

CHRISTOPHER H. HAY, PHD, PE

ASSISTANT PROFESSOR AND EXTENSION WATER MANAGEMENT ENGINEER
AGRICULTURAL AND BIOSYSTEMS ENGINEERING DEPARTMENT
SOUTH DAKOTA STATE UNIVERSITY

Contact Information

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Education

University of Nebraska-Lincoln, Lincoln, Neb.

PhD, Engineering, 2006

- Area of Specialization: Agricultural and Biological Systems Engineering
- Minor: Statistics

Colorado State University, Fort Collins, Colo.

MS, Agricultural and Bioresource Engineering, 2003

BS, Agricultural Engineering, 1992

Professional Registration

Professional Agricultural Engineer (Nebraska, E-12426)

Current Appointment

South Dakota State University, Brookings, S.D.

Assistant Professor, 2009–Present

Current Appointment Percentages: 50% Extension, 35% Research, 15% Teaching

Professional Experience

University of Nebraska-Lincoln, Lincoln, Neb.

Postdoctoral Research Associate, 2007–2009

University of Nebraska-Lincoln, Lincoln, Neb.

Graduate Research Fellow, 2001–2006

TZA Water Engineers, Inc., Littleton, Colo.

Water Resources Engineer, 1997–2001

Carroll's Foods of Virginia, Inc., Waverly, Va.

Environmental Specialist, 1994–1996

Virginia Department of Conservation and Recreation, Suffolk, Va.

Watershed Coordinator, 1994

USDA-ARS Water Management Research Unit, Fort Collins, Colo.
Engineering Aid, 1991–1993

Honors and Awards

Gamma Sigma Delta (SDSU Chapter) Award for Excellence in Extension, 2014
 Honorable Mention Paper Award, Irrigation and Drainage Council of ASCE-EWRI, 2011
 Program Excellence Award for Subsurface Water Management Education, NDSU Extension Service, 2011
 USDA National Needs Graduate Research Fellow, University of Nebraska-Lincoln, 2001–2003
 Gamma Sigma Delta—The Honor Society of Agriculture

Research Publications and Presentations

(*Undergone rigorous peer review, †Graduate student supervised by Hay)

Articles in Peer-Reviewed Journals

1. Hankerson, B.†, J. Kjaersgaard, C. Hay. 2012. Estimation of evapotranspiration from fields with and without cover crops using remote sensing and *in situ* methods. *Remote Sensing* 4:3796-3812. doi: 10.3390/rs4123796.*
2. Hay, C. H. and S. Irmak. 2010. Recursive and explicit combination-based energy balance equations for calculating reference evapotranspiration in relation to Bowen ratio measurements. *Transactions of the ASABE* 53(6):1799–1810.*
3. Hay, C. H. and S. Irmak. 2009. Actual and reference evaporative losses and surface coefficients of a maize field during non-growing (dormant) periods. *Journal of Irrigation and Drainage Engineering* 135(3):313–322. doi:10.1061/(ASCE)IR.1943-4774.0000001.*
4. Hay, C. H., T.G. Franti, D.B. Marx, E.J. Peters, and L.W. Hesse. 2008. Relationships between larval fish drift and abiotic factors in the Missouri River. *Journal of Freshwater Ecology* 23(4): 589–597. doi: 10.1080/02705060.2008.9664246.*
5. Hay, C. H., T.G. Franti, D.B. Marx, E.J. Peters, and L.W. Hesse. 2008. Macroinvertebrate drift density in relation to abiotic factors in the Missouri River. *Hydrobiologia* 598:175–189. doi:10.1007/s10750-007-9149-3.*

Articles Submitted for Publication

1. Partheeban, C., J. Kjaersgaard, C. Hay, and T. Trooien. Denitrifying woodchip bioreactors for improved drainage nutrient management in a cold climate. (Submitted)

Conference Proceedings (peer reviewed)

1. Burckhard, S. R., J. Vondruska, K. Emo, S. Gent, E. Cortus, C. Hay, and Z. Gutzmer. 2014. Engineering the future: A workshop for high school teachers. Proceedings of the 2014 ASEE North Midwest Section Conference. Iowa City, Iowa: ASEE.*

Conference Proceedings and Professional Society Papers (not peer reviewed)

1. Karki, G.†, C. Hay, J. Kjaersgaard, and T. Trooien. 2014. Design drainage intensity for eastern South Dakota. ASABE Paper No. 141914059. St. Joseph, Mich.: ASABE.

