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Social Science Methods Used in the RESTORE Project

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Abstract

The RESTORE (Rethinking Ecological and Social Theories of Restoration Ecology) project is an interdisciplinary, multi-institutional research endeavor funded by the National Science Foundation's Dynamics of Coupled Natural and Human Systems program. The goal of the project is to understand the links between organizational type, decision making processes, and biodiversity outcomes in the context of ecological restoration of oak woodlands in the Chicago metropolitan area. This paper describes the procedures used to design, implement, and analyze the social data gathered for the project. Here we provide the useful details about methods that rarely fit in journal articles. We also provide appendices of all research tools. The size and interdisciplinary nature of the project make such documentation necessary. We hope this report can also serve as a guide for future large-scale interdisciplinary projects.

Cover Photo

Prescribed burn in an oak woodland and savannah. Photo by Kristen Ross, used with permission.

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INTRODUCTION

Over a century ago, what is now called the Burnham Plan was laid out for the greater Chicago area. This iconic plan included a mosaic of natural and recreation areas that created a unique legacy for the Chicago region. These open spaces were planned to preserve biodiversity as well as create space for humans to interact with nature (burnhamplan100.org, accessed July 2012). In the past 17 years an alliance of more than 360 member organizations and partners called Chicago Wilderness has built upon that legacy to integrate the natural and human components of the landscape (www.chicagowilderness.org). The alliance includes local, state, and federal agencies; large conservation organizations; cultural and education institutions; volunteer groups; corporations; and faith-based groups working together to adopt a regional, collaborative approach to conservation. Besides representing the alliance itself, the name Chicago Wilderness has evolved to represent both the managed open spaces and the entire metropolitan region containing these areas. The region includes more than 370,000 acres of protected lands and waters across southwest Michigan, northwest Indiana, northeast Illinois, and southeast Wisconsin (Fig. 1). Diverse and often rare flora and fauna live within this heterogeneous landscape of prairies, savannas, woodlands, flatwoods, and wetlands.

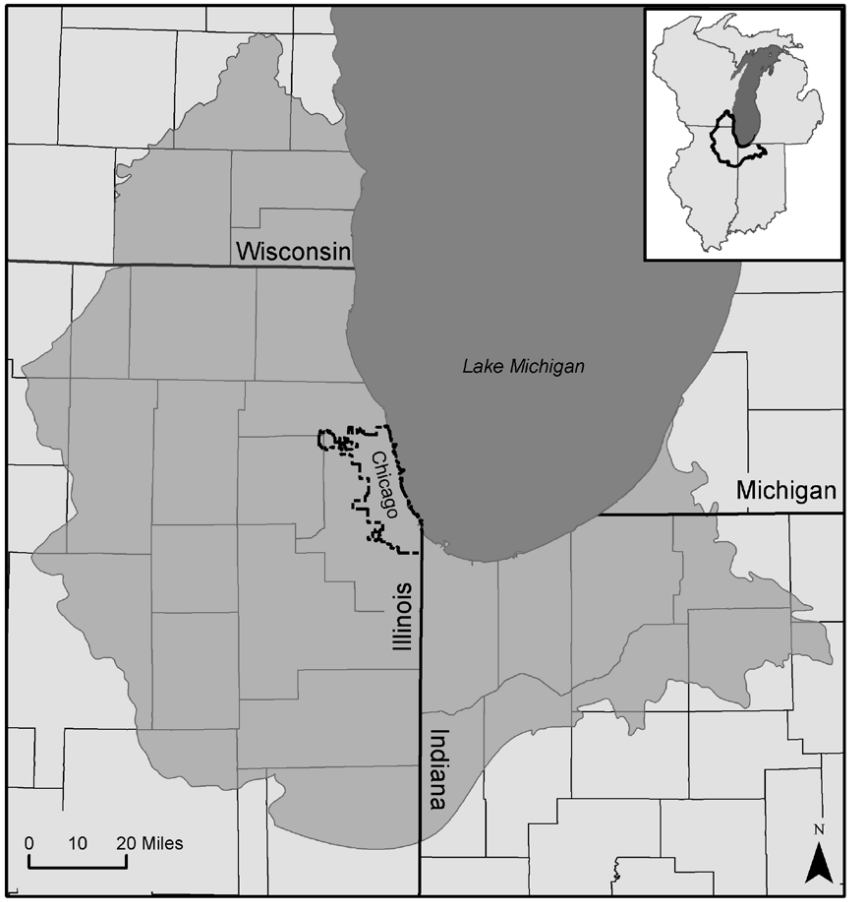

Figure 1.—The Chicago Wilderness region.

The overarching goal of the Chicago Wilderness alliance is to enhance the quality of life of residents in the region by protecting and restoring local ecosystems. Typically, these natural systems require intensive, sustained management, usually in the form of ecological restoration activities, such as the removal of invasive species or the use of prescribed fire, to achieve conservation goals. Effective management of these ecosystems requires a collaborative approach that includes a comprehensive ecological understanding of the managed habitats as well as knowledge of the social systems and institutional settings in which conservation plans are developed and implemented.

Restoration in the Chicago Wilderness region is conducted by professional land managers, contractors, volunteer stewards, and others. In fact, volunteers started conducting restoration in the 1970s and forged the way for many land owning agencies (Stevens 1995). However, diverse perspectives emerged on whether, how, and for what purposes restoration should be conducted, leading to a temporary moratorium on all restoration activities (Alario 2000, Gobster and Hull 2000). The moratorium primarily impacted work in Cook County, but those effects reverberated to other counties as well. The moratorium was lifted quickly in most areas, but lasted a decade in Cook County. Today, restoration activities are underway in Cook County and across the Chicago Wilderness region. Although diverse perspectives remain, and individual member organizations retain autonomy, the Chicago Wilderness alliance has the ability to facilitate dialogue and achieve consensus on approaches to restoration.

Over the past 15 years, research has been conducted within the context of the Chicago Wilderness mission (Belaire et al. 2011, Council 1999, Dearborn and Kark 2010, Dreher 2009, Glennemeier 2004, Gobster and Hull 2000, Heneghan et al. 2009, Heneghan et al. 2012, Moskovits et al. 2004, Wang and Moskovits 2001). Building on this foundation of multidisciplinary work, we present here the background, justification, and procedures used to devise and implement the collection and analysis of the data gathered as a part of the RESTORE project. RESTORE (Rethinking Ecological and Social Theories of Restoration Ecology) is an interdisciplinary project that integrates research in restoration ecology and the institutional arrangements involved in land management and restoration planning. U.S. Forest Service scientists consulted heavily on this project while researchers at the University of Illinois, DePaul University, and The Field Museum collected data and managed the funds. We focus on the ecological restoration of oak woodlands and savannas in the Chicago Wilderness region as a model for investigating how the planning processes related to restoration and land management link to biodiversity outcomes in complex metropolitan landscapes. Using social-ecological systems as a broad framework, we use related theories of collective action and resilient governance and complementary theories from environmental psychology (e.g., place attachment and landscape preference) to frame and analyze the ways in which diverse groups of people conceptualize ecological restoration and make decisions about it.

Theoretical Perspective

The high degree of anthropogenic disturbance in metropolitan areas imposes significant challenges to the management of habitats of high conservation value (Miller and Hobbs 2002, Palmer et al. 2004). Devising management solutions to problems associated with the degradation of natural resources is complex because solutions require an understanding of both

the resource and the institutions (loosely defined as "ways of organizing activities" (Dietz et al. 2003) that govern them (Folke et al. 2005, Ostrom 2005)). In addition, effective management requires an understanding of the environmental context, from local to global scales, in which the ecosystems of concern are situated, and the social, economic, and political settings in which management planning occurs and in which management outcomes are evaluated (Ostrom 2007). An organization's environmental management plans are derived from rule-driven processes of engagement between multiple actors that have overlapping but at times dissimilar attitudes, motivations, and access to power. These actors must consider the equally diverse opinions and values of actors outside of the immediate decision making process (e.g., board members, neighbors, natural area users). In governing the resource, managers therefore face the challenge of integrating information on all of these biophysical and social components.

Information relevant to management decisions can be drawn from a variety of sources, including experience derived from prior management, results emerging from scientific investigations, and insights emerging from traditional knowledge (Berkes and Folke 1998, Moller et al. 2004). Given the diverse set of actors and information in management of common pool or other natural resources, it seems unlikely that a simple or generalizable approach to governing systems will be useful or even feasible. In fact, a number of researchers have cautioned against a so-called panacea approach (Berkes 2007, Ostrom 2007, Ostrom et al. 2007). No one ownership approach (e.g., government vs. private ownership) and no single conservation strategy (e.g., community vs. government programs) are likely to lead to optimal management for all systems. Recognizing the uncertainty associated with the resource base and the institutions governing them, researchers cannot offer models that infallibly direct the sustainable management of a given resource—and nowhere is this more true than in ecological restoration. The alternative is to develop a diagnostic approach whereby researchers, based upon well-designed experiments, can suggest suitable starting points for governance and monitoring. Further, these starting points can be accompanied by learning from a variety of policy alternatives and adapting management in light of feedback from the varied outcomes that emerge from implementing these alternatives (Brock and Carpenter 2007, Ostrom 2007). The RESTORE project builds on these suggestions to understand the multitude of institutional arrangements that exist in the Chicago Wilderness alliance, and through the decisions that are made within these arrangements, whether and how they impact biodiversity outcomes on the ground.

Goals and Objectives

Our primary research goal was to generate results relevant to the conservation management of habitats of global conservation significance (e.g., oak savanna and woodlands) while simultaneously contributing to a general understanding of institutional responses to the challenges of balancing multiple objectives, and the way information derived from heterogeneous sources is incorporated into the planning process. To date, research into the success of restoration has focused only on biological and physical outcomes (Hobbs 2007, Ruiz-Jaen and Aide 2005). To achieve long-term success, however, restoration goals and outcomes must meet human needs and interests, fit with local ideas about proper land management, and fit within the broad array of benefits and services people expect from open space (e.g., Brooks et al. 2006). Using the Chicago Wilderness alliance as a model social-ecological system, our research had the following objectives:

1. To generate iterative Agent-Based Models based upon the behaviors of decision making groups that explore how their interactions may lead to different decision making strategies
2. To investigate and describe the human components of the management action arena involved in ecological restoration, including both the participants and the planning process itself
3. To document the range of biodiversity outcomes in woodlands and savannas undergoing restoration in the Chicago Wilderness region
4. To test hypotheses about the relationship between distinct styles of the restoration planning process and biodiversity outcomes
5. To investigate the potential impact of differences in biodiversity outcomes and different planning processes that may feed back to the broader human communities, in particular, increased (or decreased) support for, and involvement in, restoration and conservation of biodiversity by people not directly involved with restoration

Understanding the perspectives of constituency groups and the governance rules that determine how management plans develop will provide tools to inform future conservation planning processes. The connections between the planning process and biodiversity outcomes have some reinforcing components: planning processes that result in positive conservation outcomes for humans and nature may reinforce willingness by different constituents to engage in and support further restoration efforts. A broader representation of constituencies may permit the shaping and implementation of management strategies that are perceived as less controversial, thereby permitting more effective biodiversity management. We asked if different and predictable biodiversity outcomes (populations and community attributes, and ecosystem processes) are linked to styles of management characterized by a suite of individual and institutional characteristics (described below).

Framework

To achieve the objectives of this interdisciplinary research, we used several methodological approaches and analytical techniques. The Institutional Analysis and Development (IAD) framework (Ostrom 2005) defines and categorizes the variety of actors, resources, and interactions within our study's social-ecological system (Fig. 2). The framework allows for the analysis

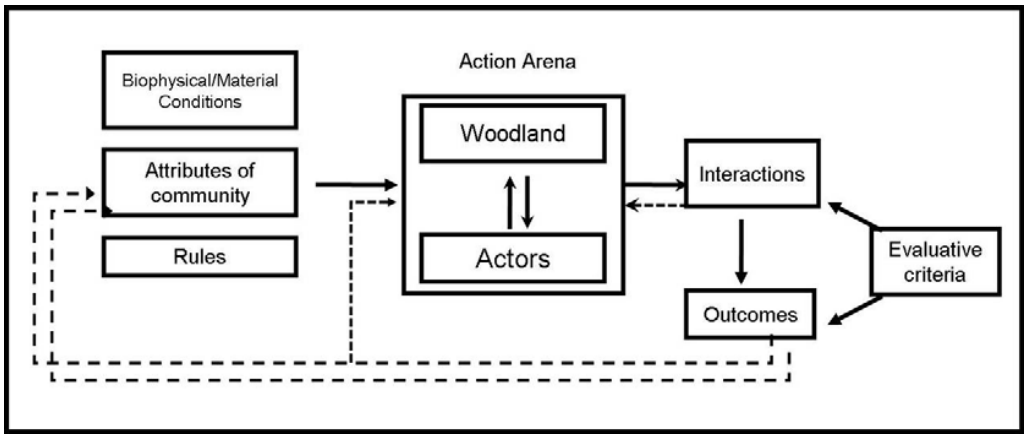

Figure 2.—Institutional Analysis and Development (IAD) Framework, modified from Ostrom (2005) per discussions with IAD scholars at the Ostrom Workshop on Political Theory and Policy Analysis on February 11, 2013.

and comparison of collaborative, inter-organizational processes (Imperial 1999) and rules of engagement in natural resource management partnerships (Hardy and Koontz 2009). The framework has been used to gain a better understanding of the conditions under which successful resource management institutions are most likely to emerge (e.g., Andersson 2006, Chhatre and Agrawal 2008, Gibson et al. 2000). Although the framework has been applied primarily to extractive situations, we applied it to the value-adding practice of ecological restoration. We describe below the methods used to inform several components of the framework. Note, too, that we present a modified version of the framework. Based upon discussions with members of the Ostrom Workshop, we have removed the label for exogenous variables found in earlier versions describing the left hand section components (personal communication, Daniel Cole, February 11, 2013). By doing so, we have clarified the role of the biophysical conditions, community attributes, and rules as having direct bearing within and upon the action arena.

Informing the framework components

We developed research components to ask questions of multiple components of the ecological restoration social-ecological system within the Chicago Wilderness region (Fig. 3). First, to represent and analyze the complexity of collective decision making in the action arena of ecological restoration, which involves patterns of interactions among heterogeneous and autonomous actors across time and space, we created a stylized agent-based model (ABM) (Janssen and Ostrom 2006, Ostrom 2007, Zellner 2008). Based on a priori knowledge and some preliminary ethnographic data, the model investigated the ways in which structural and behavioral factors (management styles) influence collective decision making in the context of ecological restoration. The purpose of the model was to establish general relationships between management styles and decision outcomes (Watkins et al. 2013). Second, we conducted in-depth interviews and participant observation (ethnography) to understand a suite of attributes

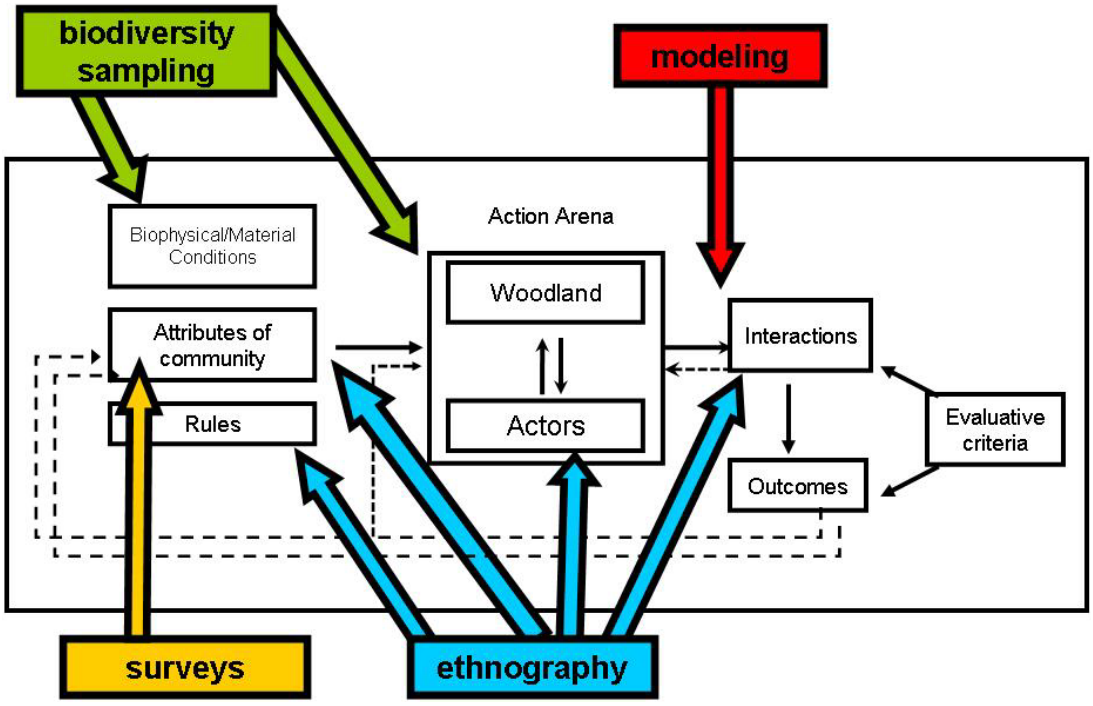

Figure 3.—The methods used to inform the components of the IAD framework.

(i.e., underlying attitudes, beliefs, behaviors, knowledge, and emotions) associated with the actors within the action. These methods were also used to reveal the rules, norms, and strategies that guide decision making behaviors (i.e., the management actions conducted on the ground as well as the organizational decision making processes). The development of the ABM and the interview implementation and analysis were done simultaneously, because they informed each other. Third, we documented biodiversity currently present on the ground in our study sites to reveal the biophysical conditions and attributes that may be linked to the planning processes of each site. Fourth, to reveal feedbacks between non-decision makers (attributes of the community) and restoration decision processes and outcomes, we surveyed visitors of and residents around each natural area to understand their perceptions and use of natural areas as well as their own yards. We also implemented a scenario-based survey of residents, managers, and volunteers. Fifth, we created a second ABM in which we tested case-specific scenarios from our ethnographic data.

SITE SELECTION CRITERIA

1. Oak woodland or savanna
2. Under restoration management for 5 or more years
3. Accessible to the public
4. Nearby residential neighborhoods
5. Sufficient sample size in each of three stratifications of management style

Case and Site Selection

Selection of both sites and cases was based on the following five criteria. To reduce ecological variance, and because of the impressive and symbolic nature of the oak habitat in Chicago, we chose to focus on natural areas (sites) dominated by upland oak woodland/savanna canopy species. To make connections between decision making processes and management actions and biodiversity outcomes on the ground, each natural area had undergone ecological restoration activities for at least 5 years. Given our interest in the feedback between public use and perceptions, each natural area had to be accessible to the public via trails or roads, and surrounded by residential neighborhoods within a half-mile radius. Lastly, to test whether management styles led to different biodiversity outcomes, each organization (case) fit into one of three categories of restoration planning and implementation. Categories are described by attributes of the participants themselves as well as the decision making process and the structure and function of the organization. These categories fit diverse management styles observed within the Chicago Wilderness alliance:

1. *Manager-led cases* are those in which managers (paid staff) are dominant in decision making and on the ground management; coded in all analysis as the "M" cases. There are four manager-led cases in our study.
2. *Co-managed cases* are those in which there is a high degree of volunteer participation and autonomy and the landowner may or may not be active in decision making and management; coded in all analyses as the "C" cases. There are four co-managed cases in our study.
3. *Research cases* are those in which scientific exploration is central to restoration activities; coded in all analyses as the "R" cases. There are two research cases in our study.

