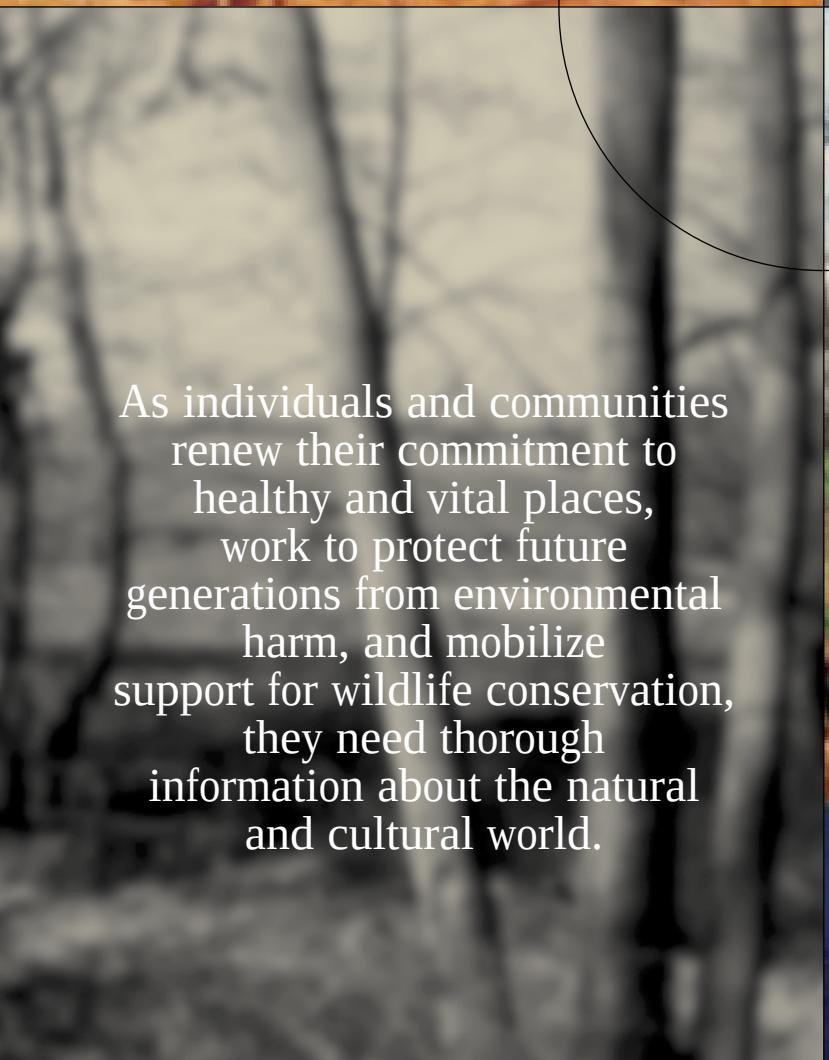


As individuals and communities renew their commitment to healthy and vital places, work to protect future generations from environmental harm, and mobilize support for wildlife conservation, they need thorough information about the natural and cultural world.

CASE STUDIES

As the impact of land-use on natural resources increases in complexity and extent, so does the need for more effective analysis and management. This issue of Futurity News focuses on new approaches for managing natural resources. Through two case studies, we define how management needs can be addressed on different geographic scales.

The first case study illustrates Futurity's ability to map conservation interests. Database and Geographic Information System (GIS) analysis illustrate how the priorities and capabilities of conservation organizations can be linked to regional resource management needs.