2. Karki, G.†, C. Hay, T. Trooien, and J. Kjaersgaard. 2014. Calibration of DRAINMOD in South Dakota for Houdek soil series (state soil of South Dakota). ASABE Paper No. SD14-065. St. Joseph, Mich.: ASABE.
3. Khand, K.†, J. Kjaersgaard, C. Hay, and X. Jia. 2014. Estimating evapotranspiration from drained and undrained agricultural fields using remote sensing. ASABE Paper No. 1829687. St. Joseph, Mich.: ASABE.
4. Kjaersgaard, J., K. Khand†, C. Hay, and X. Jia. 2014. Estimating evapotranspiration from fields with and without tile drainage using remote sensing. World Environmental and Water Resources Congress 2014: pp. 1745-1753. doi: 10.1061/9780784413548.173
5. Partheeban, C., J. Kjaersgaard, C. Hay, and T. Trooien. 2014. Demonstrating the nitrogen-removal effectiveness of denitrifying bioreactors for improved drainage water management in South Dakota. ASABE Paper No. 141911325. St. Joseph, Mich.: ASABE.
6. Partheeban, C., J. Kjaersgaard, C. Hay, and T. Trooien. 2014. A review of the factors controlling the performance of denitrifying woodchip bioreactors. ASABE Paper No. SD14-029. St. Joseph, Mich.: ASABE.
7. Rasoeu, A. N., J. Kjaersgaard, T. Trooien, and C. Hay. 2014. Weather data quality control from six weather stations in South Africa surrounding Lesotho and ET mapping: The process in sustainability assessment and design criteria for irrigation for Lesotho. ASABE Paper No. SD14-015. St. Joseph, Mich.: ASABE.
8. Hay, C. H., B. Hankerson†, and J. Kjaersgaard. 2013. Evaluating cover crop evapotranspiration using field measurements and remote sensing techniques. ASABE Paper No. 131620977. St. Joseph, Mich.: ASABE.
9. Hay, C. H., J. H. Kjaersgaard, and B. Hankerson†. 2012. Measurement of cover crop evapotranspiration and impacts on water management in crop production systems. ASABE Paper No. 121337007. St. Joseph, Mich.: ASABE.
10. Hankerson, B.†, C. Hay, and J. Kjaersgaard. 2012. Measurement of cover crop evapotranspiration and impacts on water management in crop production systems. ASABE Section Meeting Paper No. RRV12108. St. Joseph, Mich.: ASABE.
11. Hay, C. H. and D. P. Todey. 2011. Precipitation and evapotranspiration patterns in the northwestern Corn Belt and impacts on agricultural water management. 4th Drainage Water Management Field Day, Lamberton, Minn., Aug. 23.
12. Hay, C. H. and D. P. Todey. 2011. Precipitation and evapotranspiration patterns in the northwestern Corn Belt and impacts on agricultural water management. ASABE Paper No. 1111455. St. Joseph, Mich.: ASABE.
13. Seagraves, B. L., T. P. Trooien, D. P. Todey, C. H. Hay, L. C. Schleicher, and R. A. Persyn. 2010. Efficacy of evapotranspiration-based landscape irrigation in eastern South Dakota. ASABE Paper No. IRR10-9995. St. Joseph, Mich.: ASABE.
14. Hay, C. H. and S. Irmak. 2009. Bayesian model averaging for accounting for model selection uncertainty with an application for predicting net radiation. ASABE Paper No. 096630. St. Joseph, Mich.: ASABE.
15. Hay, C. H. and S. Irmak. 2009. Recursive and explicit combination methods for calculating reference evapotranspiration. ASCE-EWRI World Environmental and Water Resources Congress, Kansas City, Mo., 17–21 May.

16. Hay, C. H. and S. Irmak. 2008. Surface energy balance and surface coefficients of a corn field during non-growing periods. ASCE-EWRI World Environmental and Water Resources Congress, Honolulu, Hawaii, 12–16 May.
17. Hay, C. H., T. G. Franti, D. B. Marx, and L. W. Hesse. 2006. Drift of fish larvae in relation to abiotic factors in the Missouri River, 8th Biennial River Management Society Symposium and 10th Annual Missouri River Natural Resources Conference, South Sioux City, Neb., 9–12 May.

Conference Presentations with Published Abstracts

1. Jacobson, R. B., D. L. Galat, and C. H. Hay. 2005. Process and prospects for the designed hydrograph, lower Missouri River, *Eos Trans. AGU*, 86(18), Jt. Assem. Suppl., Abstract NB23C-04.

