

Agricultural Drainage Management Systems Task Force

August 17-18, 2005
Minneapolis, Minnesota

Participants

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Introductions

Jim Fouss opened the meeting, with a brief review of the NCR-207 Research Committee which preceded the meeting. He commented on the need for focus on retrofitting existing systems, and also shallower drains in general.

Partnership Management Team

Sheryl Kunickis gave an update on the PMT, and an upcoming meeting at which ADMS Task Force members are speaking on drainage management. She also discussed the White House Conference on Cooperative Conservation, which is an invitation-only event, featuring cooperators rather than government personnel. Charlie Schafer has been invited. The ADMS Task Force was selected as a case study for the publication Faces and Places of Conservation. (Only 180 were selected out of thousands submitted.)

ADMS Technical Committee roles and participants

Mike Sullivan presented an overview of the leadership structure in the ADMS Charter. The Charter specifies *three members* from each agency on the Technical Committee, with one from each agency being the Executive Committee of Chair, Vice-Chair, and Secretary. We will adopt this structure starting in 2006, with Jim Fouss as Chair for one year. Technical Committee members need to be identified. Roles for the Technical Committee include the following:

- Identify issues to be discussed, and develop agendas
- Make decisions in between meetings of the whole task force
- Keep Action Plan current, and figure out new things that need to be accomplished
- The Technical Committee makes up the voting members of ADMS

General thoughts for the ADMS TF: Identify ways to contribute to the Farm Bill. If not through agencies, the Coalition can bring things forward

SWCS Presentations

Sheryl Kunickis reported that the Drainage Management Symposium at the Soil and Water Conservation Society meeting in Rochester, NY, was very successful. Shortened versions of presentations were given by Larry Geohring, Jane Frankenberger, Larry Brown, Wayne Skaggs.

State Reports - Status of Activities and Funding

- Iowa: Jeff Porter of NRCS reported that final comments are due on the 554 Standard, and should be out soon. Dan Jaynes and Matt Helmers will be working with NRCS to identify cooperating farmers. Matt Helmers reported that the EPA Targeted Watershed Study is underway. They have been getting positive response from farmers, and some would like to put structures in.
- Illinois: Steve Baker reported that Richard Cooke has a new installation. He now has a total of six pairs of sites, and is aiming for eight. Indiana LICA Field Day was last week.
- Indiana: Purdue's CSREES Section 406 research/extension grant on drainage water management is proceeding well. Installation is nearly finished for five paired (controlled vs conventionally drained) fields at four sites. Beth Clarizia organized and Jane Frankenberger presented at a meeting on drainage water management for the NRCS Leadership Team. Beth is presenting at meeting in all Areas where the practice

would be useful. The State Conservationist also wants the State Technical Committee to hear about the practice and its potential.

- Ohio: Norm Fausey reported on his plot studies, and the study he authored for ARS. Larry Brown discussed current studies, the Liquid Manure on Drained Cropland conference, and the Wetland Reservoir Subirrigation System. Art Brate said that even with 90% cost share, farmers do not want to pay for control structures because they don't see the benefit. A marketing plan is needed.
- Michigan: Larry Brown reported that Bill Northcutt is working on a dairy waste recycling system that Bud Belcher designed. This responds to an issue of widespread interest.
- Minnesota: Gary Sands thanked industry members for support. The shallow drainage study is in its 7th year. Gary is working on two funded literature reviews. He teaches several hours of drainage management each year at the drainage school in collaboration with Matt Helmers, and they are thinking of devoting an entire day to it. They also collaborate on the Minnesota-Iowa Drainage Forum, which will be held in Iowa in October.
- Mark Dittrich reported that the bonding bill to fund drainage research finally went through, so there will be funding available. The Conservation Innovation Grant is being started to compare conventional to shallow and controlled drainage. There is also funding available from oil overcharge funds. Research will be conducted at Waseca to better understand where the water and N go. They have several projects called conservation drainage, responding to need to restore impaired waters.
- Sonia Maasel Jacobsen said that the 554 standard has been approved for several years, but is not on the EQIP docket because of concerns about the efficacy in Minnesota. One farmer has installed a system in Crookston that is being observed.
- Missouri: Tom Spofford said that Kelly Nelson is working on DWM training for contractors that will be conducted in January 2006
- Louisiana: Jim Fouss reported on Louisiana activities. Cabin Teele Watershed is a good site for working with drainage water management in a surface drained system.

