



**GROUNDWATER QUANTITY WORKGROUP
Minutes of November 10, 2016 Meeting**

Attendance

Present:

Workgroup Co-Chairs: Mike Carter, Skip Hansen, Andy Johnson

Workgroup Members: Jake Barnes, Ken Bradbury, Andy Diercks, Patty Dreier, James Drought, Adam Freihoefer, Scott Froehlke, Tamas Houlihan, Justin Isherwood, Mike Koles, George Kraft, Jordan Lamb, Bob Martini, Ben Niffenegger, Kara O'Connor, Carl Sinderbrand, Allison Werner, Jim Wysocki, Louis Wysocki

Facilitator: Don Last, UW-Extension Emeritus

Staff: Christina Anderson (recorder), Jim Matson (FLW project staff). FLW project staff prepared these minutes based on the recorder's notes, speakers' Powerpoint presentations, and audio recording.

Absent: Andrew Aslesen, Amber Meyer-Smith, Jim Krohelski, Lawrie Kobza, Elizabeth Wheeler

Minutes

Minutes of October 23, 2016 Workgroup meeting were accepted with one correction: The "unidentified potato farmer" cited in the draft minutes was Workgroup Co-Chair Mike Carter.

Co-Chair Comments

Mike Carter - We appreciate the participation and respectful interchange that we have had so far.

Andy Johnson – At the first meeting, we hoped to make people feel comfortable and safe, so that we could have candid and productive discussions. I think we accomplished that.

Skip Hansen – Agrees with the other co-chair comments.

Expert Presentations

Ken Bradbury (Director, Wisconsin Geological and Natural History Survey; UW-Extension; UW Madison Dept. of Geoscience)

Workgroup member Ken Bradbury explained the newly-developed Little Plover River groundwater flow model. The Wisconsin Geological and Natural History Survey developed this model in cooperation with the U.S. Geological Survey, under contract with the Wisconsin Department of Natural Resources. The model is designed to evaluate groundwater-surface water interactions, including the impact of groundwater pumping on stream flow levels in the Little Plover River. The model was developed and tested using extensive data from the Little Plover River basin. With adequate data collection, a similar model or models could be developed to evaluate groundwater-surface water interactions in other parts of the Central Sands.

Pumping rates used for the model were from real wells using actual pumping as reported to the DNR. Recharge was estimated using data on weather, runoff, plant evapotranspiration and soils, and was adjusted slightly during model calibration. The techniques used for recharge estimates were similar to standard UWEX calculations that are used to help farmers schedule irrigation. The modeling also estimated and accounted for irrigation return. The model has been extensively peer-reviewed (review comments have been addressed, and none required a change in study conclusions). The final draft should be available soon.

Some key points:

- The Little Plover River is closely connected to the groundwater system, making it vulnerable to nearby groundwater pumping.
- Irrigation accounts for 80% of groundwater use in the Little Plover basin. Irrigation use is seasonal, and occurs mainly in the summer.
- Past studies, dating back over several decades, have found that groundwater pumping has a significant impact on stream flow. Seasonal impacts are especially critical.
- Stream flow depends on water levels in the top few feet of the groundwater aquifer. Groundwater pumping can have a big impact on those top few feet, without “depleting” the rest of the aquifer.
- Stream flow also depends on the size of the land area from which groundwater flows to the stream. Groundwater pumping “intercepts” normal groundwater flows, at least seasonally, reducing the area from which groundwater normally flows to the stream.
- Much, but not all, of the water withdrawn by irrigation wells is eventually returned to the aquifer as recharge. The recharge rate depends on a number of factors, including plant evapotranspiration rates.
- Seasonal “cones of depression” around irrigation wells can have a significant impact on stream flow, even if recharge quickly restores well water levels when pumping stops. The stream flow impact tends to lag behind the groundwater impact, and also tends to dissipate more slowly. Stream flow impacts can lag by weeks or months, and can accumulate to some degree over multiple pumping cycles.
- The impact of an individual well depends, to a very significant degree, on its proximity to the stream.

- It is hard to determine the cumulative impact of multiple wells, because that depends on a number of variables. But the model allows us to estimate cumulative impacts. Estimates suggest that cumulative pumping may reduce the groundwater level in the Little Plover basin by as much as 2-6 feet (compared to no pumping and non-irrigated land use), at least on a seasonal basis.
- The Little Plover model can help to evaluate the effect of groundwater pumping, isolated from other factors that might also affect stream flow. The model did not adjust for all possible external factors that could affect stream flow, but it could be fine-tuned to incorporate additional factors for which relevant data are available.

