

National and State Resource Concerns and Quality Criteria					
Natural Resource Concern	Description of Concern	National Quality Criteria	Measurement Units	Missouri Quality Criteria	Assessment Tools for Quality Criteria Evaluation
<b>WATER</b>					
<i>Water Quantity</i> <b>Excessive Seepage</b>	Subsurface water oozing to the surface restricts land use and management.	Subsurface water is managed to limit periods of saturation that are unfavorable to the present or intended land use. Management complies with wetland policies.	acres/year	Subsurface water is managed to limit periods of saturation that are unfavorable to the present or intended land use. Management complies with wetland policies and laws.	<ul style="list-style-type: none"> <li>• Visual Assessment (physical presence of water, prevalence of hydrophytic vegetation, etc.)</li> <li>• Client interview</li> <li>• Area measurements</li> </ul>
<i>Water Quantity</i> <b>Excessive Runoff, Flooding, or Ponding</b>	The land becomes inundated restricting land use and management.	Excess water amounts and/or rates of flow are controlled consistent with desired present or intended land use goals and wetland policies.	Non Measurable	Excess water amounts and/or rates of flow are controlled consistent with desired present or intended land use goals, wetland policies and laws.	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Client interview</li> <li>• Stream Visual Assessment Protocol</li> <li>• National Engineering Handbook (EFH – chapter 2 and 3)</li> <li>• Hydrologic models e.g. HECRAS, TR-20, TR-55</li> </ul>
<i>Water Quantity</i> <b>Excessive Subsurface Water</b>	Water saturates upper soil layers restricting land use and management.	Subsurface water is managed to limit periods of saturation compatible with the present or intended land use and wetland policies.	Non Measurable	Subsurface water is managed to limit periods of saturation compatible with the present or intended land use, wetland policies and laws.	<ul style="list-style-type: none"> <li>• Visual assessment of soil cores and coring holes</li> <li>• Plant quality and quantity measurements</li> <li>• National Engineering Handbook, Part 650 (EFH-Chapter 14)</li> </ul>
<i>Water Quantity</i> <b>Drifted Snow</b>	Wind-blown snow deposits and accumulates around and over surface structures restricting ingress, egress and conveyance of humans and animals.	Snowdrifts are reduced or prevented to allow ingress, egress, and conveyance of humans and animals.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Client interview</li> <li>• Depth and area measurements</li> </ul>

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<i>Water Quantity</i> <b>Inadequate Outlets</b>	Natural or constructed outlets too small to remove excess water in a timely manner.	Outlets are designed, installed, upgraded or maintained to adequately convey water for present or intended uses.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Client interview</li> <li>• National Engineering Handbook, part 650 (EFH – Chapters 2,3,7)</li> <li>• Hydrologic models, e.g. HECRAS, TR-20, TR-55</li> </ul>
<i>Water Quantity</i> <b>Inefficient Water Use on Irrigated Land</b>	Limited water supplies are not optimally utilized.	Land and water management is planned and coordinated to provide optimal use of natural and applied moisture.	acre-inches/ac/yr	Land and water management is planned and coordinated to provide optimal use of natural and applied moisture.	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• National Engineering Handbook, Part 652, Irrigation Guide</li> <li>• Crop quality and quantity measurements</li> <li>• PHARCET</li> <li>• SRFR (Surface Irrigation Model)</li> <li>• FIRI (Farm Irrigation Rating Index)</li> </ul>
<i>Water Quantity</i> <b>Inefficient Water Use on Non-irrigated Land</b>	Natural moisture is not optimally utilized.	Management provides optimum use of natural moisture for the present or intended land use.	acre-inches/ac/yr	Same as National	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Plant or animal quality and quantity measurements</li> </ul>
<i>Water Quantity</i> <b>Reduced Capacity of Conveyances by Sediment Deposition</b>	Sediment deposits in ditches, canals, culverts, and other water conveyances reduce the desired flow capacity.	Conveyance structures are upgraded or maintained to adequately convey water for present or intended uses.	cubic yards	Conveyance structures are upgraded or maintained to adequately convey water for present or intended uses. The contributing area is treated so it does not adversely add to the identified problem.	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Client interview</li> <li>• National Engineering Handbook, Part 650 (EFH – Chapters 2,3,7)</li> <li>• Hydrologic models, e.g., HECRAS, TR-20, TR-55</li> </ul>

