

CONSERVATION PRACTICE PHYSICAL EFFECTS WORKSHEET

STATE	North Dakota	FIELD OFFICE	DATE
PRACTICE: Mulching 484		Baseline Setting: Appropriate Land Use(s): All Land Uses	
RESOURCES, CONSIDERATIONS AND CONCERNS	PHYSICAL EFFECTS	RATIONALE	
SOIL – EROSION			
Sheet and Rill	Moderate to Substantial Improvement	Soil cover reduces erosion from water.	
Wind	Moderate to Substantial Improvement	Soil cover reduces erosion from wind.	
Ephemeral Gully	Moderate to Substantial Improvement	Soil cover reduces erosion from water.	
Classic Gully	Slight to Substantial Improvement	Mulching will stabilize eroding areas and reduce runoff.	
Streambank	Not Applicable or Substantial Improvement	Mulching will stabilize eroding areas and reduce runoff.	
Shoreline	Not Applicable or Substantial Improvement	Mulching will stabilize eroding areas and reduce runoff.	
Irrigation Induced	Not Applicable or Substantial Improvement	Surface cover reduces erosion.	
Mass Movement	Not Applicable or Slight Worsening	Increased infiltration could exacerbate mass movement during high rainfall.	
Road, Roadsides, and Construction Sites	Not Applicable or Substantial Improvement	Surface cover reduces erosion.	
SOIL – CONDITION			
Organic Matter Depletion	Slight to Substantial Improvement	Decreased erosion and biomass addition from organic mulches will increase soil organic matter.	
Rangeland Site Stability	Not Applicable to Substantial Improvement	Not applicable.	
Compaction	Not Applicable	Not applicable.	
Subsidence	Not Applicable	Not applicable.	
Contaminants:			
• Salts and other Chemicals	Not Applicable to Substantial Improvement	Reduced evaporation may reduce salt build-up. Added organic matter will buffer salts.	
• Animal Waste and other Organics – N	Neutral	Not applicable.	
• Animal Waste and other Organics - P	Neutral	Not applicable.	
• Animal Waste and other Organics - K	Neutral	Not applicable.	
• Commercial Fertilizer - N	Neutral	Not applicable.	
• Commercial Fertilizer – P	Neutral	Not applicable.	
• Commercial Fertilizer – K	Neutral	Not applicable.	
• Residual Pesticides	Neutral	Not applicable.	
Damage from Sediment Deposition	Slight Improvement	Mulch cover may trap sediment, but mulch reduces soil erosion.	
WATER – QUANTITY			
Rangeland Hydrologic Cycle	Not Applicable to Substantial Improvement	Usually not applicable. Could benefit small areas where gullies are repaired.	
Excessive Seepage	Not Applicable	Not Applicable.	
Excessive Runoff, Flooding, or Ponding	Slight to Substantial Improvement	Increased infiltration, reduces runoff and ponding.	

