



SERA-17 2014 Meeting, Des Moines, IA

July 23 – 25

Minutes

The meeting was opened by Andrew Sharpley, 2014 SERA-17 Chair.

Antonio Mallarino, who coordinated the meeting organization together with John Kovar and Matt Helmers, welcomed the over 60 attendees and introduced John Lawrence, Associate Dean for Extension and Director of the Iowa Nutrient Center, who reiterated Antonio's welcome and briefly mentioned the nutrient management and water quality and quantity issues facing Iowa and the Heartland states in general.

Andrew Sharpley introduced Nathan McKinney, Assistant Director of the University of Arkansas Agricultural Experiment Station and the new administrative advisor for SERA-17.

Keith Schilling, Iowa Geological Survey kicked the meeting off with a presentation of surface and subsurface flow pathways and controls in Iowa. Keith stressed how hydrology is linked to solutions for mitigating P loss. He then discussed how the geologic history of a region, land use and cover, artificial drainage, and conservation practices affect hydrology and thus P losses.

Frank Coale, Univ. Maryland, gave an overview of P related impairments and mitigation measures in the Chesapeake Bay region over the last 40 years and left us with the question *"If we are going to use new tools to estimate P loss that plug into decision-making tools, how are we going to address policy concerns if we are targeted nutrient reduction goals."* Importantly, how can SERA-17 as a group help answer this question? Frank also noted that model development over the past 35 years is *"getting better but is it right?"*

Mark Williams, ARS, Columbus, OH presented information on nutrient reduction strategy efforts for OH and Lake Erie, focusing on the 40% P loss reduction recommended by the Ohio P Task Force and showed results from ongoing research with Kevin King, ARS, Columbus, OH on P transport in surface and subsurface (tile drainage) flow pathways. We heard that drainage water management shows potential to reduce surface runoff P losses (65 – 74%) but not P concentrations in drainage water.

Warren Goetsch, Illinois Department of Agriculture then talked about nutrient reduction strategies in the Upper Mississippi River Basin, specifically IL and efforts to decrease nutrient losses from agriculture. He stated that significant changes will be required to meet the overall goal of a 45% statewide reduction in nutrient losses.

Matt Helmers, Iowa State University, Ames IA then discussed IA efforts to reduce N and P loss from agricultural acres, discussing the relative effectiveness with several practices, ranging from cover crops,



CREP, buffers, drainage management, to bioreactors on tile drains. He concluded by stating that no single practice will achieve reduction goals but rather it will take a combination of best management practices.

David Mulla, University of Minnesota, MN described nutrient reduction tools developed for MN and how reduction goals can be met. Several BMPs were considered individually and in combination to show how the tool provides estimates of BMP effectiveness in reducing nutrient losses and their associated costs.

Following these formal presentations there was a panel discussion involving the five State nutrient reduction strategy speakers, which was vigorous and productive. An important question raised during the discussion is can we get needed nutrient reductions based solely on incentives and good will of landowners or are regulatory measures needed. Also, how do we pay for the costs of nutrient reduction practices? This ended the morning session.

After a hearty lunch, the afternoon session discussed stream bank and in-stream processing of P.

Doug Smith, ARS Temple, TX discussed the contribution from various bank and bed sources in streams and ditch channels in IN. He concluded that in-stream processes, while significant in determining watershed losses of P, are largely ignored. He also argued that on-field practices are not sufficient to obtain desired reductions in nutrient losses and that edge-of-field and in-stream remediation practices will be required.

John Kovar, ARS, Ames, IA followed presenting research by himself and Tom Isenhardt (Iowa State University Department of Natural Resource Ecology & Management) on stream bank erosion and P loss from an IA perspective. Land use tends to have little impact on stream bank and bed equilibrium P concentrations (EPC_0). They were able to show seasonal shifts in banks and beds as sources and sinks of P. Stream dissolved P changes as does the chemistry of bank and bed material.

After the formal sessions and more productive discussion another well-furnished break was followed by four workgroups meeting separately and then presenting an overview of their discussion to the whole group. The work groups are Modelling, Agricultural Production Practices, Extension, and Filtration and Amendments. The minutes of each work group follow.

Modelling

CHAIR: Nathan Nelson nonelson@ksu.edu

Member in attendance were; Mike VanLiew, Mazhar Haq, Ammar Bhandari, Candiss Williams, Biswanath Dari, Adam Forsberg, John Ramirez-Avila, Carl Bolster, David Radcliffe, Peter Vadas, and Amy Collick.



Review of past accomplishments since 2013 meeting: D. Radcliffe successfully submitted an article to the Journal of Environmental Quality covering the topic of phosphorus transport to drainage tiles by various transport and fate models (e.g., SWAT, HYDRUS, HSPF, etc.).

Topics for a new article: Pete Vadas agreed to head up another group effort to write an article on deficiencies and/or gaps in phosphorus loss/load predictions in models (SWAT was discussed in much of the discussion, but APEX and other models may come into play). Most contributions will be done via email discussions. The potential topics discussed are as follows;

1. Dissolved P simulations
2. In-stream cycling of phosphorus (and other nutrients)
3. P transport/transfers in lateral subsurface and/or baseflow
4. Organic P cycling in low P soils
5. Winter spreading and hydrology of snowmelt
6. Cover crop and P loss from crop and residue
7. P loss from irrigation.

