

**TERRAIN CONDUCTIVITY MEASUREMENTS OF BRINE-AFFECTED OIL PRODUCTION SITES ON
U.S. FISH AND WILDLIFE LANDS, WILLISTON BASIN, MONTANA AND NORTH DAKOTA**

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Surface and subsurface contamination associated with oil and gas exploration and production in the Williston Basin has taken place on U.S. Fish and Wildlife Service lands in wetland management districts in northeast Montana and northwest North Dakota. These areas are located within the prairie pothole region of the Williston Basin, which is characterized by a shallow ground-water setting with extensive shallow lakes, ponds, and wetlands. Ground electrical conductivity and resistivity measurements were used as quick assessment tools to estimate the extent of near-surface soil and ground-water salinity. Electrically conductive zones in this setting result from both natural and anthropogenic (i.e., oil exploration and production) sources. Some high electrical conductivity zones mapped within wetlands are spatially associated with past and current oil exploration and production. Shallow core sampling and chemical analyses of wetland ground water indicate that some electrical conductivity anomalies are associated with a geochemical signature (ratio of chloride and total dissolved solids) consistent with produced waters or drilling fluids. These simple geophysical electrical conductivity mapping and geochemical methods are useful tools to prioritize areas for more detailed investigation of contamination.

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