MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Water Use Advisory Council

June 13, 2023

WUAC Chair Order
June 13, 2023

- Laura Campbell, Senior Conservation & Regulatory Relations Specialist

  Michigan Farm Bureau (Items 1-8)

- Brian Eggers, Principal

  AKT Peerless Environmental (Items 9-13)

Water Use Advisory Council (WUAC) Meeting

Hosted by the Department of Environment, Great Lakes, and Energy (EGLE)

Tuesday, June 13, 2023
1:00 p.m.- 4:00 p.m.
Lee Walker Conference Room, North Atrium, Constitution Hall
525 West Allegan, Lansing, MI 48933

Remote Option Available Via Teams
Click here to join the meeting

Or call in (audio only)

+1 248-509-0316,,980321766# United States, Pontiac
Phone Conference ID: 980 321 766#

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AGENDA

1. Welcome
2. Roll Call
3. Approval of Agenda-Roll Call Vote
4. Approval of Minutes-Roll Call Vote
5. Public Comment (3 Minute Limit)
6. Committee Chairs Reports
   A. Data Collection Committee
   B. Models Committee
   C. New Topics Committee
   D. Conservation and Efficiency Committee
   E. Implementation Committee

7. DNR Prairie River data update
8. Topic presentations
    a. David Hamilton to provide overview of SSR presentations and future plans
    b. FIELD DAY: 6/22 – Todd Feenstra to provide overview
9. EGLE Update
10. Reappointment Process Update
11. Future
    a. 2023 Meeting Dates
        - August 8
        - October 10
        - December 12
12. Open Comments (3 Minute Limit)
13. Motion to Adjourn

1. Welcome

2. Roll Call

3. Approval of Agenda –Roll Call Vote

4. Approval of Minutes—Roll Call Vote

5. Public Comment

3 Minute Limit

6. Committee Chairs Reports

- A. Data Collection Committee
- B. Models Committee
- C. New Topics Committee
- D. Conservation and Efficiency Committee
- E. Implementation Committee

Water Use Advisory Council Models Committee

- web2 additional background
- Michigan Hydrologic Framework work plan details
- Transition probability study - Cass and Calhoun Co - RFP
- Aquifer properties (Transmissivity and Storage coefficent) – RFP
- Site Specific Reviews - presentations

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Water Conservation and Efficiency Committee

- Continue monthly meetings, First Thursday at 9 am
- Continue speaker series
  - Alliance for Water Efficiency Policy Scorecard
  - Michigan Aquaculture Association
  - Cherry growing
- Implementing funded WCEC 2020 recommendations
- Next meeting will be a working session on committee future work

Water Conservation and Efficiency Committee

- 2020 Recommendation 1. Advance Michigan's Water Conservation and Efficiency Efforts through State Climate, Energy, and Water Infrastructure Initiatives

- OGL developed Request for Proposals (RFP) with WCEC and Agencies to fund one project, Release by mid June

- Project will identify innovations and technological advancements in water conservation best practices that can benefit Michigan's water sectors, contribute toward Michigan's goals under the MI Healthy Climate Plan, and support long-term sustainability of Michigan's water resources.

- Project start expected before end of 2023

Innovation in Water Conservation BMP Project Tasks

- Develop and implement engagement/dissemination strategy to involve Michigan water sectors to maximize the benefits of project results and findings.
- Summarize existing Michigan water sectors' processes to review and/or change water conservation BMPs
- Research innovation and technological advancements in water sector water conservation BMPs and their impacts within business and industry sectors in other Great Lakes states/provinces and other innovative jurisdictions.
- Summarize and present findings to WCEC and WUAC that will advance Michigan water sectors' water conservation BMPs within business and industry sectors.

Water Conservation and Efficiency Committee

- 2020 Recommendation 2. Increasing Water Conservation and Efficiency Practices in Agriculture.
  - MDARD and MSU-Extension provided final workplan to committee for review, committee approved
  - Budget MDARD is setting up grant tracking
  - MSU getting ready to post positions with an October 1 start date.

7. DNR Prairie River Data Update

8. Topic Presentation Discussion

- Potential New Topics
- Overview of SSR Presentations and Future Plans
- Field Day for 6/22

Water Use Advisory Council
Site Specific Reviews

Site Specific Reviews - Applicant

- Seek authorization when proposed LQW fails to pass WWAT
- Provide details of proposed withdrawal
- Opportunity to provide additional information, including alternative analysis provided by a professional.

