CONSERVATION PRACTICE PHYSICAL EFFECTS WORKSHEET

STATE	Arkansas	FIELD OFFICE		DATE	

PRACTICE: Residue and Tillage Management, No Till/Strip Till/Direct Seed 329	Baseline Setting: Appropriate Land Use(s): Crop, Hay, Pasture	
RESOURCES, CONSIDERATIONS AND CONCERNS	**PHYSICAL EFFECTS**	**RATIONALE**
SOIL - EROSION		
Sheet and Rill	Moderate to Substantial Improvement	Managing residue to reduce soil disturbance and increase residue cover reduces erosion by water.
Wind	Moderate to Substantial Improvement	Managing residue to reduce soil disturbance and increase residue cover reduces erosion by wind.
Ephemeral Gully	Moderate to Substantial Improvement	Managing residue to reduce soil disturbance and increase residue cover reduces erosion by water.
Classic Gully	Slight Improvement	No-till may slow gully growth due to less runoff.
Streambank	Not Applicable	Not applicable.
Shoreline	Not Applicable	Not applicable.
Irrigation Induced	Slight to Substantial Improvement	Less soil disturbance and more residue cover reduces erosion.
Mass Movement	Slight Worsening	Increased infiltration could exacerbate mass movement during high rainfall.
Road, Roadsides, and Construction Sites	Not Applicable	Not applicable.
SOIL – CONDITION		
Organic Matter Depletion	Slight to Substantial Improvement	Decreased erosion and less oxidation from lack of soil disturbance will increase or maintain organic matter.
Rangeland Site Stability	Not Applicable	Not applicable.
Compaction	Slight to Moderate Improvement	Fewer field operations and less tillage reduce the potential for soil compaction.
Subsidence	Neutral	Drainage creating aerobic conditions is the predominant cause of subsidence. The action slows oxidation but not enough to offset drainage effects.
Contaminants:		
• Salts and other Chemicals	Slight Improvement	Low disturbance and high residue cropping systems increase organic matter which will buffer salts.
• Animal Waste and other Organics - N	Not Applicable	Not applicable.
• Animal Waste and other Organics - P	Not Applicable	Not applicable.

• Animal Waste and other Organics - K	Not Applicable	Not applicable.
• Commercial Fertilizer - N	Not Applicable	Not applicable.
• Commercial Fertilizer – P	Not Applicable	Not applicable.
• Commercial Fertilizer – K	Not Applicable	Not applicable.
• Residual Pesticides	Neutral	Initially this practice may require increased pesticides. As the system matures lower rates may be needed. Also, soil biological activity increases, which increases pesticide breakdown.
Damage from Sediment Deposition	Slight to Substantial Improvement	Residue management reduces erosion resulting in less sediment.
WATER – QUANTITY		
Rangeland Hydrologic Cycle	Not Applicable	Not applicable.
Excessive Seepage	Slight Worsening	No-till increases infiltration resulting in more water moving through the profile.
Excessive Runoff, Flooding, or Ponding	Slight to Moderate Improvement	No-till increases infiltration, reducing runoff and ponding.
Excessive Subsurface Water	Not Applicable	Not applicable.
Drifted Snow	Not Applicable	Not applicable.
Inadequate Outlets	Not Applicable	Not applicable.
Inefficient Water use on Irrigated Land	Slight to Moderate Improvement	No-till increases infiltration and decreases evaporation resulting in more available water. However, increased infiltration reduces the efficiency of flood and furrow irrigation.
Inefficient Water use on Non-Irrigated Land	Slight to Substantial Improvement	No-till increases infiltration and decreases evaporation resulting in more available water.
Reduced Capacity of Conveyances by Sediment Deposition	Slight to Substantial Improvement	No-till reduces erosion which results in less sediment.
Reduced Storage of Water Bodies by Sediment Accumulation	Slight to Substantial Improvement	No-till reduces erosion which results in less sediment.
Aquifer Overdraft	Slight Improvement	Increased infiltration may improve aquifer recharge and reduce withdrawals.
Insufficient Flows in Water Courses	Not Applicable	Not applicable.
WATER – QUALITY		
In Groundwater:		
• Harmful Levels of Pesticides	Slight Improvement	The action increases soil organic matter and biological activity.
• Excessive Nutrients and Organics	Slight Worsening	The action increases infiltration that contributes to nutrient leaching. Also, high organic carbon will cause microbes to immobilize nutrients.
• Excessive Salinity	Slight Worsening	Better infiltration may increase leaching potential.
• Harmful Levels of Heavy Metals	Slight Improvement	Higher organic matter levels