The categorization was based on research team members' knowledge of Chicago Wilderness history and existing conservation organizations. Categories were confirmed with preliminary interviews with representatives of each restoration organization involved in decision making and in preliminary site visits. In the interviews, we asked questions about the planning process as well as ecological questions about the restored natural areas. The ecological criterion "under restoration for at least five years" was set to ensure that sufficient time had elapsed for biodiversity changes from restoration activities to have occurred. To test our findings (that is, the relationship between the planning process and biodiversity outcomes), we delayed social science data collection on two replicate cases (one manager case and one co-management case) until the results of the first set of cases were analyzed (there were no other Research cases to test). Ecological data were collected at all sites simultaneously.

Case Descriptions

C1, C2, C3: The volunteers conduct restoration work on their designated sites with the permission of the county land owning agency (denoted hereafter as C1-3). The land owning agency approves general management plans and provides tools, occasional contract work, staff assistance, and administrative support. The land owning agency is overseen by a paid, elected board that oversees not only open-space governance and management but also all other county governance matters.

SITE STEWARD: A trained volunteer focused on a particular site or area of a site. Site stewards make decisions about restoration at that site or for that area (although the extent of these decisions and the level of autonomy for each steward may vary). They may also lead workdays and supervise other volunteers.

C1: Volunteers have been conducting restoration on this[1] site (~40 ha) for more than 20 years. Site stewards make most of the restoration decisions and have been with the site since restoration began. They work in conjunction with a larger grassroots group of volunteer stewards of other nearby sites; these volunteers meet about bi-monthly to discuss the management needs of all of their sites. Regular volunteer workdays on the site attract both experienced and new volunteers. There is no paid staff restoration work aside from occasional operations staff and contractor assistance with large restoration tasks.

C2: Volunteers have been conducting restoration at this site (~ 10 ha) for 5 years. Site stewards make restoration decisions independently, but occasionally also in conjunction with land owner staff. They are associated with a regional volunteer group that works across a much broader region than the group affiliated with C1; however, the group is much newer having formed in the early 2000s. There are no regular management meetings and restoration is only part of the focus of this larger group, regular volunteer workdays on the site attract both experienced and new volunteers. Formal meetings are rare; stewards may informally communicate in the days before a workday. There is no paid staff restoration work aside from occasional operations staff and contractor assistance with large restoration tasks.

C3: Volunteers have been conducting restoration on this site (~200 ha) for more than 20 years. Site stewards make most of the restoration decisions and have been with the

[1]Note that the sites are not disclosed due to issues of confidentiality per IRB regulations and the standards of social science. Therefore, each is referred to as "C1", "M1" etc.

site since restoration began. Their site is large and they have a large grassroots group of regular volunteers working there; the group has monthly meetings to discuss the management needs of their site. There are regular volunteer workdays on the site that attract both experienced and new volunteers. There is no paid staff restoration work aside from occasional operations staff and contractor assistance with large restoration tasks.

C4: Volunteers have been conducting restoration on this site (~7 ha) for more than 20 years, with the permission of a public land owning agency. The organization is a registered land trust that also owns its own properties and conducts restoration on them. As a land trust, it is nonprofit and has an unpaid, elected board. Restoration decisions are made by a core group of volunteers, many of whom are also on the board; restoration decisions are made primarily in the field or in other informal ways. Often a key restoration volunteer makes the decisions, with informal input from co-volunteers.

Burnpile at Harms Woods workday. Photo by Kristen Ross, used with permission.

M1: This county land owning agency conducts restoration with the assistance of paid staff and volunteers. All restoration-related staff are a part of a single division within the agency. We have two ecological sites in this case, referred to in aggregate as M1, or independently as M1 (~100 ha) and M5 (~200 ha). Restoration has been occurring at both RESTORE sites for more than 20 years. Both sites have volunteer stewards. The steward at M1 has worked there for less than 5 years and does not have regular workdays. Two stewards have worked at M5 for 10 years. These stewards, however, work and hold workdays primarily in fen and prairie areas rather than the in oak woodlands that were our study site. The agency is overseen by a paid, elected board whose sole responsibility is open-space governance.

M2: This county land owning agency conducts restoration with the assistance of paid staff and volunteers. Restoration-related staff are a part of two distinct divisions within the agency. Restoration has been occurring at our RESTORE site (~275 ha) for more than 15 years. The site has a steward who has worked at the site for more than 10 years, but works, and holds workdays, primarily in the prairie areas rather than the oak woodlands that were our study site. The land owning agency is overseen by a paid, elected board that oversee not only open-space governance and management but also all other county governance matters.

M3: This organization is a land trust that conducts restoration primarily with the assistance of paid staff and occasionally with volunteers. Volunteers are supervised at workdays and there are no site stewards. The trust owns its own properties and conducts restoration on them, but also assists with local municipal natural-area management. Restoration has been occurring at our RESTORE site (~20 ha) for more than 10 years. As a land trust, it is nonprofit and has an unpaid board, whose members are invited to serve. The board has several committees that approve restoration activities. A paid president is the bridge between the board and staff.

M4: This municipal land owning agency conducts restoration with the assistance of paid staff personnel and volunteers. Volunteers are supervised at workdays and there are no stewards.

Restoration has been occurring at our RESTORE site (~20 ha) for more than 10 years. The land owning agency is overseen by an elected board that oversees not only open-space governance and management but also all other municipal governance matters. The agency has relied on a partnership with a nearby land trust for guidance on restoration and management, with responsibilities gradually shifting to the land owning agency. The land trust continues to provide guidance as well as volunteer work day supervisors.

R1: This organization is a "pay-to-enter" horticultural collections institution with a natural area undergoing restoration (~40 ha). Restoration decisions are made and implemented by paid staff who are also scientists. Volunteers—some of whom have made long-term commitments to field and lab work—are supervised at workdays and there are no stewards. Restoration has been occurring in the woodland area of the site for 15 years. An unpaid board oversees governance and management of both natural areas and horticultural collections.

R2: This organization is a "pay-to-enter" horticultural collections institution with a natural area undergoing restoration (~400 ha). Restoration decisions are made and implemented by paid staff who have access to scientists employed in a different division of the organization. They also have some volunteer assistance. Although there are some recurring, and extensively trained, volunteers who can implement particular management actions assigned to them by paid staff, they do not function as site stewards (i.e., they do not make decisions about what management actions should happen). Site workdays are attended by volunteers and overseen by staff. Restoration has been occurring in the woodland area of the site for 6 years. An unpaid board oversees governance and management of both natural area and horticultural collections.

Oak woodlands. Photo by Kristen Ross, used with permission.

METHODS

Gathering the data to answer the questions posed in RESTORE required a suite of social science research methods. The study objectives and methods used to address each objective are outlined in Table 1 and discussed in detail in the following pages.

Institutional Review Board

The social science research conducted for the RESTORE project was reviewed by the Field Museum Institutional Review Board and was found to qualify for exempt status. Any changes made to the initial research protocol were reviewed by the Museum's Institutional Review Board chair.

Interviews and Participant Observation

To investigate both the participants themselves and the planning process within the action arena (that is, the restoration process from decision making to implementation), we collected data via interviews and participant observation, and we used two methods of analysis: qualitative content analysis (thematic coding), and manual extraction of institutional statements. These data also informed and were informed by the agent-based model (Watkins et al. 2013).

Thematic coding of interviews and field note

For the first set of cases, we conducted 69 in-depth, semi-structured, confidential interviews between March 2010 and March 2011 with restoration decision makers holding different positions and with varying authority in our 10 Chicago Wilderness study organizations. To begin, we conducted a timeline interview with the primary contacts/decision makers at each organization. These interviews allowed respondents to describe a typical year of restoration, in terms of management actions, schedules, timing, etc. (Appendix 1). Next, we conducted a semi-structured decision making interview with all relevant decision makers in each organization (Appendix 2). All respondents who participated in a timeline interview also participated in a main decision making interview. These interviews were extensive and covered the respondents' background and job responsibilities, their assessment of the natural area in question, the ways in which decisions about ecological restoration were made, and the importance and inclusion of the public and resources such as money and labor in decision making. Lastly, to get a sense of their role in ecological restoration decision making, we conducted decision making interviews with board members in three of the manager-led cases (M1, M2, and M3, Appendix 3). We

Table 1.—Social science methods and data type for each RESTORE study objective*

STUDY OBJECTIVE	METHOD/DATA TYPE
1 (ABMs)	Interviews and participant observation of restoration decision makers and literature review
2 (social structure and processes) and **4** (social-ecological synthesis)	ABM results, interviews, and participant observation of restoration decision makers
5 (non-decision makers)	Surveys of natural area visitors, nearby residents, regional residents
5 (non-decision makers and decision makers)	Scenario-based survey of managers, volunteers, and nearby residents

*Objectives are listed on page 4.

conducted only board interviews with these organizations because through the decision maker interviews, it became clear that the board was central to decision making in M3, and we wanted to confirm that by comparing it with two other manager-led organizations.

We also observed more than 50 organization meetings and ecological restoration workdays. We later conducted 11 more interviews (two timeline interviews and nine decision maker interviews) and observed another six meetings and workdays for the second set of cases (C3 and M4) (Table 2).

Participant observation varied from observing meetings to engaging in workdays on a site. Accordingly, field note taking methods varied. During observation, extensive notes were taken to capture the tone, tenor, and content of the meetings or other observed events. Because workdays and field visits were more participatory, note taking was brief during the event itself to capture important comments or events. Extensive field notes were written within 24 hours of the event.

Interviews were recorded and transcribed verbatim in most cases. In two cases respondents preferred not to be recorded. In these cases, notes were taken by hand and typed up within 24 hours of the interview. If a respondent requested it, the recorder was turned off during the interview. Notes about these sections of the interview were written after the interview. This was rare; it happened fewer than three times.

Interview transcripts and field notes were imported into Nvivo, a qualitative data analysis software program (QSR International Pty Ltd. Version 9, 2012) to facilitate analysis. The data analysis process engaged the entire social science team plus interns at the Field Museum (seven team members total). Broad thematic codes were created (Bernard 2005, Glaser and Strauss 1967) through iterative team discussion, which led to refining the code into smaller subcodes. This analysis involved each social science team member reading the same subset of interviews, noting the broad themes they saw in the data. We then discussed the themes as a team, reaching

Table 2.—Number of respondents, interviews, other conversations, site visits, and meetings (summed for a total number of field notes for each case)

	R1	R2	C1	C2	C4	C1-3	M1, M5	M2	M3	C3	M4	Total
Number of respondents	4	9	3	3	6	13	9	15	6	3	5	76
Number of interviews	4	10	2	3	7	13	11	15	4	2	9	80
Number of other conversations	1	1	3	1	1	1	1	2	1	0	2	14
Number of site visits	2	1	2	3	6	0	5	3	2	4	4	32
Number of meeting observations	0	1	6	2	1	5	3	3	2	3	2	28
Total field notes per case	7	13	13	9	15	19	20	23	9	9	17	154

Note that C2, C3, and C4 have an additional column in which data were collected from the land owning agency (C1-3). Because the land owning agency data concern all three of the sites, we kept these data separate in this table. C3 and M4 are the two replicate cases (in which data collection was delayed until data from the first cases were analyzed).

consensus on what we meant by our individual theme lists, and coalescing around a set of major theme categories that would frame the initial analysis of the first set of interviews. Once the coding structure was agreed upon, the data were further split among researchers with relevant expertise (e.g., anthropology, environmental psychology) to code for particular themes, but we ensured that all data were analyzed in detail for each thematic content area by more than one researcher.

Although our set of qualitative codes (the broad themes and subsets therein) was substantial (Table 3), four major categories of themes emerged as particularly important:

1. Because one of our main objectives was to understand the structure and process of decision making, decision making ***information*** was an obvious and important theme.
2. Similarly, because we were interested in decisions about ecological restoration, ***management actions*** became a vital thematic code.
3. The emotional context of environmental decisions can be critical to understanding points of view, motivations, conflicts, and outcomes of decision making processes (Vining 1992, Vining and Ebreo 1991, Vining et al. 2000, Vining et al. 2008). Therefore, we extensively coded for ***emotion***, using subcodes that we identified during the process of reviewing the entire dataset. These included emotions identified in other studies of emotion (e.g., anger, happiness, awe), as well as the emotions we identified from the data (e.g., lament).
4. Individual perceptions of nature, its predictability, stability, and balance, and the role of humans in it, can vary widely and influence management decisions (Gobster 1999, Sheppard 2001). Strong differences of opinion on these topics likely translate into different land management strategies (Hughes et al. 2007). Despite the shared interest in biodiversity conservation by resource managers and many conservation researchers, there seem to be fundamental obstacles to successful collaboration (Huenneke 1995, Underwood 1995). Thus, ***perception of landscape*** was a central theme.

Table 3.—All qualitative codes (tree nodes and free nodes) used in the analysis of interview and participant observation data

TREE NODES
Actors
Scientists
Volunteers
stewards
Staff
administration
project manager
planners
superiors
co-workers
president
Board
Committees
Public
partners
constituents
children
community
neighbors

continued

Table 3.—continued

TREE NODES
Management Actions
Fire
brush piles
Seeds
Removal
mowing
cutting
herbicide
Monitoring and inventorying
Management plan
Soil
Water
Disturbance control
trash pick-up
Other
Decision Information
Communication
requests
meetings
Group process
Justification/criteria
minimize harm,
data,
management perspective
Perception of Landscape
Involvement
Inappropriate
Proximity
Green Infrastructure
Non-native
Sense of ownership
Size and scale
Sustainability
Natives
Authenticity
Social-cultural
Stewardship
Participation
Clean
Listening to Nature
Constraints
Privacy screen
Safety
Balance
Differing perceptions
Children's engagement
Use
Social acceptability
Scenic vs. ecological beauty
Quality of physical environment
Protection vs. use
Place identity
Perceptual categorization
Perceptions of place
Perception of change
Noticeability
Natives vs. exotics
Multisensory perception
Motivations
Invasives
Habitat suitability
Functionality
Experience

continued

Table 3.—continued

TREE NODES
Engagement
Ecological knowledge
Ecological aesthetic
Description
Deep values
Cues to care
Connecting with nature
Aesthetics
Emotion
Negative emotions
insecurity
polarization/conflict
disappointed
fear/anxiety
disgust
hurt
frustrated
angry
sad/lament/regret
distress
Positive emotions
pride
appreciative
amazed/awe/wonder
happy/enjoy/fun/pleased
trust
Other
surprise
sarcasm
excited
concern/care
Animals
Fish
Beaver
Coyotes
Herps
Birds
Deer
Dogs
Insects
Other mammals
Resources
Information
Equipment
Labor
seasonals
contractors
interns
Money
donations
taxes and bonds
grants

FREE NODES		
Restoration philosophy	Workdays	Goals
Weather and season	Research	Time
History of organization	Sensitive information	Support
Outreach and education	Conflict	

Analysis of institutional statements

Using the same set of ethnographic data described above, we also sought to reveal the institutional statements (rules, norms, and strategies) working within each case, at various levels of analysis (Fig. 4). Institutional statements are human-devised prescriptions that guide behavior; rules, norms, and strategies are distinguished in part by the sanction associated with following, or not following, the statement (Figs. 4 and 5). Rules have a tangible sanction associated with them. That is, if a rule is followed, a reward may be bestowed upon the follower; if it is not followed, a penalty (e.g., a fine) may be imposed. Norms have emotional sanctions associated with them. That is, if a norm is followed, a positive emotion may be bestowed upon and felt by the follower (e.g., pride); if it is not followed, a negative emotion (e.g., guilt) may be imposed and felt. Lastly, strategies have automatic sanctions associated with them. Unlike the sanctions associated with rules and norms, these sanctions are not bestowed or imposed by another person. They are simply the automatic result of following or not following the strategy.

Rules, in particular, have been explored extensively by scholars using the Institutional Analysis and Development (IAD) framework (Coleman and Steed 2009, Gibson et al. 2005, Madrigal-Ballestero et al. 2013, Ostrom 2005). Further, while the IAD framework has been applied extensively to environmental resource management situations, generally the applications are to extractive common pool resources. Ecological restoration is an activity that is conducted to add value to a resource, not extract it. This characteristic, as well as the urban and suburban setting of our study, meant that the data collection instruments used in previous institutional analysis studies (e.g., The International Forestry Resources and Institutions (IFRI) program) were less useful for us (http://www.ifriresearch.net/). Moreover, the size of our dataset and the nature

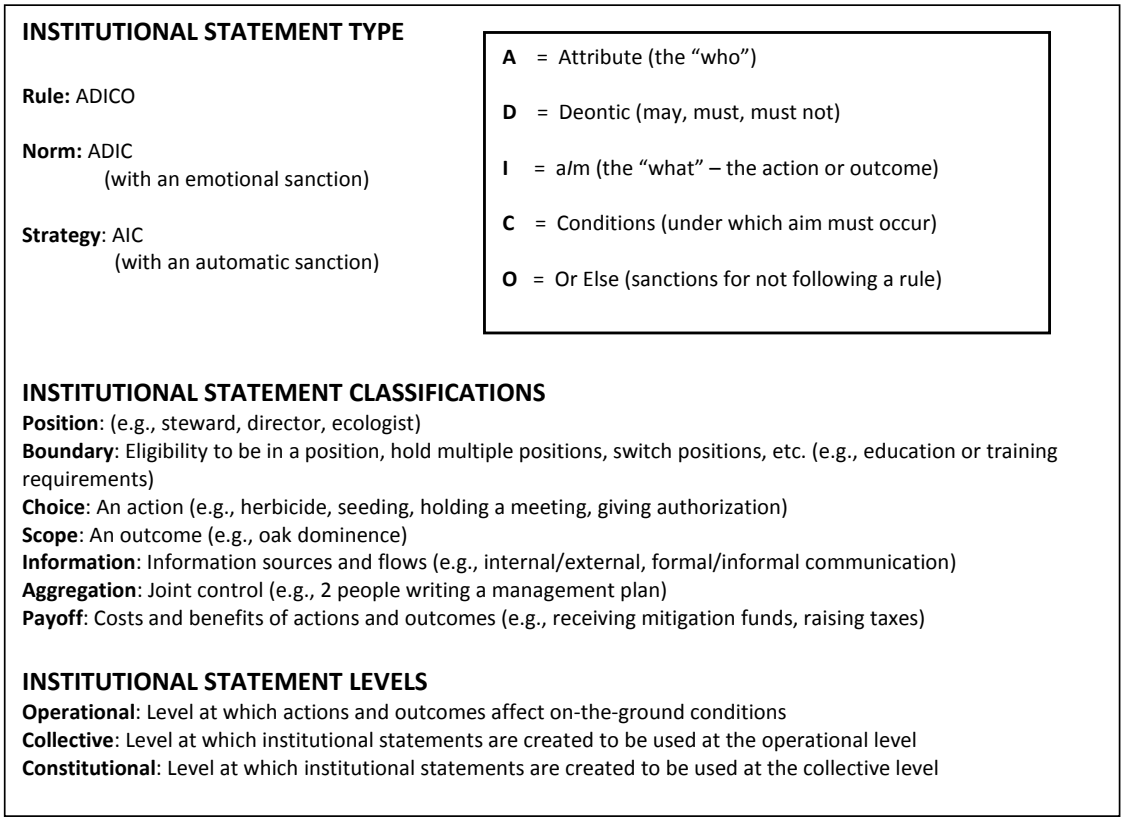

Figure 4.—Components of the ADICO syntax, statement classifications, and levels.

