

Agricultural Drainage Management Systems Task Force

March 29-30, 2006

Ames, Iowa

Meeting Participants

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Joint session with NCR-207

The meeting began with a joint session between ADMSTF and the multi-state research committee NCR-207 on DRAINMOD-NII. Mohammed Youssef and Wayne Skaggs presented an update of the DRAINMOD-NII model. The model runs very well. Great progress has been made on the user interface shell, although it is not quite ready to be released. Mohammed went through the input screens, which include some that are the same as DRAINMOD 5.1 as well as new inputs for the nitrogen and carbon cycles.

Jim O'Brien and Kagan Ceylon then presented new soil sensing technologies that could help with soil characterization for drainage planning. Their company, STI (<http://www.soiltopo.com>) has developed high resolution imagery within the soil profile, as well as other sensors integrated into a system.

AMDS TF meeting - Introductions

Jim Fouss opened the meeting, and all participants introduced themselves. Charlie Schafer and Tade Sullivan spoke briefly on behalf of the Agricultural Drainage Management Coalition. Gary Sands gave a brief review of the NCR-207 Research Committee which preceded the meeting.

State Reports - Status of Activities and Funding

- *Iowa*: Dan Jaynes reviewed various drainage research sites including the Pekin site with water table management and a new research farm in southeast Iowa that will be installed this summer. Mark Jensen reported that there is one CSP watershed in Iowa with drainage Water Management as an approved practice.
- *Illinois*: Richard Cooke reported on the many paired drainage sites he has developed in Illinois, the conservation drainage watershed, progress with bioreactors and a new water control structure that makes it possible to combine drainage water management with bioreactors. Education and demonstration activities included regional drainage workshops, the Farm Progress Show, and the ILICA Conservation Exposition. Jack Huggins reported that work is progressing on the TNC CIG project comparing controlled drainage to constructed wetlands.
- *Indiana*: Purdue's four paired drainage water management research and demonstration sites are proceeding well. Jane Frankenberger is working with Indiana LICA on a field day at the Northeast Purdue Ag Center, which will include a wetland receiving drain flow. She and Eileen Kladviko are planning to get agencies and organizations interested in drainage water management in Indiana together to discuss drainage water management, including a visit to one of the demonstration sites.
- *Minnesota*: Mark Dittrich reported that drainage continues to be of considerable interest, including regulatory (impaired waters and wetland labeling) and social issues. The bonding bill has enabled additional research sites to be developed. Craig Schrader, a new Regional Extension Educator who will be working with drainage, was introduced. The Conservation Drainage sites were also discussed.
- *Missouri*: Earl Vories of USDA-ARS Cropping Systems and Water Quality Research Unit in Portageville reported on work in Missouri. Missouri held a very successful drainage workshop this year organized by Kelly Nelson in which several ADMS members participated.
- *Ohio*: Norm Fausey is participating in a Rural Drainage Advisory Committee has been formed to study drainage issues across the state, and develop best management practices statewide. The Overholt Drainage School was successful again this year. They have

developed a team to work together on a state CIG grant proposal. Barry Allred described a new drainage water management research site, the soil characterization, and installation this year.

AMDSTF members commented that it is good to see so many demonstration sites being installed, and that the group needs to think about getting the findings synthesized and used more widely. There was discussion of whether we need drainage contractors at the meeting. Some felt that contractors would probably be most interested in a training that would give them a certification in drainage water management design.

Recent events

Sheryl Kunickis reported that the drainage management partnership including ADMC was one of the groups highlighted at the White House Conference on Cooperative Conservation. She also represented the U.S. at an international meeting on nitrogen, and was one of the co-authors of the Current Technologies paper presented at the Trilateral Meeting in Mexico. The ADMSTF and ADMS partnership and their role in implementing drainage water management and related practices was one of the case studies in this paper.

Jim Baker reviewed the recent Gulf Hypoxia and Local Water Quality Concerns Workshop. Richard Cooke led the session on water management. ASABE will be reviewing and publishing the proceedings. Cropping system and hydrologic issues are being raised as primary causes of nutrient concerns. Both in-field and off-site practices need to be looked at.

Mike Sullivan reported on a workshop in Ohio on modeling efforts that Ohio NRCS and Buffalo District of Corps of Engineers organized. The consensus was that the least is known about addressing the effects of tile drains. The many different kinds of models were reviewed, and there was agreement to address tile drains together, and to continue the discussion so that efforts are not duplicated. Steve Ashby of the Corps of Engineers - Engineering Research and Development Center is attending the ADMSTF meeting as a result of those discussions.