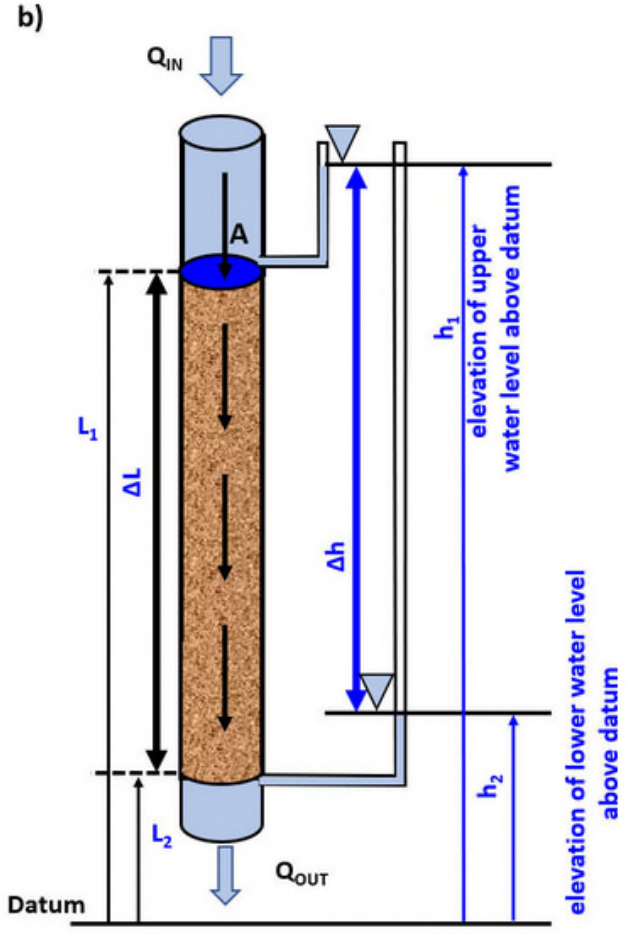
Site Specific Reviews - Department

- Reviews: information and analysis provided, index flow, local hydrogeology, other LQWs in Water Management Area, baseline capacities, etc
- Conducts analysis, frequently several methods
- Seeks ways to approve proposal, or proposal with possible modifications
- Very short time frame allowed under statute, 20-25 days for alternate analyses, and 10 days for standard SSR.
- Must provide a written response with reasons if denial.

Site Specific Reviews – presentations to Models Committee

- Two presentations for the same example SSR
- Each was a good, logical presentation
- But they seemed to talk past each other, almost like different projects
- The department found a resolution for the applicant, but not a satisfying solution.
- Raised questions we should look into more. What is the appropriate role of analytical models?

Technical underpinnings – Darcy's Law



$$Q = -K\frac{\Delta h}{\Delta L}A$$

Q = volumetric flow rate (L^3/T)

K = hydraulic conductivity, is the proportionality constant reflecting the ease with which water flows through a material (L/T)

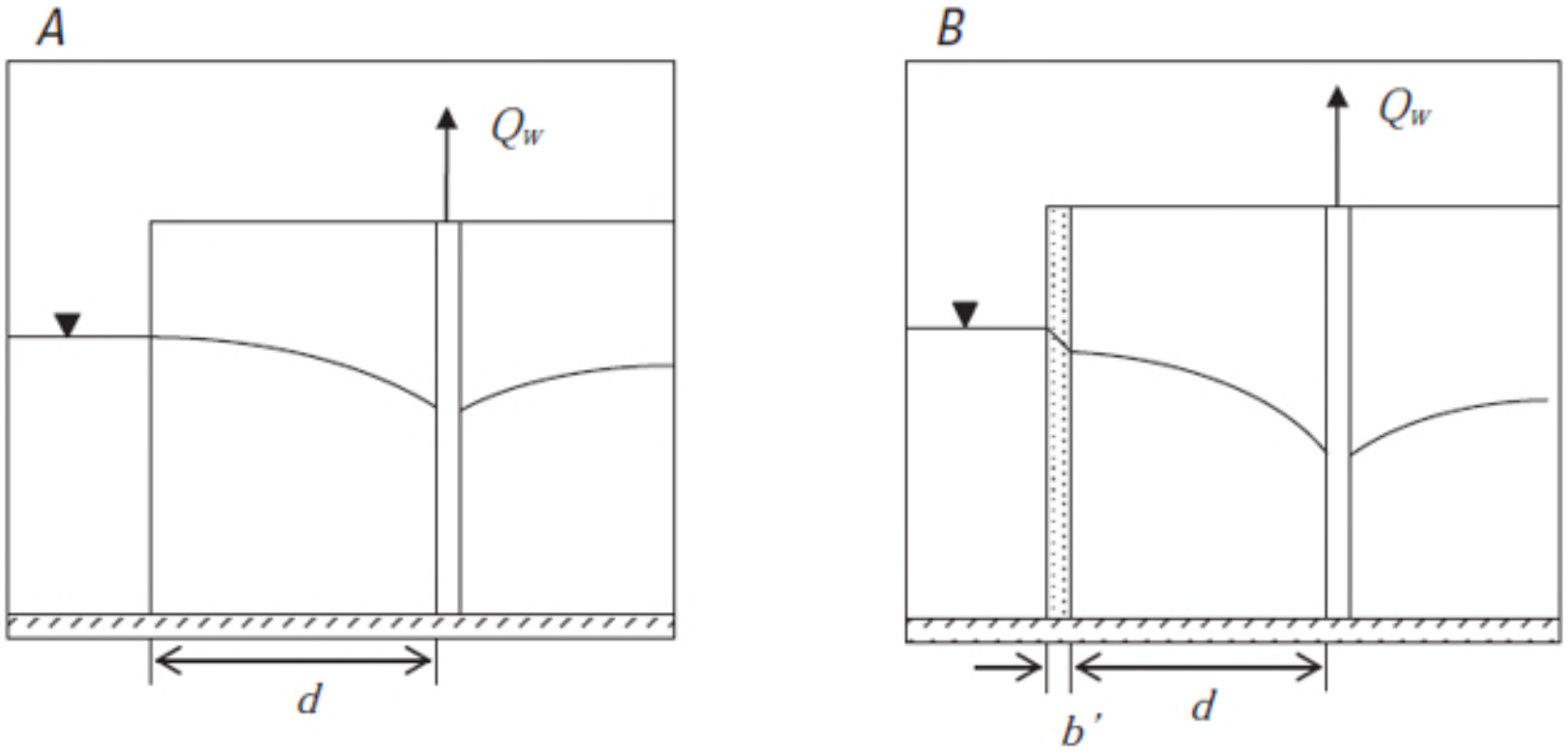
Δh = difference in hydraulic head between two measuring points as defined for Equation 14 (L)