Upcoming Conference

Dan Jaynes reported that drainage water management is one of the major topics at the **Upper Mississippi River Hypoxia Conference**. Richard Cooke and Gary Sands are leading the discussion, and additional panelists will respond. They are asked to estimate potential for each technology, and point to what the unanswered questions are.

NRCS Update

- The standard will be up for review next year. Pat Willey will be in charge for NRCS and is seeking input from ADMS TF and the NCR 207 group. Please contact him if you are willing to be involved.
- Tom Spofford discussed concerns of FSA on how control structures can function within a CRP buffer. The standard had said that drains going through a buffer should be non-perforated. It is currently in review in the Federal Register. Members are encouraged to comment through this process.
- Training: Many NRCS people are inquiring how they can be trained in designing and installing drainage systems. The recommendation is to attend the Overholt Drainage

School in Ohio. Larry Brown suggested that the Minnesota Drainage School also be included. Tom encouraged people to go to the Web site <http://www.wcc.nrcs.usda.gov/wetdrain> for information.

- He also pointed out that NRCS has two recent publications on drainage. Engineering Field Handbook Water Management - Drainage, and the National Handbook Water Table Control. We need to make sure these are linked from the ADMS Web page.

Extension Bulletin

Jane Frankenberger reported on progress with the regional bulletin “Drainage Management Strategies to Reduce Nitrate Loading”. The target audience of this publication is non-technical audience, including policy-makers and agency staff, to help them understand our toolbox of strategies to reduce nitrate losses from drained lands. The overall message that technologies are available, including practices that can be used in the field, at the edge of field, and in stream. Specific technologies, with their authors, include controlled drainage (Robert Evans) shallow drainage (Gary Sands), drainage water recycling (Norman Fausey, Barry Allred, Larry Brown), denitrification walls (Dan Jaynes), crop nutrient management (Gyles Randall), cover crops (Paul Porter and Gary Sands), increasing crop diversity (Jeff Strock) perennials, surface inlets (Gary Sands and John Moncrief), wetlands (Jim Baker, Matt Helmers), bioreactors (Richard Cooke), and ditch design (Jeff Strock). A discussion followed of the proposed Economics section and the risks and limitations of including specific numbers. The conclusion was that the most promising way to have this get done is to keep the analysis qualitative, listing benefits to the producer and the environment, but without attempting to put dollar amounts on them.

ADMS Coalition

Charlie Schafer reported on the many Coalition activities. Barry Goodwin reported that Hancor has organized a series of six workshops around the Midwest.

Needs:

- There is a concern that in Minnesota, North Dakota, and South Dakota drainage projects require a recertification of the wetlands determinations before the project is done. Since the determination needs to be done when the crop is off, there is not enough time to get it done. LICA has written to NRCS to get clarification.
- Flow reduction numbers and yield increases
- Agronomy recommendations. Planting date, spacing, etc.
- Cost benefit analysis
- Extension publication. (Industry would prefer something quicker and shorter. Audience of farmers prefers *one page*.)
- Training for NRCS folks

Education and outreach approaches

Tade Sullivan presented the challenges of communicating challenges and opportunities. How do we utilize research to educate farmers? Good methods include One-on-one evangelism, Farm forums, Watershed tours, Seminars - piggy back opportunities. He stated that it would be useful to develop a calculator for drainage water management. Even if it couldn't calculate benefits, at least it could calculate costs. He urged everyone to focus on the bottom line when presenting the practices to farmers. A brief discussion followed on strategies for outreach.

Thursday

ASAE Standards

Pat Willey presented the review process for two ASAE standards:

- ASAE EP479 Design, Installation and Operation of Water Table Management Systems for Subirrigation/Controlled Drainage in Humid Regions.

