

Public Abstract

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Title:The Land Capability Potential Index: a decision support tool for the management of Missouri River floodplain habitat

The Land Capability Potential Index (LCPI) is a hydrogeomorphic model of potential flow-return interval and soil drainage developed as a decision support tool for the restoration and management of floodplain habitat on 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.

Relationships between naturally-occurring floodplain vegetation and LCPI classes in a post-agricultural setting were quantified using existing plot data and vegetation community maps. Multivariate analyses indicate that 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 tests and analyses of variances indicate that the distributions of six exotic species are significantly related to soil drainage, flow-return interval, or both. Five species groups representing herbaceous wetlands (sedges and smartweeds), early-successional woody communities (willows and cottonwood), and late-successional forests also exhibit significant relationships with LCPI classes that are consistent with the known life-history traits of constituent species. Similar analyses of mapped community distributions in relation to LCPI classes confirm the analyses of species abundance data and support the conclusion that the LCPI model is capturing abiotic variables relevant to the distribution and management of plant species and communities on the Missouri River floodplain.

Results indicate that the LCPI can be used by resource managers at multiple scales to inform planning, land acquisition, and management of Missouri River floodplain habitat. As the abundance of LCPI classes changes with ecological province, river section, and near tributaries and other hydrologic features, so too do the opportunities for and limitations against management for particular plant species and communities. At broad scales, this information can be used to develop a conservation portfolio that meets broad habitat objectives. At moderate scales, the LCPI can be used to assess the relative values of sites in terms their ability to support target communities, and to plan the spatial arrangement of communities. At the site-level, the LCPI can be used to identify areas that are more or less susceptible to invasion by non-native species and more or less likely to support desired species. Though not tested as part of this thesis, results also suggest that the LCPI can also be used in an adaptive management framework to implement and assess the effects of management actions intended to promote target species and communities.