ΔL = length along the flow path between locations where hydraulic heads are measured (L)

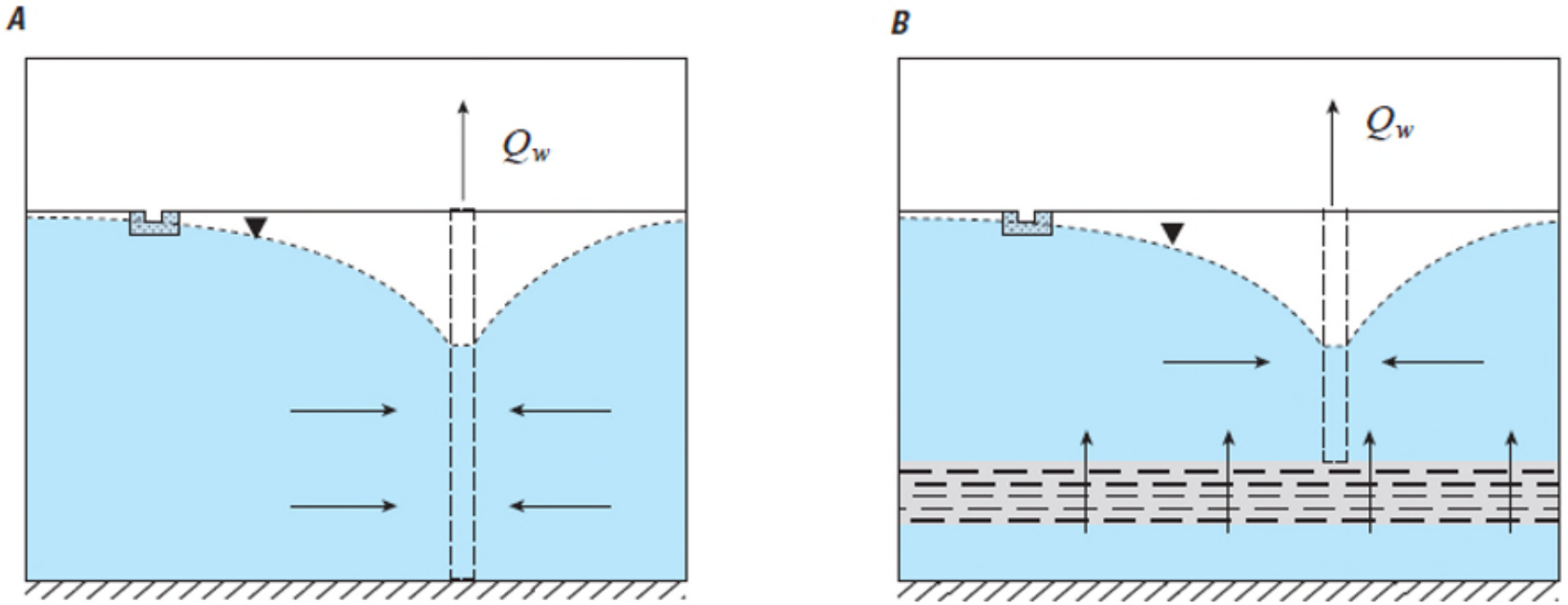
= gradient of hydraulic head (dimensionless)

A = cross-sectional area of flow perpendicular to the direction of flow (L^2)