ADMC

Tade Sullivan presented several recent highlights of ADMC activities, including a visit of the EPA Ag Advisor and Deputy Administrator to demonstration sites in Illinois led by Richard Cooke. He reviewed some of the very good press coverage lately on drainage water management. ADMC gave testimony at Farm Bill Listening sessions, for US Senate staff, and senior staff of OWOW at the request of the EPA Administrator.

The Nature Conservancy Learning Network

Jack Huggins described and presented a handout on the new Agriculture and Hydrology Learning Network, which held a meeting in Ohio that included many ADMSTF members. The mission of The Nature Conservancy is to protect plants and animals by promoting healthy ecosystems they need to survive, and hydrology has been identified as one of the major factors. This is an important network for ADMS members to collaborate with.

Tile Drain Estimate

Zach Suggs of World Resources Institute People and Ecosystems Program put together a GIS analysis of predicted drained areas, based on row crop land use and soil drainage class (or hydrologic soil group A/D, B/D, C/D). One of the problems with this analysis is that there is no uniform criteria for what is "drained". Is one tile in an 80 acre field included? It is probably not

possible to determine with any accuracy, and therefore more realistic to determine brackets around the amounts. The method of estimation may need to differ in different states. In Indiana, somewhat poorly drained soils are usually drained, while in other states they may not be. Another concern is that the hydraulic properties of soils are not consistently mapped across states. Permeability could be a factor in some places, but this is not consistent. For example, in SE Illinois, permeability limits drainage. But if low permeability were used, NW Ohio would be excluded and we know that it is drained. Other thoughts:

- Some people in the group participated in the 1987 drainage guide, and commented on the major effort by George Pavelis in compiling it. There was a great deal of knowledge on the part of SCS staff who participated at that time, but that institutional memory has been lost.
- Canada LICA looked at corrugated pipe sales to get an estimate of new tile. Dan Jaynes did the same thing with sales in Iowa, but don't know how much is put in to intensify drainage of existing drained land and how much is new.
- For the NRI estimate, an NRCS person went to each point, although subsurface drainage is hard to estimate in the field.
- The most direct method of getting estimates would be to try to get NASS to include drainage in the next Ag Census. Could ADMSTF members play a role in getting that done? Dale Bucks worked on this in the past but was not successful. Maybe inviting a NASS person to the ADMS meeting would be a possibility.

Thursday

Mike Sullivan described a program that allows funding for drainage management data collection within CSP watersheds by producers enrolled in CSP. Dennis Carman will send more information to the DrainMan email list.

Agriculture Canada (Mark Sunohara)

Mark Sunohara of Agriculture Canada described the very extensive research program on drainage water management, including a project at the watershed scale. Watershed Evaluation of BMPs (WEB) goals are to evaluate performance at several scales, and to complete an economic analysis. Controlled drainage is recognized as BMP, and Agriculture Canada has impressive watershed-scale studies. Cattle restriction from streams is also of interest. More information at http://www.agr.gc.ca/env/greencover-verdir/webs_abstract_e.phtml.

Progress report on controlled drainage lit review (Gary Sands)

Crop yield is one of most lacking pieces of data, and an interesting question was raised on why this is. Crop yield data have been collected by "bootlegging" studies over the years, as most studies were focused on WQ goals. Soil quality effects are also important.

Updates on NRCS cost share programs and NRCS Practice Standard 554, Drainage Water Mgmt. (Pat Willey)

- IL (2002)
- IN (2004): cost share under equip; 50% of up to \$1500/structure; mgmt \$40/ac up to 50 acres (for up to 3 yrs). Limited interest in past couple of years, but may increase this year.
- MN (2003): not currently cost shared, but willing to consider special request.
- OH (2005): cost share available for using controlled drainage for applying manure (50% of structural costs). EQUIP funds depend on how county ranks practice, and sometimes it doesn't end up with high enough rank.

- MO (2003): EQUIP - \$0 for water control structures; \$5/ac for 3 yrs for drainage water management (2006 first time); nutrient management required.
- IA (2005): state has approved cost-share as an option, but has not been adopted by counties.
- MI (2002): no data
- WI (554 practice not listed)
- National standard 2001: Review of national Conservation Practice Standard 554 , Drainage Water Management due this year. Pat will send out information needed for review on Drainman when it is time.
<http://www.nrcs.usda.gov/technical/standards/nhcp.html>
- USDA home page: go to eFOTG to view practice standards adopted by any county in any state.
- States take national standard and modify to fit local conditions.