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<b>WATER</b>					
<i>Water Quantity</i> <b>Reduced Storage of Water Bodies by Sediment Accumulation</b>	Sediment deposits in water bodies reduce the desired volume capacity.	Water bodies and contributing source areas are treated to allow sufficient water storage for present and intended uses.	acre-inches/ac/yr	Same as National	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Depth and area measurements</li> <li>• National Engineering Handbook, Part 650 (EFH – Chapters 2,3,7,11)</li> </ul>
<i>Water Quantity</i> <b>Aquifer Overdraft</b>	Water withdrawals exceed recharge rates.	Land and water management are coordinated to conserve aquifer water levels.	acre-inches/ac/yr	Same as National	<ul style="list-style-type: none"> <li>• Water level measurements</li> </ul>
<i>Water Quantity</i> <b>Insufficient Flows in Water Courses</b>	Water flows are not consistently available in sufficient quantities to support ecological processes and land use and management.	Authorized uses and management of water are coordinated to minimize the impacts on water course flows.	linear feet/year	Same as National	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Water flow records</li> <li>• Gauge Station data</li> <li>• Consumptive use/allocation water rights</li> <li>• Habitat Evaluation Guides</li> <li>• National Biology Handbook</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Pesticides in Groundwater</b>	Residues resulting from the use of pest control chemicals degrade groundwater quality.	Pesticides are applied, stored, handled, disposed of, and managed so that groundwater uses are not adversely affected	Non Measurable	Pesticides are applied, stored, handled, disposed of, and managed so that groundwater uses are not adversely affected. Low assessment ratings meet quality criteria levels. Intermediate, high, or extra-high ratings require mitigation measures and/or using a lower risk alternative.	<ul style="list-style-type: none"> <li>• WIN-PST (Windows Pesticide Screening Tool – USDA/NRCS)</li> <li>• NAPRA (National Agricultural Pesticide Risk Analysis – USDA/NRCS)</li> <li>• Vadose zone and groundwater chemical sampling and assay</li> </ul>

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<b>WATER</b>					
<i>Water Quality</i> <b>Excessive Nutrients and Organics in Groundwater</b>	Pollution from natural or human induced nutrients such as N, P, and organics (including animal and other wastes) degrades groundwater quality.	Nutrients and organics are stored, handled, disposed of, and applied such that groundwater uses are not adversely affected.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• National Engineering Handbook, Part 651, Ag. Waste Mgt. Field Handbook</li> <li>• Nitrate Leaching Index</li> <li>• Phosphorus Leaching Index</li> <li>• Farm*A*Syst</li> <li>• Vadose zone and groundwater chemical/particle sampling and assay</li> <li>• UMC FertRec 2.3</li> </ul>
<i>Water Quality</i> <b>Excessive Salinity in Groundwater</b>	Pollution from salts such as Ca, Mg, Na, K, HCO <sub>3</sub> , CO <sub>3</sub> , Cl, and SO <sub>4</sub> degrades groundwater quality.	Salts are stored, handled, disposed of, applied, and managed such that groundwater uses are not adversely affected.	tons/acre/year	Same as National	<ul style="list-style-type: none"> <li>• Vadose zone and groundwater salinity sampling (total dissolved solids [TDS] or electrical conductivity) and assay</li> <li>• National Engineering Handbook, Part 652, Irrigation Guide</li> <li>• Soil salinity sampling and assay</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Heavy Metals in Groundwater</b>	Natural or human induced metal pollutants present in toxic amounts degrade groundwater quality.	Materials containing heavy metals are stored, handled, disposed of, applied, and managed such that groundwater uses are not adversely affected.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Vadose zone and groundwater chemical sampling and assay</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Pathogens in Groundwater</b>	Kinds and numbers of viruses, protozoa, and bacteria are present at a level that degrades groundwater quality.	Materials that harbor pathogens are stored, handled, disposed of, applied, and managed such that groundwater uses are not adversely affected.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Vadose zone and groundwater chemical sampling and assay</li> </ul>

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<i>Water Quality</i> <b>Harmful Levels of Petroleum in Groundwater</b>	Fuel, oil, gasoline and other hydrocarbons present in toxic amounts degrade groundwater quality.	Petroleum products are used, stored, handled, disposed of, and managed such that groundwater uses are not adversely affected.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Vadose zone and groundwater chemical sampling and assay</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Pesticides in Surface Water</b>	Pest control chemicals present in toxic amounts degrade surface water quality.	Pesticides are applied, stored, handled, disposed of, and managed such that surface water uses are not adversely affected	Non Measurable	Pesticides are applied, stored, handled, disposed of, and managed so that groundwater uses are not adversely affected. Low assessment ratings meet quality criteria levels. Intermediate, high, or extra-high ratings require mitigation measures and/or using a lower risk alternative.	<ul style="list-style-type: none"> <li>• WIN-PST (Windows Pesticide Screening Tool – USDA/NRCS)</li> <li>• NAPRA (National Agricultural Pesticide Risk Analysis – USDA/NRCS)</li> <li>• Surface water chemical sampling assay</li> <li>• Farm*A*Syst</li> </ul>