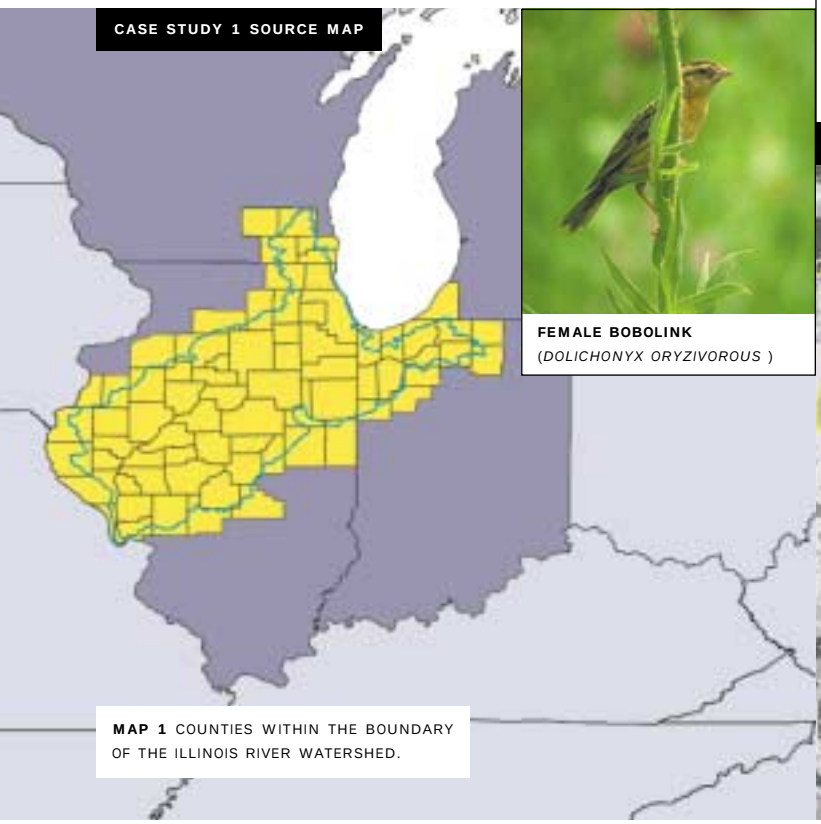
The second case study demonstrates how land-cover analysis can guide habitat management. Futurity uses GIS to assess habitat quality and identify site specific opportunities for increasing available habitat.

TOOLBOX

Effective habitat management strategies require a thorough understanding of ecological relationships. Futurity uses 'landscape metrics' as a tool to obtain this information. Landscape metrics characterize landscape structure through indices that depict the shape and distribution of land-cover conditions. For example, the quality of a prairie can be studied using indices such as edge, shape and core area.

Landscape metrics draw upon different scales of research and knowledge to produce telling results. But landscape metrics alone cannot guide decision-making. They must be used with other information such as species monitoring counts. In this context, landscape metrics and species counts are mutually beneficial. Landscape metrics determine potential monitoring locations, and monitoring data validate the accuracy of metric analyses. Futurity's integration of landscape metrics with field data enables ecological relationships to be quantified as well as visualized.

CASE STUDY 1 SOURCE MAP



FEMALE BOBOLINK
(DOLICHONYX ORYZIVOROUS)

MAP 1 COUNTIES WITHIN THE BOUNDARY OF THE ILLINOIS RIVER WATERSHED.

CASE STUDY 2 SOURCE MAP

MAP 2 LAND-COVER / LAND-USE MAP WITH FOREST PRESERVE BOUNDARIES (YELLOW) AND SURROUNDING URBAN LAND-USE.

FUTURITY INC 5121 NORTH RAVENSWOOD AVENUE CHICAGO, ILLINOIS 60640 773-506-2007
DAVID BIER, PRINCIPAL DCBIER@FUTURITYINC.COM WWW.FUTURITYINC.COM

ACHIEVING COORDINATION FOR EFFECTIVE MANAGEMENT STRATEGY

Coordinated and cooperative undertakings are not easy to achieve. When they happen, the results can be substantial. For example, as important as land trusts and conservation organizations are individually in protecting and managing habitat, they can multiply their impacts by linking efforts. Federal and state agencies can foster linked roles by working with these organizations to target objectives and coordinate activities.

The interests and capabilities of land trusts and environmental organizations can be mapped to facilitate the formation of a coordinated regional land management strategy. For the following two applications, Futurity used a database and Geographic Information System (GIS) to identify Illinois-based land trusts and conservation organizations that are active in the Illinois River watershed (Map 3). The 180 organizations that were identified as having interests in the watershed were filtered to identify those that particularly matched the purpose of each application.