EP479 addresses controlled drainage only in the context of subirrigation, and does not address the water quality benefits of controlled drainage alone. Another concern is the statement that drains should be as deep as practical, which contradicts water quality concerns. Chip Chescheir is leading the review of this standard, and all ADMS TF members are invited to comment. Pat Willey will send an electronic copy to anyone interested.

- ASAE S526.2 Soil and Water Terminology

Terms that are used in the technical standard should be defined in the S526 Terminology standard. Pat listed a number of terms related to controlled drainage and subirrigation that are not referenced in the Terminology standard. As a member of that committee, he is making sure they get included.

Potential new standard: Discussion followed on the need to develop a new ASAE standard on controlled drainage (drainage water management) alone, separate from the subirrigation standard. Everyone who spoke agreed that this was needed; however it was recognized that developing a new standard is a long and difficult process. No process was decided on for getting it done. A discussion on what such a new standard would be called followed. Participants seemed to agree that the name would be drainage water management, with a recognition that controlled drainage was the historical term.

NCR-207 Research Committee

Eileen Kladviko, Chair, reported on the multi-state research committee NCR-207 Drainage Design and Management Practices to Improve Water Quality. Presentations from each state were given, along with two Mini-Symposia on where the water and nitrate that are saved by drainage water management go, and also on the potential for more perennials and cover crops in the landscape. The next meeting is tentatively planned for Iowa State University in the last week of March 2006. The 2007 meeting will be in North Carolina in early April.

Economic analysis

Larry Brown presented past economic analyses of drainage, and a simulation analysis of the economics of different drain spacings. The advantage of the method is that includes various probability levels. They have not yet done an analysis with drainage water management. He initiated a discussion of what kinds of analyses could be done for drainage water management.

Participants discussed at what place in the economic analysis the environmental benefits to society need to be included. There is no doubt that the environmental benefits are the clearest, most consistent benefits of drainage water management. Wayne Skaggs stated

that the yield benefits are real, but variable from year-to-year and unlikely to be very large. An economic analysis that shows a negative results on the basis of private costs alone could be useful in clarifying what level of incentives need to be provided by society.

If the benefits to the farmer are not greater than the costs, there are still probably more overall benefits to society. The difference can be made up by incentives in the form of cost-share, CSP enhancement payments, or other incentives. Another incentive that society could provide would be in the form of a safe harbor process. If nitrate loss were regulated, a safe harbor procedure could provide some change in enforcement if drainage water management was implemented, for example.

We discussed what motivates farmers to install other BMPs which have no clear yield increase, like terraces, waterways, and riparian buffers. Erosion control practices may be easier to sell because the farmers can see the soil loss and may know that he cannot continue farming across gullies, so can clearly see the benefit of a waterway or terrace. Nitrate loss is completely invisible.

DRAINMOD Predictions

Mohammed Youssef presented DRAINMOD NII results for an Indiana soil. Model validation results were very good, with nitrate from drainage predicted within 8% of observed for the 5 years. He then used the model to assess the potential impact of various nitrogen application.

Question: Could it be programmed to be able to change management based on conditions? Currently DRAINMOD allows changes in weir height once a month, but uses the same timing of weir height changes in all years. To change each year, you need to run it one year at a time. Jim Fouss did quite a bit with this years ago, modifying DRAINMOD to allow changes every 3 days. He was doing it for subirrigation, but determined that this kind of control was not worth it. There was considerable interest in the group in having a version with DRAINMOD with such a capability.

Literature Review of Drainage Water Management

Gary Sands reported that he and Matt Helmers have put together a database of 300 publications, of which 100 apply to drainage water management. The highest numbers are from Canada, North Carolina, with fewer from the Midwest, Europe, and other areas of the U.S. They hope to have a white paper in a few months. They are also conducting a literature review of the effects of drainage on aquatic ecosystems. There are few or none addressing this directly, so they will first quantify impacts, then look at effects on aquatic communities.