Conference Presentations

27 non-refereed abstracts and conference presentations as author or co-author since 2005

Invited Presentations

1. Hay, C. 2013. Ag. subsurface drainage: A change in the SD landscape. South Dakota Engineering Society Annual Conference. Sioux Falls, S.D. 2 May.
2. Hay, C. 2013. Agricultural water management and GISc. SDSU Geographic Information Science Center Seminar. Brookings, S.D. 4 February.
3. Hay, C. H. 2011. Agricultural subsurface drainage: History, fundamentals, benefits, and impacts. Altered Landscape Hydrology: Impacts to Rivers and Streams and Associated Biota symposium at the Midwest Fish & Wildlife Conference, Des Moines, Iowa, 6 Dec.
4. Hay, C. H. 2010. Regional precipitation and evapotranspiration patterns: Impacts on agricultural water management. Minnesota-Iowa Drainage Research Forum, Owatonna, Minn., 23 Nov.
5. Hay, C. H. 2006. Fish and invertebrate abundance in relation to abiotic factors in the Missouri River. Missouri River Natural Resources Committee Fall Meeting. Pierre, S.D., Oct.
6. Hay, C. H. 2004. Hydrologic variability of modeled lower Missouri River Flows and Fish and invertebrate abundances in relation to hydrology, temperature, and turbidity in the Missouri River between Ft. Randall, SD and Rulo, NE. University of Missouri-Columbia Department of Fisheries and Wildlife Sciences and USGS Columbia Environmental Research Center, Columbia, Mo., Jul.

Grants and Contracts Received

Total Awards (Amount and % of spending authority)

Total Awards: \$6,513,654 (\$748,637 as PI, \$5,548,980 as Co-PI, \$1,000,023 total spending authority)

1. Frankenberger, J., L. Abendroth, L. Bowling, L. Brown, N. Fausey, C. Hay, M. Helmers, D. Jaynes, X. Jia, E. Kladviko, K. Nelson, B. Sohngen, J. Strock, and M. Youssef. USDA National Institute of Food and Agriculture. 1 Mar. 2015–29 Feb. 2020. \$5,000,000 (\$240,121, 5%).
2. Hay, C. H., J. Kjaersgaard, M. Miller, P. Sexton, T. Trooien, E. Cortus, R. Gelderman, and D. Todey. South Dakota Corn Utilization Council. 1 Jul. 2014–30 Jun. 2015. \$86,055 (\$86,055, 100%).

