CONSERVATION PRACTICE PHYSICAL EFFECTS WORKSHEET

STATE	Arkansas	FIELD OFFICE		DATE	

PRACTICE: Deep Tillage 324	Baseline Setting: Appropriate Land Use(s): Crop, Hay, Pasture	
RESOURCES, CONSIDERATIONS AND CONCERNS	**PHYSICAL EFFECTS**	**RATIONALE**
SOIL - EROSION		
Sheet and Rill	Slight to Moderate Improvement	Removing restrictive layers improves infiltration and reduces runoff. In the short term, soil disturbance exposes the soil to erosive forces by water.
Wind	Neutral	If done at critical wind periods, this practice may temporarily increase surface roughness reducing saltation.
Ephemeral Gully	Slight Improvement	Removing restrictive layers improves infiltration and reduces runoff. In the short term, soil disturbance exposes the soil to erosive forces by water.
Classic Gully	Slight Improvement	Increase infiltration reduces runoff.
Streambank	Slight Improvement	Improves infiltration and reduces runoff.
Shoreline	Not Applicable	Not applicable.
Irrigation Induced	Slight Improvement	Improves infiltration and reduces runoff.
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	Neutral	Better infiltration and available water increases crop yields. Tillage increases decomposition of organic matter.
Rangeland Site Stability	Not Applicable	Not applicable.
Compaction	Substantial Improvement	Ripping breaks up compaction, improves plant soil moisture, promotes root growth, and soil structure.
Subsidence	Neutral	Ripping will break potential hardpan, but drainage has the predominant impact on subsidence.
Contaminants:		
• Salts and other Chemicals	Slight to Moderate Improvement	Improved infiltration and porosity leaches salts.
• Animal Waste and other Organics	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of

- N		mineralized nutrients.
• Animal Waste and other Organics - P	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of mineralized nutrients.
• Animal Waste and other Organics - K	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of mineralized nutrients.
• Commercial Fertilizer - N	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of mineralized nutrients.
• Commercial Fertilizer – P	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of mineralized nutrients.
• Commercial Fertilizer – K	Slight to Moderate Improvement	Ripping improves infiltration which increases leaching of mineralized nutrients.
• Residual Pesticides	Slight to Moderate Improvement	Ripping mixes the soil and can result in adsorption and deactivation.
Damage from Sediment Deposition	Slight to Moderate Improvement	Ripping buries or mixes soil deposits from wind or water erosion.
WATER – QUANTITY		
Rangeland Hydrologic Cycle	Not Applicable	Not applicable.
Excessive Seepage	Slight to Moderate Worsening	Increased infiltration from tillage increases seepage.
Excessive Runoff, Flooding, or Ponding	Slight to Moderate Improvement	Runoff is reduced because of better infiltration.
Excessive Subsurface Water	Slight to Moderate Worsening	Increased infiltration results in more subsurface water.
Drifted Snow	Not Applicable	Not applicable.
Inadequate Outlets	Slight Improvement	Increases infiltration and reduces runoff.
Inefficient Water use on Irrigated Land	Slight to Moderate Improvement	Increases infiltration and reduces runoff.
Inefficient Water use on Non-Irrigated Land	Slight to Moderate Improvement	Deep tillage increases infiltration and reduces runoff.
Reduced Capacity of Conveyances by Sediment Deposition	Slight to Moderate Improvement	Increases infiltration and reduces erosion and runoff.
Reduced Storage of Water Bodies by Sediment Accumulation	Slight to Moderate Improvement	Increases infiltration and reduces erosion and runoff.
Aquifer Overdraft	Slight Improvement	Increases infiltration and recharge.
Insufficient Flows in Water Courses	Slight Worsening	Increases infiltration and reduces runoff.
WATER – QUALITY		
In Groundwater:		
• Harmful Levels of Pesticides	Slight to Moderate Worsening	The action increases infiltration and deep percolation.
• Excessive Nutrients and Organics	Slight to Moderate Worsening	The action increases infiltration resulting in greater leaching potential.
• Excessive Salinity	Slight to Moderate Worsening	Deep tillage increases infiltration resulting in greater