EPA Update (Katie Flahive)

AWPPG RFP FY06 will include drainage water management. Turnaround of 3 wks at the agency. Funding awarded by end of this FY. \$70,000 available for any number of projects in this priority.

- Can apply for up to 4-yr funding (only this year's request comes from FY06). Subsequent years request (for multi-yr funding) will come from subsequent yr's funding stream (if available).
- NOT for implementation of WS programs (e.g. TMDL's)

Hypoxia Task Force:

- EPA Science Advisory Board wide cast now closed (panels being formed)
- Gulf Science Sym: 4/25-27; New Orleans
- Lower Miss Sc Sym; 5/31-6/2; New Orleans
- Sources Fate and Transport Sym: October
- Not much hypoxia data taken post Katrina, but vessels are scheduled out as early as June
- Upcoming WQ Trading Meeting: 2nd Nat'l WQ Trading Conf; Pittsburg, 5/23-25; free pre-conf workshop (limited to first 100 registrants; www.farmfoundation.org)

Funding Opportunities

- CS – 2 opps for funding, CIG – more opps; don't know about next year's technology component.
- Another grant opp: CCPI (coop consv partnership initiative); doesn't currently include ADWM
- Current CIG must be awarded by Sept (should be notified by July)
- Some states have a "state CIG" (e.g. OH). About 12 pilot states initially, but up to 20 now (at state con discretion)
- CSREES-funded Great Lakes Regional Project (seed grants); \$5-20k, due 2/28
- Targeted watershed grants coming out \$10mil, cut to \$5mil in '07
- 319 grants could be explored a little more
- Special emphasis watershed funding may be extended through next year.

Upcoming Events

NOTE: All are encouraged to send event information to Ann Houser to compile and put on website.

- (Kunickis) – A session has been approved for the ASA-CSSA-SSSA meeting, Indy 11/12-16 on drainage (www.soils.org); Innovations in Reducing Nonpoint Source Pollution, 11/28-30/06 in Indianapolis (www.riversinstitute.org); Nonpoint Source Monitoring meeting in Minneapolis, MN on Sept 24-28, 2006.; ARS/CSREES/NRCS working on a meeting in CA, Oct, USDA ag water reuse, nery. Next International Nitrogen Initiative meeting -10/1-5, 2007, Brazil (coast) Costa do Savipe.
- There will be a Gulf Science Workshop in New Orleans looking at causes and effects. (www.epa.gov/msbasin)
- (Sullivan) – Water mgmt specialists from 3 tech centers + a few others will do a DRAINMOD training session in NC in April/06. National NPS monitoring conference in Oct 24-28.
- Forest hydrology conference in NC (Skaggs)
- (Schafer): DWM workshop and field day at Farm Progress show, IL, fall '07. Ducks unlimited interested in cooperating.
- (Fausey) Fall OH chapter of SWCS celebrating 50th anniv. Floodplain aquatic systems. Fausey giving at least one presentation. Sept 5-8, 2006.

Requests for information from ADMS-TF (Tade Sullivan/Charlie Schafer)

Critical needs include:

- *yield impacts* (#1 priority);
- drainage intensity measurement;
- design recommendations,
- management recommendations,
- quantification of flow and nutrient load reductions;
- education of colleagues, government officials about the practice.

They still run into individuals that are unaware or skeptical of practice. Hopefully some of these can be answered by current CIG and other projects

Continued discussion on yield data needs: old data are not adequate since new cultivars have greatly improved yields. We need to know more about yields so we understand all aspects of DWM practice. Need to be able to “sell” practice to all stakeholders.

A discussion ensued of how these needs can be met.

- ADMC did an economic analysis, hoping that others would step forward and do their own counter-analyses, but this hasn't happened.
- Most of us are concerned with quantifying the effects of the practice. Not necessary to “pay” for these practices with the cost of a “lb” of N in the river. But, one could look at the cost of removing N by various means (e.g. wetlands). We should compare the cost of DWM to the cost of these other methods to approach the economics (i.e., the alternative cost of removing N from our waterways).
- The regional pub will help educate colleagues and the public
- NRCS staff also need to be educated. There has been some education of staff in OH, but no perceived impact yet. It is difficult, because local staff are overworked. What about creating a CD/DVD about the practice that could go out to staff, producers, etc?

- Would be nice to have a document that explained the practice.
- ADMS could do a simple brochure. Agri-Drain has begun a handout. FAQ is also a good approach. ADMC has developed some nice graphics.

Open discussion about expanding role and activities of the TF to include mgmt of surface and open ditch drainage in the MS Basin.