3. **Hay, C. H.**, J. Kjaersgaard, T. Trooien, D. Todey, and L. Edwards. South Dakota Soybean Research and Promotion Council. 1 Jul. 2014–30 Jun. 2015. \$40,966 (\$40,966, 100%).
4. Kjaersgaard, J., **C. H. Hay**, G. Hua, and T. Trooien. South Dakota Soybean Research and Promotion Council. 1 Jul. 2014–30 Jun. 2015. \$59,010 (\$0, 0%).
5. Strock, J., B. Dalzell, **C. H. Hay**, J. Kjaersgaard, J. Magner, G. Sands, and T. Trooien. Minnesota Corn Research and Promotion Council. 14 Apr. 2014–13 Apr. 2015. \$162,206 (\$34,561, 21%).
6. Zoski, E. and V. Rodd (**C. H. Hay** role: collaborator for technical assistance). Agriculture and Agri-Food Canada. 14 Apr. 2014–13 Apr. 2016. CAD 216,037 (CAD 0, 0%).
7. Hua, G., C. Schmit, J. Kjaersgaard, and **C. H. Hay**. U.S. Geological Survey and South Dakota Water Resources Institute. 1 Mar. 2014–28 Feb. 2015. \$23,353 (\$0, 0%).
8. **Hay, C. H.**, L. Brown, R. Cooke, J. Frankenberger, M. Helmers, K. Nelson, G. Sands, and T. Scherer. USDA Natural Resources Conservation Service. 15 Sep. 2013–15 Dec. 2014. \$151,896 (\$94,896, 62%).
9. Kjaersgaard, J., **C. Hay**, and T. Trooien. USDA Natural Resources Conservation Service, South Dakota Farm Bureau Federation, and East Dakota Water Development District. 1 Sep. 2013–31 Aug. 2016. \$97,498 (\$87,904, 90%).
10. **Hay, C. H.**, J. Kjaersgaard, C. Carlson, K. Reitsma, and L. Wagner. U.S. Environmental Protection Agency and South Dakota Department of Environment and Natural Resources. 22 Jul. 2013–30 Sep. 2014. \$23,900 (\$23,900, 100%).
11. **Hay, C. H.**, J. Kjaersgaard, M. Miller, P. Sexton, T. Trooien, E. Cortus, R. Gelderman, and D. Todey. South Dakota Corn Utilization Council. 1 Jul. 2013–30 Jun. 2014. \$169,465 (\$147,165, 87%).
12. Kjaersgaard, J., **C. H. Hay**, and T. Trooien. South Dakota Soybean Research and Promotion Council. 1 Jul. 2013–30 Jun. 2014. \$15,000 (\$0, 0%).
13. **Hay, C. H.**, J. Kjaersgaard, T. Trooien, and G. Sands. U.S. Geological Survey and South Dakota Water Resources Institute. 1 Mar. 2013–28 Feb. 2014. \$20,526 (\$20,526, 100%).
14. Kjaersgaard, J. **C. H. Hay**, and T. Trooien. U.S. Geological Survey and South Dakota Water Resources Institute. 1 Mar. 2012–28 Feb. 2013. \$20,525 (\$0, 0%).
15. **Hay, C. H.**, J. Kjaersgaard, M. Miller, P. Sexton, T. Trooien, E. Cortus, R. Gelderman, and D. Todey. South Dakota Corn Utilization Council. 1 Jul. 2012–30 Jun. 2013. \$175,748 (\$143,848, 82%).
16. Edwards, L. M., **C. H. Hay**, and J. Kjaersgaard. Pioneer Hi-Bred International, Inc. 15 Apr. 2012–14 Apr. 2015. \$30,000 (\$0, 0%).
17. **Hay, C. H.**, J. Kjaersgaard, T. Trooien, and G. Sands. U.S. Geological Survey and South Dakota Water Resources Institute. 1 Mar. 2012–28 Feb. 2013. \$19,643 (\$19,643, 100%).
18. Kjaersgaard, J. **C. H. Hay**, and T. Trooien. U.S. Geological Survey and South Dakota Water Resources Institute. 1 Mar. 2012–28 Feb. 2013. \$19,643 (\$0, 0%).
19. **Hay, C. H.**, J. Kjaersgaard, and T. Trooien. East Dakota Water Development District. 1 Jan. 2012–31 Dec. 2013. \$60,438 (\$60,438, 100%).
20. Kjaersgaard, J. and **C. H. Hay**. USDA Natural Resources Conservation Service, East Dakota Water Development District, South Dakota Soybean Research and Promotion Council, South Dakota Farm Bureau Federation, and Vermillion Basin Water Development District. 26 Sep. 2011–30 Sep. 2014. \$107,750 (\$0, 0%).
21. Lemme, G., L. Osborne, T. Trooien, **C. H. Hay**, T. Schumacher, and J. Ball. USDA Foreign Agricultural Service. 12 Jul. 2011–30 Sep. 2012. \$13,995 (\$0, 0%).

Extension Publications

Books Edited or Co-Edited

1. Clay, D.E., C.G. Carlson, S.A. Clay, L. Wagner, D. Deneke, and C. Hay (eds). 2013. *iGrow Soybeans: Best Management Practices for Soybean Production*. South Dakota State University, SDSU Extension, Brookings, S.D.

Publications

1. Christianson, L., J. Frankenberger, C. Hay, M. Helmers, and G. Sands (Eds.). 2014. Ten ways to reduce nitrogen loads from drained cropland in the Midwest. West Lafayette, Ind.: Purdue Extension. (in press). (Open peer review)
2. Hay, C. and J. Kjaersgaard. 2014. Storing water for emergency use. Publication 07-2002-2014. Brookings, S.D.: SDSU Extension. (Internal review)
3. Scherer, T., H. Kandel, G. Sands, and C. Hay. 2013. Frequently asked questions about subsurface (tile) drainage. NDSU Extension Publication AE1690. NDSU Extension Service, Fargo, N.D.
4. Sands, G. R., C. Hay, H. Kandel, and T. Scherer. 2013. Frequently asked questions about subsurface (tile) drainage in the Red River Valley. University of Minnesota Extension, Minneapolis, Minn.
5. Hay, C., J. Kjaersgaard, and T. Trooien. 2013. Managing high water tables and saline seeps in soybean production. In Clay, D.E., C.G. Carlson, S.A. Clay, L. Wagner, D. Deneke, and C. Hay (eds). *iGrow Soybeans: Best Management Practices for Soybean Production*. South Dakota State University, SDSU Extension, Brookings, S.D. (Peer and producer reviewed)
6. Hay, C., J. Kjaersgaard, and T. Trooien. 2013. Soybean irrigation. In Clay, D.E., C.G. Carlson, S.A. Clay, L. Wagner, D. Deneke, and C. Hay (eds). *iGrow Soybeans: Best Management Practices for Soybean Production*. South Dakota State University, SDSU Extension, Brookings, S.D. (Peer and producer reviewed)
7. Hay, C., and T.P. Trooien. 2012. Managing high water tables and saline seeps in wheat production. In Clay, D.E., C.G. Carlson, and K. Dalsted (eds). *iGrow Wheat: Best Management Practices for Wheat Production*. South Dakota State University, SDSU Extension, Brookings, SD. (Peer and producer reviewed)
8. Hay, C. 2012. Agricultural drainage fact sheet. SDSU Extension Publication 07-1001-2012. Brookings, SD. (Internal review)
9. Kjaersgaard, J., E. Cortus, and C. Hay. 2012. Nitrates in South Dakota Drinking Water. SDSU Extension Publication 07-2000-2012. Brookings, SD. (Internal review)
10. Kjaersgaard, J. D. Todey, C. Hay, and T. Trooien. 2012. Watershed management. SDSU Extension Publication 03-2002-2012. Brookings, SD. (Internal review)