		may increase buffering capacity of the soil.
• Harmful Levels of Pathogens	Neutral	Better infiltration could increase leaching, but increased microbial activity may enhance competition with pathogens.
• Harmful Levels of Petroleum	Not Applicable	Not applicable.
In Surface Water:		
• Harmful Levels of Pesticides	Moderate to Substantial Improvement	The action decreases runoff and erosion.
• Excessive Nutrients and Organics	Slight Improvement	Less erosion and runoff reduces transport of nutrients.
• Excessive Suspended Sediment and Turbidity	Slight to Substantial Improvement	Less erosion and runoff reduces transport of sediment.
• Excessive Salinity	Slight Improvement	Less runoff reduces transport of soluble salts. However increased infiltration results in more seepage which can carry soluble salts to the surface.
• Harmful Levels of Heavy Metals	Slight Improvement	Decreased erosion and runoff reduces heavy metal delivery to surface water.
• Harmful Temperatures	Not Applicable	Not applicable.
• Harmful Levels of Pathogens	Slight Improvement	Less erosion and runoff reduces delivery of pathogens.
• Harmful Levels of Petroleum	Not Applicable	Not applicable.
AIR – QUALITY		
Particulate Matter less than 10 Micrometers in Diameter (PM 10)	Slight to Substantial Improvement	Less soil disturbance, increased residue on the surface and fewer field operations reduce the generation of particulate matter.
Particulate Matter less than 2.5 Micrometers in Diameter (PM 2.5)	Slight to Substantial Improvement	Less soil disturbance, increased residue on the surface and fewer field operations reduce the generation of particulate matter.
Excessive Ozone	Slight to Moderate Improvement	Reduced use of machinery reduces ozone precursor emissions.
Excessive Greenhouse Gas:		
• CO_2 (Carbon Dioxide)	Slight to Moderate Improvement	Reduced use of machinery reduces CO2 emissions and increases soil carbon storage.
• N_20 (Nitrous Oxide)	Not Applicable	Not applicable.
• CH_4 (Methane)	Not Applicable	Not applicable.
Ammonia (NH_3)	Not Applicable	Not applicable.
Chemical Drift	Slight to Moderate Worsening	The action may require increased use of pesticides and increase the potential for drift.
Objectionable Odors	Slight Improvement	Residues will reduce wind movement and intercept VOCs, fine particulates, and fugitive dust.
Reduced Visibility	Slight to Substantial Improvement	Reduction in wind erosion potential and fugitive dust

Undesirable Air Movement	Not Applicable	Not applicable.
Adverse Air Temperature	Not Applicable	Not applicable.
PLANTS – SUITABLIITY		
Plants not Adapted or Suited	Not Applicable	Not applicable.
PLANTS - CONDITION		
Productivity, Health, and Vigor	Slight to Moderate Improvement	Conserving moisture and improving soil conditions contribute to enhanced plant productivity and health. However, on cold and wet soils there may be a delay in emergence and early growth.
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	Not Applicable	Not applicable.
Forage Quality and Palatability	Not Applicable	Not applicable.
Wildfire Hazard	Not Applicable	Not applicable.
ANIMALS - FISH AND WILDLIFE		
Inadequate Food	Slight to Moderate Improvement	Crop residue provides some food for wildlife.
Inadequate Cover/Shelter	Slight to Moderate Improvement	Crop residue provides some cover/shelter.
Inadequate Water	Not Applicable	Not applicable.
Inadequate Space	Slight Improvement	Residue restores some habitat/space.
Habitat Fragmentation	Not Applicable	Not applicable.
Imbalance Among and Within Populations	Slight to Moderate Improvement	Residue is managed to provide cover during critical periods.
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	Slight Improvement	There may be some use of the residue for feed and forage by livestock.
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	Moderate increase.	
Capital - Total Investment Cost	Not applicable.	Not applicable.
Capital – Annual Cost	Slight increase.	
Capital – Credit and Farm Program Eligibility	Situational.	
Labor - Labor	Slight to moderate decrease	Slight to moderate decrease with fewer tillage operations.
Labor – Change in Management Level	Slight to moderate increase	Slight to moderate increase to control weeds and other unique problems in residue.
Risk - Yield	Moderate Decrease	Slight increase in short term, long-term moderate decrease.
Risk - Flexibility	Slight to Moderate Increase	Slight to moderate increase because of adoption of new technology.
Risk - Timing	Slight to Moderate Decrease	Slight to moderate decrease - longer field season.
Risk – Cash Flow	Slight Decrease	Slight decrease due to reduced costs.
Profitability – Change in Profitability	Situational	Slight decrease or 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	Substantial Decrease	Minimizing soil disturbance dramatically reduces fuel requirements of farming equipment.
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.