Building a GIS Toolbar for TMDL development

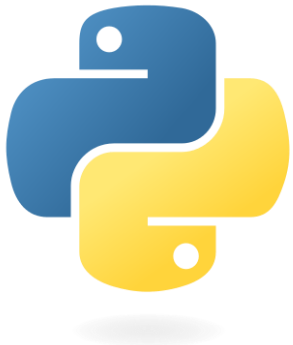
September 2021

Challenges to TMDL development

- Announcements
- Meeting Notifications and Updates
- Final TMDL Reports
- Draft TMDL Reports
- Groundwater Management Section
- Site-Specific TMDL Prioritization
  - Priority Framework Document
- TMDL Tracker
- All Water Quality Evaluation and TMDL Program Content

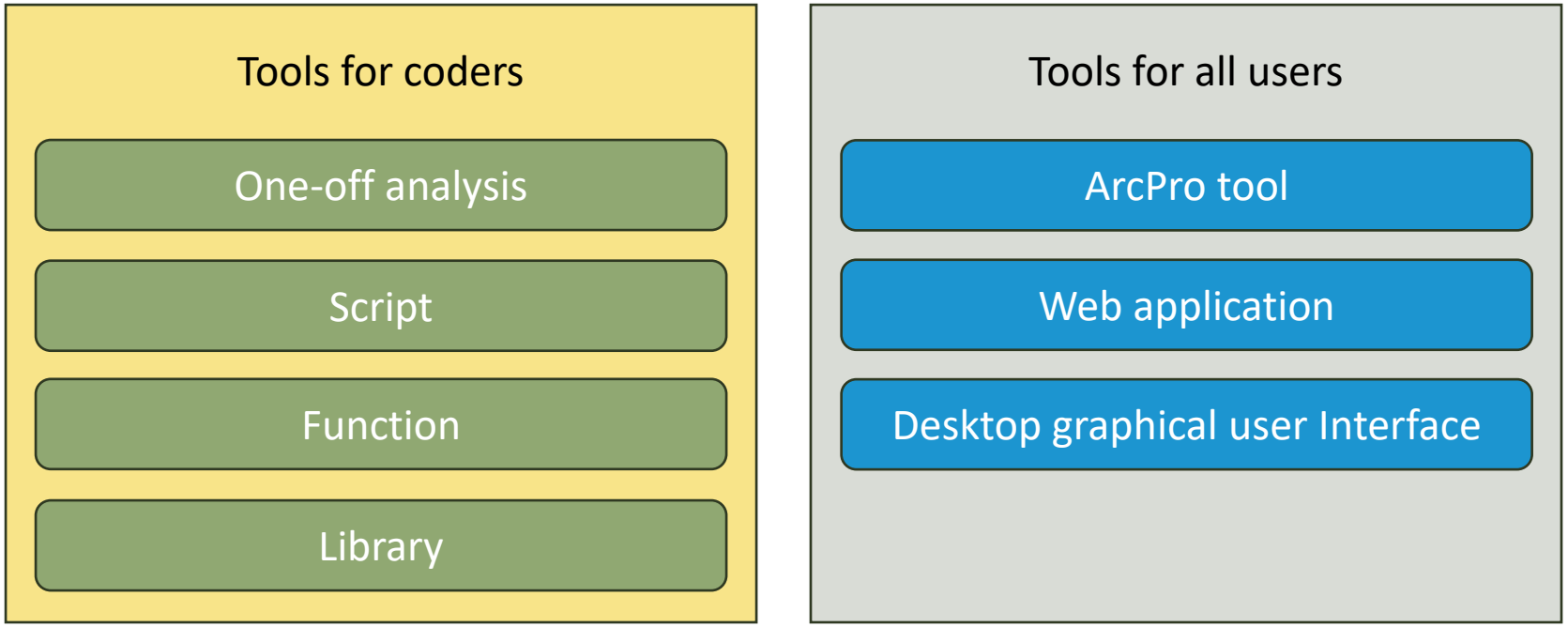
Waterbody Name(s)	Waterbody Identification Number (WBID)	Nutrient TMDL	Other TMDL	F.A.C. Rule No.
34th Street Basin, Clam Bayou Drain, Clam Bayou, (East Drainage), and Clam Bayou Drain (Tidal)	1716A, 1716B, 1716C, and 1716D		Fecal Coliform TMDL	62-304.645
Alachua Sink	2720A	Nutrient TMDL		62-304.500
Alafia River Above Hillsborough Bay - Tidal Segment	1621G	Nutrient TMDL		62-304.605
Allen Creek Tidal	1604		Fecal Coliform TMDL	62-304.600
Alligator Creek	123		Fecal Coliform TMDL	62-304.325