Articles

1. Blachford, S., C. Hay, R. Burrows, C. Zdorovstov, and J. Goodman. Water permits for local food producers. Brookings, S.D.: SDSU Extension. Available at: <http://igrow.org/community-development/local-foods/water-permits-for-local-food-producers/>. Posted 7 Feb. 2014.

2. Sands, G. R., C. Hay, H. Kandel, and T. Scherer. 2013. Water management. In *North Dakota State University Crop & Pest Report*, No. 12. NDSU Extension. 24 Jul. 2013.
3. Hay, C. H. 2012. Drain spacing calculations. Brookings, SD: SDSU Extension. Available at: <http://igrow.org/agronomy/corn/drain-spacing-calculations/>. Posted 7 May 2012.
4. Hay, C. H. 2012. New tile drainage research projects beginning. Brookings, SD: SDSU Extension. Available at: <http://igrow.org/agronomy/corn/new-tile-drainage-research-projects-beginning/>. Posted 21 May 2012.
5. Hay, C. H. 2012. Crop water use estimates. Brookings, SD: SDSU Extension. Available at: <http://igrow.org/agronomy/corn/crop-water-use-estimates/>. Posted 10 June 2012.
6. Hay, C. H. 2011. Drainage management for production and environment. Brookings, SD: SDSU Extension. Available at: <http://igrow.org/agronomy/corn/drainage-management-for-production-environment/>. Posted 28 Nov. 2011.
7. Hay, C. H. 2011. Evaluating tile drainage—design. Brookings, SD: SDSU Extension. Available at: <http://igrow.org/agronomy/corn/evaluating-tile-drainage-design/>. Posted 21 Dec. 2011.

Websites

1. iGrow Drainage Calculators. Available at: <http://www.igrowdrainage.org>.
2. Drain Spacing Calculator. (Superseded). Established 16 Mar. 2012. The website received 4,416 page views (3,633 unique) from 16 Mar. 2012–28 Sept. 2014. Sixteen percent of site traffic was from S.D., and traffic came from 49 U.S. states and the District of Columbia, 8 Canadian provinces, and 83 countries.

Online Training Modules

1. Drainage Water Management: Level 2, Module 7—Drainage Water Management Operation and Management. Available at: <http://www.forestrywebinars.net/webinars/dwm-module-2-7>. Posted 18 Nov. 2014.
2. Drainage Water Management: Level 2, Module 2—Basic Drainage Concepts, Tools and Resources. Available at: <http://www.forestrywebinars.net/webinars/dwm-module-2-2>. Posted 17 Mar. 2014.

Extension Activities

Extension Meetings and Events Organized

1. Extension Subsurface Drainage Design and Water Management Workshop, 10–11 Mar. 2015, Grand Forks, N. D. Coordinated with Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 64 consisting primarily of producers and contractors. Nine industry partners provided financial support.
2. Extension Subsurface Drainage Design and Water Management Workshop, 24–25 Feb. 2015, St. Cloud, Minn. Coordinated with Brad Carlson (University of Minnesota), Matt Helmers (Iowa State University), and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 41 consisting primarily of producers and contractors. Four industry partners provided financial support.

