversion goes outside the model domain
C                2 = Diversion goes to element DSTDL (see below)
C                4 = Diversion goes to subregion DSTDL (see below)
C                6 = Diversion goes to a group of elements with ID DSTDL
C                    (element groups are listed after this section)
C   DSTDL   ; Destination ID for diversion
C               * Note: Enter any number if TYPDSTDL is 0
C   ICOLDL  ; Delivery to destination DSTDL - this number corresponds to the
C               appropriate data column in the Diversion Data File
C   FRACDL  ; Fraction of the data value that is specified by ICOLDL
C               to be used as delivery to destination DSTDL
C   ICFSIRIG; Fraction of the delivery that is used for irrigation purposes -
C               this number corresponds to the appropriate data column in the
C               Irrigation Fractions Data File (remaining amount will be used to
C               supply the user specified urban demand)
C   ICADJ   ; Supply adjustment specification - this number corresponds to the appropriate
C               data column in the Supply Adjustment Specifications Data File
C                * Enter 0 if diversion will not be adjusted
C   NAME    ; Name of the diversion (maximum 20 characters)
C
C-------------------------------------------------------------------------------------------------------------------------------
C   ID      IRDV  ICDVMAX  FDVMAX  ICOLRL   FRACRL     ICOLNL     FRACNL      TYPDSTDL    DSTDL   IC
C-------------------------------------------------------------------------------------------------------------------------------
1       0       1       1.00    1       0.14    1       0.04    4       1       1       1.00    1
2       0       2       1.00    2       0.14    2       0.04    4       3       2       1.00    1
3       277     3       1.00    3       0.14    3       0.04    4       3       3       1.00    1
4       0       4       1.00    4       0.00    4       0.00    4       3       4       1.00    1