Analytical Models

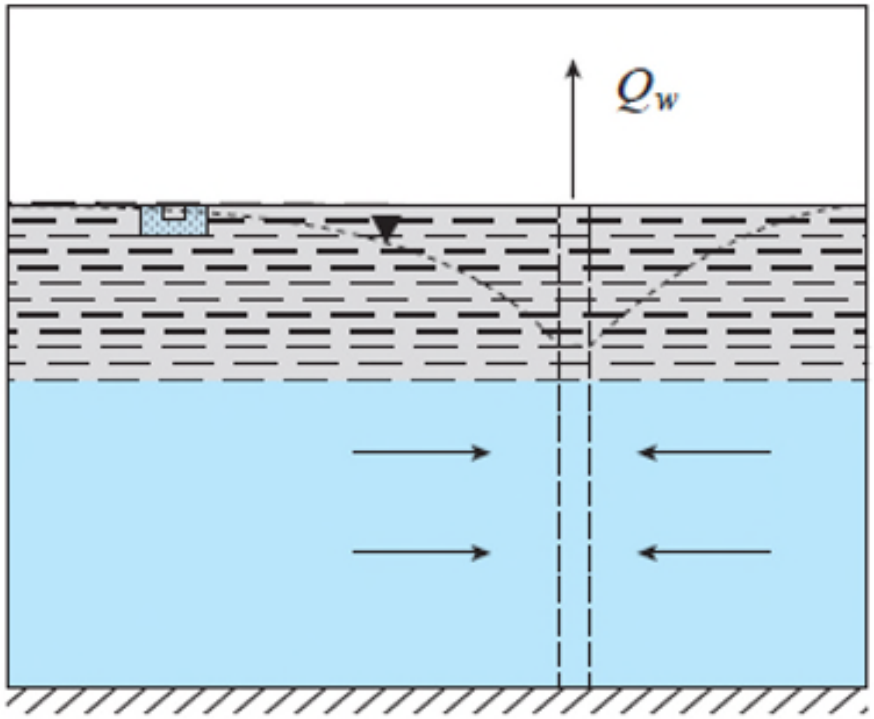


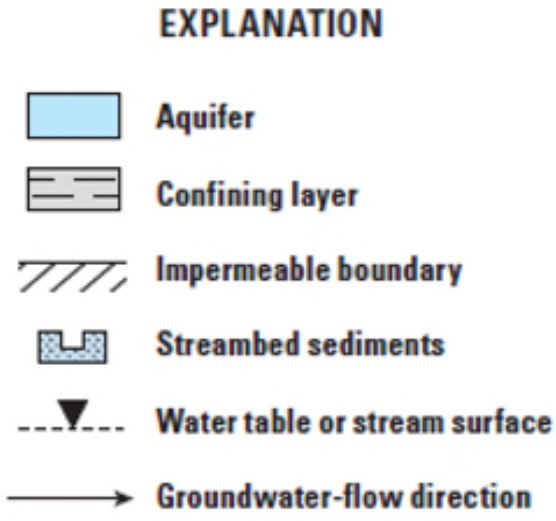
Analytical Models



Analytical Models

c





Hunt Solution, Partially penetrating stream with streambed resistance.

Assumptions:

- Aquifer is infinite extent, fully confined or unconfined
- Homogeneous
- Horizontal flow
- Small changes in saturated thickness for unconfined case
- Stream width and depth are small compared to aquifer thickness
- The streambed conductance term must incorporate the hydraulic conductivity of the streambed, geometry of the streambed, and streambed thickness.
- Head of the aquifer remains above the streambed