Conservation Security Program and Drainage Water Management

Dennis Carman presented what is needed to determine enhancement payments for CSP. With CSP, the goal is not designing a system, but rather assessing an existing system. The first factor identifies the quality of the drainage systems. They have given the highest benefit category for subirrigation. There was a discussion (based on few studies) that subirrigation is worse than controlled drainage in terms of water quality. Another discussion was whether controlled drainage systems are designed as well as subirrigation

systems, as far as drainage intensity capacity. It was suggested that the more intensive systems be referred to that way rather than as quote better. The factors included are:

- Drainage Factor (scale of 0 to 1.2 based on intensity)
- Structure Factor (yes or no; 0 or 0.5 or 0.6)
- Automation Factor (yes or no; 0 or 0.1)
- Monitoring Factor (yes or no; 0 or 0.1)

Then you put in what months are controlled. (0.25 for each month of control), and calculate drainage potential for each month. In Illinois, it is 13.2, but depends on location and somewhat on soil. (Roughly about one-third of precipitation.) Payments are based on the following drainage water management index:

DWM Index	CSP Payment per acre
0-19	No payment
20-29	\$2
30-39	\$4
40-49	\$6
50-59	\$8
>60	\$10

Discussion: Wayne suggested that for the Drainage System Factor, could take permeability from soil survey, together with depth and spacing, to calculate a simple drainage intensity. Systems with higher drainage intensity will see more benefit from controlled drainage. Many other questions were also discussed, including the following:

- How are shallow drainage systems rewarded?
- Should other factors be considered, like depth of control, whether your drainage goes into a bioreactor, etc.?

Dennis also noted that there is an opportunity to have on-farm demonstration for some of these practices. It is only possible in CSP watersheds, and the funding only goes to producer. The producer would need to keep records, possibly hiring someone to keep them for him. These are a new form of enhancement payments.

Hypoxia Task Force Update

Katie Flahive presented an update of the Action Plan. The 5-year moving average of the hypoxic zone has been around 15,000 sq km for a decade. The goal is 5,000 sq km. The 5-year reassessment is currently underway. Current and planned activities:

- The independent peer review of EPA Region 4 White Paper (www.epa.gov/msbasin) found that the science used in the white paper was not well supported. However, the general task force is pursuing a dual nutrient strategy, aiming to reduce both nitrogen and phosphorus in the Gulf of Mexico. She encourages everyone to read the comments on the Web site.
- Consultation with EPA Science Advisory Board
- Formation of Science Reassessment Team and Management Action Reassessment Team
- Upper Basin symposium (Sept 26-28 in Ames)
- Gulf Science symposium (spring 2006)
- Lower Basin symposium (spring 2006)
- Synthesis symposium

- Task Force Revisions to Action Plan of 2001

There will be a National Research Council study funded by the McKnight Foundation called Mississippi River and the Clean Water Act. Project period is 2005-2007.

Water quality trading – moving from policy to implementation

Katie presented an abbreviated version of a presentation she will send to the listserver. The EPA policy is available at <http://www.epa.gov/OWOW/watershed/trading.htm>

For point-nonpoint source trades, there is probably a need for a broker, who would work with landowners and (credit sellers) and permitted dischargers (credit buyers). The broker would need to verify that nutrient reduction practices are undertaken and comply with appropriate specifications and standards. The broker would need to estimate pollutant reductions and converts them into tradable credits, then tracks and is accountable for credits.

So far, not many trades have taken place (6 to 8). Many others are being planned. Nutrients are not in the forefront. Katie presented a list of practices that may result in tradable nonpoint source nutrient credits. Priority activities for 2005 includes the 2nd national trading forum (Austin TX Spring 2006), developing a NPS Trading Manual (CTIC), and incorporating wetland restoration into water quality trading.

Impacts of drainage water management on liquid manure from drained cropland

Liquid manure has been shown to quickly get into tile drains through worm holes and other macropores. Larry Brown discussed the list education and research needs that came out of the workshop in Ohio in 2004.

Ron Gronwald commented that much of the research has focused on how manure gets into the tile lines, rather than how to stop it. We need more research focusing on control strategies. Could we leave strips over the tile where no manure is applied? Could we add something to the manure to make it more solid? (most failures are when manure has high water content.)