Tools of the trade

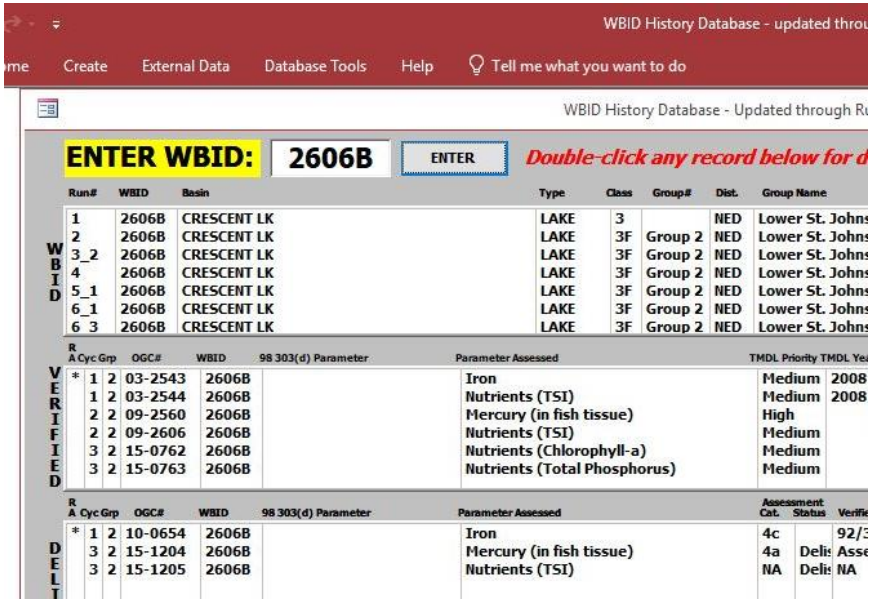


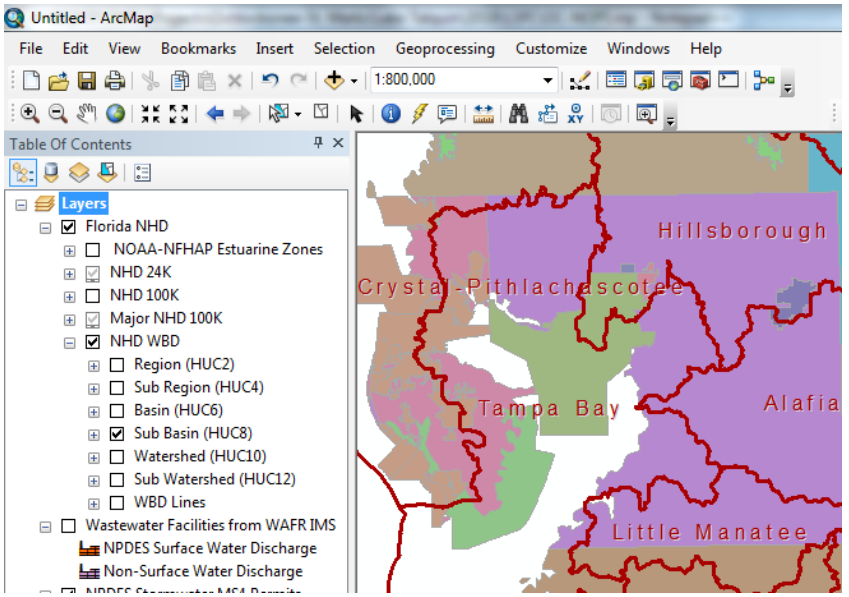
python™

Things that code can build



Bridging the spatial divide





Solution: Develop a GIS Toolbar

- Data extraction
- Plotting