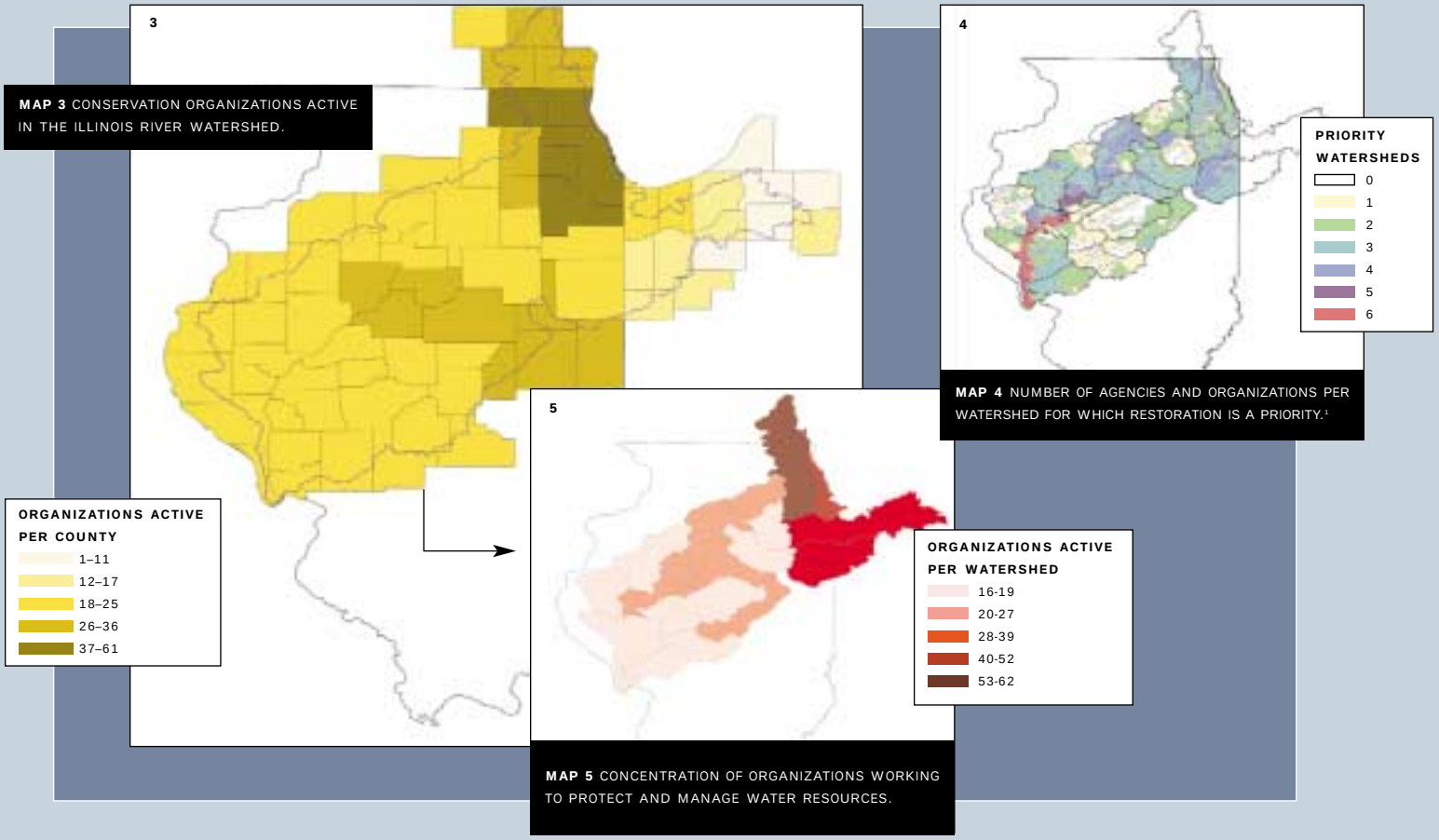
Application 1 – Protecting the Illinois River: In Illinois, five federal and state agencies, and The Nature Conservancy, are working together to identify watershed restoration priorities. An Integrated Priorities map was produced by this working group to coordinate restoration activities and resources (Map 4).