		leaching potential.
• Harmful Levels of Heavy Metals	Slight Worsening	Deep tillage increases infiltration resulting in greater leaching potential.
• Harmful Levels of Pathogens	Slight Worsening	Deep tillage increases infiltration resulting in greater leaching potential.
• Harmful Levels of Petroleum	Neutral	Deep tillage increases infiltration, which may result in greater leaching potential.
In Surface Water:		
• Harmful Levels of Pesticides	Slight to Substantial Improvement	The action reduces runoff and erosion.
• Excessive Nutrients and Organics	Slight to Substantial Improvement	Removing restrictive layers increases infiltration and permeability of water and increases crop rooting depth and growth. This reduces the volume and rate of runoff and the potential for erosion.
• Excessive Suspended Sediment and Turbidity	Slight to Moderate Improvement	Deep tillage increases infiltration reducing runoff and erosion.
• Excessive Salinity	Slight to Moderate Improvement	The action increases infiltration, reducing runoff and erosion.
• Harmful Levels of Heavy Metals	Slight to Substantial Improvement	Deep tillage increases infiltration reducing runoff and erosion.
• Harmful Temperatures	Not Applicable	Not applicable.
• Harmful Levels of Pathogens	Slight to Substantial Improvement	Deep tillage increases infiltration reducing runoff and erosion.
• Harmful Levels of Petroleum	Slight to Substantial Improvement	Deep tillage increases infiltration reducing runoff and erosion.
AIR – QUALITY		
Particulate Matter less than 10 Micrometers in Diameter (PM 10)	Slight to Moderate Improvement	The action buries erodible soils into subsoil layers.
Particulate Matter less than 2.5 Micrometers in Diameter (PM 2.5)	Slight to Moderate Improvement	The action buries erodible soils into subsoil layers.
Excessive Ozone	Not Applicable	Not applicable.
Excessive Greenhouse Gas:		
• CO_2 (Carbon Dioxide)	Not Applicable	Not applicable.
• N_20 (Nitrous Oxide)	Not Applicable	Not applicable.
• CH_4 (Methane)	Not Applicable	Not applicable.
Ammonia (NH_3)	Slight Improvement	Buries fertilizers in subsoil layers
Chemical Drift	Slight Improvement	The action can incorporate pesticides and reduce the potential for volatilization.
Objectionable Odors	Not Applicable	Not applicable.
Reduced Visibility	Slight to Moderate Improvement	Buries erodible materials into subsoil layers
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 Substantial Improvement	Enhanced root growth and the reduction of concentrated contaminants improves 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 Worsening	Deep tillage may enhance the growth of noxious and invasive plants.
Forage Quality and Palatability	Slight Improvement	Deep tillage increases rooting depth and vigor.
Wildfire Hazard	Not Applicable	Not applicable.
ANIMALS - FISH AND WILDLIFE		
Inadequate Food	Not Applicable	Not applicable.
Inadequate Cover/Shelter	Not Applicable	Not applicable.
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	Slight to Moderate Improvement	Forage production may be enhanced by increasing rooting depth and vigor.
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.	
Capital – Annual Cost	Slight to moderate increase.	

Capital – Credit and Farm Program Eligibility	Situational.	
Labor - Labor	Slight to moderate increase	Slight to moderate increase for performing tillage operations.
Labor – Change in Management Level	Negligible	
Risk - Yield	Slight Decrease	Slight decrease due to improved infiltration and root penetration.
Risk - Flexibility	Slight Decrease	Slight decrease due to more conductive growing conditions.
Risk - Timing	Moderate Increase	Moderate increase - practice should be implemented prior to planting.
Risk – Cash Flow	Slight Increase	Negligible to slight increase due to trips over the field.
Profitability – Change in Profitability	Slight to moderate increase.	
HUMAN - CULTURAL		
Cultural Resources and/or Historic Properties Present or Suspected to be PRESENT	Slight to Substantial Increase	Historic properties below existing plow zone can be adversely effected.
HUMAN – ENERGY		
Depletion of Fossil Fuel Resources	Slight Increase	This practice uses energy; however the outcome of this practice has no effect on energy use efficiency.
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.