- Data analysis
- Model setup tasks

Development Team

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- Eric Tano
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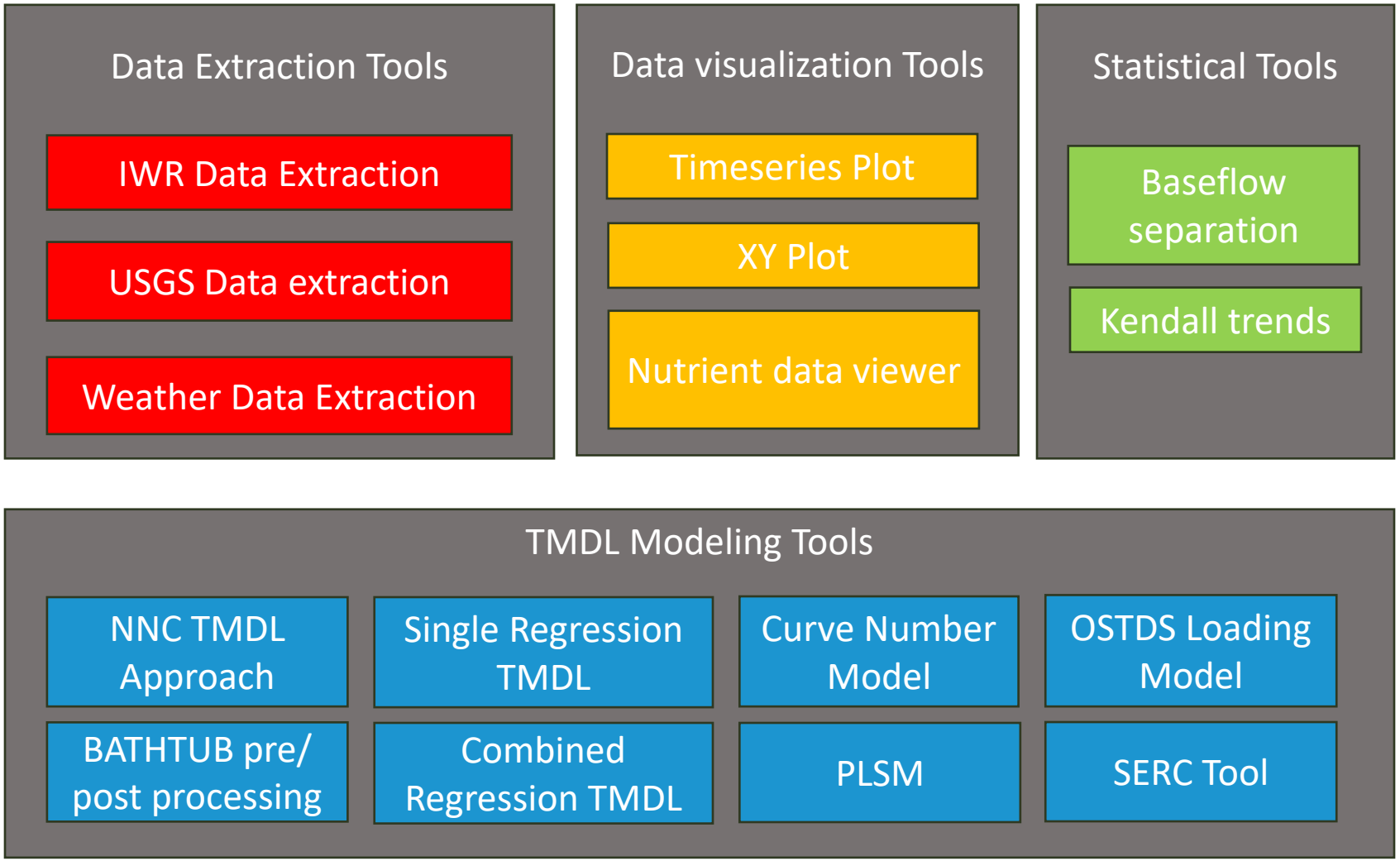
- Alireza Merikhi

