

Minnesota Mitigation Effectiveness Guide – Selecting Practices to Reduce Pesticide Impacts on Water Quality

NRCS Pest Management Policy requires environmental risk evaluation and appropriate mitigation for all identified resource concerns. NRCS' Windows Pesticide Screening Tool (WIN-PST) is used to evaluate environmental risk to the water resource. The following NRCS in Minnesota guidance identifies the number of mitigating practices needed for identified water resource concerns (narrative and summary tables 1 and 2) and then lists the mitigation practices and their effectiveness (Table 3). The larger the Table 3 number the greater the positive or negative impact on water quality with no impact shown as a 0.

REQUIRED NUMBER OF MITIGATING PRACTICES

The number of mitigating practices recommended for a given pest management alternative will vary dependent on the control; WIN-PST hazard ratings; and site conditions. The following instructions provide the minimum level of mitigation practices needed. Planners may require additional mitigation dependent on site specific knowledge of site potential to move products to surface waters or sources of drinking water.

1. **Mitigation requiring management or conservation practices totaling a positive 5 from the mitigation charts and addressing the appropriate loss pathways.** Chemical control alternatives with *High or Extra High* Human Hazard ratings on land within Drinking Water Supply Management Areas (DWSMAs) **with moderate vulnerability to contamination** or land within **vulnerable** Source Water Assessment Areas (SWAAs) or in other areas identified in pest management sensitive area assessments as having high pollution sensitivity.
2. **Mitigation requiring management or conservation practices totaling a positive 4 from the mitigation chart and addressing the appropriate loss pathways.** Chemical control alternatives with *High* Human Hazard ratings or *Extra High* Fish Hazard ratings.
3. **Mitigation requiring management or conservation practices totaling a positive 2 from the mitigation chart and addressing the appropriate loss pathways.** Chemical control alternatives with *Intermediate* Human Hazard ratings or *High* Fish Hazard ratings.
4. **No Required Mitigation.** Pest controls with *low or very low* WIN-PST Human Hazard or Fish Hazard ratings require no mitigation measures for the respective pathway except as noted in 7 below.
5. **Mitigation recommending at least one management or conservation practice with a positive number.** Mitigation is recommended but not required for chemical control alternatives with an *Intermediate* Fish Hazard rating.

Additional mitigation guidance

6. **Use of chemicals with High or Extra High WIN-PST Human Hazard ratings for the appropriate loss pathway is not allowed on land within the boundaries of DWSMAs with high or very high vulnerability to contamination..**
7. **Use of “Common detect chemicals” (currently acetochlor; atrazine; metolachlor and metribuzin) will require at least one mitigation management or conservation practice with a positive number when WIN-PST human hazard ratings are low or very low for the respective loss pathway.**

Table 1 Summary of Required Number of Mitigation Practices for Human Hazard

WIN-PST Human Hazard Rating for leaching (ILP) and Solution Runoff (ISRP)	Mitigation Measures including Pest Management Practices and Conservation Practices
Low or very low	None
Intermediate	Practices totaling a positive 2
High	Practices totaling a positive 4
Extra High	Practices totaling a positive 5
<i>Additional requirements for common detect chemicals (currently acetochlor; atrazine; metolachlor and metribuzin)</i>	
Low or very low	Practices totaling a positive 1.
<i>Additional requirements for Land Within DWSMAs with medium or higher vulnerability to contamination; vulnerable SWAAs; or land outside of these areas identified as susceptible to water contamination</i>	
High or Extra High.	Practices totaling a positive 5 if in a DWSMA with moderate vulnerability to contamination or a vulnerable SWAA or areas outside of DWSMAs or SWAAs identified as susceptible to contamination
	Chemicals with High or Extra High Human Hazard Ratings not allowed in DWSMAs with high or very high vulnerability to contamination.

Table 2. Summary of Required Number of Mitigation Practices for Fish Hazard

WIN-PST Fish Hazard Rating for Leaching (ILP); or Solution Runoff (ISRP) and/or Adsorbed Runoff (IARP)	Mitigation Measures including Pest Management Practices and Conservation Practices ^{2/}
Low or Very Low	None required
Intermediate	None required but practices totaling a positive 1 recommended
High	Practices totaling a positive 2
Extra High	Practices totaling a positive 4

NOTE: *Mitigation practices already accounted for in the respective WIN-PST rating cannot be counted again when developing mitigation alternatives. And mitigation practices for common detect chemicals should include at least one state water quality pest management BMP for the respective chemical.*

Conservation and pesticide management practices must be appropriate for each pesticide loss pathway(s) applicable on the site.

Conservation practices must be included in the conservation plan for the field(s)/site(s).