Futurity selected organizations working to protect and manage water resources. The area of operation for these 116 organizations was then mapped to identify concentrations of activity (Map 5). A comparison between the two maps shows areas targeted as high priority and those having low levels of conservation activity.

Application 2 – Managing Bobolink Breeding Habitat: The Bobolink is a grassland bird species that migrates from central South America to breeding range in North America (Map 6). In Illinois, loss of suitable habitat, including prairies, grasslands and hayfields has caused the population of this species to decline.[2]

Reversing the decline of Bobolinks in Illinois requires a state-wide habitat management plan that focuses on providing large areas of suitable habitat and on controlling the succession of vegetation.[3]

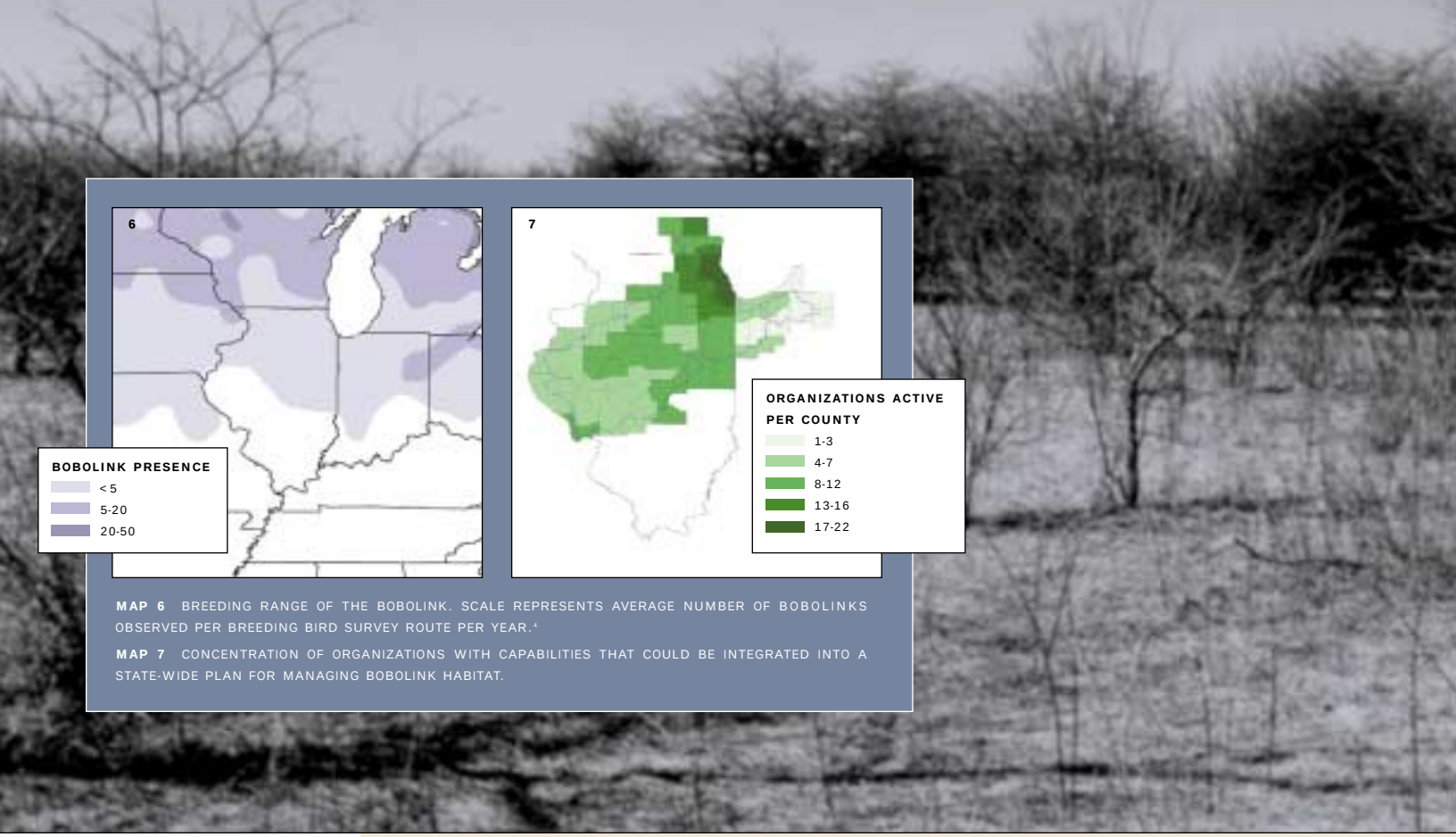
Futurity selected organizations with capabilities (land acquisition, management and restoration) that could be integrated and coordinated through a plan for managing Bobolink habitat. The area of operation for the 80 identified organizations was mapped (Map 7). This served to identify areas with high potential for coordinating conservation activities.