GIS toolbar


Data Extraction Tools
IWR Data Extraction
USGS Data extraction
Weather Data Extraction
Data visualization Tools
Timeseries Plot
XY Plot
Nutrient data viewer
Statistical Tools
Baseflow separation
Kendall trends
TMDL Modeling Tools
NNC TMDL Approach
Single Regression TMDL
Curve Number Model
OSTDS Loading Model
BATHTUB pre/ post processing
Combined Regression TMDL
PLSM
SERC Tool

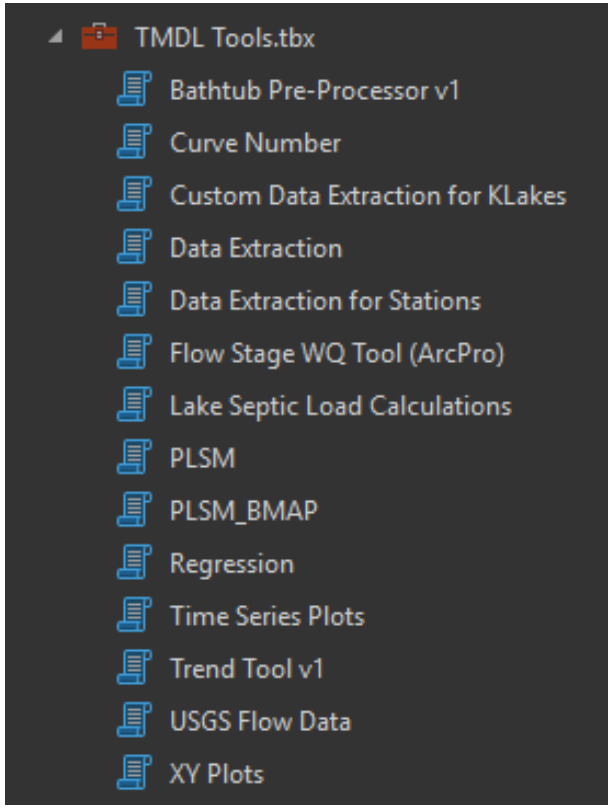
Toolbar Phases

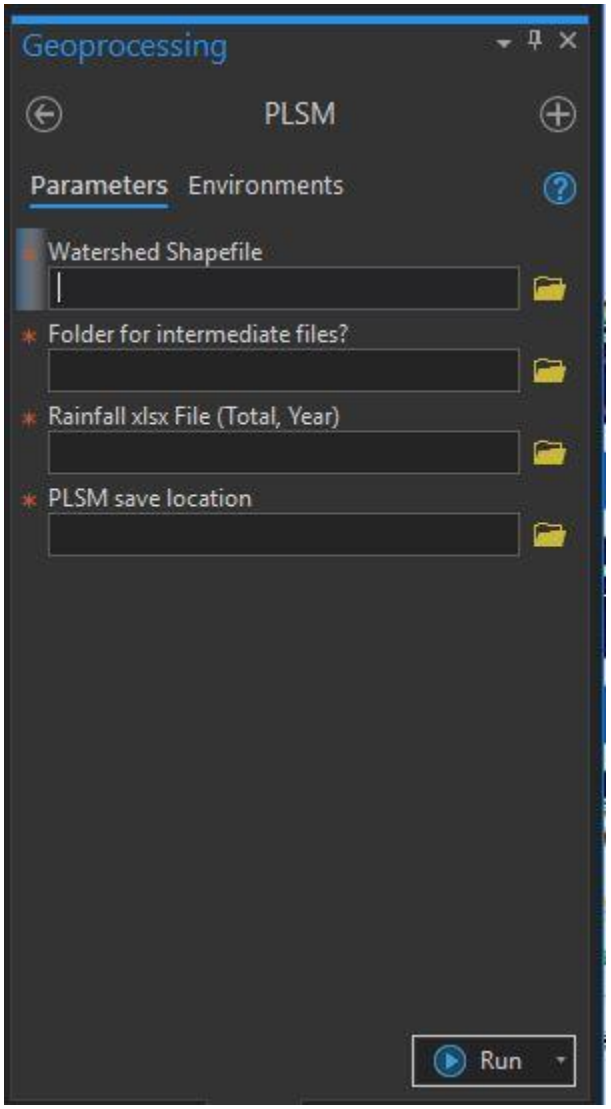
- **Phase 0 -** 2018
  - SERC Tool
- **Phase 1** - 2019
  - Data extraction
  - XY Plotting
  - Timeseries plotting
  - PLSM
- **Phase 2 -** 2020
  - Curve Number
  - OSTDS
  - USGS Data Extraction
  - Single regression TMDL
- **Phase 3 –** 2020/2021
  - Trend tool
  - USGS Tool II
  - Combined regression TMDL
  - Bathtub pre-processor
  - Bathtub post-processor
  - Bathtub file split
- **Phase 4 –** 2021
  - Nutrient data viewer
  - NNC TMDL
  - Precipitation Data Extraction

Benefits

- Toolbar Phase 0: $17k
- Toolbar Phase 1: $34k
- Toolbar Phase 2: $60k
- Toolbar phase 3: ~$50K
- Toolbar phase 4: ~$50K