Statement (Rule)	All villagers are forbidden to let their animals trample the irrigation channels, always and everywhere, or else the villager who owns the livestock will have to pay a fine.					
ADICO syntax	**A**	**D**	**I**	**C**	**O**	**Other sanction**
	All villagers	Are forbidden	To let their animals trample in the irrigation channels	Always and everywhere	Or else the livestock owner will have to pay a fine	
Statement (Norm)	(Note on microwave) if you use the microwave, you must clean up your own mess!					
ADICO syntax	**A**	**D**	**I**	**C**	**O**	**Other sanction**
	All microwave users	must	Clean up their own mess	Always and everywhere		(emotional) be shamed; feel guilt
Statement (Strategy)	(Unspoken) The person who places a phone call, calls back when the call gets disconnected.					
ADICO syntax	**A**	**D**	**I**	**C**	**O**	**Other sanction**
	The person who places a phone call		Calls back when the call gets disconnected	Always and everywhere		(automatic) call is not finished

Figure 5.—Examples of a rule, norm, and strategy, provided by Ostrom (2005), broken out in ADICO syntax.

of our data (qualitative interviews) made it difficult to use Nvivo to code discrete sentences as institutional statements. Our attempts to code in this manner resulted in extremely weak kappa values for intercoder reliability. The results using the Nvivo program's reliability function ranged between .77 and .07, with an average of .27 across 10 codes (3 levels and 7 statement classifications, Fig. 4).

Given these weak intercoder reliability results, we used the IAD framework's ADICO syntax grammar to manually write out (or extract) all individual institutional statements for each study organization (case) (Crawford and Ostrom 2005). In this syntax, A = attribute, D = deontic, I = a*I*m, C= conditions, and O= or else (Figs. 4 and 5). We began by creating a data template on which to document the following statement components: the raw statement, attribute, deontic, aim, conditions, or else, level, classification, type, and notes. The notes proved to be invaluable later in the analysis process, so that we could return to the field notes themselves and assess contextual information around the statement to better gauge its strength and value.

To begin, we (Watkins and Westphal) each wrote out statements for 15 percent of our interviews. From this 15 percent we extracted statements for several interview transcripts together and then completed the remaining interviews in the subset separately. Upon completion, we ran an interrater reliability check on the subset, which yielded an 80 percent interrater reliability score. We discussed the remaining 20 percent that one of us picked up that the other did not and found that we agreed with the other's findings–underscoring the need to have multiple people analyzing the data in this way. We then continued extracting statements

case by case, with Watkins extracting statements for all interviews and field notes and Westphal extracting them for two thirds of the interviews. We maintained separate Excel workbooks for each case and separate worksheets for each transcript or field note.

Within each case, we first combined and discussed our lists, merged duplicates, and noted differences and conflicts. Fleischman et al. (2010) used a similar team-based analytical system in which crosschecking of each other's statements was an important, iterative step. We considered a statement a duplicate when the same statement was extracted from multiple respondents; pseudonym initials of each respondent who expressed an institutional statement were recorded. Multiple expressions of a given statement were often a sign of a strongly followed institutional statement. After combining and discussing our list, and to make it easier to find duplicates, we arranged statements into groups of similar topics, based on the thematic codes of import (e.g., Board, staff, and volunteer roles; Management actions; Monetary statements; Public influence; Meetings and interactions). Then we reviewed each list again, refining the level, classification, and type of institutional statement. We repeated this review process until we reached a version of saturation, in which we were no longer changing rules to norms, scope to choice, etc. Next, we uploaded the complete set of statements into NVivo where we could analyze them in the context of the full dataset. We created codes for the IAD components: three levels, seven classifications, and three types. We also coded each institutional statement with relevant codes derived from the qualitative data (e.g., management actions, decision information, etc. See Table 3). At this stage, we included additional members of our social science team in discussion of the statements as an additional reliability check on what we had found. Lastly, we verified that the differences in the number of statements *in* a case were not an artifact of the amount of data we had *per* case (they were not). We tested this by checking each case's number (and type) of field notes against the number of statements we extracted (Table 2). We found that cases with few notes or interviews did not necessarily have fewer institutional statements, and those with more notes did not have more statements. This finding laid the groundwork for future analysis of differences in the kinds of institutional statements across groups.

Manual extraction of the statements was a time-consuming process with a steep learning curve. Although there were plenty of IAD studies to refer to, little guidance existed on how to apply ADICO to ethnographic data. Therefore, we wrote a paper outlining our process and the steps we took in applying the syntax (Watkins and Westphal, in review).

Agent-Based Model Development

To examine how individuals' preferences for restoration actions and their respect for other decision makers affect their interactions and consequently lead to different management outcomes, we developed a stylized agent-based model (ABM) using NetLogo (Watkins et al. 2013). To create the model, we conducted an iterative process of literature review, data collection from the Chicago Wilderness alliance cases selected for the RESTORE project (not including the two replicate cases), and conceptual modeling to distill the main factors and mechanisms that should be present in a stylized model of collective decision making for ecological restoration. This process resulted in a general organizational structure consisting of an organization, two to four subgroups within the organization (these represented departments

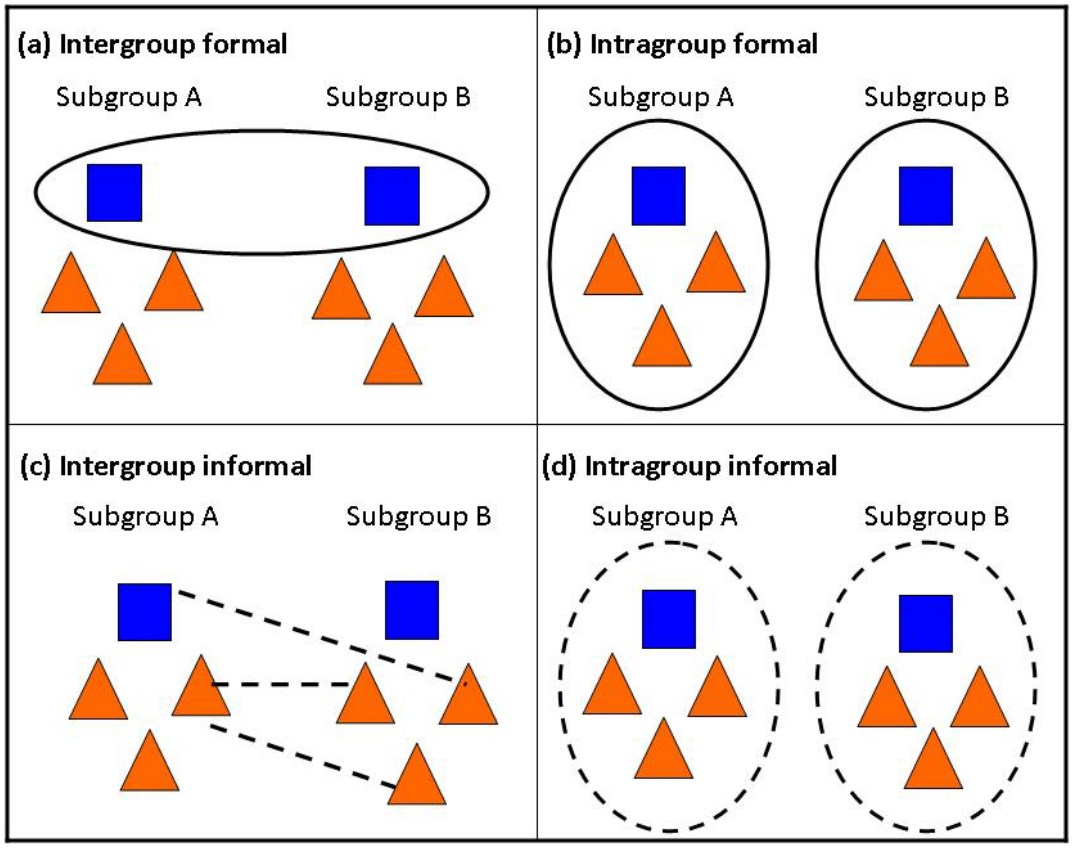

Figure 6.—The four types of interactions modeled in the agent-based model. The blue squares are point persons, the red triangles are advisors, the solid lines are formal interactions, and the hashed lines are informal interactions.

or divisions within the organization), and two types of agents within the subgroups. Each subgroup had one *point person* (like a leader or manager) and several *advisors* (non-managers). We also derived a set of mechanisms that underlie collective decision making processes: *respect* levels for others and for one's own self; *position* (or preference) values for a particular decision; *type and frequency of interactions* between agents (intergroup-formal, intragroup-formal, intergroup-informal, and intragroup-informal) (Fig. 6); *entrenchment* in a particular position; and the *cost of dissent*.

The model maps out and simulates the processes by which individuals within restoration organizations communicate, discuss, and ultimately make a decision. Thus, as interviews and site/meeting visits were conducted, the ABM team (Watkins, Massey, Ross, Brooks, Zellner) had regular meetings to discuss what was being observed in the field in terms of how people communicate and make decisions, and how it either supported or diverged from the literature. The aim of the first iteration of the preliminary model was to parameterize the mechanisms identified (above) and develop theory explaining a wide range of cases, rather than to represent the detailed reality of particular cases. As model development and team discussion continued, members of the social science team (primarily Watkins and Westphal) used the generalizations derived from the modeling to generate hypotheses that then guided aspects of the qualitative data analysis for the larger project in which the modeling was embedded, which then facilitated the calibration of a second model (described below).

A brief discussion of the results of the prototypical modeling effort is necessary, because it informed ethnographic data analysis and agent-based models. The prototypical model revealed that formal meetings and group leaders were important facilitators of convergence by the whole group in reaching a decision, especially when multiple groups are present, when new information is introduced during the decision making process, and when participants are polarized around an issue. Interactions among different groups were also particularly important for overall convergence around the decision. A participant's entrenched position about an issue slowed the convergence process and increased the need for decision strategies involving outside-the-group intervention. A participant's willingness to dissent from the group position on an issue can reinforce these effects. The model mathematically formalized collective decision making processes within the context of ecological restoration, established generalizable relationships between these processes and decision outcomes, and provided a foundation for further empirical and modeling research.

In the next ABM we calibrated the stylized, prototypical model with ethnographic data of case-specific decision scenarios from our fully analyzed dataset. Watkins and Westphal selected two ethnographic scenarios from two different cases (M2 and C1), each describing the sequence of interactions for a particular decision making event/process and illustrating varying levels of respect and diverse views (positions) between the actors involved. We selected a scenario on seed dispersal from case C1 and a scenario on prescribed fire from case M2. M2 was selected because it offered a scenario in which the organization had difficulty coming to a consensus about prescribed fire. The organization then hired a liaison (with high respect and high interaction frequencies) to facilitate the decision process, which led to increased efficiency in coming to an agreement. Hypothetical scenarios were created to test whether just respect, just interaction rates, or the two parameters combined, led to consensus the fastest. C1 was chosen because it was the most complex of all of our cases. It offered a scenario in which efficient collective decision making is lacking and for which there is no empirical evidence of an effective solution. This complexity allowed us to simulate the "messy" decision process and then test the effects of a hypothetical liaison (with higher respect values and more frequent interactions) on time to consensus. We also ran hypothetical scenarios that tested the effect of a biased liaison, equal sized subgroups and a point person with liaison-like attributes.

For each empirically based ethnographic scenario, Watkins and Westphal created a preliminary respect and position table (Table 4) and a preliminary interaction frequency table (Table 5), which were then imported to NetLogo. Watkins and Westphal worked with the rest of the ABM team to calibrate the model by making small adjustments to each of the parameters (e.g., respect and interactions) until we obtained model outcomes (length of run and final collective position) that accurately reflected the ethnographic data for the empirical and hypothetical scenarios (Table 6). For each of our cases we had estimates for how often each type of interaction occurred over the course of a decision making period and how long the decision making process took.

Table 4.—Respect and position values for Case M2, scenario 1a and 1b

	Subgroup A					Subgroup B		
	YJ	LC	GM	JJ	KL	LB3	IQ	Position
YJ	1	0.9	0.9	0.9	0.9	0.01	0.1	0.2
LC	0.9	1	0.9	0.9	0.9	0.2		0.4
GM	0.9	0.9	1	0.9	0.9	0.2		0.4
JJ	0.9	0.9	0.9	1	0.9	0.2		0.4
KL	0.9	0.9	0.9	0.9	1	0.9		0.5
LB3	0.01	0.2	0.2	0.2	0.9	1	0.9	0.8
IQ						0.9	1	0.8

Agents (labeled with their pseudonym initials, e.g., YJ, have a respect value between 0 and 1 for themselves and for every other agent they interact with. Blank cells indicate that agents never interact. Each agent also has a position value between 0 and 1, which represents his/her preference for a particular restoration action.

Table 5.—Interaction values for Case M2, scenario 1a and 1b

	Intergroup Interactions			Intragroup Interactions		
Formal Interactions	monthly (20 workdays)			Subgroup A	every 3 months	
				Subgroup B	daily	
Informal Interactions	Chance of each pairing occurring each day			Meetings per day		
	Subgroup A	Subgroup B		Subgroup A	1	
	YJ	LB3	50%	Subgroup B	1	
	LC	LB3	25%	Chance of being in group meeting		
	GM	LB3	25%			
	JJ	LB3	25%	Subgroup A	YJ	100%
	KL	LB3	75%		LC	25%
					GM	25%
					JJ	25%
					KL	75%
				Subgroup B	LB3	100%
					IQ	100%

The upper left quadrant (blue) shows the formal intergroup interaction frequencies (all organization members—from both subgroups—have a monthly formal meeting). The upper right quadrant (yellow) shows the formal intragroup interaction frequencies. Each subgroup has its own frequency of meeting. The lower left quadrant (orange) shows the informal intergroup interactions (each pair of agents has a certain chance of having an informal interaction each day (e.g., YJ and LB3 have a 50 percent chance of meeting on any given day). The lower right quadrant (green) shows the informal intragroup interaction frequencies. On average, there is one informal interaction per day, per subgroup. Each agent has its own chance of being a part of that interaction (note that YJ, in Subgroup A, and LB3, in Subgroup B, are the point persons, and as such have a higher chance of meeting; in fact, they will have one interaction everyday with at least one of their advisors).

Surveys

To investigate the impacts that management styles and resulting biodiversity may have on people not directly involved with ecological restoration, as well as the possible influence of those people on restoration decisions (i.e., the feedback loop from Attributes of the Community to the Action Arena, Fig. 2), we conducted several kinds of surveys and targeted multiple populations. The *natural area onsite visitor survey* targeted visitors to each natural area who were there to recreate but were necessarily nearby residents. The *nearby residential survey* targeted single family homes in close proximity to the natural area. The *regional residential surveys* targeted single family homes within the broader region but not in close proximity to any natural

Table 6.—The empirical and hypothetical scenarios for cases C1 and M2

C1 Scenarios	M2 Scenarios
2a – (empirical) No liaison (KL)	1a – (empirical) No liaison (KL)
2b – (hypothetical) With KL - high respect and high interactions	1b – (empirical) With KL - high respect and high interactions
2c – (hypothetical) - With KL - high respect and high interactions - exception: KL has low respect for Subgroup D agents	1c – (hypothetical) - With KL - high respect and low interactions
2d – (hypothetical) - With KL - high respect and high interactions - Subgroup A and D same size	1d – (hypothetical) - With KL - low respect and high interactions
2e – (hypothetical) - No KL - Subgroup A point person replaced with agent that interacts more and has higher respect	

area undergoing restoration. These samples allow comparison to earlier studies (Bright et al. 2001, 2002) and enable us to further differentiate the populations that compose the community (Fig. 2). Recall that while M1 and M5 were collapsed into one case for the ethnographic data on decision making, we conducted surveys at each individual site.

Survey design

The objectives of the surveys were to understand people's values and attitudes toward, knowledge about, and use of open space at multiple scales. Questions addressed general environmental issues as well as specific ecological restoration activities, at the regional, local, and household levels. The surveys were informed by basic theories of environmental perception (e.g., Gobster et al. 2007, Wohlwill 1976), by our specific objectives, and by previous research on people's responses to natural environments (e.g., Fry et al. 2009, Litt et al. 2011, Tzoulas et al. 2007). We also based some of our survey questions on research done specifically in the Chicago region on attitudes toward nature and restoration (Bright et al. 2001, 2002).

All of the surveys addressed the theme of Nature in the City and included closed-ended questions on the importance and value of nature, conservation, and management; the extent and type of natural area use and engagement in site activities; and awareness and support of restoration activities (at the site, or in the case of the regional survey, in the region). Asking these questions across all of the surveys allows for cross-population comparison. On the nearby and regional residential surveys, we also addressed the theme of Nature in the Neighborhood and include closed-ended questions about the benefits and annoyances of nature and factors influencing neighborhood satisfaction. On these surveys we also asked specific closed-ended questions about the theme of Nature in your Yard, including size/vegetation characteristics, management activities/attitudes, and natural landscaping preference and norms (see Appendices 4, 5, and 6 for the full surveys).

The surveys also helped inform the feedback loop within the IAD framework, between the public (represented in the community attributes box) and the action arena (where the decision makers are). To elicit information about interactions between those groups, we specifically asked whether people (both site visitors and residents) had ever contacted land managers with concerns, compliments, or questions about management activities at natural areas. We did so as an open-ended question. For the residential surveys we also asked, in an open-ended question, where people got their information about how to manage their yards.

Table 7.—Number (N) of responses for the onsite user survey for each case

	Cases											
	R1	R2	C1	C2	C3	C4	M2	M1	M4	M5	M3	Total
N	60	38	3	17	37	22	25	20	21	15	1	269

On-site survey implementation

Recall that one criterion in site selection for the study was public access by trail or road to the site. This criterion was a part of the design so that we could assess the attitudes and behaviors of people active at the site itself but not regularly active in restoration decision making (the action arena), and any impacts they may have on the action arena and the biodiversity outcomes.

We conducted on-site surveys between June and September 2011. Each site was visited three times (two weekend days and one weekday), and we avoided rainy or extremely hot days. We stationed ourselves in areas where visitors passed by; in some cases we were at the edge of a walking burn, in others we remained near a main parking lot.

We used an intercept sampling method, in which participants (at least 18 years old) were selected on a quasi-random basis and at an interval dependent on the number of individuals present in the natural area. For example, if the area had many people, our surveyors could choose every fifth group; if there were few people, they sampled more frequently. Individuals within a group were selected in an attempt to minimize biasing who was selected from that group. Surveyors were instructed to create rules for themselves for these cases, such as: "When approaching couples come down the path, I will ask the one on the left to be interviewed," or "When dealing with large groups I will choose the fourth person I see." Multiple people in a large group (determined at the discretion of the interviewer) could be interviewed. Because we wanted all types of users to be surveyed, we encouraged surveyors to be aware of diversity and vary their sampling strategy to get a cross-section of ages, genders, ethnicities, and activities.