Comments and Discussion by Workgroup Members:

- Seasonal reductions in stream flow can have a significant impact on biological processes, such as fish spawning.

Note: Ken Bradbury's Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/food-land-water-project>

James Drought (Hydrologist, GZA GeoEnvironmental, Inc., Waukesha, WI)

Workgroup member James Drought gave a presentation on Groundwater Data and Irrigated Agriculture, from the perspective of the WI Potato and Vegetable Growers Association (WPVGA).

Some key points:

- WPVGA members depend on groundwater, and view it as a precious resource.
- WPVGA is committed to good environmental stewardship, and has sponsored a number of groundwater research and conservation projects.
- Wisconsin ranks third nationally in potato and processed vegetable production, in large part because of irrigated Central Sands production. Irrigated agriculture is a big economic and employment driver in the Central Sands.
- The WPVGA has formed a Groundwater Task Force to promote judicious use practices that can ensure resource sustainability. WPVGA has funded a program to measure groundwater depths in irrigation wells; has installed equipment to monitor groundwater in 4 areas designated as high risk for surface water impacts; funds and collects data from over 25 monitoring wells in cooperation with the Wisconsin Institute for Sustainable Agriculture; and has developed and implemented a number of new technologies and practices to conserve water. WPVGA has received a number of major conservation awards for its efforts.
- Most Central Sands growers now employ a high level of irrigation technology to manage water use more effectively, and to prevent unnecessary water use.
- WPVGA is researching and documenting historic well levels in areas of concern. Preliminary findings suggest that static well levels (when pumping is not in progress) have varied over the years, but that the overall trend is relatively stable.
- WPVGA has published a "High Capacity Well Factbook," containing information relevant to the Central Sands groundwater pumping issue (copies were distributed to Workgroup members).

- WPVGA believes that there are significant unresolved questions related to irrigation pumping impacts on groundwater and surface water, which warrant further study. For example, there are questions related to the annual amount of water used by irrigated crops compared to alternative land uses, such as pine plantations. It is not clear that irrigated crops use more water, at least on an annual basis.
- External factors such as weather, regional climate swings, and drainage ditches can have a big impact on groundwater and surface water levels. It is not easy to isolate the impact of irrigation wells. More study is needed. WPVGA is working with others to identify research needs and study opportunities.
- More work is needed to identify and define acceptable minimum baseline levels for groundwater and surface water, including “public rights” levels for lakes and streams. What are the “target” levels that we are trying to maintain? Michigan has implemented fairly specific baseline levels, based on fisheries impacts.
- WPVG hopes that the Little Plover River groundwater flow model can be used to identify strategies, other than well removal, for maintaining stream flow. Alternative strategies could include things like dam or drainage ditch manipulation, or cooperative efforts between growers to stagger crop rotations and pumping demands.
- The WPVGA is meeting with the Central Sands Groundwater Action Coalition to identify potential local solutions tailored to the Central Sands.

Comments and Discussion by Workgroup Members:

- Is it true, as implied by WPGA materials, that irrigated agriculture has no more impact on groundwater and surface water levels than pine plantations or other alternative land uses? This and other technical issues may need clarification.

Note: James Drought’s Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/food-land-water-project>.

Carl Sinderbrand (Attorney, Axley Brynelson, LLC)

Workgroup member Carl Sinderbrand presented an overview of relevant Wisconsin water law.

Some key points:

- Wisconsin’s common law tradition takes a modified “reasonable use” approach to water law, as compared to the “prior use” approach in western states. But there are significant legal uncertainties, especially related to the use and allocation of groundwater.
- The Wisconsin Constitution, as interpreted by the courts over many years, provides that the state holds the navigable waters of the state in trust for the public. That trust extends to navigation, fishing, recreation, scenic and other uses of navigable waters. The state has a constitutional duty to protect the navigable waters that it holds in trust. The state can regulate groundwater withdrawals to protect navigable waters.