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Numerical Models

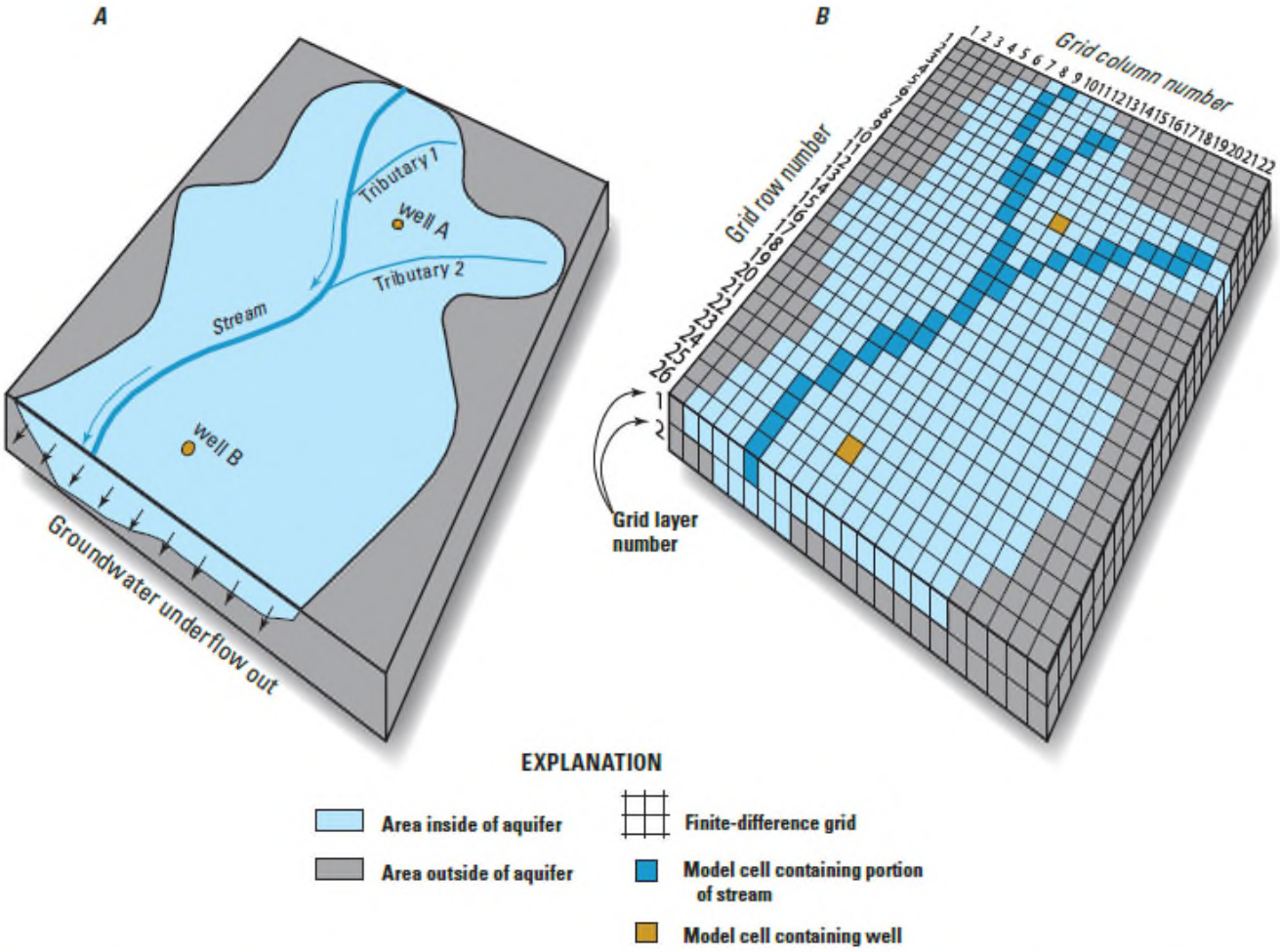

Figure 42. *A*, Part of a hypothetical stream-aquifer system. *B*, Representation of that system with a finite-difference model grid consisting of 26 rows, 22 columns, and 2 layers of rectangular finite-difference blocks.