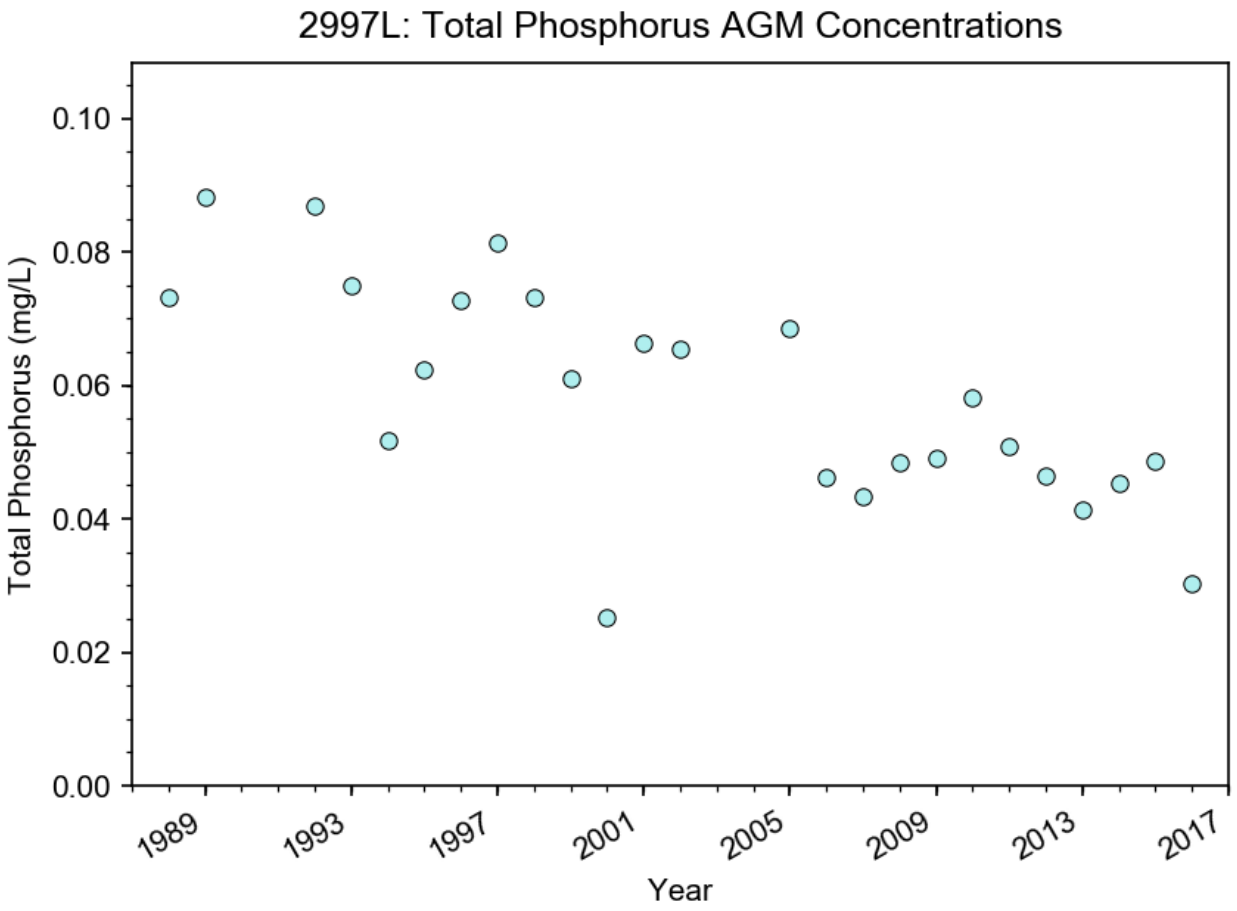
Tool Interface





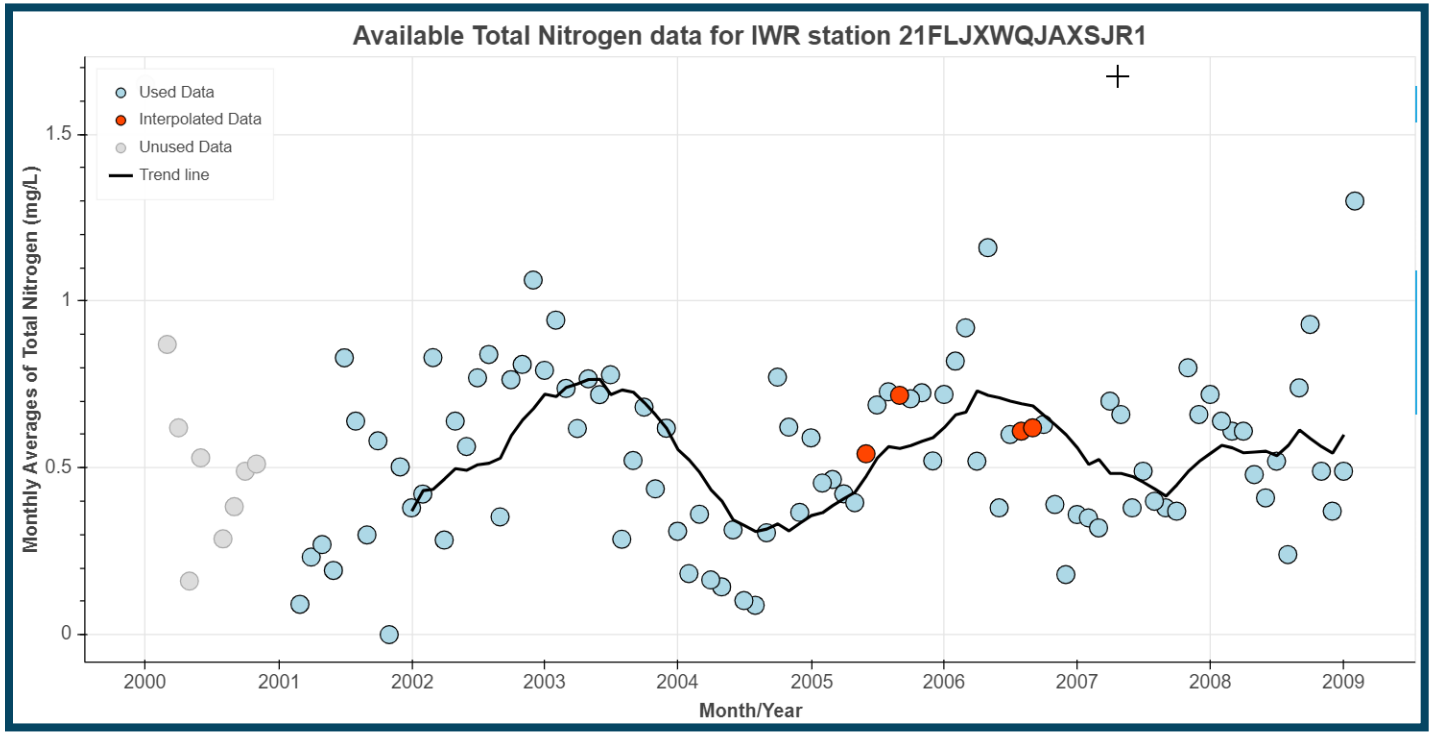
Examples of Selected Tools