3. Extension Subsurface Drainage Design and Water Management Workshop, 17–18 Feb. 2015, Sioux Falls, S. D. Coordinated with Brad Carlson (University of Minnesota), Matt Helmers (Iowa State University), and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 30 consisting primarily of producers and contractors. Four industry partners provided financial support.
4. 15th Annual Iowa-Minnesota-South Dakota Drainage Research Forum, 18 Nov. 2014, Ames, Ia. Coordinated with Matt Helmers (Iowa State University) and Gary Sands (University of Minnesota). Attendance was approximately 100 consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.
5. Drainage Water Management Level 2 Workshop, 28 Oct. 2014, Brookings, S.D. Coordinated with Michelle Burke (USDA NRCS) and Matt Helmers (Iowa State University). Attendance was 30 USDA NRCS staff.
6. Drainage Water Management Level 2 Workshop, 24 Sept. 2014, Jamestown, N.D. Coordinated with Christi Fisher and Erica Althoff (USDA NRCS) and Tom Scherer (North Dakota State University). Attendance was 23 USDA NRCS staff.
7. Drainage Water Management Level 2 Workshop, 23 Sept. 2014, Jamestown, N.D. Coordinated with Christi Fisher and Erica Althoff (USDA NRCS) and Tom Scherer (North Dakota State University). Attendance was 31 USDA NRCS staff.
8. Drainage Water Management Level 2 Workshop, 9 Sept. 2014, Waseca, Minn. Coordinated with Lea Holter (USDA NRCS) and Gary Sands (University of Minnesota). Attendance was 36 USDA NRCS staff.
9. Drainage Water Management Level 2 Workshop, 30 July 2014, Pocahontas, Iowa. Coordinated with Bruce Atherton (USDA NRCS) and Matt Helmers (Iowa State University). Attendance was 14 USDA NRCS staff.
10. Drainage Water Management Level 2 Workshop, 22 July 2014, Saginaw, Mich. Coordinated with Tom Bourdon and Rick Woodford (USDA NRCS) and Larry Brown (Ohio State University). Attendance was 16 USDA NRCS staff.
11. Drainage Water Management Level 2 Workshop, 29 May 2014, Portage, Wis. Coordinated with John Ramsden (USDA NRCS) and Gary Sands (University of Minnesota). Attendance was 25 USDA NRCS staff.
12. Extension Subsurface Drainage Design and Water Management Workshop, 18–19 Mar. 2014, Owatonna, Minn. Coordinated with Gary Sands and Brad Carlson (University of Minnesota). Attendance was approximately 50 consisting primarily of producers and contractors. Seven industry partners provided financial support.
13. Extension Subsurface Drainage Design and Water Management Workshop, 5–6 Mar. 2014, Crookston, Minn. Coordinated with Gary Sands and Brad Carlson (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was approximately 60 consisting primarily of producers and contractors. Seven industry partners provided financial support.
14. Extension Subsurface Drainage Design and Water Management Workshop, 11–12 Feb. 2014, Wahpeton, N.D. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was approximately 50 consisting primarily of producers and contractors. Eight industry partners provided financial support.
15. Extension Subsurface Drainage Design and Water Management Workshop, 29–30 Jan. 2014, Sioux Falls, S.D. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was approximately 45 consisting primarily of producers and

contractors. Four industry partners provided financial support. 14th Annual Iowa-Minnesota-South Dakota Drainage Research Forum, 14 November 2013, Sioux Falls, S.D. Coordinated with Matt Helmers (Iowa State University) and Gary Sands (University of Minnesota). Attendance was approximately 70 consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.

16. 14th Annual Iowa-Minnesota-South Dakota Drainage Research Forum, 14 Nov. 2013, Sioux Falls, S.D. Coordinated with Matt Helmers (Iowa State University) and Gary Sands (University of Minnesota). Attendance was approximately 70 consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.
17. Big Sioux Water Festival, 7 May 2013, Brookings, S.D. Served as facilities chair on the festival organizing committee. Attended by over 1000 fourth graders.
18. NCERA 217 (Drainage design and management practices to improve water quality) and Agricultural Drainage Management Systems Task Force joint meeting, 9–11 April 2013, Sioux Falls, S.D. Coordinated with Jeppe Kjaersgaard (SDSU), Jane Frankenberger (Purdue University) and Paul Sweeney (USDA-NRCS). Attendance was 47 consisting of academics, industry and agricultural group representatives, government officials and agency personnel.
19. SD-MN-ND Extension Subsurface Drainage Design and Water Management Workshop, 27–28 Feb. 2013, Aberdeen, SD. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was 75 consisting primarily of producers and contractors.
20. MN-ND-SD Extension Subsurface Drainage Design and Water Management Workshop, Moorhead, MN. 12–13 Feb. 2013. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 80 consisting primarily of producers and contractors.
21. 13th Annual IA-MN-SD Drainage Research Forum, 20 Nov. 2012, Waseca, MN. Coordinated with Gary Sands (University of Minnesota) and Matt Helmers (Iowa State University). Attendance was 60 consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.
22. MN-SD Extension Subsurface Drainage Design Workshop, 13–14 Mar. 2012, Mankato, MN. Coordinated with Gary Sands and Brad Carlson (University of Minnesota). Attendance was 50 consisting primarily of producers and contractors.
23. MN-ND-SD Extension Subsurface Drainage Design Workshop, 23–24 Feb. 2012, Wahpeton, ND. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.
24. MN-ND-SD Extension Subsurface Drainage Design Workshop, 21–22 Feb. 2012, Wahpeton, ND. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.
25. SD-MN-ND Extension Drainage and Water Management Design Workshop, 2–3 Feb. 2012, Sioux Falls, SD. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.
26. SD-MN-ND Extension Drainage and Water Management Design Workshop, 31 Jan.–1 Feb. 2012, Sioux Falls, SD. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.