Michigan Hydrologic Framework

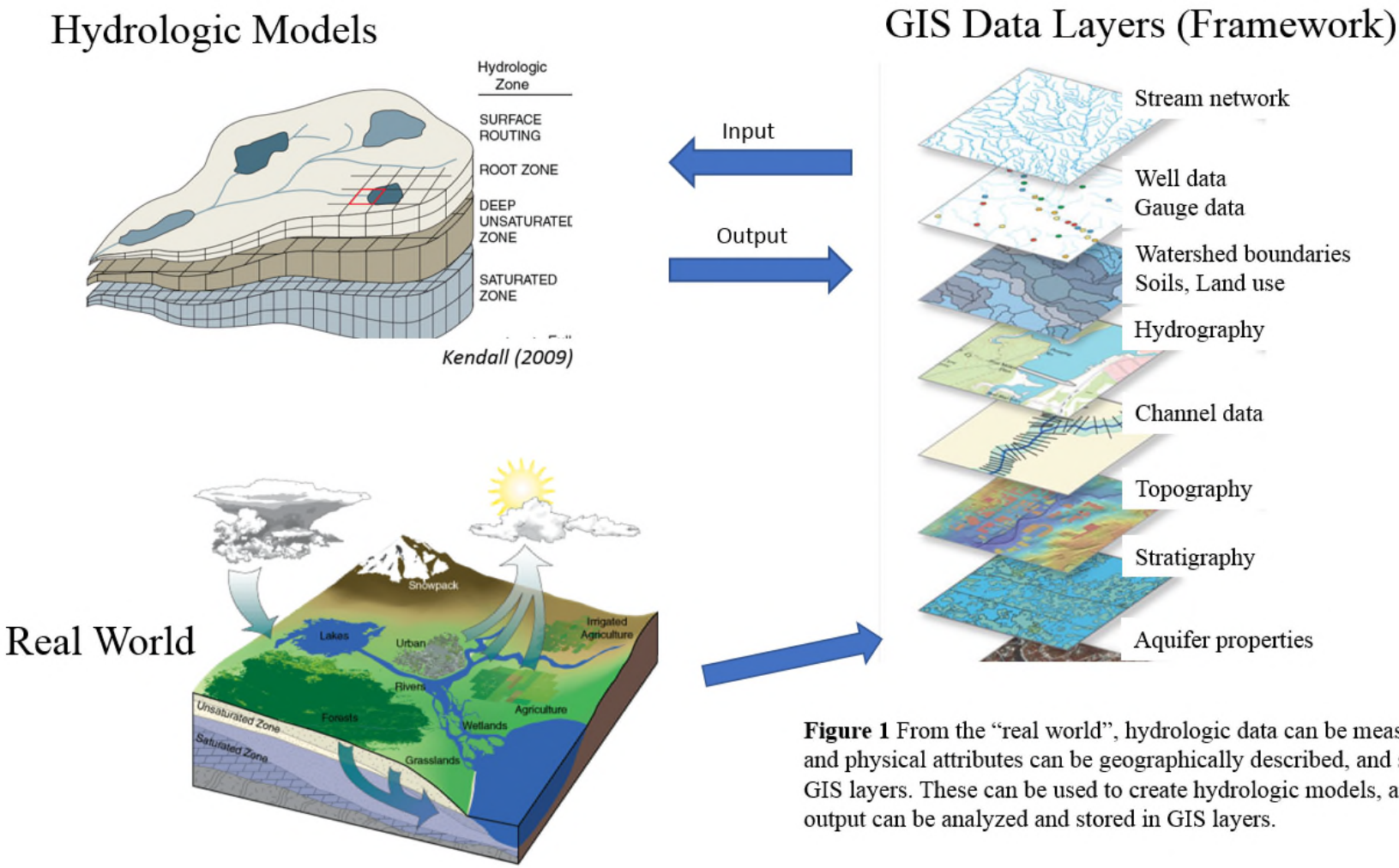

Figure 1 From the "real world", hydrologic data can be measured and physical attributes can be geographically described, and stored in GIS layers. These can be used to create hydrologic models, and the output can be analyzed and stored in GIS layers.

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Analytical-modeling methods to estimate streamflow depletion:
Several analytical solutions to the groundwater- flow equation have been developed to estimate streamflow depletion by wells. These solutions are based on highly simplified representations of field conditions that are necessary to develop mathematical solutions to the groundwater-flow equation but that limit their applicability to real-world field conditions. Some of the important limitations of analytical solutions are that they cannot adequately represent aquifer heterogeneity, the presence of multiple streams or complex stream geometry, or aquifers having complex, three-dimensional geometries. Nevertheless, analytical solutions provide insight into several of the factors that affect streamflow depletion and are often used to make an initial estimate of the effect of a particular well on a nearby stream.
(Barlow, P.M., and Leake, S.A., 2012, Streamflow depletion by wells)

Numerical-modeling methods to estimate streamflow depletion:
Numerical models are the most robust method for determining the rates, locations, and timing of streamflow depletion caused by pumping because they are capable of handling many of the common complexities of real groundwater systems. They are the only effective method for determining detailed, basinwide water budgets that account for the effects of complex pumping histories from large numbers of wells on all types of hydrologic features, including streams. Numerical models can be used to generate streamflow-depletion response functions and capture maps. Response functions characterize the unique functional relation between pumping at a particular location and the resulting depletion in a nearby stream or stream network, independently of other pumping or recharge stresses that may be occurring simultaneously within the aquifer.

(Barlow, P.M., and Leake, S.A., 2012, Streamflow depletion by wells)

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9.Program Update

Water Use Advisory Council

June 13, 2023

Outline

- WUAU Personnel Update
- Michigan Hydrologic Framework Update
- Transition Probability Modeling Update
- Updating WWAT Aquifer Properties Update
- Program Metrics
- WMA Depletion Status Map
- Questions

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WUAU Personnel Update

- Introducing Megan Cameron

Michigan Hydrologic Framework Update

- Received draft work plan & project schedule
- Waiting for project budget
- Internal review in WUAU
- Meet with MSU IWR & USGS as necessary
- Work with EGLE procurement staff on grant agreement

Transition Probability Modeling Update

- Work group chair requested presentation to work group on transiogram theory
- Revising RFP language based on comments from Models Committee work group
- WUAU will work with EGLE procurement to finalize RFP

