Figure 1: Location of the Prairie Pothole Region within the United States and Canada, as well as the Des Moines Lobe (blue area in the figure on right) in Iowa.

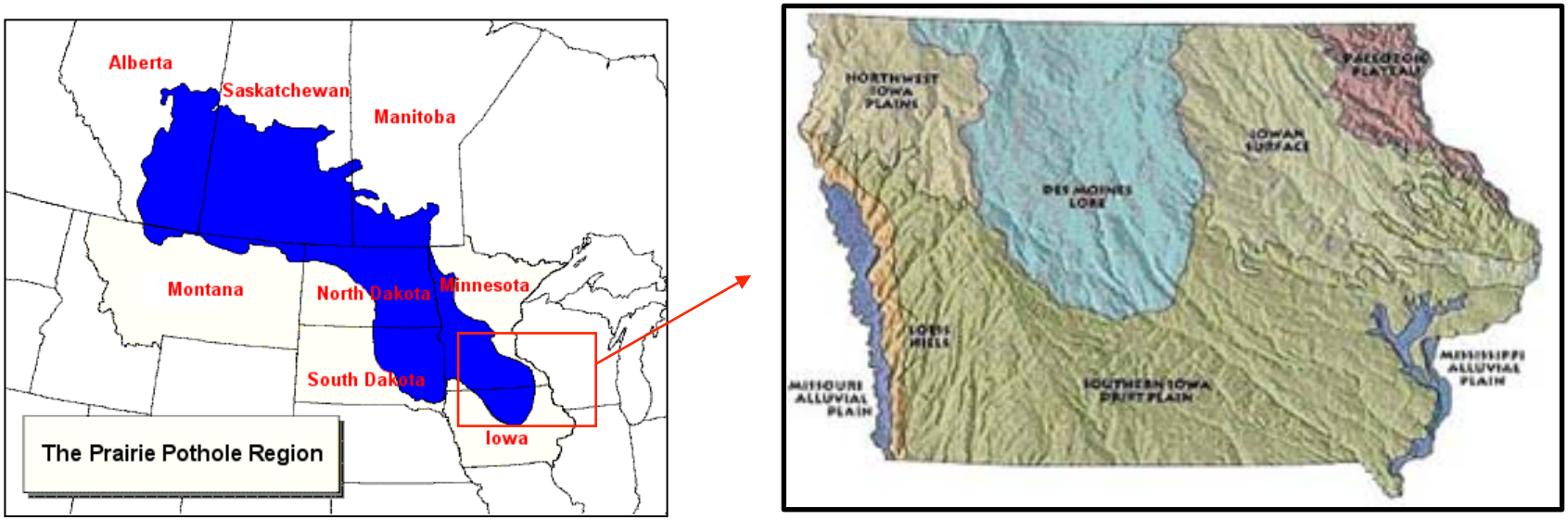

Figure 1: Aerial View of PPR Landscape

Background information	The Prairie Pothole Region (PPR) is a vast area of glacially formed depressional wetlands. The region extends from the province of Alberta in Canada to the State of Iowa in the United States. The portion of the PPR that extends into Iowa is known as the Des Moines Lobe, and covers 3.5 million ha of north central Iowa. This area consists of a high density of shallow wetlands that typically range from 1-50 ha in size.
Research and management problems	The Des Moines Lobe has been heavily farmed for the production of row crops. It is estimated that upwards of 95% of PPR wetlands within Iowa have been drained for agricultural purposes. Draining is achieved by tiling, or placing a system of drains underneath depressions to lower the water table. This extensive draining has undermined the beneficial properties of PPR wetlands including waterfowl habitat, flood control, groundwater recharge and water quality benefits. Further, draining of wetlands have exacerbated flooding problems downstream. At what point is increased agricultural production outwieghed by the negative downstream effects of weltand tiling? Many tiled depressions still produce poor crop yields, since heavy rains lead to increased wetness in these low lying areas. The management question that is of interest is whether these could potentially be converted back to their natural hydrologic state to provide overall benefits throughout the state. The state Department of Natural Resources (DNR) is restoring some of these areas, but primarily on an ad-hoc basis. What is the role of the distribution and spatial hydrologic connectivity of these wetlands on downstream impacts? Can targeted restoration of a few key depressional areas be used to maximize benefits? In order reach answers to these questions it is important to understand the hydrology and distribution of wetlands within the Des Moines Lobe. Using 1 meter resolution LiDAR data depressions can be mapped and analyzed for trends in size and distribution throughout the landscape. This information will then be used in stochastic and deterministic models to answer the questions discussed above.
Possible end-users	USGS, EPA, USDA
Site Conditions	The Des Moines Lobe consists of morainic complexes formed during the Wisconsin Glaciation 12,000 years ago. The area is generally flat with small hills and ridges interspersed by isolated depressions. The soil consists mainly of fine silty loam soil with around 20% clay, 50% sand, along with a high shale content. The area was originally a prairie landscape Land within the Des Moines lobe consists primarily of privately owned agricultural fields. Rowcrops such as corn and soybeans are the primary products grown. Many of the depressional areas that were formerly wetlands have been drained by tiling and no longer have wetland hydrology.

Monitoring and data	Extensive 1 meter LiDAR data is available for the entire state of Iowa. This information can be used to determine the location of depressions in the region. There is little available data on the location of tiles within the region. The Iowa DNR is beginning a project to attempt to map the location of tiles using aerial photos. The Iowa DNR has been monitoring wetlands within the Des Moines Lobe since 2005. Wetlands are tested for water chemistry, water contaminants, sediment, flora and fauna, and the physical setting.
Related, recent pulications	Appels, Willemijn M., Patrick W. Bogaart, Sjoerd E.A.T.M. van der Zee. 2010. "Influence of spatial variations of microtopography and infiltration on surface runoff and field scale hydrological connectivity." *Advances in Water Resources*. Brunet, Nathalie N., Cherie J. Westbrook. 2011. "Wetland Drainage in the Canadian prairies: Nutrient, salt and bacteria characteristics." *Agriculture, Ecosystems & Environment*. 146.1: 1-12. Liu, G. and F. W. Schwartz (2011), An integrated observational and model-based analysis of the hydrologic response of prairie pothole systems to variability in climate, Water Resour. Res., 47, W02504, doi:10.1029/2010WR009084. Miller, Bradley, William Crumpton, and Arnold van der Valk. (2009). "Spatial Distribution of Historical Wetland Classes on the Des Moines Lobe, Iowa." *Wetlands*. 29.4: 1146-1152.
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