27. 12th Annual IA-MN-SD Drainage Research Forum, 22 Nov. 2011, Okoboji, IA. Coordinated with Matt Helmers (Iowa State University) and Gary Sands (University of Minnesota). Attendance was 95 consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.
28. SD-MN Subsurface Drainage Design Workshop, 23 Mar. 2011, Sioux Falls, SD. Coordinated with Gary Sands (University of Minnesota). Attendance was 50 consisting primarily of producers and contractors. 96% of evaluation respondents rated the Sioux Falls workshop as useful or very useful (63% very useful). 71% of respondents rated my soil principles and tools presentation as useful or very useful. Received industry sponsorship from five vendors.
29. MN-ND-SD Subsurface Drainage Design Workshop, 1–2 Mar. 2011, Wahpeton, ND. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.
30. MN-ND-SD Subsurface Drainage Design Workshop, 23–24 Feb. 2011, Wahpeton, ND. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer and Hans Kandel (North Dakota State University). Attendance was 50 consisting primarily of producers and contractors.
31. Tri-State (SD, ND, MN) Agricultural Drainage Forum, 26 Jan. 2011, Brookings, SD. Coordinated with Gary Sands (University of Minnesota) and Tom Scherer (North Dakota State University). Attendance was 180 consisting of producers, contractors, county officials, general public, and industry, conservation group, and agency representatives from South Dakota and Minnesota. 95% of evaluation respondents rated the overall program as good or excellent. 86% rated my drainage fundamentals presentation as useful or very useful.
32. 11th Annual IA-MN Drainage Research Forum, 23 Nov. 2010, Owatonna, MN. Coordinated with Gary Sands (University of Minnesota) and Matt Helmers (Iowa State University). Attendance was 85 participants consisting of producers, contractors, and industry and agency representatives from Iowa, Minnesota, and South Dakota.
33. South Dakota Agricultural Drainage Forum, 16 Sept. 2010, Huron, SD. Coordinated with a team of educators. Attended by over 100 participants consisting of producers, government officials, consultants, and contractors. A majority (56%) of evaluation respondents rated the presentation as excellent. 92% of participants indicated that they had a better understanding of drainage fundamentals as a result of the forum, which would impact over 38,000 acres. Presentations were recorded and made available via the web. A needs assessment was conducted as part of the program to help guide future drainage programming efforts.

Extension Presentations

- 2015: 6 presentations (to-date)
- 2014: 12 presentations
- 2013: 9 presentations
- 2012: 13 presentations
- 2011: 20 presentations
- 2010: 6 presentations

Other Extension Activities

1. Serve as the South Dakota representative to the Leadership Team for the North Central Region Water Network—a 12-state collaboration between Extension water resource professionals and university, federal, state, NGO and industry partners.
2. Serve on the organizing committee for the annual Big Sioux Water Festival at South Dakota State University that is attended by over 1,000 fourth graders each year, 2010, 2011, 2012, 2013 and 2014.
3. Member of the Steering Committee for the Eastern South Dakota Water Conference, 2009, 2010, 2011, 2012, 2013, and 2014 (Chair in 2009 and 2010, Vice-Chair in 2011–2014).
4. 11 trade show displays

Teaching and Advising

Undergraduate Courses Taught

Natural Resources Engineering (ABE 434, SDSU)

Independent Study Courses in Natural Resources Engineering (ABE 491, SDSU)

Special Topics—Natural Resources Engineering (ABE 492, SDSU)

Graduate Courses Taught

Advanced Hydrology in Agriculture (ABE 732, SDSU 25%)

Groundwater Engineering in Agriculture (ABE 733, SDSU, 25%)

Advanced Irrigation Engineering (ABE 734, SDSU, 25%)

Theoretical Microclimatology (ABE 752, SDSU, 25%)