5       0       5       1.00    5       0.14    5       0.04    4       4       5       1.00    1
6       0       6       1.00    6       0.035   6       0.01    4       5       6       0.125   1
7       0       7       1.00    7       0.035   7       0.01    4       5       7       0.125   1
8       0       8       1.00    8       0.00    8       0.00    4       6       8       1.00    2
9       134     9       1.00    9       0.12    9       0.03    4       7       9       1.00    1
10      155     10      1.00    10      0.12    10      0.03    4       8       10      1.00    1
```

What Can it Do?

- → Visualize time-series data
- → Visualize model geometry and geospatial data
- → Create interactive 3D visualization of model stratigraphy
- → Create 3D animations of groundwater levels (from model output)

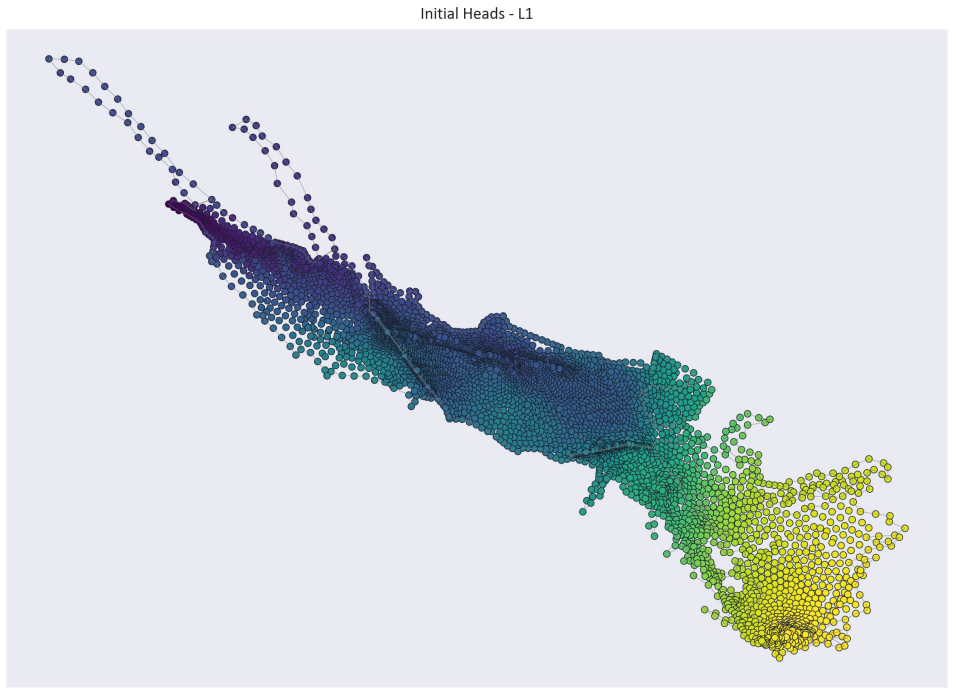
Development Goals

→ Flexible enough for Python users

- Object-oriented programming enables rapid development of new methods

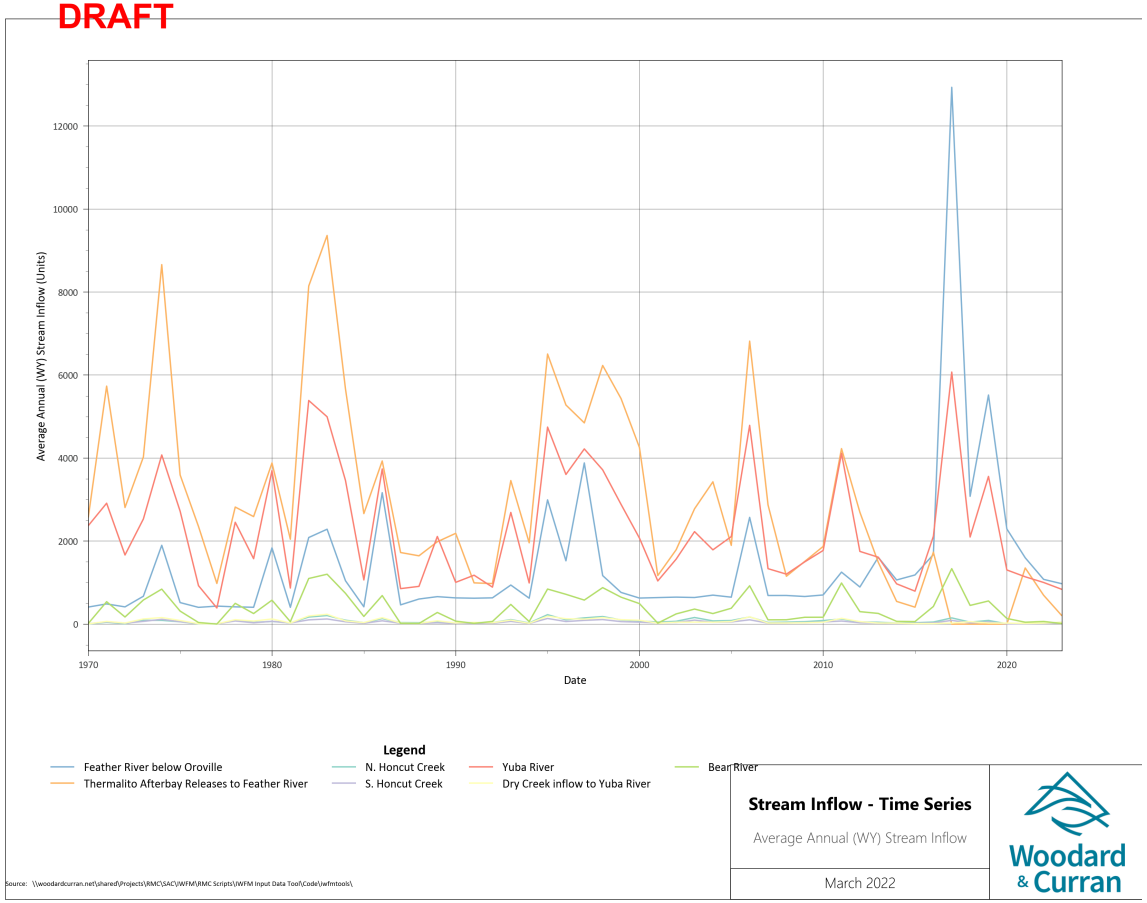
→ Simple enough for non-users

- Very few user inputs required
- Planned future GUI and interactive environment
- Write results to Excel/ESRI shapefile



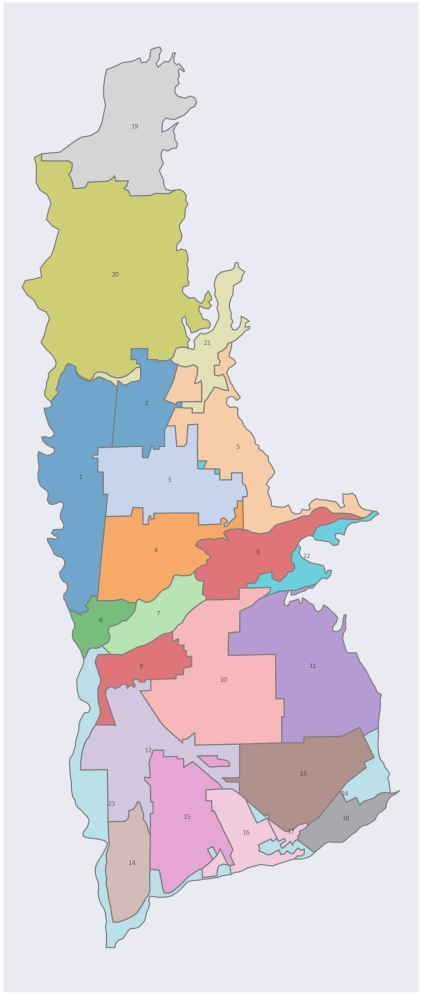
Example Tool Outputs

DRAFT

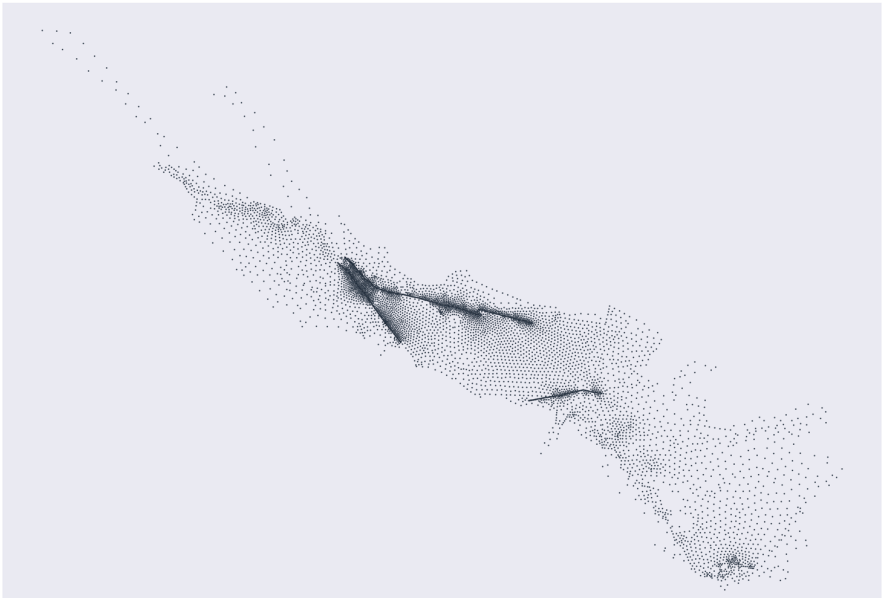


Time Series Data

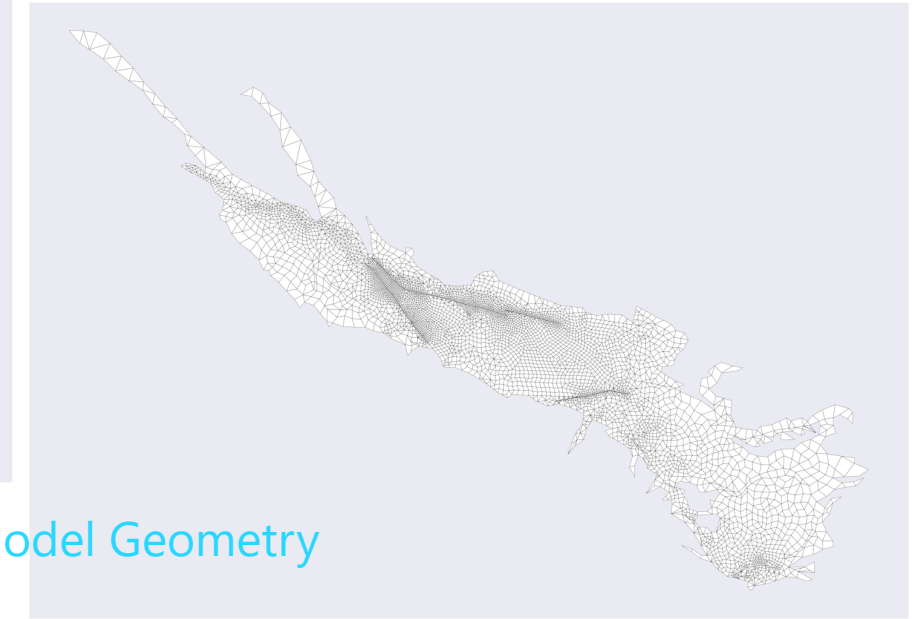
