Rules Governing Agricultural Activities in The Lower Umatilla Basin Groundwater Management Area: References 9/2/25

A. OSU Extension and Outreach Publications

A Guide to Collecting Soil Samples for Farms and Gardens. (EC 628) 2022. Fery, M., Choate, J., and Murphy, E. Oregon State University Extension Service. https://extension.oregonstate.edu/pub/ec-628

Applicability of the NLOS Model for Predictions of Soil Water Movement and Nitrogen Transport in an Agricultural Soil, Agassiz, BC. 2007. Hirsch, Heather. M.S. thesis. Western Washington University, Bellingham, WA. https://cedar.wwu.edu/wwuet/441

Baseline Soil Nitrogen Mineralization: Measurement and Interpretation. (EM 9281) March 2020. Sullivan, D.M., Moore, A.D., Verhoeven, E., and Brewer, L.J. Oregon State University Extension Service.

https://extension.oregonstate.edu/catalog/pub/em-9281-baseline-soil-nitrogen-mineralization-measurement-interpretation

Estimating Plant-available Nitrogen from Manure. Oregon State University (EM 8954-E) January 2008. https://catalog.extension.oregonstate.edu/em8954

Get Actionable Results from a Soil, Plant or Environmental Testing Lab. (EC 8677) 2024. Cappellazzi, S., Sullivan, C., Jones, G.B., and Brewer, L. Oregon State University Extension Service Publication.

https://extension.oregonstate.edu/catalog/pub/em-8677-get-actionable-results-soil-plant-or-environmental-testing-lab

Interpreting Compost Analyses (EM 9217). 2018. https://catalog.extension.oregonstate.edu/em9217

Introduction to Pasture and Grazing Management in Western Oregon. (EM 9302) December 2020. Fery, M., Hannaway, D., Chaney, D., Powell, M., and Stephenson, G. Oregon State University Extension Service.

 $\frac{https://extension.oregonstate.edu/catalog/pub/em-9302-introduction-pasture-grazing-management-western-oregon}{}$

Manure Application Rates for Forage Production: Western Oregon (EM 8585). 2020. https://catalog.extension.oregonstate.edu/em8585

Monitoring Soil Nutrients Using a Management Unit Approach. (PNW 570E) October 2003. Staben, M.L., Ellsworth, J.W., Sullivan, D.M., Horneck, D., Brown, B.D., and Stevens, R.G.. A Pacific Northwest Extension publication, Oregon State University, University of Idaho,

Washington State University.

https://extension.oregonstate.edu/sites/extd8/files/documents/pnw570.pdf

Nitrate Pollution in Groundwater: A Grower's Guide. (Exc/Crs 137) February 2012. Foley, K.M., Doniger, A.R., Shock, C.C., Horneck, D.A., and Welch, T.K. Oregon State University Extension Service.

https://agsci.oregonstate.edu/system/files/extcrs137feb2012 nitrate hi res 30jan2012.pdf

Nutrient Management for Pastures: Western Oregon and Western Washington. (EM 9224)
January 2019. Moore, A., Pirelli, G., Filley, S., Fransen, S., Sullivan, D., Fery, M., and Thomson, T. Oregon State University Extension Service. https://catalog.extension.oregonstate.edu/em9224

OSU Organic Fertilizer & Cover Crop Calculator: Predicting Plant-available Nitrogen. (EM 9235) May 2019. Sullivan, D.M., Andrews, N., Sullivan, C., and Brewer, L.J. Oregon State University.

https://extension.oregonstate.edu/catalog/pub/em-9235-osu-organic-fertilizer-cover-crop-calculator-predicting-plant-available

Pastures: Stewarding a Working Landscape. (EM 9303) December 2020. Nichols, C. and Jones, G.B. Oregon State University Extension Service Land Steward Program Rural Resources Guide. https://extension.oregonstate.edu/catalog/pub/em-9303-pastures-stewarding-working-landscape

Plant Tissue Sampling. Wysocki, D. Oregon State University, Columbia Basin Agricultural Research Center. https://agsci.oregonstate.edu/cbarc/2020fd/video/plant-tissue-sampling