Visitors who agreed to participate were given a clipboard and pencil; the surveyor stepped away, but stayed within reach in case of any questions. The survey took between 5 and 10 minutes (in a few cases, longer) (Appendix 4). After completing the survey, participants were offered the opportunity to sign up for a raffle for a Field Museum Family Pass. Number of responses varied across sites, and was most notably low at C1 and M3, where the number correlates with low visitor frequency (not a low response rate) (Table 7). Decision makers at M3 confirmed that this was a very low-use site, while those for C1 stated that the site was frequented by bird watchers and nature-walkers. In contrast, the research cases (R1 and R2) are pay-to-enter public education institutions where there is a high volume of members and daily visitors.

Nearby and regional residential survey implementation

Recall that one criterion in site selection for the study was residents surrounding the natural area within one-half mile. This criterion was a part of the design so that we could connect the attitudes and behaviors of people living near the site, but not regularly active in restoration decision making (the action arena), and any impacts they may have on the action arena and

the biodiversity outcomes, to the full analysis. The regional residential survey then allowed for comparison between those living close to and those living far from our study natural areas.

For the nearby residential survey, we purchased more than 10,000 addresses from Survey Sampling Incorporated of residences within one-half miles of the perimeter of each natural area in our sample; using Google Maps, we purposefully weighted our sample toward addresses that bordered each natural area. We did so by visually ensuring that all of the bordering homes were in our sample of addresses. To these addresses, we added a random selection of the rest of the purchased sample, adding to a total sample of 5,127 addresses (Table 1 site sample distribution).

Following Dillman et al. (2009), our mailing protocol consisted of (1) a pre-notice postcard inviting participants to take the survey online (via SurveyGizmo) or wait for a hard copy to be mailed soon, (2) a hard copy survey mailing, with a cover letter, online survey information, and prepaid postage return envelope, and (3) a followup postcard reminding those who did not yet complete the survey to please do so online or via the hardcopy they recently received, and thanking those who completed the survey. Per Dillman et al. (2009), we tried to make the mailings noticeable, but not flashy; the postcard had a vivid photograph of a native flower, but the hard copy envelope was plain white with The Field Museum logo at the top left and the following message at the bottom: Natural Areas Residential Survey Enclosed. The hard copy mailing included two incentives: a small puzzle from the Field Museum and an invitation to sign up for a raffle for a chance to win a Field Museum Family Pass.

Our mailing protocol resulted in a final response rate of 5.7 percent. Given this unusably low response rate, we altered our method in two ways. We changed the incentive to a raffle for one of five $100 gift cards, and we used the Drop-off/Pick-Up (DOPU) technique (Allred and Ross-Davies 2011, Clark and Finley 2007, Steele et al. 2001). Although labor intensive, this method has been shown to substantially increase response rates (Allred and Ross-Davis 2011). The method includes (1) dropping off a survey and, if possible, making direct contact with the resident, (2) returning several days later to pick up the survey, and if the survey has not been done, attempt to make contact, and if unable, leave a sticky note reminder, and (3) return the next day for a final pick up. With a team of trained interns (see Appendix 7 for the training manual), we implemented this method in the same neighborhoods that received the mail survey, skipping those who had already completed the survey (the 6 percent). In this second attempt, we also sought to remedy the low response rate at one site in which there was a high refusal rate due to a language barrier. We had the survey translated into Spanish by a native Spanish speaker from The Field Museum's Environment, Culture, and Conservation division. The translated survey was then reviewed by a bilingual social science Principle Investigator on the RESTORE team before it was used in the field.

On the first day (Saturday), if we were unable to make contact, we hung the survey on the door knob or other easily accessible and visible hook (although Federal law prohibits surveys from being placed in the mailbox or on any mailbox hooks). We did not visit homes with "No Solicitation" signs. The survey itself was bright canary yellow with the following message on the front:

"WE WANT YOUR OPINIONS (not your money!) Please complete this survey, and place it back in the bag and on your doorknob for a chance to win a $100 gift card. We will pick it up on Tuesday."

Three days after drop off (Tuesday), we returned to each house where we successfully dropped off a survey. If the survey was not on the door, or if it was there but it was incomplete, we attempted contact to politely remind residents about the survey and that we could pick it up later that day or the very next day. If no one answered, we left a small sticky note that read:

"Sorry we missed you! Don't miss your chance to win a $100 giftcard. We'll be back tomorrow morning to pick up your completed Natural Areas Survey that we dropped off on Saturday. Thank you!"

We used a sticky note designed for retailers to label shelves. These can be used in a printer, saving writing each by hand.

On the third and final day (Wednesday), we made a sweep of all remaining houses for which we had not picked up a survey or received a verbal refusal. Upon completion, we obtained an overall response rate of 15 percent, which, although still relatively low, was almost triple what we received via the mail method.

As we were wrapping up the DOPU method, a colleague on a different project informed us that she was using the DOPU method and giving a $1 incentive directly in the bag. She was getting response rates double what we were getting. Thus, we conducted "DOPU with a dollar" at two of our sites, for which we had a lower than average response rate with the DOPU method. Dollar bills were placed behind the survey with about a ¼ inch visible on the side, making them visible to the resident, but not from the street.

For both DOPU methods, it took two people about 6 hours to visit approximately 150 houses on the first and second day of implementation. In total, we dropped off 2,487 surveys in 10 neighborhoods. At every site for both methods, we tracked whether we made contact with an adult member of the household or whether we simply left the survey on the door knob. We also tracked refusals, and a general reason why the survey was being refused (e.g., no time, posted "no solicitations").

For the regional residential survey, we had originally intended a mail survey, but abandoned this due to the problems described above. Therefore, we used the DOPU method of data collection. We selected three neighborhoods that were demographically similar to three of the nearby residential neighborhoods and were representative of the variation in the residential survey. These neighborhoods were between 1 and 3 miles away from the target natural areas and not near any other natural area, with the possible exception of a neighborhood city park (coded as RG1, RG2, and RG3 in Table 8).

Across all of the DOPU-implemented surveys, we obtained an average face-to-face *contact* rate of 45.6 percent with an average face-to-face *refusal* rate of 10.1 percent. The average overall *response* rate for DOPU was 15.8 percent. The two sites at which DOPU and a dollar was implemented (C4 and R1) had significant increases in response rates: 15.5 percent to 24.4 percent, and 15.4 percent to 36.5 percent, respectively. This combination of methods resulted in a collective *response* rate from all collection methods of 9.3 percent (Table 8).

Table 8.—Face-to face contact rates, refusal rates, and response rates for nearby residential and regional residential surveys

	MAIL			DROP OFF - PICK UP (DOPU)							TOTAL	
SITE	N_1	Response Rate		N_2	**Contact Rate**		**Refusal rate**		**Response Rate**		**Response Rate (both methods)**	
		n	%		n	%	n	%	n	%	n	%
C1	500	33	6.6	263	154	58.5	26	9.8	55	21	88	33.4
C2	500	27	5.4	288	77	26.7	27	9.3	37	12.8	64	22.2
C3	500	24	5.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	24	4.8
C4	500	21	4.2	148	54	20.3	17	9.7	23	15.5	68	27.6
C4($)	n/a	n/a	n/a	98	100	102	6	6.1	24	24.4		
M1	500	27	5.4	194	103	53	27	13.9	29	15	56	28.9
M2	327	15	3	173	94	54.3	14	8.1	29	16.8	44	25.4
M3	500	25	5	163	79	48.4	15	9.2	28	17.2	52	27.8
M4	300	36	7.2	140	63	45	6	4.2	27	19.2	63	45
M5	500	18	4	195	90	46.1	27	13.8	15	7.6	33	16.9
R1	500	31	6.2	175	89	50.8	13	7.4	27	15.4	77	28.5
R1($)	n/a	n/a	n/a	52	50	96.1	6	11.5	19	36.5		
R2	500	35	7	130	72	55.3	20	15.4	25	19.2	60	36.4
RG 1	n/a	n/a	n/a	279	113	40.5	37	13.3	41	14.7	41	14.7
RG 2	n/a	n/a	n/a	251	84	33.5	17	6.8	37	14.7	37	14.7
RG 3	n/a	n/a	n/a	290	74	25.5	28	9.7	33	11.4	33	11.4
TOTALS	5127	292	5.7	2839	1296	45.6	286	10.1	449	15.8	740	9.3

N_1= total number of surveys mailed, per site; N_2 = total number of surveys distributed via Drop-off Pick-up, per site. For the Drop-off Pick-up method (DOPU), **Contact rate** = the number and percent of respondents who were given a survey for whom we had face-to-face contact; **Refusal rate** = the number and percent of respondents who verbally refused a survey; **Response rate** = the number and percent of respondents who completed a survey; **(#2)** = a second DOPU trip was conducted to increase number of surveys; **($)** = Sites where "DOPU with a dollar" occurred. Residential surveys are denoted by their category code (e.g., M1), and regional surveys are denoted by "Reg" and their community initials. Note that the contact rate was summed over Day 1 and Day 2, and does not account for contact with the same person multiple times

Nonresponse bias checks

After the mail survey method, we attempted to sample for nonresponse bias via phone. We called *all* of the people who received, but did not complete, the survey from five sites (n= 570). Most calls were unsuccessful in that no one ever picked up the phone. The handful of people (~15) we did reach and who were willing to speak offered potential reasons for not completing the survey, including the obvious, "I didn't receive it" (which we took to mean someone else in the household had received it, or they simply did not remember seeing it). Some people, after being told that we were calling from the Field Museum, said that they had not been to the museum in ages, or were not interested in donating or becoming members. Although we could explain on the phone that that was not why we were calling, we suspect that the Field Museum logo on the mail survey could have misguided people. However, part of the usefulness of the DOPU method was occasionally receiving verbal refusals before residents even looked at the survey. Often, people qualified their refusal with a reason. Overwhelmingly, people said that they were simply too busy, but occasionally, after we explained what the survey was about, some people did admit that they were not interested. A comparison of demographics between our respondents and the census tract in which they lived revealed some differences: our respondents were sometimes older, female, white, and more highly educated than the census tract average. These differences will be taken into account during interpretation of the results in forthcoming publications.

Survey data processing

Raw data

Survey data from the paper copies of the questionnaire were entered into an Excel spreadsheet and merged with the data entered by the few participants who filled out the survey online. The data matrix included a series of identifier variables for each respondent (e.g., respondent number, site number, survey type, etc.) and an initial set of variables corresponding to each question item in the survey. For the closed-ended questions, responses to scaled and mutually exclusive categorical items were coded 1-n in the order they appeared on the survey form. If there was a "don't know" response category for a question item, responses in that category were coded 888, and if no answer was given, the response was coded 999 to indicate missing data. For responses to the two questions that included a checklist of items ("please check all that apply"), each item was treated as an individual variable and coded 0-1 for not checked-checked. For these questions there is no way to distinguish between missing data and a "don't know" or negative response, but in most cases respondents did check at least one item.

Responses to the open-ended questions were reviewed by social scientists in our team and coded into narrow content categories for as many discrete responses as were present (never more than six and on the average of one or two). Then, as deemed useful or necessary to attain a sufficient number of responses for statistical analysis, these narrower content categories were aggregated into a smaller number of more general themes, and in some cases, meta-themes. From here, a variable was created for each theme and responses were coded 0-1 for not mentioned-mentioned. However, if a respondent did not answer the question at all, these variables were coded as 999 missing data.

For a number of questions in the final socio-demographic section of the survey, participants were given a blank line to enter their response. Numerical responses for age, number of adults and children in the household, number of years lived in current home, and age were coded directly. Categories were developed for coding occupation, education level, and race/ethnicity. Blank responses were coded 999 missing.

Data recoding

The completed data matrix was imported into SPSS (Version 21), and initial frequencies were run to provide a first look description of the findings and identify and correct any coding errors. A new set of parallel variables was created for several of the variables that had ordered responses to collapse the data into a smaller number of response categories (e.g., age (stated number of years) to five age categories (18-24 yrs., 25-35, 36-50, 51-65, > 65); overall neighborhood satisfaction (5 point Likert scale from very dissatisfied – very satisfied) to three categories (dissatisfied-neutral-satisfied). These collapsed variables provided flexibility in analyzing the data using parametric or non-parametric statistics. For non-parametric analysis, it also helped make cross-tabulations (e.g., by site or management type) easier to comprehend and pooled responses in cases where there were sparse data in some categories.

For the multiple-item attitude questions, a new set of parallel variables was created with the "don't know" responses recoded as missing data and any negatively stated items or scales reverse-coded so that the highest rating (e.g., "strongly agree") indicated a positive response. These recodings are a necessary step in creating a composite attitude scale or index, a common technique in attitude measurement because it is believed that multi-item measures have more stability and depth in measuring a complex concept than do single item measures (Oskamp 1977). Once recoded, scale items were input into SPSS Reliability analysis, which assesses the inter-item consistency. A Cronbach's alpha coefficient of .7 is considered acceptable in most social science survey research applications and indicates that the items within the scale express a unidimensional concept (George and Mallery 2003; but see also Sijtsma 2009). For those multi-items with high coefficients, a single index variable was created by adding each respondent's ratings across all items. In cases where coefficients were lower and items in the scale were thought to represent multiple concepts, the items were input into an SPSS Factor Analysis and the factor scores from the analysis were output so that the factors could be used as new variables in further analyses.

Finally, in a number of cases, altogether new variables were created from existing ones for summarizing and further analyzing data. For example, a "lot area" variable was developed by multiplying responses from lot depth and lot width. A "green index" variable was also computed from a number of different variables that reflected respondents' nature-oriented attitudes and behaviors with respect to their yard landscape management.

Survey data analysis

Several types of first-level analyses have already been described, including basic frequencies and scaling of multi-item attitude questions. These analyses have value in and of themselves but are also precursors to answering larger questions stemming from the main objectives of the RESTORE project. One of these is to help identify commonalities across study sites and management types and here analyses include cross-tabulation of categorical variables, Analysis of Variance (ANOVA) of parametric variables, and multidimensional pattern analysis of both parametric and non-parametric variable sets using techniques such as multidimensional scaling and Gower's Distance formula. A second set of procedures is aimed at developing predictive and explanatory models of concepts of central interest, and here multiple regression and structural equation modeling will be used. These analyses are still underway and will be described in detail in future publications.

Scenarios

The objective of the scenario study was to assess people's reactions to, attitudes about, and emotions concerning a hypothetical example of ecological restoration near their homes. This method has been used successfully in psychological research to provide insight into environmental attitudes, emotions, perceptions, behaviors, and knowledge in a more realistic context than can be found in studies restricted to using survey scales. This approach is similar to, but not the same as, the use of scenarios in futures research (see, for example, the Millennium Ecosystem Assessment Synthesis Report, 2005).

Scenario-based studies involve the use of a written scenario based upon existing choices and situations to generate environmental decisions, values, and emotions (Merrick and Vining, 2006, Vining 1992, Vining et al. 2000). Using a written scenario helps set a common baseline of knowledge about the issues for participants, although it is not perfectly successful in this effort. Scenarios can also provide insight into how subgroups view other subgroups in a decision making situation (e.g., managers' views of nearby residents and vice versa). The subgroups of interest were land managers, restoration volunteers, and residents living near restoration sites.

Scenario design

Social science team members drafted a scenario describing a typical restoration decision, informed by preliminary analysis of our interview data. The scenario had sections defining ecological restoration, giving a brief history of restoration in the Chicago region, describing various techniques and the arguments for and against restoration in general and particular techniques. It was reviewed by local experts in ecological restoration to ensure factual accuracy and reviewed by colleagues outside the restoration field to check for bias for or against restoration in the text. The scenario was approximately 1,800 words and written to the 10th grade reading level. Each target group received the same scenario, but we added group-specific questions to each (Appendices 8, 9, and 10). All respondents are asked to give an open-ended response to the scenario itself and then answer a suite of Likert-scale questions pertaining to their emotional reaction to the scenario, their attitudes about several restoration management goals, and their perceived connection with nature. Managers were asked to describe the public they serve and predict how they would respond to the scenario. These populations were targeted so that comparisons could be made between those actively engaged in restoration (volunteers and paid managers) and those who may impact or be impacted by restoration (nearby neighbors).

Residential scenario implementation

We implemented the residential scenario study at the same time and with the same method (DOPU) as the residential surveys described above. One-third of each residential sample (every third home) was designated to receive a scenario survey. Any given household received either the residential survey or the scenario, but never both. We received a total of 139 scenario responses (C=34, M=69, R=36) and the average response rate was 16.5 percent (Table 9).

Volunteer scenario implementation

Individual volunteers who had already participated in RESTORE project interviews (i.e., those associated with co-management cases C1, C2, C3, and C4) were emailed a personal invitation to participate in the scenario study via the Web site SurveyGizmo. In addition, we posted a call

Table 9.—Residential scenario study response rates and totals

	Drop-off Pick-up % Response rate			Total scenarios
Site	*Day 1*	*Day 2*	*Total*	*N*
C1	3.9	7.1	11	15
C2	6.9	4.1	11	8
C4	4.1	2.5	6.6	9
M1	10.3	17.9	28.2	22
M2	13	3.6	16.7	14
M3	14.1	5.9	20	17
M4	6.25	6.25	12.5	8
M5	5.6	4.2	9.8	8
R1	5.3	8.5	13.8	13
R2	15.4	20	35.4	23
				137

for participation on a regional listserve, the Volunteer Stewardship Network. Participants were screened first: those that had not volunteered in the last year were not asked to continue on to the scenario. We obtained a 76 percent response rate from RESTORE participant volunteers. Because the Volunteer Stewardship Network listserve goes out to volunteers and non-volunteers, we were unable to derive an accurate response rate from that population. We received a total of 81 volunteer scenario responses.

Manager scenario implementation

Individual managers from all RESTORE sites and categories who had already participated in RESTORE project interviews were emailed a personal invitation to participate in the scenario study via the Web site SurveyGizmo. In addition, we posted a call for participation on the Chicago Wilderness manager list (82 recipients). We obtained a 53 percent response rate from RESTORE participant managers, a 19 percent response rate from the Chicago Wilderness list, and a total of 32 scenarios.

Scenario data processing and analysis

The open-ended responses to the scenario (question 1, as well as question 7 in the manager scenario, about their predicted public response) were entered into a Word document, to be uploaded and analyzed in Nvivo. Each answer was associated with the scenario type (residential, manager, or volunteer), a site identification number (for residential scenarios), and a unique identification number.

The responses to quantitative measures were entered into an Excel spreadsheet and uploaded into SPSS. Each answer was associated with the site identification number and a unique respondent identification number. For these data, we used factor analysis to reduce the number of emotions and values measured. We then used ANOVA to examine differences between managers' responses about themselves and their predictions about the responses of the public. We used MANOVA to determine if there were statistically significant differences among the three groups: managers, residents, and volunteers. Then, within the resident scenario, we used MANOVA to examine differences among the individual sites and then among the three independent a priori categories: manager, co-management, and research.

Integrative Multivariate Analyses

To test whether there is a relationship between distinct styles of restoration planning and biodiversity outcomes (Objective 4), we created several data matrices based on both social data and ecological data. Below we describe the social matrix variables in detail.

Social science data matrix design

The social science team developed the matrix variables after the qualitative coding of field notes and institutional statement extraction was complete. We discussed emergent patterns and assessed them for their meaningfulness in terms of characterizing the cases. Some variables are based on a single type of information (e.g., length of time under restoration, or maximum seed collection distance), while others are composite variables representing data from several codes and institutional statements. For example, the variable "process" describes the clarity and complexity of the decision making process for each case. Data informing this variable includes an understanding of the number of individuals and subgroups interacting, and respondent perceptions of interactions involved in the decision making procedures. Variable values include raw scores, percentages, categorical, and ranked ordinal values.