Jim Fouss presented an overview of the need to expand to surface drainage. For example, Ducks Unlimited cooperating on mngd ditch systems to provide habitat during winter.

We need to think beyond the field-scale. NC (fabric-dam) example (which was taken from Celeryville, OH?? Application)

Question: Can NRCS practice standard 554 be interpreted for surface drainage? Yes

A list was compiled of subjects that could be addressed at the next meeting when more time is available:

- Working with drainage districts (watershed/ditchshed approach)
- 8-state area is priority. How quickly can/should we move beyond this area?
- 5 recommendations that came from OH (rural drainage advisory group product)
- Potential for drainage water management to reduce CO₂ losses from loss of organic matter. (Purdue study beginning on this in the organic soil area in northern Indiana where controlled drainage is used to prevent subsidence)
- Stimulating denitrification
- P filtering
- Storage in ditches: WQ, subirrigation.

Discussion of other related conservation practices that could be integrated with drainage water management

The group discussed various conservation practices that would enhance or complement nitrogen benefits of drainage water management.

- Shallow drainage
- Bioreactors; which microbes; north vs. south, etc.
- Wetland systems
- Emphasize suite of practices
- Use more water (cropping systems)
- Storage in ponds
- Cover crops may change mgmt strategy of DWM
- Environmental remediation practices [applicability to ag nutrient mitigation practices; e.g., surfactant treated zeolite? (Allred)]

Specific potential actions addressing these topics by ADMSTF are not clear. These may include

- Seek increased funding
- Help identify collaborators (e.g., Ducks Unlimited)
- May need to have individuals be ready to testify on some practices

Continue discussion of this topic at next meeting.

Afternoon

Action Plan

1. Develop list of Frequently Asked Questions

The group came up with the following list:

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|--|---|
| Where does the water go? | Will it affect manure application? |
| Where will it work (soils, etc)? | Will it cause flooding? |
| How many acres can I manage? | What does it cost? |
| Should it go on the top or bottom of hill? | What is the life of the structure? |
| Do I need a pump? | How much yield impact? |
| How high should I hold the water? | Who will help pay for it? |
| How much management is required (automation)? | What corn varieties work best? |
| Why should I worry about N? | How shallow would tiles need to be to work like managed drainage? |
| What is Gulf hypoxia? | Where can I get more information? |
| What is the reduction in N loss? | Is retrofit possible? |
| Can I reduce fertilization? | Will I need more drain tile (closer spacing)? |
| What happens to earthworms? | Can I bury the structure? |
| Will it cause blowouts? | What if you can't retrofit? |
| How does it affect soil quality? | How does it work with other practices? |
| Will tile plug? | Can I subirrigate through the same pipes? |
| Will tile freeze? | |
| Will it affect my neighbors? | |
| Will it increase surface runoff, erosion, other chemicals? | |

2. Follow up with Ag Census on collecting drainage information

- Ask Dale Bucks what happened in his discussions
- Dan Jaynes will ask NASS through the web site. He may provide information for others to ask as well.
- We could all ask state Ag Statistics people about drainage information

3. Standards

4. Develop a plan to create Fact sheets, CDs, etc.

Jane Frankenberger, Gary Sands, Craig Schrader

Distribution of Brochures

Jim Fouss brought copies of the brochure to all attendees. Discussion of distribution:

- Distribute at ASABE meeting in Portland. AgriDrain will be exhibiting, and could include the brochure on the table.
- ADMC wants to distribute material to all county offices. Mailing list is probably not available. Need to work with State Engineers or someone else in each State Office to distribute. Pat Willey will help make contact with them.
- Distribute link to pdf via listserver
- Get to Extension people

- Teach professors so that students coming out of our universities will know about drainage management

Web page

The following items should be included on the Web site. A plan is needed to send material to Ann Houser in Ohio, and follow up to make sure the items are there.

- Meeting minutes
- List of articles related to DWM with electronic links where available
- Links to other important sites
- List of conferences (would need to be updated regularly)

Tade Sullivan said that ADMC is preparing information and links for each state, including link to that state's 554 standard. Members are invited to send information to him on what the link should be.

Get comments on Action Plan to Mike Sullivan. He will update and then put on web site.

Next meeting

The group decided to continue to hold one meeting in the fall and one in the spring with NCR207. The NCR 207 meeting will be in North Carolina, with dates TBA. The next ADMS/ADMC meeting will tentatively be held Sept 12-13 in Illinois.

The meeting was adjourned at 2 pm.

*Notes compiled by Jane Frankenberger, Purdue University
April 17, 2006*