Postharvest Soil Nitrate Testing for Manured Grass and Silage Corn (West of the Cascades) (EM 8832) February 2021. Sullivan, D.M., Cogger, C.G., Bary, A.I., Bittman, S., and Brewer, L.J. Oregon State University Extension Service.

https://extension.oregonstate.edu/sites/extd8/files/documents/em8832.pdf

Soil Nitrate Testing for Willamette Valley Vegetable Production (EM 9221) January 2019. Sullivan, D.M., Andrews, N., Heinrich, A., Peachey, E., and Brewer, L.J., Oregon State University Extension Service. https://extension.oregonstate.edu/sites/default/files/2023-08/em-9221.pdf

Soil Test Interpretation Guide (EC 1478) 2019, reviewed 2023. Horneck, D.A., Sullivan, D.M., Owen, J., and Hart, J.M.. Oregon State University Extension Service. https://extension.oregonstate.edu/catalog/pub/ec-1478-soil-test-interpretation-guide

Soil Testing Lab Selection and Recommended Analytical Methods for Oregon (EM 9423) 2024. Jones, G.B., Moore, A., and Smith, E. Oregon State University Extension Service. https://extension.oregonstate.edu/catalog/pub/em-9423-soil-testing-lab-selection-recommended-analytical-methods-oregon

Spring Pasture Essentials (EC 1642) March 2013. Oregon State University Extension Service. https://extension.oregonstate.edu/sites/extd8/files/documents/ec1642.pdf

The pre-sidedress soil nitrate test (PSNT) for Western Oregon and Western Washington (EM 8650) August 1998. Marx, E.S., Christensen, N.W., Hart, J., Gengwer, M., Cogger, C.G., and Bary, A.I. Oregon State University Extension Service.

https://ir.library.oregonstate.edu/concern/open educational resources/nv935317c?locale=en

B. Research Articles

Carey, B.M., Pitz, C.F., and Harrison, J.H. 2017. Field nitrogen budgets and postharvest soil nitrate as indicators of N leaching to groundwater in a Pacific Northwest dairy grass field. *Nutrient Cycling in Agroecosystems* 107(1), 107-123.

Castaldo, G., Visser, A., Fogg, G.E., and Harter, T., Effect of Groundwater Age and Recharge Source on Nitrate Concentrations in Domestic Wells in the San Joaquin Valley. *Environ. Sci. Technol.* 2021, 55, 4, 2265–2275. https://pubs.acs.org/doi/10.1021/acs.est.0c03071

Compton, J.B., Pearlstein, S.E., Erban, L., Coulombe, R.A., Hatteberg, B., Henning, A., Brooks, J.R., Selker, J.E. 2021. Nitrogen inputs best predict farm field nitrate leaching in the Willamette Valley Oregon. *Nutr Cycl Agroecosyst* (2021) 120:223–242.

Gavlak, R.G., Horneck, D.A., and Miller, R.O. Plant, Soil and Water Reference Methods for the Western Region, 1994, (WREP 125).

Köhler, K., Wilhelmus, D., H.M., and Böttcher, J. Nitrogen fertilization and nitrate leaching into groundwater on arable sandy soils. *J. Plant Nutr. Soil Sci.* 2006, *169*, 185–195. Accepted December 1, 2005.

Kuipers, P. J., Ryan, M. C., & Zebarth, B. J. Estimating nitrate loading from an intensively managed agricultural field to a shallow unconfined aquifer. Water Quality Research Journal of Canada, 49(1), 10–22. (2014) https://doi.org/10.2166/WQRJC.2013.136 (requested article on 9/2/25).

Meisinger, J.J., Calderon, F.J., Jenkinson, D.S. (2008) Soil Nitrogen Budgets. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. *Nitrogen in Agricultural Systems*, Agronomy Monograph 49.