The following pages describe each variable, including the variable name [in brackets] and its descriptive name, the values, the definition (with example data excerpts from interviews and field notes, if appropriate, with the case indicated by initials in brackets) and the cases for each category. There are three additional sites for which the RESTORE project has ecological data, but for which interviews, meeting observations, and site visits were not conducted. These additional sites strengthened the ecological data and the inferences possible from it. The three sites followed the same selection criteria (i.e., oak woodlands under restoration management for at least 5 years) and were additional sites managed by the same restoration decision makers on sites where social science data were collected. Because the management and decision making staff were identical to sites with social science data collection, social science data for these three additional sites can be inferred from their referent site. For example, the group size and decision making processes were the same for the sites where the additional ecological plots measured. In these instances, we used the values from the referent social science site in the matrix. Variables # 13, 14, 26, and 27 are exceptions where using the values of the referent site was not justifiable. The matrix values we used for those variables are described below and provided in Appendix 11.

Referent case and site with complete social science data	*Additional sites where ecological data were collected within referent case*
M2 site #10	#5, #13
M3 site #11	#8

1. [time] Length of restoration: This continuous variable describes how long restoration has been taking place at the site. See Appendix 11 for the length of restoration for each case.

2. [groupsize] Group size, as it relates to input into restoration decisions: This is not a continuous variable because it is difficult to say who truly has input, and how much weight that input has on a decision. As shown below, we created ranked ordinal values based on

approximately how many people are involved (with broad estimations of the weight of their input) with collective-level decisions for that site.

Value	Definition	Cases
1	Small (2-7 people with input)	R1, R2, C4, M3, M4
2	Medium (8-16 people with input)	C2, M1, M2
3	Large (17+ people with input)	C1, C3

3. [board] Role of Board in restoration decisions: This ranked ordinal variable describes the role of the Board in restoration decisions.

Value	Definition	Data examples (typically an interview excerpt)	Cases
1	Minor role	CAW[1]: There's a board, right? Do they ever have any say in what goes on there? CJ: Well, they would support the activities that are presented to them. I suspect that they would have input with these issues at some level, probably not in the nitty gritty details... [R2] RB2 will give a PowerPoint presentation to the board because she thought "it would be good for the board to know what he's been doing." [M4]	R1, R2, M4, C4
2	Irregular but important role	IG: … don't get the wrong impression that they … micromanage or anything... they play a role in, certainly in…. I mean, everybody that's here plays a role one way or another. But they don't, they're not dictating to us what we need to do or how we do it. I mean that happens every once in a while but that's really kind of rare. [M1] MC: Any contract [must be] approved by the Board. Disbursement or payment to a vendor has to be approved by the Board. [C1-3]	M1, M2, C1, C2, C3
3	Regular and important role	CAW: How does the board influence restoration and management activities? BL: The people who are on the land management committee influence that most of all… and can change decisions that the staff has made if the board wants it this way. Which is only rightly so. [The president is the one who is supposed] to make sure that the staff is heard, but that the board makes the final decision. There's a reason for that. The board runs the organization. They understand how to keep it alive and viable in the community, and their aesthetic, and how they see it fitting in the community, is the board's decision. Staff is there to follow through. [M3]	M3

[1]"CAW" are the initials of the interviewer. The other initials (IG, RB2) are coded initials for different respondents.

4. [publland] Public land: This variable is a dichotomous categorical measure of whether the land is publicly owned. The variable captures the action arena a group is operating in. Private and public lands have different constitutional rules and financial arrangements, both of which impact how many resources are available and how they can be used.

Value	Definition	Cases
0	Not public	M3, R2
1	Public land	C1, C2, C3, C4, M1, M2, M4, R1

5. [mtgstyle] Meeting style: This ranked ordinal variable captures an important component of decision making. Formal meetings are one method of communication and information sharing (recall that observation of these meetings was one step in the research protocol). The variable is a qualitative assessment based on interview and observation data about the regularity of formal group meetings and their impact on ecological restoration decisions.

Value	Definition	Data examples (typically an interview excerpt)	Cases
1	Low impact	DK: When it comes to restoration, we do almost nothing in like any kind of a formal meeting. With us, we very rarely meet. We try to meet once a year at a formal meeting... Almost all the discussions occur while we're working. [C4]	C2, C4
2	Low-medium impact	LC: A lot of our staff meetings end up being sort of YJ making announcements and things like that 'cause everybody is in one place. And that's good. But… it's just like best to, like go out into the field and just have a discussion. That's not most effective for updates and things like that. [M2]	M2
3	Medium impact	Two excerpts together support M4 in this category, indicating multiple views regarding the impact of meetings: NJ: So we have an agenda, we go through what the site inspection for each of the properties that they covered that week, if there are any upcoming activities that I need to let them be aware or that they need to let me be aware of, any unresolved land management issues. and RB2: Yeah once a week… it gets a little bit too much because it takes us out of the field and sometimes you're like we could have done this in an email. So that's sometimes frustrating... some of it kind of slows you down… [M4]	R1, M4
4	Medium-high impact	When they talked about when to schedule the training, one staff said "early March because late March is burn season"- CJ later said that that person is a key burn crew member and that is exactly why he needs to be at these coordination meetings- so that critical management tasks are recognized and can stay on schedule. [R2, meeting observation field notes]	R2

5	High Impact	QK: We have a group that we fondly call the [name removed], which stands for the ecological management group, and it's really all the stewards and anyone else who is an interested volunteer who wants to learn more. And we meet every two months… At those meetings, we have various business that we transact, it's every two months, all the stewards are invited… most people come all the time. [C1] CAW: What is the process for making a restoration decision? GB: We have, as you know, monthly staff meetings. So that would be an opportunity to bring up a challenging question or something that would be challenging that would require a big change. Then that would be an opportunity to express what your perspective was on that and kind of bring it to the table and have sort of a discussion. [M1] Overall, my impression of the Office of Natural Resources is that it is run quite effectively. At least, communication is standardized and there are at least three levels of authority (NI2, MD, and LR) that attend this monthly meeting. People ask questions about each other's updates, and several staff work together on various projects. [M1, meeting observation field notes]	C1, C3, M1, M3

6. [dmstyle] decision making style: This ranked ordinal variable describes the complexity, clarity, and functional capacity of the decision making process. How complex, clear, and functional a decision making process is can ultimately impact what can happen on the ground. For example, autocratic decision processes may be quite efficient, or they could lead to information being missed; decisions may be transparent, or they may be secretive and therefore raise suspicion and lead to conflict. This composite variable is a qualitative assessment and includes factors like the number of subgroups, and respondents' perception of complexity, clarity, and functionality of the process.

Value	Definition	Data examples (typically an interview excerpt)	Cases
1	Simple, typically one decision maker	DK: US is definitely the most decisive and the one who has established the goals and established the strategy. He's the director of restoration and other people kind of get their ideas in and… It's very informal how we reach consensus. You kind of talk about stuff and US kind of drives it [C4] AJ: CJ is really the organizer of it. And so he's the manager of that. But I can help facilitate some priorities, for example, that the horticultural crews need to augment their labor force in the winter. [R2]	C4, R2

2	Simple, multiple decision makers	IG: I think with the people within [the organization], of the hired employees anyway, that are in the natural resource division, there's plenty of initiative or, wanting to do the right thing for natural areas restoration. With the rest of the administration, politically, they're always looking at the bottom line. And, do we want to spend the money? Or well, you know, we need to put a trail in there 'cause that's what I can show. That's what I can show my constituents. I did this for them. I put those trails in. I put this parking lot in to make this [natural area] accessible for them. And so I think, yeah, that aspect is still there. And I don't know that that will ever go away cause we are a tax supported entity. [M1]	M1, M4
3	Complex, multiple decision makers	LB3: So my challenge is, ultimately, is with communication, is with the other departments. We have other departments as well. We have cultural resources—obviously, cultural resources is not my area. And I get requests, though, to do work for them as well. Of course, I have my bias—I would be biased toward what we do, but also toward what YJ's staff sends us. [M2] SI: Here, it's a big can of worms [the decision making process]. We are very involved in several committees, as well as staff, as well as working with conclusions from research done on the sites. So there are a lot of different steps that go into our decision making process. [M3] BL says that decisions are deliberate, and not made in a hurry. They are not made ad-hoc nor unilateral. Decisions go through the committees [M3]	M2, M3, R1, C2

4	Very complex (multiple, semi-autonomous groups having their own decision making systems, and also trying to work together)	QK: We are definitely a consensus-based decision making organization which of course means that everything takes a lot longer. [C1, who then links with the land owner of C1-3]. FL: … And the problem with them [management practices] not being as codified as they should be is that they can kind of disappear into a dark room and get changed and come back out again and nobody knows about them. [C1, re. C1-3] ER: … And as an organization I understand that they're desiring a clear chain of command… which sounds good in a large organization. [But] as they try to exert more control over us they take away more of our autonomy and therefore take away more of our drive. Because, you know, we lose the ownership of this, as this is our baby, 'cause now we're having people tell us to do this. I have to ask ZC if… If I have to do this, I ask ZC if I can do this. So that's bad. It's also bad because it now adds a layer of bureaucracy, which is dependent on my relationship with ZC or ZC's interest in my site. [C3, re. C1-3] CAW: So how would you describe the way those pieces of pie communicate with each other? QI: Sometimes very well and sometimes not! (laughs). Sometimes it works very well and sometimes the politics can raise its ugly head and get in the way of putting the pieces of the pie together. CAW: What do you mean by politics? QI: Politics, meaning, somebody wants something done and their going to the commissioner. They're screamin' and hollerin' 'I want this done now. I need this done now.' So instead of listening to the staff, who have the knowledge of putting the pieces together, the higher-ups then turn around and make the decision for you, and you go out and do it. [C1-3]	C1, C3

7. [difview] Differing views: This ranked ordinal variable captures an organization's ability to acknowledge and handle differing views about restoration actions, which can reduce the likelihood of conflict (e.g., the moratorium on ecological restoration). The variable is a qualitative assessment of group members' willingness to accept differing views of others in the decision making process (views outside the decision making process are taken into account in the variable [public], below). In general, the views held by people we interviewed, especially within a restoration group, are not widely different, but this variable captures the subtle variations that are possible in ecological restoration actions, and the extent to which groups allow them.

Value	Definition	Data example (typically an interview excerpt)	Cases
1	Very willing to acknowledge and work with differing views, with ways of circumventing problems via leadership and key positions	YJ: When we hired this land management ecologist, it was one of the goals was to iron out this issue with the burns. Because if I could do it, I would burn every acre I could, every year. That's my mentality. Some people disagree with it, and certainly that's not what we do… we've ran into some stumbling blocks, and hiring AK was one of the ways to put that responsibility onto somebody else... She has a clear understanding of where I'm coming from, and she has a clear understanding of what these guys are talking about. [M2]	M1, M2
2	Willing (little evidence of differing views)	AJ: And then I led a project that had some problems with it. But basically what I found was challenging, and again it's relating to area use is… We didn't have a kind of a site plan that said, okay, where are the natural areas. Where are the collections? You know, cause you're stepping in boundaries and things. So I led an effort that we sat down with the area managers to try to define units and sections of where they were. [R2]	R2
3	Somewhat willing	LO: But he basically controls what happens when on our preserves. And this is a complaint I have had all the time about [our organization] and I've said it at board meetings. I've said it at strategy meetings is that we need a stronger committee system because there is a restoration committee. [C4] GL said that board members (e.g., donors) have the final say in restoration decisions. He knows that there are some thickets of buckthorn that are 50 years old and will stay there until certain people die! GL—and the rest of the restoration team—is limited because the donors also pay his paycheck. [M3]	C4, M3, M4, R1
4	Not very willing	See C1-C3 quotes below. C2 is in this category due to their connection with C1-3, but the volunteers themselves are not entrenched in their views of what should happen at their site.	C2

5	Very unwilling	MI2: You know, it's like we've got to pee on our territory… they want to have a little more control over our decision making. [C3] AI2: In UV's famous words: 'Get those volunteers under control!' [C1] LB2: It's not about control, it's about sustainability… it's [the organization's] philosophy on restoration, which we haven't even determined, right now it's coming through UV. Decisions will be made according to what's best for the mission of the organization I said to JA once, 'why don't we do that?' And he said, 'LB2, good luck shoving that genie back in the bottle… because the genie's been out for 35 years… the genie likes when [we aren't] organized, the genie likes the comfort of owning their site and doing what they want.' Who doesn't? If we're not organized, and we're dysfunctional, it's to the advantage of a lot of people. [C1-3]	C1, C3

8. [volauton] Volunteer autonomy: This ranked ordinal variable is key to one of the management categories. Volunteers are a unique type of stakeholder, and their autonomy is a measure of their ability to cross over from the community to the action arena (Fig. 2). Autonomy is indicated in part by the kinds of activities volunteers are permitted to do and under what amount of supervision. The variable is a qualitative assessment of the autonomy of volunteers.

Value	Definition	Data example (typically an interview excerpt)	Cases
1	Low (Volunteers are supervised by a staff member while working on a site; they assist but do not lead any restoration workdays on their own)	BC: While I extremely appreciate volunteers and I think they are just a great group of people and how much they get done, I really don't think that our world would come to a stop. I think it's a lot to do with the limitations the township has put on the volunteers, like you mentioned the lack of power equipment… you have to realize that one day with RB2 and I out cutting with a chainsaw, is probably like a month of them being out there with croppers. I'm not saying it's their work ethic I'm just saying because of all the things we've imposed on them they can't accomplish as much now. [M4]	M3, M4, R1

2	Medium (Trained volunteer stewards may hold and supervise workdays on designated sites/ areas, but they may not burn brush piles or use chain saws)	JA2: When we'd go burn the brush piles, sometimes they'd [the volunteers] have larger trees that they couldn't cut down with a bow saw. So we would take our chainsaws out there and assist them. They wouldn't be on site, usually. [M1]	M1, M2, R2
3	Medium-high (Trained stewards may burn brush piles and use chainsaws)	FL: But, in terms of getting the work done at [site], much of it is having earned the title Master Steward, I have the right to go out there and lead workdays and do certain things that are kind of accepted no-brainers, best practices, whatever you want to call them. [C1] FL begins to describe a workday…AI2 starts a brush pile with the help of several regular volunteers. AI meets the day's volunteers at the parking lot and gives an educational tour through the site as they walk towards AI2. They then give a safety talk and break into 2-3 groups. They usually cut buckthorn by hand, waist high, and then come back with a chainsaw. [C1] QI: We utilize volunteers more than any other county. And we give… the volunteers… the volunteers forget that we give them more autonomy than any of the others… [C1-3]	C1, C2, C3
4	High (Trained volunteers may burn brush piles, use chainsaws, and conduct prescribed fires.)	US: I think we've been around long enough, most of the villages trust us. They know we're not some wild, radical group that's going to say, 'Well, we believe in this, and to hell with the community.' It's our land, and so long as we're within ordinances of [the municipality], we're fine. But that's the reason we do so much public outreach, is so that people trust us. [C4] The first burn was in 1989, and from then on, every part is burned. [The organization] takes care to inform neighbors of what is going on and to be careful about the smoke from burns. The [landowner] is also very supportive. [C4]	C4

9. [research] Extent of research: This ranked ordinal variable is key to one of the management categories. The extent of research occurring at a site can change the amount of information available and considered, and it may reveal alternative techniques. Monitoring indicates an interest in collecting information for long-term purposes. The variable is a qualitative assessment of extent of research activities occurring at the site.

Value	Definition	Case
1	None	C2
2	Some monitoring and data collection	C1, C3, C4, M3, M4
3	Monitoring and some research and/or experimentation	M1, M2, R2
4	Monitoring and lots of research and experimentation	R1

10. [public] Concern regarding potential public response: This ranked ordinal variable is important because the level of sensitivity can be a constraint on restoration activities, or it potentially could enhance activities (like at M4). The variable is a qualitative assessment of the extent to which the organization is sensitive to or concerned about potential public reaction to restoration (it includes assessment of the following codes: social acceptability, noticeability, proximity, privacy screening).

Value	Definition	Data example (typically an interview excerpt)	Cases
1	Less concerned about negative reaction from public	TK: I like the accessibility that that flat stone canal provides people to walk their dogs through there. So you feel that what you're doing will be noticed by people who come into the area because of that walk, that very scenic kind of walkway. [C2] ER: But I can't remember the last time we had any negative comments… I would say probably ten years. [C3]	C2, C3
2	Some concern	RB2: The area was covered with buckthorn so from the neighbors perspective, it was woods, you know? From our perspective and the banker's perspective it was weeds. And so we've been in the process of restoring that but what we've learned in that process is, to your point, people did have a lot of concerns, they didn't understand what was going on… [M4]	C4, M4, R2
3	Moderately concerned	OS: Since we've worked to expand our deer program, you know, we've had some public outreach associated with that... You tend to have to frame things in a different way. As part of the deer presentation, [we] explain our management of deer… it's a controversial topic. [M2] LZ2: Sometimes there are conversations about tree removal: "Wow, that is a big tree… even though it is not native… can we leave it?" She says that they are not purists when it comes to restoration. She and the board recognize tree removal is a big concern of the public. [M2]	M1, M2

4	Very concerned	FL: Just yesterday we had a workday at [x site], and we have to have a staff person at those sites because when we finally allowed work to go on there at the level it does everywhere else, the protesters—and it's a group of the same 8-12 people—has gotten to be… hamper the work of the volunteers. [C1] [The sites where it recently ended- sites X, Y, Z], those are the big three… It's not the most effective use of the volunteer coordinator's time… I have to stand between the volunteers and the people who don't agree with the process. [C1-3]	C1
5	Extremely concerned	NI3: There are ornamental species there that are woodies that are, supposedly, to be there on a temporary basis as the oak savanna develops. But whether that… And there had to be compromises made as to what woodies went in, etc. Again, on people's aesthetic, you know, in a more horticultural aesthetic pushing that. [R1] BL describes some heated discussions in the past about buckthorn screens, and the desire by some to have the "feel" of a preserve versus seeing houses. [M3] KQ: Two years ago we had 6 acres of turf grass management dumped in our laps. And that is almost the number one priority because they are so high profile, and there's a legal ordinance in town for your grass. SI: For example, residents would complain about the dandelions growing in the parkway—our parkway—across from their street. So, we have to take more of our time to control dandelions on our parkways. [M3]	M3, R1

11. [membership] Membership: This variable is a dichotomous categorical measure of whether there are paying members or not. The variable takes into account the groups that have a formal membership program and therefore also indicates a specific additional public interest group that the managers have to pay attention to.

Value	Definition	Cases
0	No	C1, C2, C3, M1, M2, M4
1	Yes	C4 (land trust members), M3 (land trust members), R1 (paying visitors and members), R2 (paying visitors and members)

12-14. [overemo, posemo, negemo] Emotion: These variables represent a fundamental component of human behavior known to impact decision making and other behaviors and processes. Each site has a total number of interview or other data references coded to emotion overall and to positive or negative emotion subcodes. For each site, we divided that total number of codes by the total number of emotion references for *all* sites to get a proportion of

emotion for that site (relative to other sites).The variables are percents of the number of overall, negative, and positive emotion (see Table 3 and see Appendix 11 for the emotion values for each case).

12. [overemo] Overall emotion: Each case has a total number of references coded to an emotion. For each site, we divided the total number of emotion codes by the total number of emotion references for *all* sites to get a proportion of emotion for that site (relative to other sites).