- Under both the public trust doctrine and the state’s general regulatory powers, the Legislature has created statutory programs to protect Wisconsin surface water and groundwater. The Legislature has designated the Department of Natural Resources as the primary agency responsible for protecting Wisconsin surface water and groundwater (other agencies play a subordinate role). Among other things, DNR is responsible for regulating high capacity wells.
- No person may install a high capacity well (capacity of more than 100,000 gallons a day) without a permit from DNR. No high capacity well may impair a public water supply. All permit holders must file annual pumping reports with DNR.
- DNR must conduct an environmental review of a proposed high capacity well if the well is located in a groundwater protection area (within 1200 ft. of an “outstanding water resource,” an “exceptional water resource,” or a trout stream); if it has a water loss of more than 95% (bottling); or if it may have a significant impact on a spring. DNR must impose permit conditions, as necessary, to ensure that the well will not have a significant adverse impact. These may include conditions related to well location, depth, pumping capacity, rate of flow, and ultimate use. Special requirements apply to wells with a potential water loss of more than 200,000 gallons a day, and to high capacity wells located in the Great Lakes basin.
- Court and administrative decisions have held that DNR may consider surface water impacts of a proposed well, including the “cumulative impacts” of the proposed well and existing wells, when acting on a permit application. However, recent legislative enactments, including Wis. Stats. ss. 227.10(2m) and 281.34(5m), may affect DNR’s authority to consider “cumulative impacts” and impose groundwater monitoring requirements on permit holders. The Wisconsin Attorney General recently opined that DNR lacks authority to consider “cumulative impacts” or to impose permit conditions other than those explicitly authorized by statute. That interpretation may be litigated in a pending lawsuit.
- Minnesota’s regulatory approach is different from Wisconsin’s approach. At the state level, water protection programs are divided among several agencies; however, the Minnesota DNR is primarily responsible for regulating groundwater withdrawals. Water use and protection planning is focused at the local level to a considerable degree. A state fund provides substantial financial resources. The Minnesota DNR must approve high capacity wells, and must consider environmental impacts. The agency has explicit authority to limit withdrawals based on surface water impacts, and may consider “cumulative” impacts (“cumulative impacts” are also on the local planning checklist). DNR must coordinate its actions with county and local water use plans.
- Michigan takes yet another regulatory approach. State agency authority over well permits is divided between the Department of Environmental Quality and the Department of Agriculture. Michigan has standards for determining minimum acceptable flows in streams (standards are based on adjustments from 2006 baseline stream flow). There are separate standards for different stream categories (e.g., cold and warm water streams). The administering agency uses a standard screening tool to evaluate the likely impact of a proposed well on surface waters. The agency must consider the “cumulative impact” of the proposed well and existing wells. If the proposed well will cause the “cumulative impact” to exceed acceptable levels (i.e., if the proposed well is “the straw that breaks the camel’s back”), the agency must deny or restrict the well permit accordingly.

Comments and Discussion by Workgroup Members:

- Michigan’s “screening tool” is simply a preliminary screening device, used to identify wells that can be easily approved. Other wells require further analysis. Wisconsin uses a similar, but not identical, approach. Michigan’s “screening tool” has some limitations, especially in Wisconsin’s complex geological context; and it does not work for lakes. A bigger difference between Wisconsin and Michigan is that Michigan spells out minimum acceptable flow standards for streams. Wisconsin takes more of a case-by-case approach, based on local conditions. There are pros and cons to both approaches (e.g., clarity and predictability vs. sensitivity to varying local conditions).
- What happens in Michigan when a well permit is denied? Could the applicant negotiate with “existing” users to obtain some of their pumping rights? How would that work in practice? Do “existing” users have any incentive to reduce their use, so that a new use can be accommodated? How would withdrawal “equivalencies” be determined? Answer: In Michigan, “existing” uses are not affected by the denial of a “new” well permit; but the agency invites “existing” users to meet and discuss voluntary arrangements by which the proposed “new” use might be accommodated without increasing “cumulative” harm to the environment. This may or may not yield an arrangement that allows for the proposed “new” use.
- This points to an underlying issue: Even if we can agree on the science, and on sustainable use targets, how do we allocate a limited resource among “new” and “existing” uses that are constantly evolving? Do we “lock in” existing uses, at the expense of “new” or changing uses? Is there a fair, flexible and efficient approach to resource allocation that also preserves the resource?
- The Workgroup declined, at this time, to express any preference for the Minnesota or Michigan approach. Workgroup members wanted to get more information, and explore other options, before expressing preferences or making recommendations.

Note: Carl Sinderbrand’s Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/food-land-water-project>.

