

THE LAND CAPABILITY POTENTIAL INDEX:
A DECISION SUPPORT TOOL FOR THE MANAGEMENT OF MISSOURI RIVER
FLOODPLAIN HABITAT

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ABSTRACT

The Land Capability Potential Index (LCPI) is a model of potential flow-return interval and soil drainage for the lower Missouri River (Chojnacki et al., 2012). The LCPI captures critical abiotic variables known to affect the distribution of plant species, implying that it may be applied at a variety of scales to anticipate the distribution of plant species and communities and to inform management of floodplain vegetation. This thesis quantifies the current and future climate change-altered distribution of LCPI classes, variation in groundwater response to changes in river stage according to soil drainage classes, and relationships between LCPI classes and the distribution of plants species and communities on the Missouri River floodplain.

Longer flow return intervals in the upper reaches of the river reflect the far-reaching effects of management of the Missouri River reservoir system. Flow-return intervals tend to increase through incising sections and decrease through stable and aggrading section. Tributaries are associated with longer flow-return intervals in both ecological provinces, and with poorer soil drainage in the prairie province. Modeled climate change is likely to induce shift towards more frequently flooded conditions throughout the modeled area. Weak evidence suggests that better drained soils have larger and longer groundwater responses to flow pulses.

Classes in the LCPI often are more strongly correlated to the distribution of species than are other factors known to affect species distribution. Chi-square analyses and analyses of variance on ranks indicate that the distributions of six exotic species, five native species groups, and 15 mapped communities are significantly related to soil drainage, flow-return interval, or both. These results indicate that the LCPI captures variables relevant to the distribution and management of plant species and communities on the Missouri River floodplain.