# CONSERVATION PRACTICE PHYSICAL EFFECTS WORKSHEET

| STATE | Nebraska | FIELD OFFICE | Any | DATE | 10/10/2008 |
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| **PRACTICE: Residue and Tillage Management, No Till/Strip Till/Direct Seed 329** | Baseline Setting:<br>Appropriate Land Use(s): Crop, Hay, Pasture | |
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| **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 | Not Applicable | Not applicable. |

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| • 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 |

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| | | 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. |

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| 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. | |

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| 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: |
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| **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. |