Excessive Subsurface Water	Not Applicable or Slight Worsening	Increased infiltration results in more water moving through the profile.
Drifted Snow	Not Applicable	Not applicable.
Inadequate Outlets	Neutral	Not applicable.
Inefficient Water use on Irrigated Land	Slight to Substantial Improvement	Increases infiltration and decreases evaporation resulting in more available water.
Inefficient Water use on Non-Irrigated Land	Slight to Substantial Improvement	Increases infiltration and decreases evaporation resulting in more available water.
Reduced Capacity of Conveyances by Sediment Deposition	Not Applicable to Substantial Improvement	Reduces erosion which results in less sediment in conveyances.
Reduced Storage of Water Bodies by Sediment Accumulation	Not Applicable to Substantial Improvement	Reduces erosion which results in less sediment in water bodies.
Aquifer Overdraft	Not Applicable to Slight Improvement	Increases infiltration and reduces evaporation, reducing the amount of water needed and improving aquifer recharge.
Insufficient Flows in Water Courses	Not Applicable	Not applicable.
WATER – QUALITY		
In Groundwater:		
• Harmful Levels of Pesticides	Neutral	Not applicable.
• Excessive Nutrients and Organics	Slight Worsening to Slight Improvement	The action increases infiltration that contributes to nutrient leaching. Also, high organic carbon will cause microbes to immobilize nutrients.
• Excessive Salinity	Not Applicable	Better infiltration increases leaching potential.
• Harmful Levels of Heavy Metals	Neutral	Not Applicable.
• Harmful Levels of Pathogens	Neutral	Not Applicable.
• Harmful Levels of Petroleum	Not Applicable	Not applicable.
In Surface Water:		
• Harmful Levels of Pesticides	Slight to Moderate Improvement	The action reduces runoff, erosion and the need for pesticide use. Impervious mulches may increase runoff.
• Excessive Nutrients and Organics	Slight to Moderate Improvement	The action reduces erosion and runoff, reducing the loss of dissolved and sediment-bound nutrients from the site.
• Excessive Suspended Sediment and Turbidity	Slight to Moderate Improvement	Less erosion and runoff reduces transport of sediment.
• Excessive Salinity	Not Applicable to Slight Improvement	Less runoff reduces transport potential of soluble salts.
• Harmful Levels of Heavy Metals	Not Applicable	Not Applicable.
• Harmful Temperatures	Not Applicable	Not applicable.
• Harmful Levels of Pathogens	Neutral	Not applicable.
• Harmful Levels of Petroleum	Not Applicable	Not applicable.
AIR – QUALITY		
Particulate Matter less than 10 Micrometers in Diameter (PM 10)	Slight to Substantial Improvement	Mulches can stabilize the soil surface, reducing the generation of particulate matter.
Particulate Matter less than 2.5 Micrometers in Diameter (PM 2.5)	Slight to Substantial Improvement	Mulches can stabilize the soil surface, reducing the generation of particulate matter.

Excessive Ozone	Neutral	There is a minimal reduction of ozone precursors through reduced surface temperatures offered by mulch material.
Excessive Greenhouse Gas:		
• CO ₂ (Carbon Dioxide)	Slight Improvement	If used, vegetation residue stores carbon.
• N ₂ O (Nitrous Oxide)	Not Applicable	Not applicable.
• CH ₄ (Methane)	Not Applicable to Slight Worsening	Breakdown and decay of organic material is conducive to the formation of CH ₄
Ammonia (NH ₃)	Not Applicable	Not applicable.
Chemical Drift	Not Applicable	Not applicable.
Objectionable Odors	Not Applicable	Not applicable.
Reduced Visibility	Slight to Substantial Improvement	Soil erosion from wind is reduced.
Undesirable Air Movement	Not Applicable	Not applicable.
Adverse Air Temperature	Slight to Moderate Improvement	Materials can insulate sites from low temperatures accelerating plant germination and growth.
PLANTS – SUITABILITY		
Plants not Adapted or Suited	Not Applicable	Not applicable.
PLANTS – CONDITION		
Productivity, Health, and Vigor	Slight to Substantial Improvement	Mulching materials improve growing conditions contributing to increased plant health and vigor.
Threatened or Endangered Plant Species:		
• Plant Species Listed or Proposed for Listing Under the Endangered Species Act	Not Applicable	Not applicable.
• Declining Species, Species of Concern	Not Applicable	Not applicable.
Noxious and Invasive Plants	Slight to Substantial Improvement	Thick and/or impenetrable mulch cover can prevent emergence of undesired species.
Forage Quality and Palatability	Not Applicable	Not applicable.
Wildfire Hazard	Not Applicable to Slight Worsening	Most mulches are flammable.
ANIMALS – FISH AND WILDLIFE		
Inadequate Food	Slight Improvement	Mulching enhances production of any food species planted.
Inadequate Cover/Shelter	Slight Improvement	Mulching enhances cover/shelter conditions.
Inadequate Water	Not Applicable	Not applicable.
Inadequate Space	Not Applicable	Not applicable.
Habitat Fragmentation	Not Applicable	Not applicable.
Imbalance Among and Within Populations	Not Applicable	Not applicable.
Threatened and Endangered Fish and Wildlife Species:		
• Fish and Wildlife Species Listed or Proposed for Listing Under the Endangered Species Act	Neutral	Activities are designed, installed, and mitigated to an extent to maintain or enhance species of concern.
• Declining Species, Species of Concern	Neutral	Activities are designed, installed, and mitigated to an extent to maintain or enhance species of concern.