Plotting tools



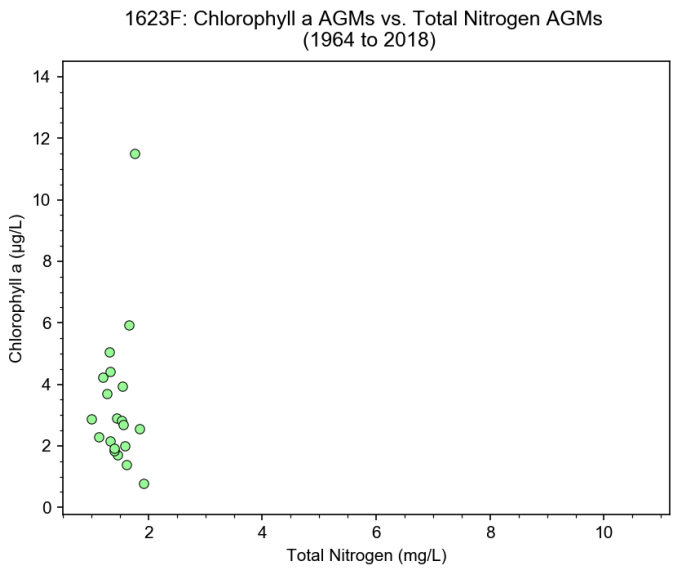
Trend tool

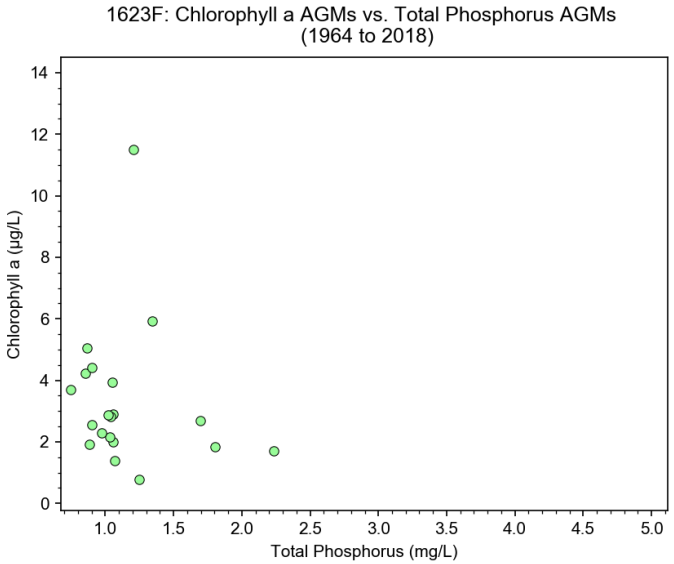
	A	B	C	D	E	F	G
1	Station	Slope	Tau	Pvalue	Timescale	Trend test	Slope unit
2	21FLJXWQJAXSJR1	0.006964	0.054	0.772	Quarterly	Seasonal Mann-Kendall	mg/l/quarter