Special Topics—Advanced Irrigation Engineering (ABE 792, SDSU, 25%)

GIS Applications in Watershed Modeling (BSEN 998, UNL, 25%)

Graduate Student Advising

Brett Hankerson (MS, 2013)

Govinda Karki (PhD, in progress)

Kul Khand (MS, 2014)

Erick Koech (MS, in progress)

Arturo Reyes-Gonzalez (PhD, in progress)

Ashik Sahani (MS, in progress)

Shailendra Singh (MS, in progress)

Other Contributions to Teaching

1. Engineering the Future Workshop. 2015. Co-lead the Agricultural and Biosystems Engineering day of this week-long workshop to help high school science and math teachers incorporate the Next Generation Science Standards engineering principles and standards into their courses. 20 participants.
2. Engineering the Future Workshop. 2014. Co-lead the Agricultural and Biosystems Engineering day of this week-long workshop to help high school science and math teachers

incorporate the Next Generation Science Standards engineering principles and standards into their courses. 20 participants.

3. Engineering the Future Workshop. 2012. Co-lead the Agricultural and Biosystems Engineering day of this week-long workshop to help high school science and math teachers incorporate the Next Generation Science Standards engineering principles and standards into their courses. 18 participants.

Professional Society Membership

American Society of Agricultural and Biological Engineers

- SW-23 Drainage Group, Vice-Chair (2011–2013), Chair (2013–2015)
- ED-208 Extension Committee, Secretary (2011–2012), Vice-Chair (2012–2013), Chair (2013–2014)
- SW-02 Soil & Water Division Steering Committee, Member
- SW-04 Soil & Water Program Committee, Member
- SW-06 Paper Awards Committee, Member
- SW-21 Hydrology Group, Member
- SW-244 Irrigation Management Committee, Member
- T-09 Environmental Quality Coordinating Committee, Member
- Professional Engineering Institute, Member

American Society of Civil Engineers

- Evapotranspiration in Irrigation and Hydrology Committee, Member

American Water Resources Association

Gamma Sigma Delta, The Honor Society of Agriculture, Member 2009–Present

- SDSU Chapter Secretary 2013–Present

Soil and Water Conservation Society

South Dakota Engineering Society

Technical Reviewer

Journals (number of reviews)

- Applied Engineering in Agriculture (3)
- Biosystems Engineering Journal (1)
- Field Crops Research (1)
- Irrigation Science (1)
- Journal of Hydrology (2)
- Proceedings of the South Dakota Academy of Sciences (1)
- Transactions of the American Society of Agricultural and Biological Engineers (3)

Others

- Reviewer of manuscripts for ASABE Soil and Water Division paper awards, 2012 and 2013
- Reviewer of educational aids for the ASABE Educational Aids Competition for Blue Ribbon Awards, 2010 and 2014, and Assistant Judging Coordinator for the medium publication category, 2014 and 2015
- Reviewer of manuscripts for the American Society of Agricultural and Biological Engineers National Decennial Irrigation Symposium, 2010
- Reviewed a regional Extension publication on energy conservation in irrigation

Proposal Reviews

- International Arid Lands Consortium (1)
- NIWR/USGS 104g program (1)

External Reviews

- External review of a promotion and tenure packet for North Dakota State University

University Service

University

University Library Committee 2010–2015

Graduate Faculty Representative (5 Masters, 3 PhD)

Member of the Graduate Faculty 2009–Present

Proposal reviewer for Research and Scholarship Support Fund, 2012

College

- Departmental faculty representative to the Engineering Phonathon committee, 2009, 2010, 2011
- SDSU representative to the North Central Extension and Research Activity (NCERA) 217: Drainage design and management practices to improve water quality, 2010–Present (Chair 2013–2014, Secretary 2012–2013)

Department

- Member of the program committee for the department's hosting of the 2014 North Central ASABE/CSBE meeting
- Department representative at Spring Majors Fair, 2012
- Spoke to GE 109 class about Agricultural and Biosystems Engineering, 2012 and 2013
- Helped develop text and design for ABE recruiting banner, 2012
- Edited ABE recruiting fact sheet, 2012
- Assisted with departmental Hobo Day alumni luncheon, 2010, 2011, 2012, and 2013
- Department representative at Senior Day, 2011
- Department holiday party planning committee, 2011

- Assisted with the development of new Program Educational Objectives as part of the department's ABET accreditation process, 2009
- Assisted with marketing efforts and session scheduling for the department's hosting of the North Central ASABE/CSBE meeting, 2009
- Search committee member for departmental hiring (5 positions)