ANIMALS – DOMESTIC		
Inadequate Quantities and Quality of Feed and Forage	Not Applicable	Not applicable.
Inadequate Shelter	Not Applicable	Not applicable.
Inadequate Stock Water	Not Applicable	Not applicable.
Stress and Mortality	Not Applicable	Not applicable.
HUMAN – ECONOMICS		
Land - Change in Land Use	Not applicable.	Not applicable.
Land – Land in Production	Not applicable.	Not applicable.
Capital – Change in Equipment	Slight Increase.	Some mulch spreading equipment required.
Capital - Total Investment Cost	Slight	Some mulch spreading equipment purchased.
Capital – Annual Cost	Slight increase.	Some mulch spreading equipment purchased.
Capital – Credit and Farm Program Eligibility	Situational.	
Labor - Labor	Slight to Moderate Increase	Additional labor to apply mulch.
Labor – Change in Management Level	Negligible	
Risk - Yield	Slight Decrease	Slight decrease due to conserved moisture and reduced erosion.
Risk - Flexibility	Slight Increase	Slight increase due to incorporating practice into the cropping system.
Risk - Timing	Substantial Increase	Substantial increase - practice must applied prior to planting.
Risk – Cash Flow	Slight Increase	Negligible to slight increase because of application cost.
Profitability – Change in Profitability	Situational	Slight decrease to slight increase.
HUMAN – CULTURAL		
Cultural Resources and/or Historic Properties Present or Suspected to be PRESENT	Not applicable.	Not applicable.
HUMAN – ENERGY		
Depletion of Fossil Fuel Resources	Situational	Reduced evaporation, erosion and sedimentation, and improved weed suppression reduce the need for irrigation, pesticide use and off site sediment removal. Manufacture, transport and application of mulch materials require varying amounts of energy.
Underutilization of Non-Fossil Energy Resources	Not Applicable	Not Applicable

Human Considerations Explanation

Considerations	Physical effects indicate:
Land - Change in Land Use	The degree to which implementing the conservation practice is expected to cause a change from one land use to another.
Land - Land in Production	The degree to which implementing the conservation practice is expected to cause an increase or decrease in the amount of land in production.
Capital - Change in Equipment	The degree to which implementing the conservation practice is expected to cause an increase or decrease in the amount of capital equipment required for farm or ranch operations.
Capital - Total Investment Cost	A qualitative measure of the increase in total investment dollars required in order to implement the conservation practice.
Capital - Annual Cost	A qualitative measure of the expected change in annual capital costs required in order to operate and maintain the conservation practice.
Capital - Credit & Farm Program Eligibility	Included to make conservation planners aware of the potential availability of funding for implementing conservation practices.
Labor – Labor	The degree to which implementing the conservation practice is likely to cause an increase or decrease in the total amount of overall farm or ranch labor required for operations.
Labor - Change in Management Level	The degree to which implementing the conservation practice is likely to cause an increase or decrease in the total amount of required active management on a farm or ranch.
Risk – Yield	The degree to which risk, as related to crop or livestock yields, is expected to increase or decrease as a result of implementing the conservation practice.
Risk – Flexibility	The degree to which risk, as related to the flexibility of farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice. For example, converting from flood irrigation to a sprinkler system gives a farmer an increase in flexibility of irrigation, which results in a decrease in the level of risk associated with inflexibility of operations.
Risk – Timing	The degree to which risk, as related to the timing of farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice.
Risk - Cash Flow	The degree to which risk, as related to cash flow in farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice.
Profitability - Change in Profitability	The degree to which farm or ranch profitability is expected to increase or decrease as a result of implementing the conservation practice.
Cultural Resources and/or Historic Properties Present or Suspected to be Present	The degree to which implementation of the conservation practice is expected to increase or decrease the risk of cultural resource disturbance, degradation, or loss.
Depletion of Fossil Fuel Resources	Inefficient use of fossil-originated energy sources (diesel, gasoline, propane, natural gas, coal), lubricants, and other materials.
Underutilization of Non-Fossil Energy Sources	Available and cost-effective alternative energy sources (solar, wind, biofuel, hydroelectric, geothermal) are not being used or are being used inefficiently.