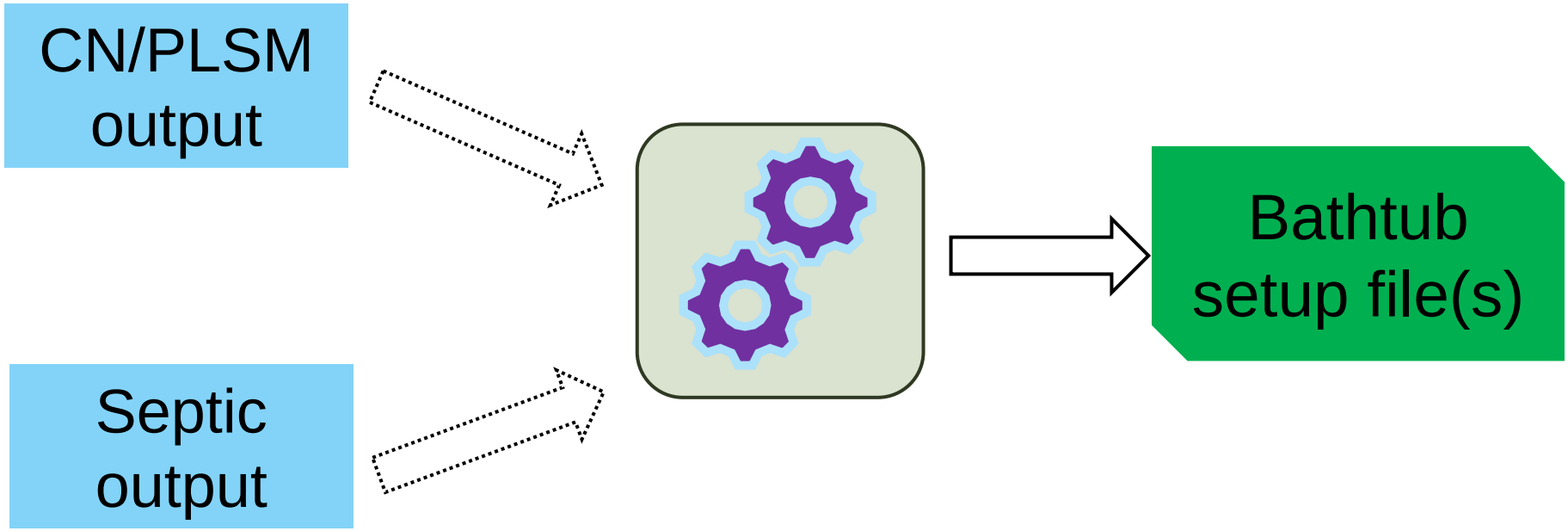
Regression Tool

	A	B	C	D	E	F	G	H	I	J	K
1		Coefficient	Standard Error	t-value	p-value	Confidence Interval (Lower Limit)	Confidence Interval (Upper Limit)	Observations used in Regression	R-Squared	Overall p-value (F-Statistic)	VIF Factor
2	const	-18.5	6.53	-2.83	0.00719	-31.7	-5.3	45	0.76	9.30359E-12	4.09
3	COLOR	-0.04	0.06	-0.69	0.49181	-0.17	0.08				
4	TEMP	0.16	0.16	1.05	0.30041	-0.15	0.48				
5	TN	24.07	2.44	9.85	3E-12	19.13	29.01				
6	TP	97.68	68.14	1.43	0.1595	-40.04	235.4				
7											





BATHTUB Input File Utility



Questions?

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- USGS Data extraction
- Weather Data Extraction

Data visualization Tools

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- XY Plot
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9/22/2021