MAP 3 CONSERVATION ORGANIZATIONS ACTIVE IN THE ILLINOIS RIVER WATERSHED.

MAP 4 NUMBER OF AGENCIES AND ORGANIZATIONS PER WATERSHED FOR WHICH RESTORATION IS A PRIORITY.[1]

MAP 5 CONCENTRATION OF ORGANIZATIONS WORKING TO PROTECT AND MANAGE WATER RESOURCES.



MAP 6 BREEDING RANGE OF THE BOBOLINK. SCALE REPRESENTS AVERAGE NUMBER OF BOBOLINKS OBSERVED PER BREEDING BIRD SURVEY ROUTE PER YEAR.[4]

MAP 7 CONCENTRATION OF ORGANIZATIONS WITH CAPABILITIES THAT COULD BE INTEGRATED INTO A STATE-WIDE PLAN FOR MANAGING BOBOLINK HABITAT.

MANAGING HABITAT WITHIN THE URBAN LANDSCAPE

When grassland is divided by a road, the impact extends far beyond the pavement. For some species such as the Savannah Sparrow, Grasshopper Sparrow, and Henslow's Sparrow, the impact of the intrusion is dramatic. These area-sensitive grassland bird species have a low rate of breeding success in areas where habitat is broken into isolated fragments.[2]

In this case study, Futurity analyzed a section of northwest Cook County, Illinois, using a Geographic Information System (GIS) to identify options for managing habitat for these three area-sensitive grassland sparrows.* The first step was to identify potential habitat (see "Identifying Potential Habitat"). From this, options for managing habitat quality were considered.

Land managers can promote habitat quality by minimizing edge conditions and maximizing core area. Core area is internal area removed from noise, predators or parasitic species. Area-sensitive grassland birds require significant amounts of core area to survive. Map 8A shows a patch of grassland that has a great deal of edge and very little core area. Of the original 422 hectares, only 93 hectares of core habitat remain after edge effect is taken into consideration. However, edge effect can be managed by targeting specific areas within a habitat for restoration. By restoring the hedgerows and islands of unassociated woody vegetation in Map 8A to grasslands, core area would increase from 93 to 152 hectares (Map 8B).

Sometimes, the effective size of a habitat can also be increased by managing adjacent land covers.[5,6] For example, several row crop agricultural fields are adjacent to potential habitats identified in this study. These fields could be converted to grain crop or placed in a conservation reserve program—in effect, connecting the grasslands to functional habitat (Maps 9A-9D).[2] The result is an expanded habitat with less edge and more core area.

*LAND-COVER INFORMATION USED IN THE ANALYSIS WAS PROVIDED BY A LAND-COVER/LAND-USE MAP PREPARED FOR CHICAGO WILDERNESS BY THE FIELD MUSEUM OF NATURAL HISTORY AND FUTURITY, INC. (MAP 2). THIS MAP WAS CREATED BY COMBINING THE CHICAGO WILDERNESS 1997 LAND-COVER MAP AND THE NORTHEASTERN ILLINOIS PLANNING COMMISSION 1995 LAND-USE MAP.