13. [negemo] Negative emotion: Each case has a total number of references coded to a negative emotion. For each case, we added all of these up (total # for fear + total # for angry + etc.) and divided it by the total number of negative emotion references for *all* cases to get a proportion of negative emotion for that case (relative to other cases).

14. [posemo] Positive emotion: Each case has a total number of references coded to a positive emotion. For each case, we added all of these up (total # for happy + total # for pride + etc.) and divided it by the total number of positive emotion references for *all* cases to get a proportion of positive emotion for that case (relative to other cases).

*** Specific emotion data on additional sites**

We know that M2, site #10 (the site for which we have complete social science data), has a particular iconic feel to it, one that elicited positive emotions, for that site only. We did not want to assume that the additional sites within that case for which we do not have social data, also have particularly iconic feels. Therefore, for sites #5 and #13, we decreased the percent positive emotion slightly (from 98 instances of positive emotion to 90 instances).

We also know that M3 site #11 (the site for which we have complete social science data), has a particular public use history which elicited negative emotions, for that site only. We know that this is the only site with this use history. Therefore for site #8, we decreased the percent of negative emotion slightly (from 14 instances of negative emotion to 10 instances).

15-20. [numbrule, numbnorm, numbstrat, numbaggr, numbcol, numboper] Suite of institutional statements: These continuous variables are raw scores that describe the institutional arrangement in terms of the types of institutional statements used (rule, norms, and strategies) and the overall institutional complexity (in terms of the number of statements). Aggregation statements are a measure of joint control, an important aspect of the decision making process. Collective level statements impact operational level actions and operational level statements impact on-the-ground conditions (see Fig. 5 and see Appendix 11 for the institutional variable values for each case).

15. [numbrule] Number of rules: The total number of rules documented for the case.

16. [numbnorm] Number of norms: The total number of norms documented for the case.

17. [numbstrat] Number of strategies: The total number of strategies documented for the case.

18. [numbaggr] Number of aggregation statements: The total number of aggregation statements for the case.

19. [numbcol] Number of collective level statements: The total number of collective level statements for the case.

20. [numboper] Number of operational level statements: The total number of operational level statements for the case.

* Specific institutional statement data on additional sites

For M2 site #5, M2 site #13, and M3 site #8, it was not necessary to make any modifications to the values given to their referent sites. Although there were a few (~four) institutional statements specific to the referent site, they were likely to have analogous statements specific to the additional sites or unique statements for those sites.

21-23. [seedcoll, seedpurch, seeddist] Seeding: These variables describe a particular management strategy—seeding—the only strategy where significant differences across cases were observed (fire, use of herbicides, etc., are relatively constant across cases).

21. [seedcoll] Seed collect: This ranked ordinal variable is a qualitative assessment of the intensity of collecting seed from on site.

Value	Definition	Cases
1	Seed collecting is minimal; it is something they are struggling to make a regular activity.	C2
2	Occasional seed collection happens, no specific program	M4, R2
3	Seed collection happens but not an intensive, regular activity	M1, M3
4	Active seed collection by staff and volunteers	M2, R1
5	Seed collection conducted regularly and intensively and is part of their identity as volunteer restorationists.	C1, C3, C4

22.[seedpurch] Seed purchase: This categorical variable describes whether organizations have purchased seed or not.

Value	Definition	Case
1	No	C1, C3, C4, R2
2	Yes, but avoid when possible	R1
3	Yes	C2, M1, M2, M3, M4

23. [seeddist] Seed source distance: This continuous variable describes the acceptable seed source distance, in miles. *Note that R1 and C3 are based on the fact that they trade seeds with each other, and C2 is based on the distance that volunteer stewards are allowed to collect from (although they themselves have not actually collected seed yet). See Appendix 11 for the seed distance for each case.

24. [haowned] Hectares owned by organization: This continuous variable describes the total number of acres owned by the organization that indicates how far the group has to spread their efforts and what detail can be used at any given site (creates need to make a particular decision about efforts, e.g., could choose to focus on particular sites). See Appendix 11 for the hectares owned for each case.

25. [sitesize] Site size: This continuous variable describes the size of the RESTORE site. Site size indicates how far the group has to spread their efforts and what detail can be used in any given area on that site (with the understanding that the entire site will eventually be restored). See Appendix 11 for the site size for each case.

26. [progress] Perceived restoration progress: This categorical variable indicates the extent of ecological progress and quality a site is perceived to have made, and it can be compared with biodiversity variables. The variable is a qualitative assessment of extent to which people doing the restoration at the site perceive that progress has been made on the site (from perception of change, and quality).

Value	Definition	Data examples	Cases
1	Low quality, little progress	TK: I get frustrated that you know, we've been working for seven years and … I don't know in my lifetime who will complete the project on this side… it is not a healthy woodland because its located within a metropolitan environment with all this air pollution, city air pollution around it. [C2] BA: But, you see, people don't care about my site because it's not as high quality, which is fine… it's still important. [C2]	C2
2	Not in great shape, but making progress	KQ: It's fairly diverse, there was a lot of thistle up in here, I think we got rid of that… we started using chemicals here in '04, and I would say at that time we had 10% of the site, so about 6 acres, was a filarus [invasive plant] monoculture. Now, I would say that we don't really have any monocultures here anymore. [M3]	M3
3	Progress acknowledged but issues of oak regeneration persist	CJ: So we have sections where oaks are in the overstory. These oak woodlands have persisted for many, many years with maples… but now the maples are replacing the oaks. The oaks are falling and they're decaying on the ground. As we speak. And the maples are continuing to grow and set seed. There are literally some sections that are just covered with maple seeds. Okay? And that's a natural way that they regenerate, I understand, but, without fire, those are going to continue to regenerate and, um, reduce the chances of successful oak woodlands... sustaining themselves in the future. [R2]	C4, M4, R2

4	Significant progress acknowledged on the portion of the site that has been managed; sections of the site have less progress.	RI: It's such a rare thing to experience a woodland in that kind of condition. And I would say that about 50% of that acreage is in sort of a maintenance mode of restoration now, where it's basically being burned and looking at whatever invasive species are still popping up. But there are some acreages in there that are in really sad shape yet... those will be the last parcels to get restoration activity in them. [R1]	C3, M2, R1
5	Near maintenance mode	ZC: It's got a lot of good stuff in it. You know, you look at the species list, it's pretty impressive. [C1] They usually have several spring workdays, although AI2 says that for the last half a dozen years or so, it has been harder and harder to find garlic mustard. Nonetheless, people like to come out and see the wildflowers as they walk through looking for the garlic mustard. [C1] OS: You know, there's some really high quality remnant oak savannas there. [M1] AC: There's not much to do at this point. The woodlands, the woods—there's not much to be done in there, from a volunteer standpoint. The things we do—cut buckthorn, garlic mustard, purple loosestrife, gather seeds, that kind of thing. So, the oak groves really don't have much in the way of trash vegetation in there. [M1]	C1, M1

*** Specific data on perceived restoration progress for additional sites**

M2 site #5: Our data for this site indicate that it is being managed with just fire, which is talked about as not being enough. Therefore, we gave it a 2.

M2 site #13: Our data for this site indicate that it is an Illinois Nature Preserve Commission designated site, and thus high quality, but also has a lot of restoration work still going on. Therefore, we gave it a value of 4.

M3 site #8: Our data for this site indicate that it is making progress but has a way to go. Therefore, we gave it a 2.

27. [impact] Use impact: This ranked ordinal variable is a qualitative assessment of the degree to which impacts of use (recreation and proximate urban development) is a concern.

Value	Definition	Data examples	Cases
1	No mention of negative use impact; they welcome exposure and use	Overall, they have concentrated only on about 1/3 of the whole woods (which is small, anyway). Why that 1/3? BA: "A PR reason"— it is an area that is exposed, that people walk through. [C2]	C2, C3
2	A few use issues, but no tension surrounding it	CW: Do the bikes go off the trails? LI: Oh, I'm sure that they do. But they stay on these illegal trails, at least. It's not like they get off the illegal trail and they're just riding through the woods aimlessly. That's the only positive to the illegal trail. And that they at least stay on… [C1]	R2, C1
3	Moderately concerned about impacts	SI: This being our main education site, we went up against a lot of education programs going on here that we can't be aggressively doing land management techniques, so that has at times stifled us in what we wanted to do because we have to find balance between, you know, keeping education going, atmosphere, and coming in and hard-handedly doing some restoration projects. That has come up quite a bit over the years and, you know, going about using, as far as management techniques... [M3] LO: And then probably a longer term goal and I've had a real big problem with trail use over there. And a scout put in a zigzag path down to the lake. And unfortunately they left a gap between two of the poles. And so people started doing a straight line down. And I can't tell you how many times I've taken. And initially there used to be two straight line paths down. [C4]	C4, M2, M3, M4
4	Highly concerned about impacts	RI said that board members wanted children to be able to run around the [the site] "rolling over logs" in the same way that the board members did in their youth. However, the board members did not think about the volume of children that would be doing this and the effect it would have on the environment. He explained to them that it would be like letting every person who came into a rose garden pick a rose; of course, they didn't like that idea. [R1] JR: And then just in this urbanized area we live in, too. All the outside influences. There are some that it's challenging to burn certain areas because of proximity to roads and buildings. Hydrological changes that we really can't fix, unfortunately, in some areas, too. So, some of those are some of our bigger challenges. [M1] IG: And, yeah, people want what they want. They want a trail through. They don't want any plants brushing up against them so it's got to be ten feet wide. [M1]	R1, M1

*** Specific data on perceived restoration progress for additional sites**

M2 site #5: Our data for this site give no indication of concerns about impacts. There are few facilities at the site, suggesting little use. Therefore, we gave it a 1.

M2 site #13: Our data for this site indicate that it has lots of facilities, suggesting it gets used. But there is no mention of frustration or tension about impact. Therefore, we gave it a value of 2.

M3 site #8: Our data for this site indicate that there are some impacts from neighbors (dumping clippings, making their own access points in the fence), but there does not seem to be any tension about it. Therefore, we gave it a 2.

Matrix analysis

The social science matrix variables were analyzed as a full set, as well as in submatrices, which allowed for more refined statistical analysis of themes within the data. The variables used in the full-matrices and submatrices are listed below. Analysis of the overall, positive, and negative emotion showed high correlation between them so we used only overall emotion in the *Full* matrix, and only negative emotion in the *Conflict* submatrix.

Full matrix: time, groupsize, board, publland, regmtgs, dmstyle, difview, volauton, research, public, membership, overemo, numbrule, numbnorm, numbstrat, numbaggr, numbcol, numoper, seedcoll, seedpurch, seeddist, haowned, sitesize, progress, impact

Organizational complexity: groupsize, board, mtgstyle, dmstyle, difviews, volauton, membership, numbrule, numbnorm, numbstrat, numbaggr, numbcol, numoper

Conflict: dmstyle, difviews, negemo, numbaggr

Site description: time, publland, sitesize, progress, impact

Seeds: seedcoll, seedpurch, seeddist

Attitudes toward restoration: volauton, research, public, overemo, progress, impact

Organizational mission: publland, research, public, membership, impact

IAD variables: numbrule, numbnorm, numbstrat, numbaggr, numbcol, numoper

Covariates: time, haowned, sitesize

CONCLUSIONS

This report documents the complex set of methods and procedures used to design, implement, and analyze the social science data gathered for the National Science Foundation Dynamics of Coupled Natural Human Systems project, RESTORE. To understand the social structures, institutional arrangements, and decision making processes within a variety of organizations undertaking ecological restoration in the Chicago Wilderness region, we conducted in-depth interviews of restorationists and observations of workdays and meetings. We used the Institutional Analysis and Development (IAD) framework to guide our research and analysis (Imperial 1999; Ostrom, 2005, 2007). We analyzed the data to uncover the rules, norms, and strategies (that is, institutional statements) in use by restorationists, and for the perceptions of landscape, management actions, decision making styles and processes, and emotions present in the interview data. These qualitative data informed two agent-based models, which deepened our understanding of particular collective decision making mechanisms. To understand the role of people outside of the IAD decision making action arena, we conducted a suite of surveys, extensively documenting the views, values, beliefs, and actions of natural area visitors, residents that live near natural areas with active restoration, and a residential sample reflective of the regional population. Similarly, we explored attitudes and emotions that both restoration decision makers and non-decision makers had about restoration practices through the scenario study. Finally, these datasets led to the creation of a matrix of social science variables that will allow analysis of the relationship between the social structure and processes and biodiversity outcomes within the RESTORE project cases.

Although online supplemental materials are a much needed and useful source for peer reviewed publications, this document allowed us to report in greater detail about our methods. Such documentation is useful, given the size and interdisciplinary nature of the project. We hope that this report will be helpful for future large-scale interdisciplinary projects, particularly those that seek to use a wide variety of social science methods.

Picnic spot in an oak woodland. Photo by Cristy Watkins, used with permission.

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APPENDIX 1: TIMELINE INTERVIEW GUIDE

RESTORE Project
Timeline Questions

In order to gather information about (1) restoration activities in general, and (2) individual goals, preferences and philosophies about those activities, we want to conduct a timeline interview with key actors at each site.

This interview will cover a year, *if* that makes sense to you—do restorationists think in terms of a year? A calendar year, or is there a season-season year that makes more sense? Why?

Tell me about the site; your role; how did you get started; overall goals.
- What is your planning process like? How far out do you plan? Informal, formal, ad hoc, on the ground?

From the most sensible starting point, let's go through the months/seasons <u>of last year</u> and talk about typical and possible activities and goals.

What's your process for planning long-term goals? What do you think about/incorporate into your strategy?

- Opportunities, limitations, goals, priorities. (why?)
- The conditions under which actions were possible.
  - Larger, past decisions/mandates (by who and why?)
  - Cooperation/coordination with others (rules and division of labor)
  - Resources: time, money, manpower, tools, permission
- Communicating this strategy to group
- Cross-organizational cooperation, coordination, communication

From the interviewer's perspective, we want to interject and ask "why" and "how" throughout!

APPENDIX 2: INTERVIEW GUIDE FOR DECISIONMAKERS

Interview Guide for Decisionmakers

Introduction of purpose of interview

Thanks for taking the time to talk with me. As you know, the purpose of this research is to understand how and why restoration activities take place; who is making decisions about a site, and why; and ultimately what do these processes mean for biodiversity on the ground.

My purpose in interviewing you is to understand your position and role in restoration activities at ____ site, and in _____ (County/organization). I want to know why you, personally, have invested your time and energy in this position and this site, and the ways in which information is gathered, passed on and utilized.

If I have your permission, I'd like to record our conversation, but your name, and all other names that are mentioned or asked about will be coded in all reports from this research.

The data will contribute to Chicago Wilderness efforts to understand and advance regional restoration efforts. It will be published in academic journals and shared with local and regional interested parties and partners (including your organization).

(1) Participant

Tell me about yourself! How did you come to be in this field/position?

What interested you about this position? What is your role? What are you responsibilities? How many years have you been in this position?

What's the best part about this job? The most challenging?

(2) Site

Describe this site, with particular emphasis on the woodland areas (size, ecological community, use and management history, areas of restoration, etc).

What do you, personally, like about this site? (Importance, value, emotions, etc)

How has this site changed since you began working there? What's your ideal vision of this site?

(3) Goals

What are the long-term goals for this site? *Why/how did these become a priority? (decisions)*

- Ecology related?
- Human related?

What are the short-term goals for this site?

Who established these goals and how? How have the goals changed/evolved over the years?

Do you, personally, have goals for the site that aren't currently being addressed? *Why?*

(4) Management- organizing, directing, monitoring

Describe the management structure related to this site. How are people and/or responsibilities organized? Would you describe the structure as simple or complex? Well understood or unclear? Strict or flexible? Congenial or formal? How do staff communicate with each other?

How are staff directed to accomplish tasks? Are staff encouraged to contribute their perspectives or ask questions about how tasks should be accomplished? Are completed tasks monitored, and if so, how?

Do you have a management plan? How was it created and who participated in its development? What is the purpose of the plan? How often is it updated? How?
If no plan exists, how is information about management stored/tracked?

Are there ever disagreements about how to approach the management of the site? Give an example. How do disagreements typically get resolved?

(5) On the ground activities

Tell me about the people who "work" at the site. Who participates, *why*, in what ways/what type of projects? List these.

Are there certain people that are particularly critical to restoration management? How so? (Names not required: Title/position; expertise; experience; knowledge; personal connections?) *Staff, Volunteers, Interns, Contractors, other.*

What are the most basic rules-of-thumb for restoration activities at your site?

Are there people or organizations that don't play a role on the ground but are important in other ways? (Who and in what ways?)

(6) Decisionmaking

What is the process for making restoration management decisions? For example, is one person in charge or do several people make the decision? Who is involved, and is there communication about decisions? How? How are actions prioritized?

Who gets to voice concerns, how are those concerns voiced, and how are these concerns incorporated into the final decision?

I'd like to ask you to think back to a time when the way decisions about restoration actions were changed… how did it change, and why?

- Person, policy (what, who), event, information?
- Did this decision provoke any particular emotions for you?

If difficult: Can you tell me about a particularly good year of restoration? Why does that year stick out in your mind? How about a bad year? Did you learn anything from that year? Did you do anything different the next year? In retrospect, was there anything that could have been done differently to make it a better year?

Is this typically how decisions are made? If not, why was it atypical/what is typical?

Is there a person or a group of people that have a final say about restoration actions? Why?

Who would you go to for guidance/advice on the following actions. Why? (What is it about the person or what he/she knows that you trust? Can you give an example for one/several?)

- Prescribed burns
- Deer management
- Herbicide use
- Seed collection and seeding
- Tree removal

Sounds like you rely a lot on ____. What about other people- do the opinions of certain other people mean more (carry more weight) than others? In what ways, and why? (other restoration actions, donations, equipment, funding)

(7) Broader public involvement

Who are the various groups that you need to keep informed about decisions and actions? How do you keep them informed? Is outreach a routine part of your job? (or someone else's?). *Ask about groups not mentioned that might be important.*

Do you actively seek out public responses to any of your plans or management actions?

In what ways is public interest and concern integrated into your management actions?

What are the ways in which the broader public constrains what you do?

(8) Resources

I assume that finances are limited, so in what ways does that shape your (1) goals for the site and (2) management plan/approach? Of these limitations, what are the top three issues of most concern? What would you do if you had unlimited funding for the site?

What kinds of non-monetary resources and information do you use to inform how you make decisions about what to do at a site? (Anything!) How are those sources used to inform your overall goals? What about as things change on-the-ground as well as in the field of restoration and the "restoration community"?

Are there particular people or groups that you get information from? Why them? (Names not required: Title/position; expertise; experience; knowledge; personal connections?) How do you get this information? (email, listserves, regular meetings, informal/personal relationships, journal subscriptions, newsletters)

How do you find information when you don't have it? Does your organization encourage you to keep current and confer with others?

Probe when:

- Conversation includes discussion of other actors (e.g. county <>steward; board<>staff; PCAC/FTFP<>staff/steward

- Meaningful terms, phrases, themes

- Ask:
    - For elaborations
    - For opposing views
    - If answer "all-encompassing"; does it apply to everything/all the time?

APPENDIX 3: INTERVIEW GUIDE FOR BOARD MEMBERS

(1) Participant

Tell me about yourself! How did you come to be a board member?
What interested you about this position?
What is your role? (On the board and on-site) What are you responsibilities? How long have you been in this role?