Updating Aquifer Properties Update

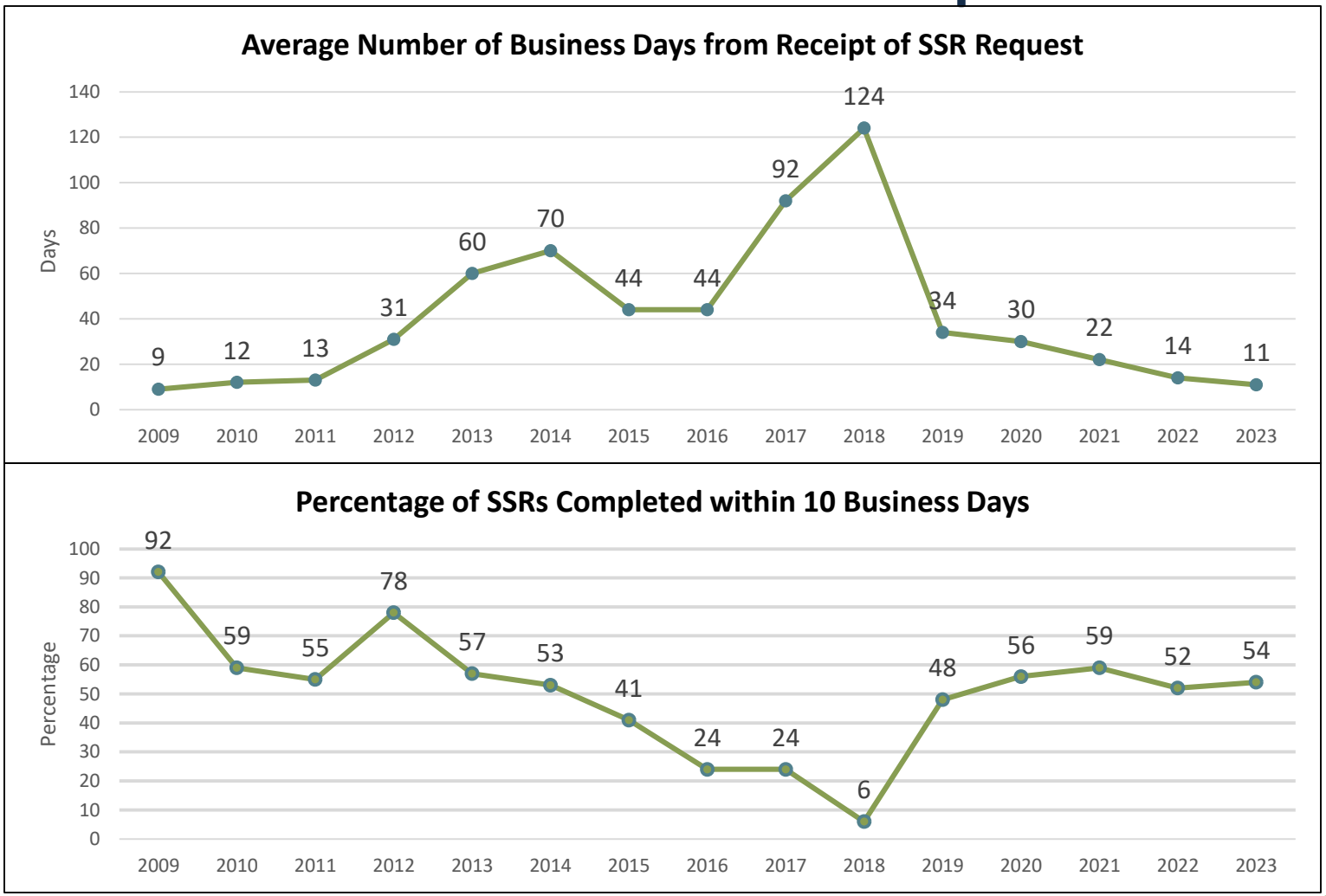
- Draft scope of work under internal review
- Share with Data Collection & Models Committee work groups before joint meeting
- Discuss scope of work at joint meeting
- Revise based on comments
- Work with EGLE procurement staff on RFP