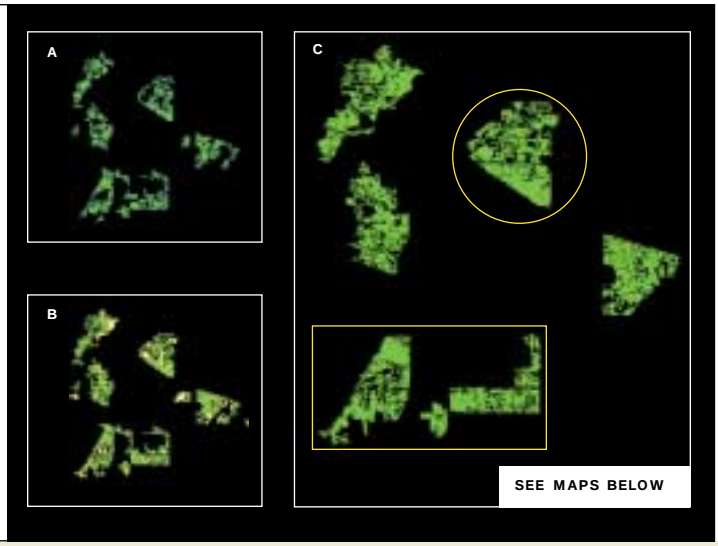
IDENTIFYING POTENTIAL HABITAT

HABITAT FOR GRASSLAND BIRDS CAN BE DIVIDED INTO TWO CLASSES– PRIMARY AND SECONDARY. PRIMARY HABITAT PROVIDES THE FUNDAMENTAL LIFE REQUIREMENTS OF A SPECIES. SECONDARY HABITAT MUST BE ADJACENT TO PRIMARY HABITAT, AND MUST PROVIDE SOME LIFE REQUIREMENT NEEDS.

POTENTIAL PRIMARY HABITAT FOR THE SAVANNAH SPARROW WAS DEFINED AS GRASSLANDS (MAP A). CASE STUDY ANALYSIS WAS LIMITED TO ONLY THOSE GRASSLAND PATCHES THAT MET THE 'MINIMUM SIZE CRITERIA' FOR THE SPECIES.

FOR THE SAVANNAH SPARROW, SECONDARY HABITAT INCLUDED LAND-COVER TYPES THAT, WHEN COMBINED WITH GRASSLANDS, CAN PROVIDE PROTECTIVE HABITAT (MAP B).

AFTER THE POTENTIAL PRIMARY AND SECONDARY HABITATS WERE IDENTIFIED FOR THE SAVANNAH SPARROW, GRASSHOPPER SPARROW, AND HENSLOW'S SPARROW, THEY WERE OVERLAYED TO IDENTIFY THE INTERSECTION OF POTENTIAL HABITATS FOR ALL THREE (MAP C). THIS MAP WAS USED TO ADDRESS CORE AREA MANAGEMENT NEEDS.



MAP 8A HABITAT REDUCED BY EDGE EFFECT: EDGE EFFECT - 60 METER BUFFER (RED), AVAILABLE CORE AREA (WHITE).

MAP 8B LAND MANAGERS CAN INCREASE CORE AREA SIZE BY TARGETING SPECIFIC AREAS (HEDGEROWS, ISLANDS OF UNASSOCIATED WOODY VEGETATION) WITHIN A HABITAT FOR RESTORATION.

MAP 9A INTERSECTION OF POTENTIAL PRIMARY AND SECONDARY HABITAT FOR FOCUS SPECIES.

MAP 9B POTENTIAL HABITAT REDUCED BY EDGE EFFECT.

IF MANAGED PROPERLY, ADJACENT LAND-COVERS MAY INCREASE THE EFFECTIVE SIZE OF A HABITAT.

MAP 9C POTENTIAL PRIMARY AND SECONDARY HABITAT WITH ADJACENT ROW CROP AGRICULTURE AREAS.

MAP 9D POTENTIAL HABITAT REDUCED BY EDGE EFFECT.