Table 3 Mitigating Practices and Their Effectiveness

Mitigation Practices for water Quality	Relative Effectiveness Rating by Pesticide Loss Pathways			Description of Mitigation Techniques and Conservation Practices Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Pesticide Management Practices				
Application Timing	Use WIN-PST 3.0 to account for timing relative to rainfall events			Delaying application when significant rainfall events are forecast
Banding	Use WIN-PST to account for banding			Pesticide is applied to 50% or less of the field receiving treatment.
Lower Application Rates	Use WIN-PST to account for rates that supply low amounts of product active ingredients.			Use lowest effective rate. NOTE: WIN-PST definitions of standard, low and ultra-low rates of active ingredients may vary from what is considered a low label rate.
Scouting and use of Land Grant Economic Thresholds	3	3	3	Pesticides used only when needed. “Preventative prescriptions” reduced. Pest correctly identified and controls applied at correct life stage.
Scouting without thresholds	2	2	2	
Set-backs	1	1	1	Reduces amount of pesticide applied, inadvertent pesticide application and drift.
Spot treatment	3	3	3	At least one application of a pesticide with a WIN-PST human hazard rating of intermediate or higher is reduced by applying the same or a different product to 20% or less of the field.
Soil Incorporation – mechanical or irrigation	Use WIN-PST to account for soil incorporation.			Reduces exposure potential for surface losses, but increases exposure potential for leaching losses
Substituting non-pesticide controls (complete substitution)	5	5	5	Pesticide use replaced by non-pesticide controls
Substituting non-pesticide controls (partial substitution)	3	3	3	At least one application of a pesticide with a WIN-PST human hazard rating of intermediate or higher is replaced by a non-pesticide control such as cultivation or shredding.
Substituting lower risk pesticides (complete substitution)	Use WIN-PST to account for complete substitution			Reduces hazard potential by using alternative pesticides with lower environmental risk in the designated pathway.
Substituting lower risk pesticides (partial substitution)	2	2	2	Annual applications of pesticides with WIN-PST human hazard ratings of high or extra high eliminated by rotating to pesticides with intermediate or lower hazard ratings every other year. Or annual applications of pesticides with intermediate WIN-PST human hazard ratings eliminated by rotating to pesticides with low or very low hazard ratings every other year.
Substituting lower risk pesticides (partial substitution)	Use WIN-PST to account for partial substitution or take 1point if the WIN-PST rating doesn’t change			Reduced rate of pesticides with WIN-PST human hazard rating of intermediate or higher by partial substitution of a pesticide with low risk in a tank mix or as part of split application.
Conservation Practices				
Conservation Crop Rotation (328) with more than one crop type.	2	2	2	Crop rotations with small grains, legumes, or grasses can decrease erosion. The rotation must also break the life cycle of the targeted pest.
	1	1	1	Rotations comprised of different row crops
Contour Buffer Strips (332)	0	2	2	Increases infiltration and reduces soil erosion.
Contour Farming (330)	-1	1	2	Increases infiltration and deep percolation and reduces soil erosion
Cover Crop (340)	1	1	2	Increases infiltration, reduces soil erosion, builds soil organic matter; provides some weed control
Diversion (362)	1	1	1	Water is diverted from flowing across fields.

Pest Management Mitigation Techniques for water Quality	Relative Effectiveness Rating by Pesticide Loss Pathways			Description of Mitigation Techniques and Conservation Practices Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Field Border (386)	0	1	1	Increases infiltration and traps adsorbed pesticides. Can reduce application area and drift to surface water.
Filter Strip (393)	0	1	3	Similar to Field Border (see above).
Forage Harvest Management (511)	2	2	2	Reduces exposure potential - timely harvesting reduces the need for pesticides
Grassed Waterway (412)	0	1	2	Increases infiltration and traps adsorbed pesticides (should be applied with Filter Strips at the outlet and on each side of the waterway)
Irrigation Water Management (449)	3	2	2	Water is applied at rates that minimize pesticide transport to ground and surface water.
Nutrient Management (590)	1	1	1	Promotes healthy plants to better tolerate pests
Prescribed Burning (338)	2	2	2	Often reduces the need for pesticides
Prescribed Grazing (528A)	2	2	2	Improves plant health; reduces need for pesticide
Residue Management, No-till or Strip-Till (329); Mulch Till (345) or Ridge Till (346)	-1	2	3	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Seasonal (344)	-1	1	1	Similar to No-till and Strip-till
Riparian Forest Buffer (391)	1	2	3	Increases infiltration and uptake of subsurface water, traps sediment, builds soil organic matter
Sediment Basin (350)	0	1	2	Captures pesticide residues and facilitates their degradation
Sinkhole and Sinkhole Area Treatment (725)	3	0	0	
Stripcropping, <i>Contour</i> (585)	0	2	2	Increases infiltration, reduces soil erosion
Stripcropping, <i>Field</i> (586)	0	1	1	
Terrace (600) <i>Gradient PTO Level</i>	0	1	3	Increases infiltration and deep percolation, reduces soil erosion
	-1	-1	4	
	-1	3	4	
Vegetative Barriers (601)	0	0	2	Reduces soil erosion, traps sediment, increases infiltration
Water and Sediment Control Basin (638)	-1	0	3	Captures pesticide residues and facilitates their degradation. Traps sediment. May increase infiltration and deep percolation
Well Decommissioning (351)	3	0	0	Eliminates point source contamination

This Minnesota mitigation effectiveness guide was adapted from the national NRCS “Mitigation Effectiveness Guide” developed by the NRCS National Water and Climate Center’s Pest Management Team. The national effectiveness guide is an expanded version of an original matrix developed by the EPA-sanctioned Aquatic Dialogue Group and published by SETAC. The original reference is Aquatic Dialogue Group: Pesticide Risk Assessment and Mitigation, Baker JL, Barefoot AC, Feasley LE, Burns LA, Caulklins PP, Clark JE, Feulner RL, Giesy JP, Graney RI, Griggs RH, Jacob HM, Laskowski DA, Maciorowski AF, Mihaich EM, Nelson Jr HP, Parrish PR, Siefert RE, Solomon KR, van der Schalie WH, editors. 1994. Society of Environmental Toxicology and Chemistry, Pensacola FL., pages 99-111 and Table 4-2.

NOTE: Mitigation effectiveness ratings are relative index values as opposed to absolute values. Varying site conditions as well as how a particular mitigation practice is designed and applied can result in site specific variation in actual mitigation effectiveness.

NOTE: Mitigation practices for common detect chemicals should include at least one state water quality pest management BMP for the respective chemical.