What are the goals and responsibilities of the board?
How is the board structured? (Draw)
Are there committees? What is their purpose/goal?
Describe the composition of the board (who are the members)?
What are the requirements to be on the board?
How often do you meet? Who attends these meetings? What is the mood like at a board meeting, and is there a typical process for the way a meeting is held?

What is the board's role in setting goals for particular sites? (Vary? E.g. everyone, specific members, specific committees)
Do you have any specific goals for _____ site?

What is the board's role in creating management plans?

What kinds of decisions has the board made in regards to management of and restoration activities at this site?

How has the structure of the board evolved over the years? How have the goals evolved?

How do you communicate the board's decisions and goals to the staff?
How does staff communicate their goals and concerns to the board?
How influential are your major donors in deciding on restoration activities?

Do you or other members of the board participate in restoration activities? (If informant does not, skip on-the-ground activities section)

APPENDIX 4: ONSITE SURVEY

URBAN NATURAL AREAS SURVEY

The Field Museum is working together with local forest preserves and other groups to understand how people think about and use Natural Areas in metropolitan Chicago. ***Natural Areas are public and private lands and waters within parks and forest preserves that are set aside as habitat for wild plants and wildlife and for people's enjoyment of nature.***

Your participation is voluntary. Your answers will be confidential and reported only in summary form. If you would like more information on research participant rights, contact Deborah Bekken, at (312) 665-7807 or dbekken@fieldmuseum.org.

1. How often do you visit this natural area? *Check ONE answer*

□ First time □ A few times a year □ At least once a month □ At least once a week

2. How often do you visit other natural areas? *Check ONE answer*

□ Rarely □ A few times a year □ At least once a month □ At least once a week

3. What activities are you doing here today? _____

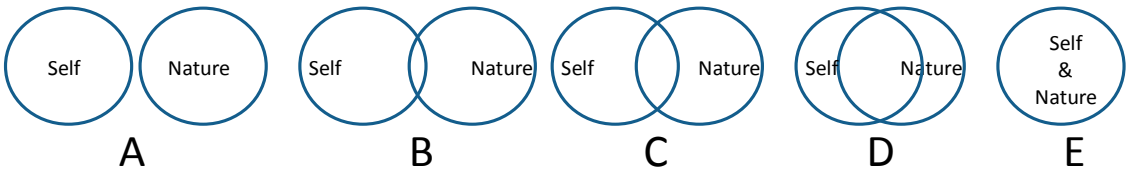
4. What other activities do you enjoy doing **here?** *Describe the activity, the season, whether you do it alone or in a group, etc.*

_____

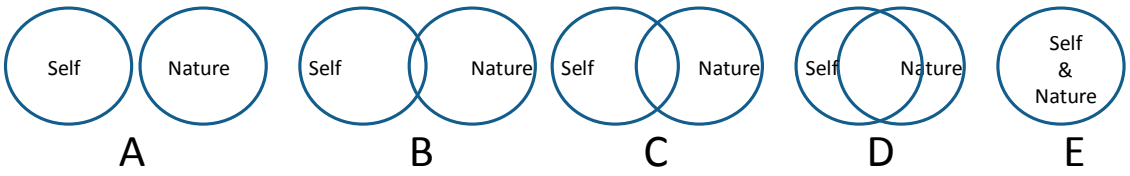
5. Have you ever participated in any of the following activities **here?** *Check ONE answer for each activity*

ACTIVITY	Never	Once	A few times	Regularly
Organized sporting or outdoor recreation event (e.g., trail run)				
Organized nature education event (e.g. guided wildflower walk)				
Litter clean-up, trail maintenance				
Nature stewardship activities (e.g., pull weeds, collect seeds)				

6. Thinking of your experience here today, which of the following diagrams below best represents how connected you feel with nature **right now**? *Circle ONE letter*



7. Now, thinking more generally about the way you live, which of the following diagrams below best represents how connected you feel with nature **in your everyday life**? *Circle ONE letter*



NATURE IN THE CITY

8-10. How much do you agree or disagree with each of the following statements? *Check ONE answer for each statement*

8.	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	Don't Know
a. The choices managers make about the types of plants that are managed in urban natural areas have implications for the surrounding neighborhoods						
b. The issue of biodiversity is only relevant to remote national parks and wilderness areas						
c. We do not need to worry too much about the impact of human-built urban developments on animals and plants?						
d. We, as humans, have a moral responsibility to protect plants and animals that are native to the local area even if they do not benefit us						

9. ***Restoring natural areas in and around Chicago would…***	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	Don't Know
a. …increase the natural beauty of the metropolitan area						
b. …decrease recreational opportunities						
c. …help combat the effects of global climate change						
d. …decrease air quality						
e. …preserve plants and animals that are in danger of becoming extinct						
f. …decrease the amount of tourism and its economic benefits						
g. …increase water quality in the metropolitan area						
h. …maintain the region's natural heritage.						
i. …increase the number of unique and interesting plants and animals that exist in the metropolitan area						

10. ***It is important to me …***	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	Don't Know
a. … that natural areas in the Chicago region are preserved, rather than developed for housing or businesses						
b. … to know about natural area restoration issues in and around Chicago						
c. … to have native plants and animals in my home garden or yard						
d. … to remove invasive species from my home garden or yard						
e. … that native animals be provided with sufficient natural habitat in and around Chicago						

MANAGING NATURE AT *THIS* SITE

11. This site has a management plan that includes ecological restoration for some areas.

In Column A, check whether you think the following restoration techniques happen at this site, do not happen at this site, or you don't know. *Check ONE answer for each statement*

In Column B, check whether you support the technique, do not support the action, or you don't know. *Check ONE answer for each statement*

TECHNIQUE	COLUMN A				COLUMN B		
	Happens Here	**Does not happen here**	Don't know	⇨	**Support**	**Do not support**	Undecided/ Don't know
a. Planting native seeds and seedlings				⇨			
b. Removal of undesired plants, shrubs and small trees by hand or with the use of hand tools				⇨			
c. Mechanical removal of undesired shrubs and small trees (e.g. by chainsaw)				⇨			
d. Removal of undesired mature trees				⇨			
e. Using herbicide on undesired plants, shrubs, or trees				⇨			
f. Controlled burns to control undesired plants and encourage native ones (Controlled burns are prescribed fires undertaken by experts)				⇨			
g. Exclusion of overabundant and destructive deer (fencing)				⇨			
h. Removal of overabundant and destructive deer (professional sharp shooters)				⇨			

12. What do you like about this site, and why?

13. What do you **not** like about this site, and why?

14. Have you learned anything from your experiences at this site (**today, another time, or over time**) that has changed how you think, or act, in other parts of your life? *Check all that apply*

□ Landscape practices □ Group involvement □ Voting choices

□ Awareness of: _____

□ Other:_____

15. Do you belong to an organization(s) that focuses on some aspect of environmental or natural resources management, use, or recreation? C*heck ONE answer*

□ no □ yes

If YES, list the organizations that you belong to in Column A below. In Column B indicate how active you are in each organization.

Column A -- ORGANIZATION	Column B – How Active Are You?			
	Not at all	Slightly	Moderately	Extremely

16. Have you ever contacted someone about the management of this site (e.g., with concerns or compliments)? If so, please tell us a bit about it (e.g., what was the issue? was there an outcome? who did you contact?).

BACKGROUND INFORMATION
For statistical purposes only. All answers will be strictly confidential.

17a. Are you here □ alone □ with a group

17b. How many in your group?

17c. How many are 12 years of age or younger? _____

18. What is the zip code where you live? ___ ___ ___ ___ ___

19. How many total years have you lived in the Chicago area? _____ years

20. What is your occupation? _____

21. What is the highest level of education you have completed?

_____

2. How old are you? _____ years

23. Are you □ Female □ Male

24. How do you identify your race/ethnicity?

_____

25. What was your total household income last year, before taxes? *(Please check ONE answer)*

□ less than $25,000
□ $25,000 up to $50,000
□ $50,000 up to $100,000
□ $100,000 up to $150,000
□ more than $150,000

Do you have any final comments about this topic or the survey that you would like to add?

Thank you very much! We really appreciate your help!

Site _____

Date _____

Surveyor Initials _____

APPENDIX 5: NEARBY RESIDENT SURVEY (DOPU VERSION)

WE WANT YOUR OPINIONS

(not your money!)

Please complete this survey, and place it back in the bag and on your doorknob for **a chance to win a $100 gift card.**

We will pick it up this coming **Tuesday.**

This Natural Areas Residential Survey is a project of:

Chicago Wilderness

The Field Museum

Environment Culture and Conservation

A Division of Science

The Field Museum

Environment Culture and Conservation
A Division of Science

NATURAL AREAS RESIDENTIAL SURVEY

Dear Neighbor,

The Field Museum and the Chicago Wilderness science team want to know you think about nature and how it is managed, including your own yard and nearby natural areas. ***Natural Areas consist of public or private lands and waters within parks and forest preserves that are set aside as habitat for wild plants and wildlife, and for people's enjoyment of nature.*** People who live in cities have different opinions about urban natural areas, how they are managed, and how private yards and other green spaces contribute to nature in the city. Because you live near a natural area, your opinions are especially important and we would be grateful for your input.

The survey should be filled out by an adult member of your household who has some responsibility for decisions about managing your yard. Your participation in this survey is voluntary. Your answers will be confidential. If you would like more information on the survey and your rights as a participant, contact Deborah Bekken, at (312) 665-7807 or dbekken@fieldmuseum.org.

Completing the survey is easy:

1. Fill out the survey

2. If you would like to, give us your contact information to enter a raffle for 1 of 5 $100 gift cards to your choice of several major retailers.

3. Place the survey back in the back and hang it on your doorknob.

4. We will pick up the survey this coming **Tuesday.**

Thank you for your participation!

Sincerely,

Alaka Wali

Alaka Wali
Curator of North American Anthropology
Applied Cultural Research Director
Environment, Culture and Conservation

Cristy Watkins

Cristy Watkins
Environmental Social Scientist
Environment, Culture and Conservation

NATURE IN THE CITY – This set of questions is about nature and management of natural areas near your home.

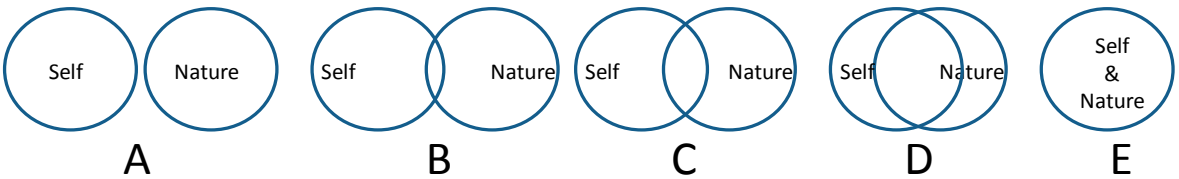
1. How much do you agree or disagree with each of the following statements? *Please check ONE answer for each statement.*

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	Don't Know
a. The choices managers make about the types of plants that are managed in urban natural areas have implications for the surrounding neighborhoods						
b. The issue of biodiversity is only relevant to remote national parks and wilderness areas						
c. We do not need to worry too much about the impact of human-built urban developments on animals and plants						
d. We as humans have a moral responsibility to protect plants and animals that are native to the local area even if they do not benefit us						
e. It is important to me that natural areas exist in urban and suburban areas.						

2. Ecological restoration is the process of assisting the recovery of a natural area that has been degraded, damaged, or destroyed. The following phrases complete the sentence *"Restoring natural areas in and around Chicago would…"* How much do you agree or disagree with each of the following phrases about potential effects of ecological restoration in and around Chicago? *Please check ONE answer for each phrase.*

Restoring natural areas in and around Chicago would…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	Don't Know
a. …increase the natural beauty of the metropolitan area						
b. …decrease recreational opportunities						
c. …help combat the effects of global climate change						
d. …decrease air quality						
e. …preserve plants and animals that are in danger of becoming extinct						
f. …decrease the amount of tourism and its economic benefits						
g. …improve water quality in the metropolitan area						
h. …maintain the region's natural heritage.						
i. …increase the number of unique and interesting plants and animals that exist in the metropolitan area						

3. Which of the following diagrams below best represents how connected you feel with nature **in your everyday life**? *Please circle ONE letter.*



4. In a few words, what comes to your mind when you think of "nature"? _____

_____

6. Have you ever participated in any of the following activities at [SITE NAME]? *Check ONE answer for each activity.*

	Never	Once	A few times	Regularly
a. Organized nature education event (e.g. guided wildflower walk)				
b. Litter clean-up, trail maintenance				
c. Nature stewardship activities (e.g., pull weeds, collect seeds)				

7a. [SITE NAME] has a management plan that includes ecological restoration for some areas. *Check whether you think the following restoration techniques happen at this site, do not happen at this site, or you don't know. It is okay if you don't know!*

	Happens Here	Does not Happen here	Don't know
a. Planting native seeds and seedlings			
b. Removal of undesired plants, shrubs and small trees by hand or with the use of hand tools			
c. Mechanical removal of undesired shrubs and small trees (e.g. by chainsaw)			
d. Removal of undesired mature trees			
e. Using herbicide on undesired plants, shrubs, or trees			
f. Controlled burns to control undesired plants and encourage native ones (Controlled burns are prescribed fires undertaken by experts)			
g. Exclusion of overabundant and destructive deer (fencing)			
h. Removal of overabundant and destructive deer (professional sharp shooters)			

7b. Now, for the same techniques listed above, *check whether you support the action, do not support the action, or you don't know.*

	Support	**Do not Support**	**Don't know**
a. Planting native seeds and seedlings			
b. Removal of undesired plants, shrubs and small tree by hand or with the use of hand tools			
c. Mechanical removal of undesired shrubs and small trees (e.g. by chainsaw)			
d. Removal of undesired mature trees			
e. Using herbicide on undesired plants, shrubs, or trees			
f. Controlled burns to control undesired plants and encourage native ones (Controlled burns are prescribed fires undertaken by experts)			
g. Exclusion of overabundant and destructive deer (fencing)			
h. Removal of overabundant and destructive deer (professional sharp shooters)			

8. Have you ever contacted someone about the management of [SITE NAME] (e.g., with concerns or compliments)? If yes, please tell us a bit about it (e.g., what was the issue? was there an outcome? who did you contact?).

_____

_____

_____

NATURE IN YOUR NEIGHBORHOOD – This set of questions is about different features of your neighborhood.

9. The following phrases complete the sentence *"I value nature in my neighborhood because it…" Please check ONE answer for each phrase.*

"I value nature in my neighborhood because it…"	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Don't know**
a. Increases property value						
b. Attracts songbirds to my yard						
c. Attracts other wildlife to my yard						
d. Increases privacy						
e. Increases sense of community						
f. Blocks unwanted views						
g. Provides places for pets to run free						
h. Is beautiful						
i. Cleans the air						
j. Is pleasing to the senses (e.g. sights, smell, sounds)						
k. Enhances the look of my home						
l. Provides spiritual values						
m. Will be there for future generations						
n. Decreases flooding						

10. The following phrases complete the sentence *"I think nature in my neighborhood can be annoying, or create problems, because it …" Please check ONE answer for each phrase.*

"I think nature in my neighborhood can be annoying, or create problems because it …"	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Don't know**
a. Attracts deer to my yard						
b. Attracts other unwanted wildlife to my yard						
c. Attracts or breeds annoying insects						
d. Reduces personal (or family) safety						
e. Encourages people to let their dogs go off-leash						
f. Triggers allergies						
g. Attracts undesirable activities (e.g. loitering, dumping)						
h. Creates unwanted noise						
i. Blocks views						
j. Decreases property values						
k. Is unattractive to look at						
l. Is not neatly maintained						
m. Creates a mess						
n. Increases flooding						

11. How satisfied or dissatisfied are you with your neighborhood? *Please check ONE answer.*

☐ Very dissatisfied ☐ Somewhat dissatisfied ☐ Neither dissatisfied nor satisfied ☐Satisfied ☐ Very Satisfied

12. How much does each of the following community features contribute to your satisfaction with your neighborhood? *Please check ONE answer for each feature.*

	Very much	**Somewhat**	**Neutral**	**Not much**	**Not at all**
a. Style of homes					
b. Trees					
c. Safety					
d. Access to natural areas					
e. School system					
f. Lawns					
g. Municipal services					
h. Access to roads or transit					
i. Flowers and shrubs					
j. Access to shopping areas					
k. Nice neighbors					

NATURE IN YOUR YARD – This set of questions is about your yard and your management of your lawn and gardens.

13. Please estimate the size of your lot: _____ ft. wide by _____ ft. deep

14. What percentage of your lot is **yard** (space not taken up by your house and garage or other buildings)? _____ %

15. Thinking about your **entire yard** (front, back, side), about what percentage is:

_____% Lawn (turf grass that is mowed)

_____% Garden (shrubs and flowers, ferns, or other groundcover plants but not mowed turf grass)

_____ % Hard covered surfaces (concrete, asphalt sidewalk, patio/deck, driveway, pool, etc.)

_____% Other uncovered surfaces (dirt, gravel, mulched play areas, paths, etc.)

100% Total

16. Now think about your **entire lot** (yard and buildings). Imagine flying high over your house in full summer. What percentage of your total lot is shaded from view by the leafy tree canopy?

_____% Tree canopy

17. What kinds of activities do you and your family like to do in your yard? _____

_____

18. What kinds of management activities happen in your yard (lawn and garden)? *Please check all that apply.*

☐ Watering the lawn ☐ Watering the garden ☐ Fertilizing ☐ Weeding by hand

☐ Weekly mowing ☐ Mowing as needed ☐ Use of natural predators ☐ Composting

☐ Planting of native plants ☐ Planting of non-native plants ☐ Insecticide or herbicide application

19. Thinking about lawn and garden care combined, how much time per week does **your household** spend on yard maintenance? *Please check ONE answer*.

☐ 1 hour or less ☐ 1-5 hours ☐ 5-10 hours ☐ over 10 hours

20. Do you regularly use a lawn service? ☐ Yes ☐ No

21. Do you regularly use a gardening/landscaping service? ☐ Yes ☐ No

22. In my household **lawn care** typically is: *Please check ONE answer* ☐ Not applicable

☐ a very undesirable chore ☐ an undesirable chore ☐ neutral ☐ an enjoyable hobby ☐ a very enjoyable hobby

23. In my household, **gardening** typically is: *Please check ONE answer* ☐ Not applicable

☐ a very undesirable chore ☐ an undesirable chore ☐ neutral ☐ an enjoyable hobby ☐ a very enjoyable hobby

24. Do you have any of these plants in your yard?

A.

A1. Buckthorn (shrub or small tree) ☐ Yes ☐ No ☐ Don't know

If yes,

A2. Did you plant on purpose? ☐ Yes ☐ No

A3. Do you like it? ☐ Yes ☐ No ☐ Neutral

A4. Have you tried to remove it? ☐ Yes ☐ No

B.

B1. Privet (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

B2. Did you plant on purpose? ☐ Yes ☐ No

B3. Do you like it? ☐ Yes ☐ No ☐ Neutral

B4. Have you tried to remove it? ☐ Yes ☐ No

C.

C1. Honeysuckle (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

C2. Did you plant on purpose? ☐ Yes ☐ No

C3. Do you like it? ☐ Yes ☐ No ☐ Neutral

C4. Have you tried to remove it? ☐ Yes ☐ No

D.