Wang H, Gao J-e, Li X-h, Zhang S-l, Wang H-j (2015) Nitrate Accumulation and Leaching in Surface and Ground Water Based on Simulated Rainfall Experiments. PLoS ONE 10(8): e0136274. doi:10.1371/journal.pone.0136274 Editor: Jonathan A Coles, Glasgow University, United Kingdom. https://pmc.ncbi.nlm.nih.gov/articles/PMC4546371/pdf/pone.0136274.pdf

Zotarelli, L., Scholberg, J.M., Dukes, M.D., and Mufioz-Carpena, R. Monitoring of Nitrate Leaching in Sandy Soils: Comparison of Three Methods, *J. Environ. Quality*, 36:953-962 (2007). https://abe.ufl.edu/faculty/carpena/files/pdf/publications/refereed_articles/MonitoringOfNitrateLeaching.pdf

C. Federal Guides

NRSC Conservation Practice Standard Nutrient Management Code 590.

 $\underline{https://www.nrcs.usda.gov/resources/guides-and-instructions/nutrient-management-ac-590-conservation-practice-standard}$

NRCS Conservation Practice Standard Irrigation Water Management Code 449 https://www.nrcs.usda.gov/resources/guides-and-instructions/irrigation-water-management-ac-449-conservation-practice-standard

NRCS Nutrient Management

https://www.nrcs.usda.gov/getting-assistance/other-topics/nutrient-management

NRCS Comprehensive Nutrient Management Planning (CNMP) Technical Guide https://efotg.sc.egov.usda.gov/references/public/ME/TECHNICAL GUIDANC1.pdf

USDA Conservation Enhancement Activity, Conservation Stewardship Program, EF90A Improving nutrient uptake efficiency and reducing risk of nutrient losses. May 2023 https://www.nrcs.usda.gov/sites/default/files/2024-01/FY%2024%20E590A%20May%202023%20Improving%20nutrient%20uptake%20efficiency%20and%20reducing%20risk%20of%20nutrient%20losses.pdf

EPA Nutrient Management Methods

https://www.epa.gov/sites/default/files/2015-10/documents/chap4a.pdf

D. Oregon

Oregon Department of Agriculture/Department of Environmental Quality: Oregon Confined Animal Feeding Operation National Pollution Discharge Elimination System General Permit #01-2016.

 $\underline{https://www.oregon.gov/oda/Documents/Publications/NaturalResources/NPDESGeneralPermit.pdf}$

Oregon Department of Environmental Quality: Water Pollution Control Facilities Permit #101326 issued to Lamb Weston. (Deep soil testing for N)

Umatilla Agricultural Water Quality Management Area Plan, Oregon Department of Agriculture, Umatilla Local Advisory Committee, Umatilla Soil and Water Conservation District, February 2024.

 $\underline{https://www.oregon.gov/oda/Documents/Publications/NaturalResources/UmatillaAWQMAreaPlan.pdf}$

Willow Creek Agricultural Water Quality Management Area Plan, Oregon Department of Agriculture, Willow Creek Local Advisory Committee, Morrow Soil and Water Conservation District, February 2024.

 $\underline{https://www.oregon.gov/oda/Documents/Publications/NaturalResources/WillowCreekAWQMAr}\\ \underline{eaPlan.pdf}$

Oregon Nitrate Reduction Plan for the Lower Umatilla Basin Groundwater Management Area, Draft Report prepared by Oregon Department of Environmental Quality, Oregon Water Resources Department, Oregon Department of Agriculture and Oregon Health Authority, August 15, 2024.

https://www.oregon.gov/deq/wq/programs/pages/nitratecontamination.aspx#:~:text=The%20Oregon%20Nitrate%20Reduction%20Plan,groundwater%20nitrate%20concentrations%20to%20less

E. Other State Resources

California

State of California State Water Resources Control Board, Water Quality Order 2018-0002 In the Matter of Review of Waste Discharge Requirements General Order No. R5-2012-0116 for Growers Within the Eastern San Joaquin River Watershed that are Members of the Third-Party Group Issued by the California Regional Water Quality Control Board, Central Valley Region SWRCB/OCC FILES A-2239(a)-(c) (February 7, 2018) https://www.waterboards.ca.gov/rwqcb1/board_info/board_meetings/02_2019/pdf/4/Order%20WQ2018-0002.pdf

Pettygrove, Stuart. (2013) Crop Nitrogen Budgeting. Department of Land, Air & Water Resources, University of California, Davis.