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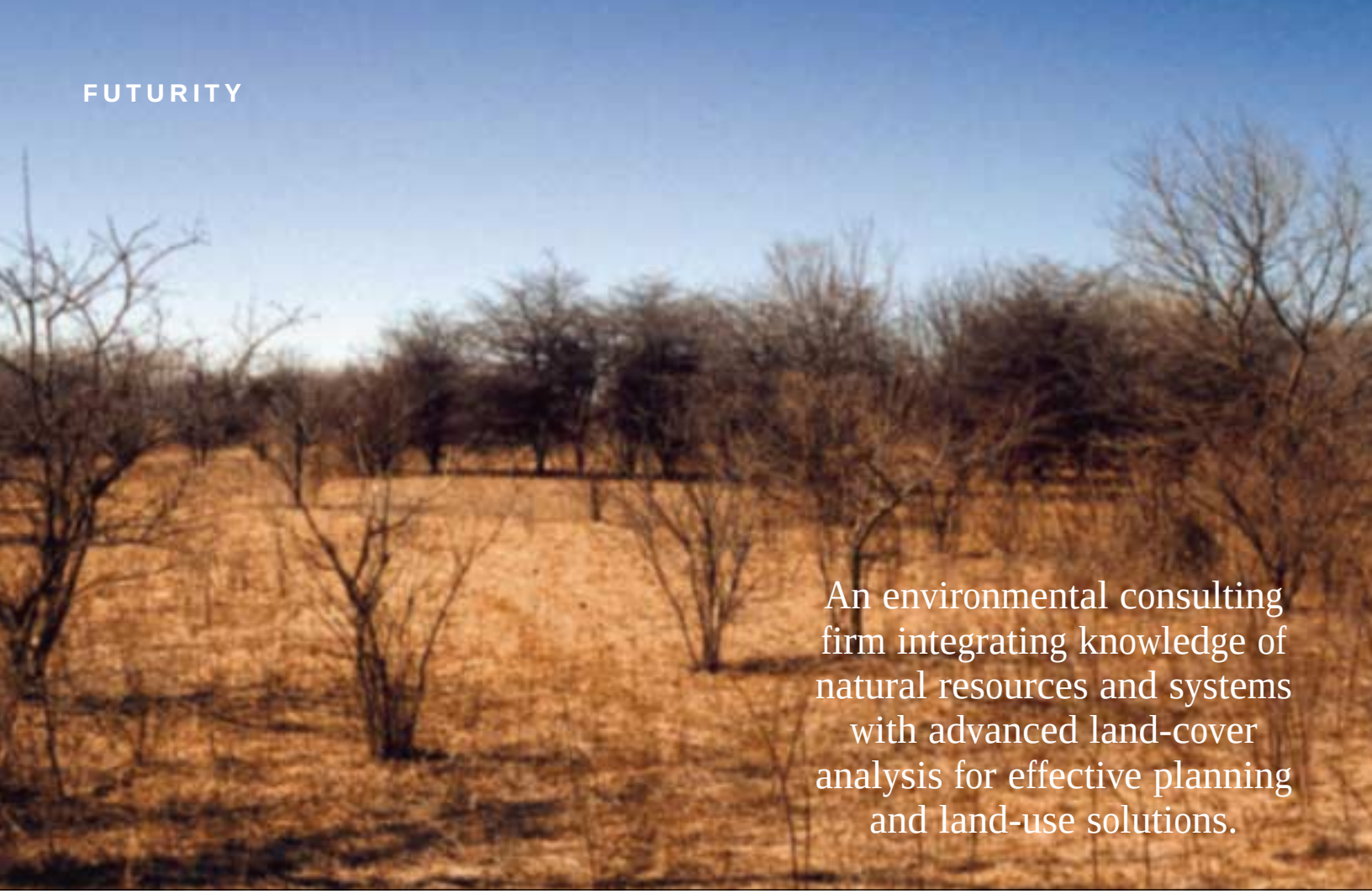

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FUTURITY INC
5121 NORTH RAVENSWOOD AVENUE CHICAGO, ILLINOIS 60640
773-506-2007 WWW.FUTURITYINC.COM