Drainage Water Management state groups

Is there a need for state groups? Especially if ADMS moves to annual meetings, it might be a good idea to meet at the state level. Also, in moving to larger watershed-scale projects, it would be useful to have all stakeholders on board. It could be part of the state LICA meeting. Jim Fouss suggests that we think about it and talk more at the next meeting.

Newsletter

A means of communicating what Task Force members are doing between meetings would be helpful. However, an elaborate newsletter has been found to be more effort than it's worth. An electronic newsletter (format of SWCS Conservogram, for example) would probably be the most useful. Tade Sullivan puts out a monthly newsletter for the ADMC. Articles by Task Force members could be useful.

ADMS Task Force Action Plan

Mike Sullivan developed a table of the ADMS Action Plan. There were 14 actions, and we have had significant actions on 11 of them. The table was updated. Things to add as accomplishments:

- Symposia at SWCS
- Articles (Farm Industry News, Drainage Contractor, ASAE Resource magazine, ARS Research, etc.)
- Published proceedings from goal 1.2, 8th International Drainage Symposium
- Liquid manure symposium
- Bus tour
- Water table management workshop
- NACD policy statement

Future efforts

- Economic analysis
- Symposium at Tri-Societies meeting in Indianapolis in 2006 – Sheryl Kunickis
- Publish results of simulation studies using DRAINMOD-NII
- Mini-Symposium on shallow subsurface drainage. Probably with or by NCR research committee
- Support ADM Coalition activities to obtain CAST study
- Coordinated needs assessment of drainage water management
- Support for DRAINMOD and associated enhancements
- Comprehensive assessment of environmental and economic benefits associated with drainage water management in the Midwest. (This would be a long-term study including field work.)
- Maintain a list of drainage water management projects with links to contacts (Coalition is planning this.)
- Post answers to frequently asked questions
- Collect and maintain list of technical papers etc and means to obtain copies
- Drainage water management system design guide
- Continuing guidance for DWM in CSP
- Identification of potential farmer enhancement activities in CSP watersheds
- Assess potential for water quality trading associated with DWM
- Input into Farm Bill? The Coalition can work on this.

Mike Sullivan will lead the process of continuing to pulling information together into an Action Plan and continue to update it at future meetings.

ARS Water Resource Management National Program (NP-201) Action Plan

Dale Bucks and Jim Fouss passed out copies of the plan for Problem Area 3: Drainage water management systems. It lists products to be produced, and scientists participating in each product. Norm suggested we think about research with common goals across the Midwest.

ADMS Web site

What do people use the Web site for?

- Contact information, but needs to be updated

- Meeting information (hotel, dates, etc.)
- Links to ASAE papers on drainage water management

Action: Ann Houser manages the Web site, and encourages participants to send suggestions. Her email is on the home page. Norm Fausey and Ann Houser will take responsibility to post materials such as meeting arrangements, meeting minutes, etc. as they become available.

- Link to ADM Coalition Web site
- Link to NCR-207 Web site when it becomes available.
- Encourage states to have Web pages and link to them

Next meeting

March 29-30 in Ames, Iowa, following NCR meeting.

Agenda items to consider including:

- Action plan – Mike Sullivan
- Extension publications – Jane Frankenberger
- CSP tool update and 2006 program – Dennis Carman
- Funding updates –
- Iowa workshop update – Dan Jaynes
- Review of other basin symposia – Katie Flahive
- DRAINMOD NII Mini-symposium, between the NCR and ADMS TF meetings. Include watershed version updates. – Wayne Skaggs
- Automated control structures – Jim Fouss
- Farm Forum in an evening. Tade Sullivan, perhaps in collaboration with a commodity group.

Note: For research presentations that might be of interest to both NCR-207 and ADMS Task Force, schedule them on Wednesday morning. Matt Helmers, as Chair of NCR-207 will need to identify which those presentations are.

The meeting ended at 5 p.m. Many participants attended the Drainage Field Day at Lamberton and Tracy, organized by the University of Minnesota.

Notes written by Jane Frankenberger, August 22, 2005