Nathan Nelson turned over the work group meeting chair responsibilities to Amy Collick for the next meeting in 2015.

Agricultural Production Practices

Agronomic practices affecting P fate workgroup

Doug Smith agreed to take over duties as chair of this workgroup. The group will develop a white paper, for the SERA-17 web site, that will review key trade-offs associated with phosphorus-based management. Although some of these are well known to the SERA-17 community, they remain a persistent concern to the implementation of P-based strategies and to the mitigation of P runoff (surface and subsurface). Trade-offs include: the implications of P-based management on nitrogen fate/management; the differential contribution of particulate, dissolved forms of P to runoff losses when only one phase is targeted. Following the development of the white-paper and approval for on-line publication by SERA-17, the group will seek to publish an opinion editorial on the subject. Members in attendance were; Pete Kleinman, Jordanis Moustakidis, John Kovar, Barbara Cade-Menun, Carlos Perdomo, Laura Klaiber, Billy Beck, Sam Feagley, Bill Jokela, Antonio Mallarino, Doug Smith, Jennifer Weld, Becky Young, and Mark Williams.



Extension

The Extension group will:

1. Finish the drainage extension presentation
2. Try to determine how often the fact sheets are used (Dan Fuka)
3. Review the fact sheets to determine whether they need to be updated, and, if yes, start revisions
4. Add fact sheets on drainage (Mark Williams will lead) and P transport in snow (Laura Good will lead)
5. Work with IPNI and TFI (and potentially others) to try and get TSP back on the market
6. Interface with Extension Education to determine if they have a mechanism for graduate students to be involved.

Members in attendance were; Quirine Ketterings, Doug Beele, Beatrix Haggard, Laura Good, Amy Shober, Geoffrey Rijue, and Eric Hurley.

Filtration and Amendments

Discussion on the main limitations of filtering runoff/drainage water: mainly focused on physical issues of hydraulic conductivity and practicality of achieving proper particle size distribution at a large scale.

Laura Christianson indicated current research on use of acid mine drainage residuals and water treatment residuals for treating aquaculture wastewater. Andrew Sharpley indicated current research with Sheri Herron regarding the use of drinking water treatment residuals in removing P from exhaust fan emissions in poultry barns. Martin Shipitalo presented some of the work that he had conducted on using alum and limestone around field drains and blind inlets.

There is a great interest in combining the nitrogen bioreactors with the P removal structures

Outputs:

Fact sheet on the use of PSMs as soil amendments in progress led by Ray Bryant.

Video on rainfall simulators published in JOVE (Ray Bryant).

Paper published in JSWC on a case study of designing and constructing a P removal structure (Penn and McGrath)

MD Dept Ag cost sharing of P removal structures (McGrath)

OK state university extension pamphlet on P removal structures (Penn)

Future:

Special session on the land application of gypsum rich by-products at the 2014 ASA meeting (Ray Bryant)

Fact sheet on N bioreactors (Laura Christianson)

NRCS standard on land application of gypsum in progress (Ray Bryant)



NRCS standard on construction of P removal structures in progress (Penn and McGrath)
Spectroscopy to be conducted on spent PSMs to determine P forms (Shober and Penn)

Field Trip

There was an excellent field trip on Thursday. In the morning we visited the Neal Smith National Wildlife Refuge (http://www.fws.gov/refuge/Neal_Smith/) and heard about prairie restoration project and the Walnut Creek CEAP Project. In the afternoon we visited the Des Moines water treatment facility (<http://www.dmww.com/>) and learnt how they maintain nitrate-N concentrations below 10 mg L⁻¹ under trying conditions.

On the morning of the third day there was an excellent session on Bioreactors to reduce N and P loss.

Laura Christianson, of The Conservation Fund Freshwater institute, Shepherdstown, WV presented information and technology on N reduction bioreactors. Wood chip based technology appears to be one of the more common, popular, and successful options. She also presented information on the role of constructed wetlands to reduce N loss from landscapes.

Chad Penn, Oklahoma State University, OKK then described work with Josh McGrath and others using passive P removal technology. There are many designs but the success of each relies on three basic principles; **physical properties** to allow water flow through the material; **chemical properties** that determine how much P can be removed and ensure that no other chemicals (i.e., metals) might be released, and **material availability** where a cheap source of material in significant quantities is locally available to meet design demand and required P removal.

Following these presentations, updates were given on the five regional CIGs that are evaluating and refining P Indices in the Heartland States, Chesapeake Bay States, Southern States, Wisconsin, and Ohio.

The Business meeting followed with discussions on the format and scheduling of future meetings and whether they should be independent or tagged with another relevant meeting. Topics for future meetings were discussed and several ideas raised but given that a major proportion of the SERA17 members were not at the meeting, this discussion will be followed up on the list serve and with Monkey Surveys.

Doug Smith was unanimously elected as the Chair of SERA-17 for 2015 and will follow Carl Bolster who takes over the leadership in January, 2015.

The meeting was adjourned on time.