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<p><i>Water Quality</i></p> <p><b>Excessive Nutrients and Organics in Surface Water</b></p>	<p>Pollution from natural or human induced nutrients such as N, P, and organics (Including animal and other wastes) degrades surface water quality.</p>	<p>Nutrients and organics are stored, handled, disposed of, and managed such that surface water uses are not adversely affected.</p>	<p>Non Measurable</p>	<p>Nutrients and organics are stored, handled, disposed of, and managed such that surface water uses are not adversely affected.</p> <p><b>Livestock movement:</b> Livestock access to surface water is controlled in a manner (exclusion, protected entry points, or grazing prescriptions that address duration, intensity, season of use, supplemental water, and frequency) that provides positive impacts on surface water quality parameters or other aquatic resources. Feeding, watering and shade locations are sited to minimize impacts of nutrients and organics associated with runoff or transported soil particles.</p>	<ul style="list-style-type: none"> <li>• SVAP (Stream Visual Assessment Protocol – USDA/NRCS)</li> <li>• P index</li> <li>• National Engineering Handbook, Part 651, Ag. Waste Mgt. Field Handbook</li> <li>• Surface water chemical/particle sampling and assay</li> <li>• UMC FertRec 2.3</li> </ul>

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<b>WATER</b>					
<i>Water Quality</i>  <b>Excessive Suspended Sediment and Turbidity in Surface Water</b>	Pollution from mineral or organic particles degrades surface water quality.	Movement of mineral and organic particles is managed such that surface water uses are not adversely affected.	tons/acre/year	Movement of mineral and organic particles is managed such that surface water uses are not adversely affected. <b>Livestock movement:</b> Livestock access to surface water is controlled in a manner (exclusion, protected entry points, or grazing prescriptions that address duration, intensity, season of use, supplemental water, and frequency) that provides positive impacts on surface water quality parameters or other aquatic resources. Feeding, watering and shade locations are sited to minimize impacts of nutrients and organics associated with runoff or transported soil particles.	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Client interview</li> <li>• SVAP (Stream Visual Assessment Protocol – USDA/NRCS)</li> <li>• Water Quality Indicators Guide – Surface Waters, Field Sheets IA and 1B (Terrene Institute ©1996)</li> <li>• Surface water chemical/particle sampling and assay</li> </ul>

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<i>Water Quality</i>  <b>Excessive Salinity in Surface Water</b>	Pollution from salts such as Ca, Mg, Na, K, HCO <sub>3</sub> , HCO <sub>3</sub> , CO <sub>3</sub> , Cl, and SO <sub>4</sub> degrades surface water quality.	Salts are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected.	tons/acre/year	Salts are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected. Timing, amounts and application of materials are in balance with plant requirements considering all nutrient sources, soil characteristics, realistic yields and runoff loss potential of nutrients dissolved in the runoff and /or attached to soil particles transported by water and wind.	<ul style="list-style-type: none"> <li>• SVAP (Stream Visual Assessment Protocol – USDA/NRCS) – Salinity</li> <li>• UMC FertRec 2.3</li> </ul>
<i>Water Quality</i>  <b>Harmful Levels of Heavy Metals in Surface Water</b>	Natural or human induced metal pollutants are present in toxic amounts that degrade surface water quality.	Materials containing heavy metals are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected.	Non Measurable	Materials containing heavy metals are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected. Timing, amounts and application of materials are in balance with plant requirements considering all nutrient sources, soil characteristics, realistic yields and runoff loss potential of nutrients dissolved in the runoff and /or attached to soil particles transported by water and wind.	<ul style="list-style-type: none"> <li>• Surface water chemical sampling and assay</li> </ul>

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<b>WATER</b>					
<i>Water Quality</i> <b>Harmful Temperatures of Surface Water</b>	Undesired thermal conditions degrade surface water quality.	Use and management of land and water are coordinated to minimize impacts on surface water temperatures.	Non Measurable	Use and management of land and water are coordinated to minimize impacts on surface water temperatures for targeted aquatic species	<ul style="list-style-type: none"> <li>• SVAP (Stream Visual Assessment Protocol – USDA/NRCS) – canopy cover</li> <li>• HSI model for target species (Habitat Suitability Index – USF&amp;WS)</li> <li>• Surface water temperature sampling and assay</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Pathogens in Surface Water</b>	Kinds and numbers of viruses, protozoa, and bacteria are present at a level that degrades surface water quality.	Materials that harbor pathogens are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected.	Non Measurable	Materials that harbor pathogens are stored, handled, disposed of, applied, and managed such that surface water uses are not adversely affected. <b>Livestock movement:</b> Livestock access to surface water is controlled in a manner (exclusion, protected entry points, or grazing prescriptions that address duration, intensity, season of use, supplemental water sources, and frequency) that provides positive impacts on surface water quality parameters or other associated aquatic resources. Feeding, watering and shade locations are sited to minimize impacts of organics associated with runoff or transported soil particles.	<ul style="list-style-type: none"> <li>• Surface water pathogen sampling and assay</li> </ul>
<i>Water Quality</i> <b>Harmful Levels of Petroleum in Surface Water</b>	Fuel, oil, gasoline and other hydrocarbons present in toxic amounts degrade surface water quality.	Petroleum products are used, stored, handled, and disposed of such that groundwater uses are not adversely affected.	Non Measurable	Same as National	<ul style="list-style-type: none"> <li>• Surface water chemical sampling and assay</li> </ul>