Model Subregions



Groundwater Nodes

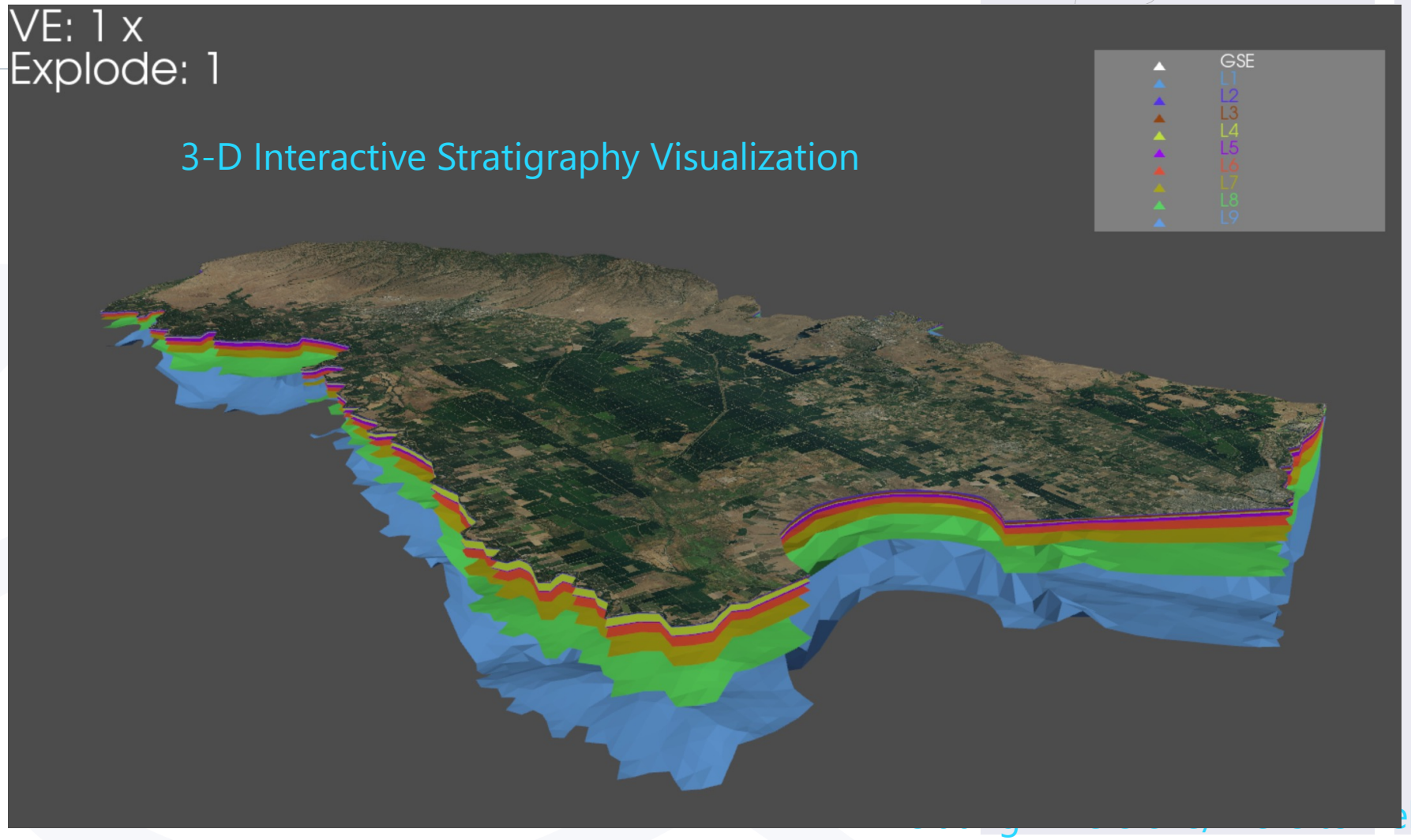


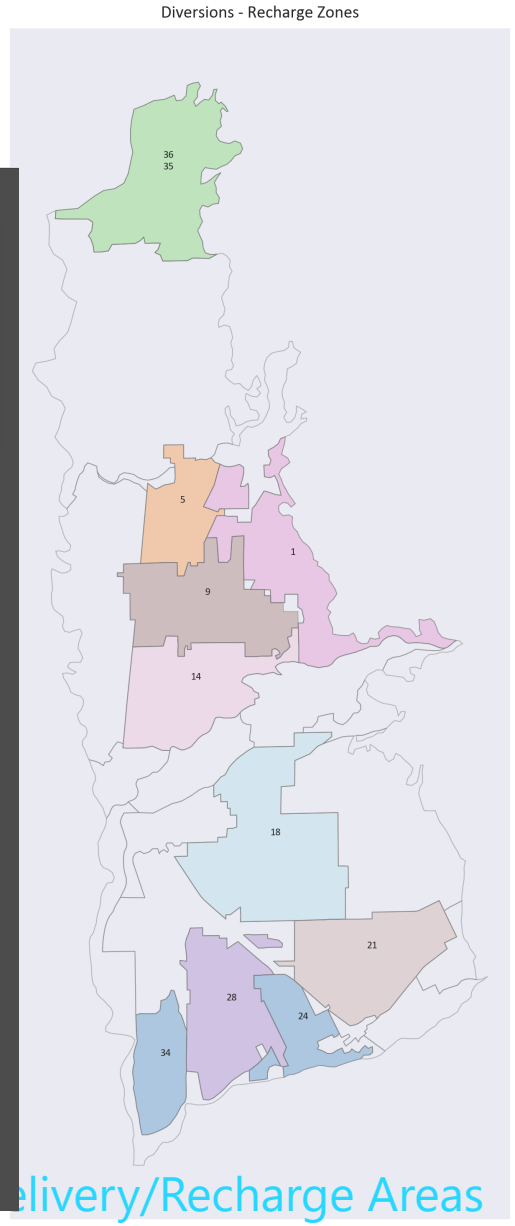
Elements



Model Geometry

More Example Tool Outputs!

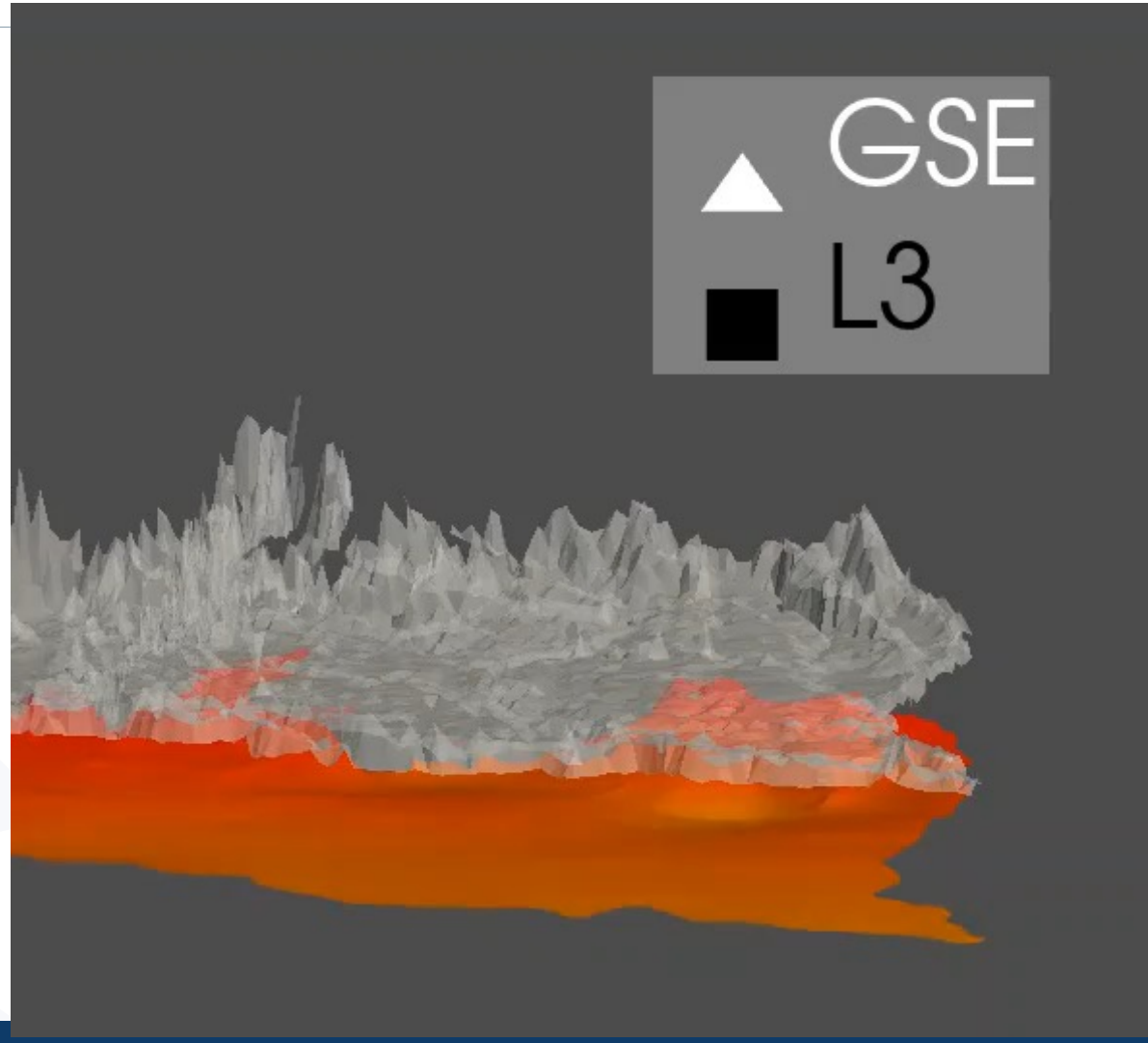




elivery/Recharge Areas

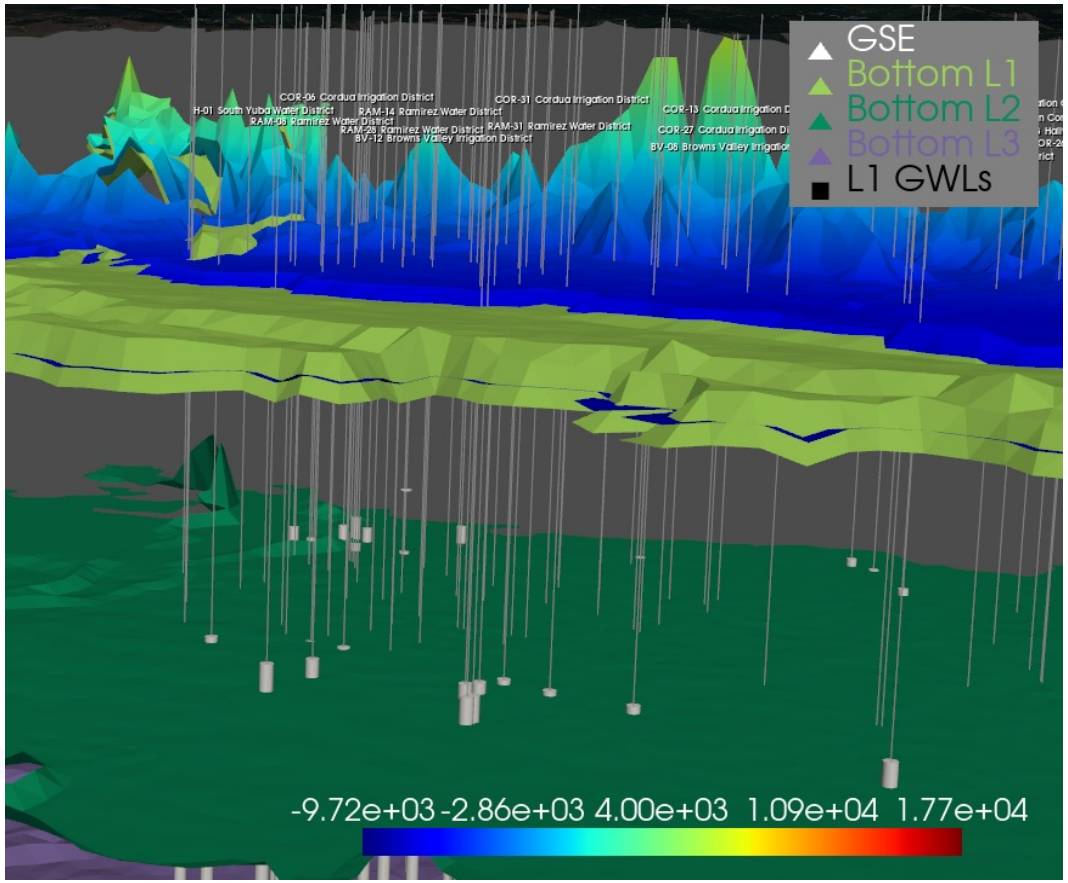
Even More Example Tool Outputs!

- Some *model outputs* can also be visualized
- Working on developing visualization of simulated GWLs



Future Plans

- Add support for additional input file types
  - Linking time-series and geospatial data (e.g. well spec and pump time-series)
- Interactive maps
- GUI



Adding well-screens to 3-D Stratigraphy (in progress)

Thank You!