General Discussion

- Several workgroup members expressed the hope that the Wisconsin legislature would refrain from trying to enact new groundwater quantity legislation until the Workgroup had completed its deliberations, so that legislators could consider information and recommendations developed by the Workgroup. Others said that legislation would be difficult at this time, without a better understanding of the underlying facts and issues. The Workgroup can play a helpful role.
- In its charge to the Workgroup, the FLW Project Steering Committee asked the Workgroup to focus mainly on the Central Sands. It is fine for the Workgroup to focus on the Central Sands, without trying to come up with a “one size fits all” solution for the entire state, and without trying to change Wisconsin’s entire system of water law. The Workgroup may consider legislative or non-legislative approaches (or both) for the Central Sands.
- Some Workgroup members emphasized the need for more information and research, more monitoring, a continued pursuit of improved technology and “best practices,” and more collaborative approaches to sustainability. Others said that we already have pretty good technical tools and information; but we need more DNR staff to handle well permit applications,

and we need to consider the “cumulative” impacts of groundwater pumping on surface water levels. Still others emphasized the need for reasonable predictability and certainty, and encouraged further groundwater modeling to create a generally accepted “technical platform” for decision-making. When developing technical tools, it is important to know what questions we are trying to answer. The Workgroup could support further research, monitoring and groundwater modeling, while also recommending other actions.

- Some workgroup members emphasized that water rights, water protection and water resource allocations have a big effect on land use, business investments, property values and real estate transactions. Reasonable clarity and certainty are important for individual, business and community planning.
- Some Workgroup members noted that, while good science is important, this is not just a scientific issue. It is also a social issue involving public rights, environmental protection, and the fair use and allocation of a shared public resource. There may be competing private uses, as well as competing private and public uses. What are our “bottom line” values and expectations?

Assignments

- Bob Martini discussed a similar resource allocation problem facing the Wisconsin River basin about 40 years ago. The problem was addressed, with considerable success, using a broad-based stakeholder group. There were no pre-ordained outcomes. The process looked at technical as well as policy issues, and everyone’s perspective was heard. It was agreed that Bob would produce a one-page summary of the Wisconsin River process, which could be distributed to the Workgroup.
- A key challenge for the Workgroup is to arrive at a common understanding of the underlying hydrology “facts.” Workgroup members felt that it would be helpful to have a short summary of basic facts related to the impact of groundwater pumping on surface water levels in the Central Sands, insofar as those facts are understood. The Workgroup understands that experts might disagree, or be uncertain about, some points. However, the Workgroup would like to understand the basics, and identify the key points on which experts agree. It would also be helpful to identify (and work toward resolving) key points of disagreement and uncertainty. It was agreed that the hydrology experts in the Workgroup – Ken Bradbury, James Drought, George Kraft and Adam Freihoefer – would try to put together a brief joint summary (2-3 pages) of key “facts” prior to the next workgroup meeting. The goal is to provide a basic factual framework and context for future Workgroup discussions, recognizing that most Workgroup members are not hydrology experts. The experts are free to identify the “key points” that they wish to emphasize, including key points of agreement, disagreement and uncertainty. The experts may consult with other experts as they deem necessary.
- The Workgroup facilitator and co-chairs will consider possible ways to survey workgroup members on key issues (points of agreement, disagreement and uncertainty).

Final Co-Chair Comments

- *Mike Carter* – I am encouraged by the good discussion today. The expert presentations were necessary and beneficial, and we can build off of them. Going forward, we need to consider the remaining questions posed by the Steering Committee. I think we had a good discussion regarding Workgroup focus, scope and future directions. I hope that we can get a report on what we have done so far.

- *Andy Johnson* – I think we need to define the “problem” as clearly as possible before we proceed to a “solution.” The Central Sands issue is, to a large degree, a local issue requiring a localized approach. Central Sands groundwater and surface waters are connected, and there seems to be a sustainability limit that we need to recognize. We need to think about trends over time, and how we fairly allocate a limited resource for which there is growing demand. We may need to proceed incrementally. The Central Sands should be our primary focus, and we need to keep the local conversation going.
- *Skip Hanson* – I would echo the other co-chair comments. I think we should focus primarily on the Central Sands. It is important that we are all here, and talking together. I hope that we can continue to clarify the issues, and find some solutions. Legislation is not the only approach, and may or may not be feasible right now.

Adjournment

By unanimous consent, the meeting was adjourned.