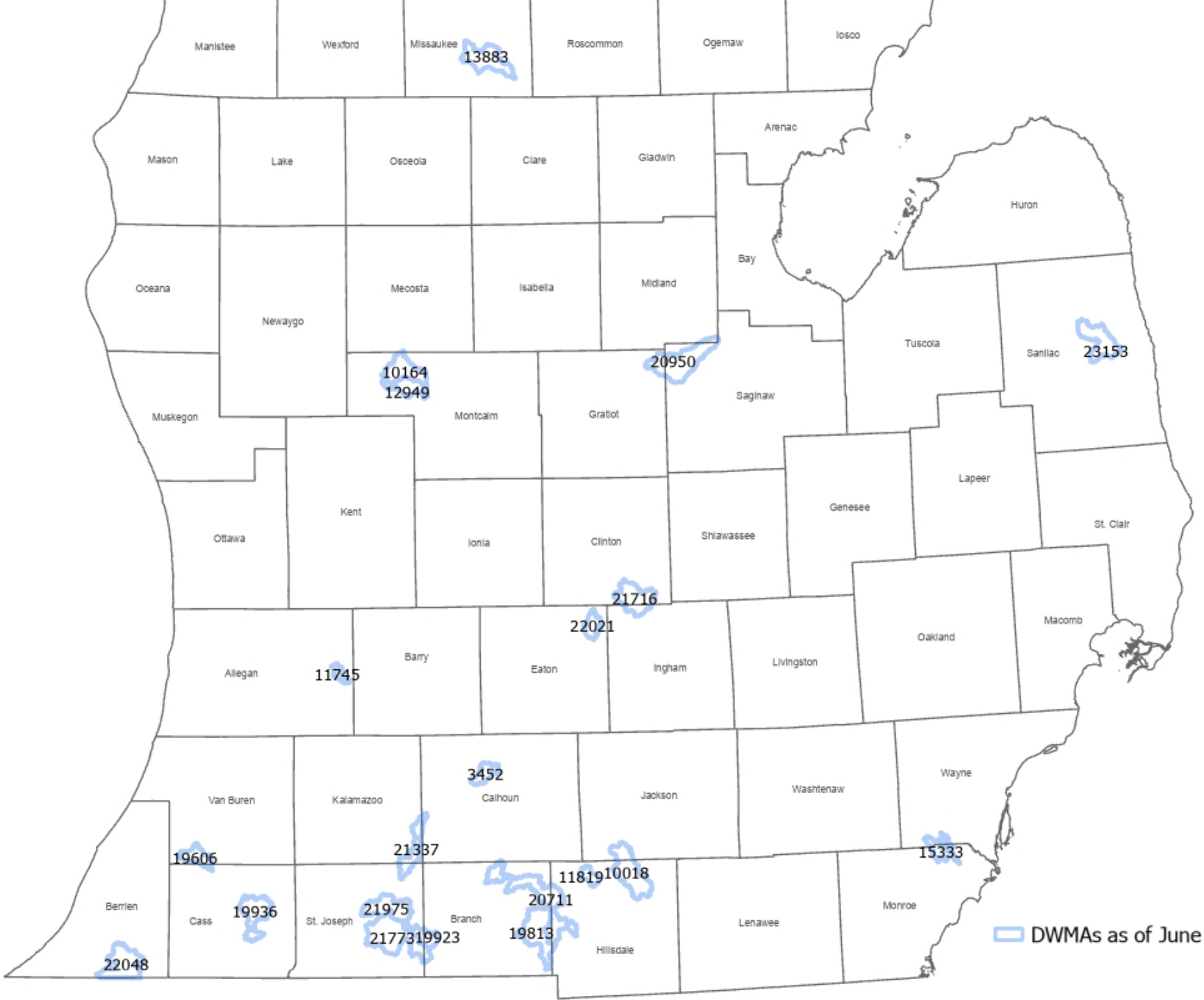
Program Metrics

January-May 2023

- 127 WWAT Registrations
- 98 SSR Registrations
- 2 SSR Denials
- 22 Pre-Screening Reviews Completed
  - 15 Zone A
  - 2 Zone B
  - 2 Zone C
  - 3 Zone D
- 4 Part 327 Permits

SSR Timeliness Graphs




Manistee
Wexford
Missaukee
13883
Roscommon
Ogemaw
Iosco
Arenac
Mason
Lake
Osceola
Clare
Gladwin
Huron
Bay
Oceana
Newaygo
Mecosta
Isabella
Midland
Tuscola
Sanilac
23153
20950
10164
12949
Saginaw
Muskegon
Montcalm
Gratiot
Lapeer
Genesee
St. Clair
Ottawa
Kent
Ionia
Clinton
Shiawassee
21716
22021
Macomb
Oakland
Allegan
11745
Barry
Eaton
Ingham
Livingston
Wayne
Van Buren
Kalamazoo
3452
Calhoun
Jackson
Washtenaw
19606
21337
15333
11819
10018
Berrien
Cass
19936
St. Joseph
21975
Branch
20711
Monroe
Lenawee
2177319923
19813
Hillsdale
22048
DWMAs as of June

Depleted Watersheds as of June 2023

Name	Number	Type	Index Flow	Allowable Depletions	Current Status
Conger Drain	11819	Cool Stream	1,121	337	-358
South Branch Kalamazoo River	10018	Cool Stream	1,930	482	-357
Bear Creek	21337	Warm stream	1,825	442	-221
Swan Creek	19923	Warm stream	8,011	1,939	-93
Swan Creek	15333	Warm Stream	808	194	-76
Dickinson Creek	3452	CTS	898	39	-65
Prairie River	21773	Cool small river	24,035	6,059	-57
	21716	Warm stream	356	86	-56
Greggs Brook	11745	Cool stream	853	213	-51
	12305	Cool Stream	4,443	1,111	-51
Christiana Creek	19936	Cool Stream	8,752	2,188	-42
Carrier Creek	22021	Warm stream	90	22	-41

Name	Number	Type	Index Flow	Allowable Depletions	Current Status
Osborn Drain	19606	CTS	1,571	63	-36
Greggs Brook	20950	Warm Stream	135	32	-33
Butterfield Creek	13883	CTS	6,732	269	-26
Black River	23153	Warm Small River	2,334	397	-15
Hog Creek	20711	Warm small river	6,727	1,373	-11
Tamarack Creek	10164	Cool Stream	9,425	1885	-11
Spring Creek	21975	Warm Stream	4,111	1,185	-9
	12949	Cool Stream	2,693	673	-8
McCoy Creek	22048	CTS	10,951	438	-5
	19813	Warm Stream	2,154	517	-4

Questions?

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Michigan Department of

Environment, Great Lakes, and Energy

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10. Reappointment Process Update

11. Future

a. 2023 Meeting Dates (at Con Hall unless others offer to host)
   - August 8, 2023
   - October 10, 2023
   - December 12, 2023

b. Formats

c. Quorum

12. Open Comments

3 Minute Limit

13. Motion to Adjourn