



An Ecological and Habitat Vulnerability Assessment of Arkansas' White River Basin

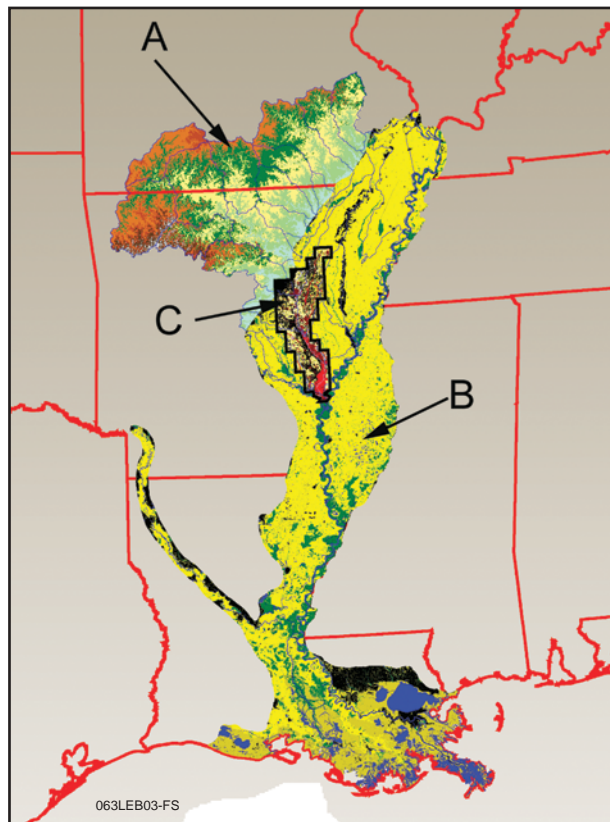
Project Overview

In the summer of 2000, the U.S. EPA's Office of Research and Development was requested to collaborate in a U.S. EPA Region 6 Regional Applied Research Effort (RARE). The primary goal of this RARE is to utilize current science and technology to improve the assessment capabilities of ecological and habitat vulnerability in the White River Basin (Arkansas). This RARE is also being conducted in the relevant surrounding areas of the Lower Mississippi River Valley and builds upon the results of U.S. EPA's ecological assessment of the Louisiana Tensas River (EPA/600/R-99/016).

Project Geographical Coverage

The risk of surface water impairment as a result of land cover configuration and change potential was assessed

and reported for the White River's drainage basin (left, A), bounded by the U.S. Geological Survey Hydrologic Unit Codes (HUCs) 0802 and 1101. The risk of habitat damage or loss as a result of land cover change was assessed and reported for the "Omernik" Mississippi Alluvial Valley (MAV) Ecoregion (left, B), which includes a portion of HUC 0802. A portion of Arkansas' Lower White River Basin (left, C), which includes a 9,000 square kilometer sub-region of the MAV Ecoregion, was utilized to test habitat vulnerability methodologies at a relatively fine scale. The fine-scale study area (left, C) was selected in conjunction with the U.S. Fish & Wildlife Service and Regional EPA scientists, such that the White River National Wildlife Refuge (NWR), Cache River NWR, and Bald Knob NWR (Arkansas) were included. These three National Wildlife Refuges contain a large proportion of the last-remaining bottomland hardwood swamps of the Mississippi River Valley.



Project Goals and Approach

HABITAT VULNERABILITY ASSESSMENTS:

- Create GIS models of habitat suitability for plant species, animal species, and guilds using published Habitat Suitability Index (U.S. Fish & Wildlife Service) and life history documentation
- Utilize fundamental ecological principles of habitat patch dynamics to determine vulnerability to loss or degradation
- Utilize land cover gradients in the Lower White River Basin and MAV Ecoregion to model current and future landscape change scenarios

WATER QUALITY VULNERABILITY ASSESSMENTS:

- Utilize landscape-ecological metrics (e.g., percent forest cover) and land cover gradients among watersheds in the White River Basin to determine water quality impairment vulnerability
- Validate modeled relationships between landscape-ecological condition and surface water quality using the National Water Quality Assessment Program (U.S. Geological Survey) water chemistry data

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Habitat Vulnerability Assessment Parameter

Overview: U.S. FWS Habitat Suitability Index factors for mallard duck (below, left), black bear, least tern, and wetland plants; habitat patch area; habitat patch perimeter; habitat interior-to-edge ratio; habitat shape indices; unified patch index; current human population density; future human population density; road indices; unified human disturbance index; and a unified vulnerability index (below, left)

Water Quality Vulnerability Assessment

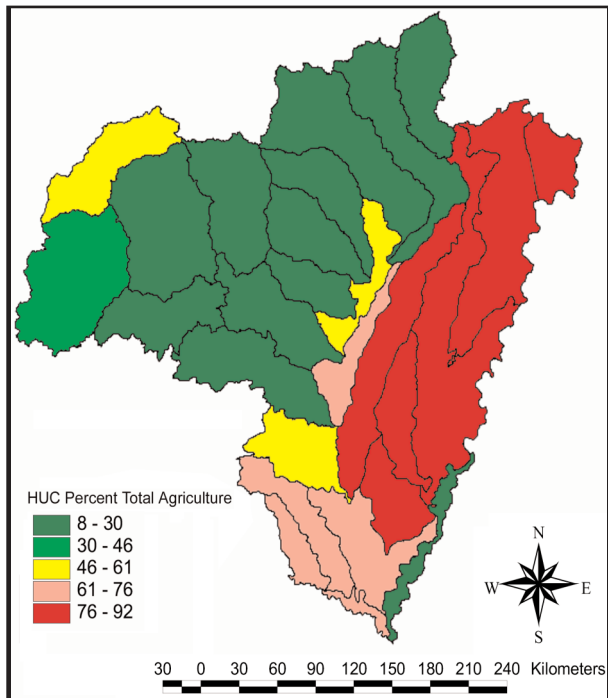
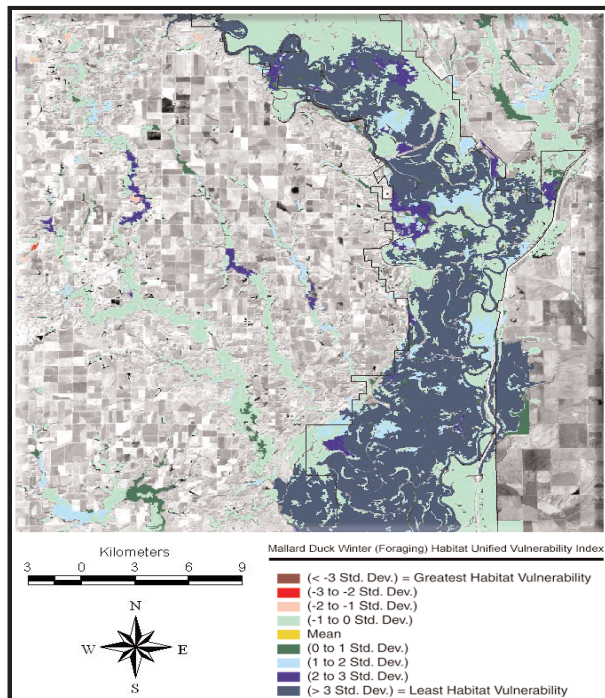
Parameter Overview (measured among HUCs and within riparian zones): percent forest cover; largest forest patch proportion of watershed; mean forest patch area; largest forest patch area; percent crop agriculture; percent pasture; percent total agriculture (below, right); percent barren land; percent urban and built-up; percent wetland; percent human-use; percent natural land cover; and percent agriculture on steep slopes

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