https://ucanr.edu/site/solution-center-nutrient-management/nitrogen-budgeting

Indiana

Soil Sampling to Assess Current Soil N Availability, Jim Camberato (<u>jcambera@purdue.edu</u> and R.L. (Bob) Nielsen (<u>rnielsen@purdue.edu</u>), Agronomy Dept., Purdue Univ., West Lafayette, IN 47907-2054 June 2017.

https://www.agry.purdue.edu/ext/corn/news/timeless/assessavailablen.html

Minnesota

Minnesota's Nonpoint Source Management Plan (2019 – 2029) https://www.mda.state.mn.us/nfr

Minnesota Nitrogen Fertilizer Management Plan. Minnesota Department of Agriculture, Pesticide and Fertilizer Management Division. March 2015, Addended July 2019.

2024 Update to Minnesota's Nitrogen Fertilizer Management Plan https://www.mda.state.mn.us/pesticide-fertilizer/minnesota-nitrogen-fertilizer-management-plan

North Carolina

Deep Soil Sampling for Nutrient Management, North Carolina State Extension Publications, *Soil Facts*. https://content.ces.ncsu.edu/deep-soil-sampling-for-nutrient-management#

Vermont

Vermont Required Agricultural Practices Rule for the Agricultural Nonpoint Source Pollution Control Program (effective November 23, 2018)

https://agriculture.vermont.gov/sites/agriculture/files/documents/RAPFINALRULE12-21-2018 WEB.pdf

Washington

Carey B. 2002. Effects of land application of manure on groundwater at two dairies over the Sumas–Blaine surficial aquifer: implications for agronomic rate estimates. Washington State Department of Ecology, Olympia, Washington. Publication

Number 02-03-007. https://fortress.wa.gov/ecy/publications/documents/0203007.pdf

Carey, B. and J. Harrison. 2014. Nitrogen Dynamics at a Manured Grass Field Overlying the Sumas-Blaine Aquifer in Whatcom County. Washington State Department of Ecology, Olympia, Washington. Publication No. 14-03-001.

https://fortress.wa.gov/ecy/publications/documents/1403001.pdf

Nitrogen Dynamics at a Manured Grass Field Overlying the Sumas-Blaine Aquifer in Whatcom County. Barbara M. Carey and Joseph H. Harrison, State of Washington Department of Ecology, March 2014, Publication No. 14-03-001. https://apps.ecology.wa.gov/publications/SummaryPages/1403001.html

Concentrated Animal Feeding Operation General Permit A National Pollutant Discharge Elimination System and State Waste Discharge General Permit. State of Washington Department of Ecology. Issuance Date: December 7, 2022; Effective Date: January 6, 2023; Expiration Date: January 5, 2028 (hereinafter "Washington CAFO General Permit")

https://ecology.wa.gov/regulations-permits/permits-certifications/concentrated-animal-feeding-operation

Wisconsin

Guolong, Liang. Manage nitrogen as a budget to reduce groundwater contamination. University of Wisconsin-Madison, Extension.

 $\frac{file://Users/OR0010365/Documents/Agronomic\%20Resources/Manage\%20nitrogen\%20as\%20}{a\%20budget\%20to\%20reduce\%20groundwater\%20contamination\%20\%E2\%80\%93\%20Agricul \\ \frac{1}{20}\frac$

Long-Term Drainage and Nitrate Leaching below Well-Drained Continuous Corn Agroecosystems and a Prairie, Kevin C. Masarik, John M. Norman, Kristofor R. Brye College of Natural Resources, University of Wisconsin-Stevens Point, Stevens Point, USA. Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, USA., Department of Soil Science, University of Wisconsin, Madison, USA. *Journal of Environmental Protection*, Vol.5 No.4, March 2014.

F. International Resources

Government of Canada. Indicator of the Risk of Water Contamination by Nitrogen. https://agriculture.canada.ca/en/agricultural-production/water/nitrogen-indicator#calc

Government of Canada. Environmental Sustainability of Canadian Agriculture: Agri-Environmental Indicator Report Series – Report #4.

https://agriculture.canada.ca/en/environment/resource-management/indicators/environmental-sustainability-canadian-agriculture-agri-environmental-indicator-report-series-report