D1. Barberry (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

D2. Did you plant on purpose? ☐ Yes ☐ No

D3. Do you like it? ☐ Yes ☐ No ☐ Neutral

D4. Have you tried to remove it? ☐ Yes ☐ No

25. How much do you agree or disagree with each of the following statements? *Please check ONE answer for each statement*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
a. I like a neat and tidy yard.						
b. It is important to me to plant plants in my yard that are pretty						
c. It is important to me to plant plants in my yard that attract butterflies and other beneficial insects (e.g. bees)						
d. It is important to me to have a lush, green, weed-free front lawn, even if it requires substantial effort or cost						
e. My yard is a critical part of what makes my property "home."						
f. I feel there are expectations among my neighbors that everyone should have a green, weed-free **front** lawn						
g. Having a green, weed-free **front** lawn helps to maintain property values						
h. Having a green, weed-free **front** lawn is a sign of responsible home ownership						
i. Residents should remove established plants from their garden if the plants are not native to the area						
j. It is best to plant native plants in the garden						
k. The problem with native plants in my yard is that they often look scraggly and untidy						
l. It is important for residents to choose plants for their garden that are native to their local area						
m. People who live close to natural areas should be able to plant whatever they want in their yards, even if their non-native plants escape into natural areas						
n. What other people do with their **back** yards does not matter to me						
o. What other people do with their **front** yards does not matter to me						

26. Where do you get your information about gardening and landscaping practices? _____

_____

27. Have you changed your landscaping practices in any way because you live close to the natural areas in Oak Openings?

☐ Yes: Please explain: _____

☐ No: **If no**, would you be willing to? *Please check all that apply.*

☐ No: → ☐ no interest ☐ no time ☐ too big of a job ☐ would cost too much

☐ Yes: → ☐ with more information ☐ with more money ☐ with more time

☐ with incentives or support ☐ with other _____

ABOUT YOU AND YOUR HOUSEHOLD

– This section is for statistical purposes only. All answers will be **strictly** *confidential.*

28. How many people are in your household?

Adults _____

Children (13- 18) _____ Children (12 or younger) _____

29. Do you have a dog(s)? ☐ Yes ☐ No

30. Do you have a cat(s)? ☐ Yes ☐ No

If yes, does your cat go outside? ☐ Yes ☐ No

31. How many years have you lived in your current home?

_____

32. What is your occupation?

_____

33. What is the highest level of education you have completed?

_____

34. How old are you? _____ years

35. Are you ☐ Female ☐ Male

36. How do you identify your race/ethnicity?

_____

37. What was your total household income last year, before taxes? *(Please check ONE answer)*

☐ less than $25,000 ☐ $100,000 up to $150,000

☐ $25,000 up to $50,000 ☐ more than $150,000

☐ $50,000 up to $100,000 ☐ prefer not to answer

Do you have any final comments about this topic or the survey that you would like to add?

Please give us your name and contact information if:

1. You would like to be entered into a raffle for 1 of 5 $100 gift cards to your choice of several major retailers.
2. You would be willing to participate in an interview or a different survey related to this study

We will not share this information with anyone outside of the research team, and we will destroy it when the study is complete.

☐ Raffle ☐ Additional studies

Name _____ Email/phone _____

Thank you very much! We really appreciate your help!

APPENDIX 6: REGIONAL RESIDENT SURVEY (DOPU VERSION)

WE WANT YOUR OPINIONS

(not your money!)

Please complete this survey, and place it back in the bag and on your doorknob for **a chance to win a $100 gift card.**

We will pick it up this coming **Tuesday.**

This Natural Areas Residential Survey is a project of:

Chicago Wilderness

The Field Museum

Environment Culture and Conservation

A Division of Science

The Field Museum

Environment Culture and Conservation
A Division of Science

NATURAL AREAS RESIDENTIAL SURVEY

Dear Neighbor,

The Field Museum and the Chicago Wilderness science team want to know you think about nature and how it is managed, including your own yard and nearby natural areas. ***Natural Areas consist of public or private lands and waters within parks and forest preserves that are set aside as habitat for wild plants and wildlife, and for people's enjoyment of nature.*** People who live in cities have different opinions about urban natural areas, how they are managed, and how private yards and other green spaces contribute to nature in the city.

The survey should be filled out by an adult member of your household who has some responsibility for decisions about managing your yard. Your participation in this survey is voluntary. Your answers will be confidential. If you would like more information on the survey and your rights as a participant, contact Deborah Bekken, at (312) 665-7807 or dbekken@fieldmuseum.org.

Completing the survey is easy:

1. Fill out the survey

2. If you would like to, give us your contact information to enter a raffle for 1 of 5 $100 gift cards to your choice of several major retailers.

3. Place the survey back in the back and hang it on your doorknob.

4. We will pick up the survey this coming **Tuesday.**

Thank you for your participation!

Sincerely,

Alaka Wali
Curator of North American Anthropology
Applied Cultural Research Director
Environment, Culture and Conservation

Cristy Watkins
Environmental Social Scientist
Environment, Culture and Conservation

NATURE IN THE CITY – This set of questions is about nature and management of natural areas near your home.

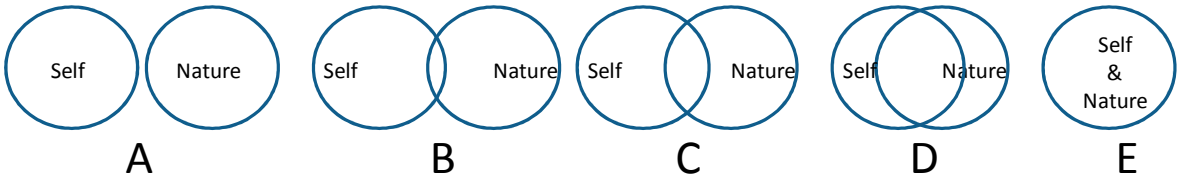
1. How much do you agree or disagree with each of the following statements? *Please check ONE answer for each statement.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
a. The choices managers make about the types of plants that are managed in urban natural areas have implications for the surrounding neighborhoods						
b. The issue of biodiversity is only relevant to remote national parks and wilderness areas						
c. We do not need to worry too much about the impact of human-built urban developments on animals and plants						
d. We as humans have a moral responsibility to protect plants and animals that are native to the local area even if they do not benefit us						
e. It is important to me that natural areas exist in urban and suburban areas.						

2. Ecological restoration is the process of assisting the recovery of a natural area that has been degraded, damaged, or destroyed. The following phrases complete the sentence *"Restoring natural areas in and around Chicago would…"* How much do you agree or disagree with each of the following phrases about potential effects of ecological restoration in and around Chicago? *Please check ONE answer for each phrase.*

Restoring natural areas in and around Chicago would…	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
a. …increase the natural beauty of the metropolitan area						
b. …decrease recreational opportunities						
c. …help combat the effects of global climate change						
d. …decrease air quality						
e. …preserve plants and animals that are in danger of becoming extinct						
f. …decrease the amount of tourism and its economic benefits						
g. …improve water quality in the metropolitan area						
h. …maintain the region's natural heritage.						
i. …increase the number of unique and interesting plants and animals that exist in the metropolitan area						

3. Which of the following diagrams below best represents how connected you feel with nature **in your everyday life**? *Please circle ONE letter.*



4. In a few words, what comes to your mind when you think of "nature"? _____

_____

5a. How often do you visit natural areas? *Please check ONE answer.*

☐ Never ☐ Rarely ☐ A few times a year ☐ At least once a month ☐ At least once a week

5b. If you have visited natural areas, which ones?

_____

5c. If you have visited natural areas, what activities do you do there?

_____

_____

6. Have you ever participated in any of the following activities at a natural area? *Check ONE answer for each activity.*

	Never	**Once**	**A few times**	**Regularly**
a. Organized nature education event (e.g. guided wildflower walk)				
b. Litter clean-up, trail maintenance				
c. Nature stewardship activities (e.g., pull weeds, collect seeds)				

7. Some natural areas have a management plan that includes ecological restoration for some areas. *Check whether you support the action, do not support the action, or you don't know.*

	Support	**Do not Support**	**Don't know**
a. Planting native seeds and seedlings			
b. Removal of undesired plants, shrubs and small tree by hand or with the use of hand tools			
c. Mechanical removal of undesired shrubs and small trees (e.g. by chainsaw)			
d. Removal of undesired mature trees			
e. Using herbicide on undesired plants, shrubs, or trees			
f. Controlled burns to control undesired plants and encourage native ones (Controlled burns are prescribed fires undertaken by experts)			
g. Exclusion of overabundant and destructive deer (fencing)			
h. Removal of overabundant and destructive deer (professional sharp shooters)			

8. Have you ever contacted someone about the management of natural areas (e.g., with concerns or compliments)? If yes, please tell us a bit about it (e.g., what was the issue? was there an outcome? who did you contact?).

_____

_____

_____

_____

_____

NATURE IN YOUR NEIGHBORHOOD – This set of questions is about different features of your neighborhood.

9. The following phrases complete the sentence *"I value nature in my neighborhood because it…" Please check ONE answer for each phrase.*

"I value nature in my neighborhood because it…"	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Don't know**
a. Increases property value						
b. Attracts songbirds to my yard						
c. Attracts other wildlife to my yard						
d. Increases privacy						
e. Increases sense of community						
f. Blocks unwanted views						
g. Provides places for pets to run free						
h. Is beautiful						
i. Cleans the air						
j. Is pleasing to the senses (e.g. sights, smell, sounds)						
k. Enhances the look of my home						
l. Provides spiritual values						
m. Will be there for future generations						
n. Decreases flooding						

10. The following phrases complete the sentence *"I think nature in my neighborhood can be annoying, or create problems, because it …" Please check ONE answer for each phrase.*

"I think nature in my neighborhood can be annoying, or create problems because it …"	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Don't know**
a. Attracts deer to my yard						
b. Attracts other unwanted wildlife to my yard						
c. Attracts or breeds annoying insects						
d. Reduces personal (or family) safety						
e. Encourages people to let their dogs go off-leash						
f. Triggers allergies						
g. Attracts undesirable activities (e.g. loitering, dumping)						
h. Creates unwanted noise						
i. Blocks views						
j. Decreases property values						
k. Is unattractive to look at						
l. Is not neatly maintained						
m. Creates a mess						
n. Increases flooding						

11. How satisfied or dissatisfied are you with your neighborhood? *Please check ONE answer.*

☐ Very dissatisfied ☐ Somewhat dissatisfied ☐ Neither dissatisfied nor satisfied ☐Satisfied ☐ Very Satisfied

12. How much does each of the following community features contribute to your satisfaction with your neighborhood? *Please check ONE answer for each feature.*

	Very much	**Somewhat**	**Neutral**	**Not much**	**Not at all**
a. Style of homes					
b. Trees					
c. Safety					
d. Access to natural areas					
e. School system					
f. Lawns					
g. Municipal services					
h. Access to roads or transit					
i. Flowers and shrubs					
j. Access to shopping areas					
k. Nice neighbors					

NATURE IN YOUR YARD – This set of questions is about your yard and your management of your lawn and gardens.

13. Please estimate the size of your lot: _____ ft. wide by _____ ft. deep

14. What percentage of your lot is **yard** (space not taken up by your house and garage or other buildings)? _____ %

15. Thinking about your **entire yard** (front, back, side), about what percentage is:

_____% Lawn (turf grass that is mowed)

_____% Garden (shrubs and flowers, ferns, or other groundcover plants but not mowed turf grass)

_____ % Hard covered surfaces (concrete, asphalt sidewalk, patio/deck, driveway, pool, etc.)

_____% Other uncovered surfaces (dirt, gravel, mulched play areas, paths, etc.)

100% Total

16. Now think about your **entire lot** (yard and buildings). Imagine flying high over your house in full summer. What percentage of your total lot is shaded from view by the leafy tree canopy?

_____% Tree canopy

17. What kinds of activities do you and your family like to do in your yard? _____

_____

18. What kinds of management activities happen in your yard (lawn and garden)? *Please check all that apply.*

☐ Watering the lawn ☐ Watering the garden ☐ Fertilizing ☐ Weeding by hand

☐ Weekly mowing ☐ Mowing as needed ☐ Use of natural predators ☐ Composting

☐ Planting of native plants ☐ Planting of non-native plants ☐ Insecticide or herbicide application

19. Thinking about lawn and garden care combined, how much time per week does **your household** spend on yard maintenance? *Please check ONE answer.*

☐ 1 hour or less ☐ 1-5 hours ☐ 5-10 hours ☐ over 10 hours

20. Do you regularly use a lawn service? ☐ Yes ☐ No

21. Do you regularly use a gardening/landscaping service? ☐ Yes ☐ No

22. In my household **lawn care** typically is: *Please check ONE answer* ☐ Not applicable

☐ a very undesirable chore ☐ an undesirable chore ☐ neutral ☐ an enjoyable hobby ☐ a very enjoyable hobby

23. In my household, **gardening** typically is: *Please check ONE answer* ☐ Not applicable

☐ a very undesirable chore ☐ an undesirable chore ☐ neutral ☐ an enjoyable hobby ☐ a very enjoyable hobby

24. Do you have any of these plants in your yard?

A.

A1. Buckthorn (shrub or small tree) ☐ Yes ☐ No ☐ Don't know

If yes,

A2. Did you plant on purpose? ☐ Yes ☐ No

A3. Do you like it? ☐ Yes ☐ No ☐ Neutral

A4. Have you tried to remove it? ☐ Yes ☐ No

B.

B1. Privet (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

B2. Did you plant on purpose? ☐ Yes ☐ No

B3. Do you like it? ☐ Yes ☐ No ☐ Neutral

B4. Have you tried to remove it? ☐ Yes ☐ No

C.

C1. Honeysuckle (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

C2. Did you plant on purpose? ☐ Yes ☐ No

C3. Do you like it? ☐ Yes ☐ No ☐ Neutral

C4. Have you tried to remove it? ☐ Yes ☐ No

D.

D1. Barberry (shrub) ☐ Yes ☐ No ☐ Don't know

If yes,

D2. Did you plant on purpose? ☐ Yes ☐ No

D3. Do you like it? ☐ Yes ☐ No ☐ Neutral

D4. Have you tried to remove it? ☐ Yes ☐ No

25. How much do you agree or disagree with each of the following statements? *Please check ONE answer for each statement*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
a. I like a neat and tidy yard.						
b. It is important to me to plant plants in my yard that are pretty						
c. It is important to me to plant plants in my yard that attract butterflies and other beneficial insects (e.g. bees)						
d. It is important to me to have a lush, green, weed-free front lawn, even if it requires substantial effort or cost						
e. My yard is a critical part of what makes my property "home."						
f. I feel there are expectations among my neighbors that everyone should have a green, weed-free **front** lawn						
g. Having a green, weed-free **front** lawn helps to maintain property values						
h. Having a green, weed-free **front** lawn is a sign of responsible home ownership						
i. Residents should remove established plants from their garden if the plants are not native to the area						
j. It is best to plant native plants in the garden						
k. The problem with native plants in my yard is that they often look scraggly and untidy						
l. It is important for residents to choose plants for their garden that are native to their local area						
m. People who live close to natural areas should be able to plant whatever they want in their yards, even if their non-native plants escape into natural areas						
n. What other people do with their **back** yards does not matter to me						
o. What other people do with their **front** yards does not matter to me						

26. Where do you get your information about gardening and landscaping practices? _____

_____

27. Have you changed your landscaping practices in any way because of ecological restoration efforts in the Chicago region?

☐ Yes: Please explain: _____

☐ No: **If no**, would you be willing to? *Please check all that apply.*

☐ No: → ☐ no interest ☐ no time ☐ too big of a job ☐ would cost too much

☐ Yes: → ☐ with more information ☐ with more money ☐ with more time

☐ with incentives or support ☐ with other _____

ABOUT YOU AND YOUR HOUSEHOLD

– This section is for statistical purposes only. All answers will be **strictly** *confidential.*

28. How many people are in your household?

Adults _____

Children (13- 18) _____ Children (12 or younger) _____

29. Do you have a dog(s)? ☐ Yes ☐ No

30. Do you have a cat(s)? ☐ Yes ☐ No

If yes, does your cat go outside? ☐ Yes ☐ No

31. How many years have you lived in your current home?

_____

32. What is your occupation?

_____

33. What is the highest level of education you have completed?

_____

34. How old are you? _____ years

35. Are you ☐ Female ☐ Male

36. How do you identify your race/ethnicity?

_____

37. What was your total household income last year, before taxes? *(Please check ONE answer)*

☐ less than $25,000 ☐ $100,000 up to $150,000

☐ $25,000 up to $50,000 ☐ more than $150,000

☐ $50,000 up to $100,000 ☐ prefer not to answer

Do you have any final comments about this topic or the survey that you would like to add?

Please give us your name and contact information if:

1. You would like to be entered into a raffle for 1 of 5 $100 gift cards to your choice of several major retailers.
2. You would be willing to participate in an interview or a different survey related to this study

We will not share this information with anyone outside of the research team, and we will destroy it when the study is complete.

☐ Raffle ☐ Additional studies

Name _____ Email/phone _____

Thank you very much! We really appreciate your help!

APPENDIX 7: RESIDENT SCENARIO

WE WANT YOUR OPINIONS

(not your money!)

Please complete this survey, and place it back in the bag and on your doorknob for **a chance to win a $100 gift card.**

We will pick it up this coming **Tuesday.**

This Natural Areas Residential Survey is a project of:

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Field Museum
Environment Culture and Conservation
A Division of Science

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Field Museum
Environment Culture and Conservation
A Division of Science

Dear Neighbor,

The Field Museum and UIUC want to know what you think about nature and how it is managed. We are interested in your answers to the enclosed study even if you are not aware of ecological restoration in the Chicago area. You are among only a small number of households near restoration areas. You have been selected at random from those households to participate in this survey, so it is important that we hear from you. I think you will find the study easy and enjoyable to complete. It should take about 20 minutes of your time.

Your participation in this survey is voluntary. Your answers will be confidential. Your name and address will never be paired with your answers in any reports that are written from this study. If you would like more information on the rights of research participants, please contact Deborah Bekken, at (312) 665-7807 or dbekken@fieldmuseum.org.

You may also enter a raffle for the chance to win 1 of 5 $100 gift cards to your choice of several major retailers. By completing the study, you are agreeing that you are 18 years of age or older, that you have read the above information, and that you voluntarily agree to participate in the research.

We sincerely appreciate your time and effort in answering the enclosed questions. If you have any questions or concerns regarding this study, please contact either Joanne Vining at jvining@illinois.edu or Cristy Watkins at cwatkins@fieldmuseum.org.

My sincere thanks,

Joanne Vining, Ph.D.
Professor Emerita of Environmental Psychology
University of Illinois

Chicago's Oak Woodlands

Because the Chicago metropolitan area has a long history of preserving nature through parks and forest preserves, we now have tens of thousands of acres of public land. Before Europeans settled the Chicago region in the 1830's, the woods, wetlands, and prairies (habitats) had 100s of different types of plants and animals. This period is often called "pre-settlement" and the plants, animals and habitats that existed at that time are considered "native." Today, most of the original natural areas have been replaced by cities and towns, but many of these native plants and animals are still found in natural habitats preserved on public land.

Many types of plants from other parts of the world were brought here by settlers because they were useful. Others came accidentally. Some of these plants spread into natural areas and are now growing in the remaining habitats. These plants are considered "non-native." Norway maple is an example of a non-native tree that competes with oak trees, which are native, for water and nutrients. Species that spread quickly and are hard to control are considered "invasive." European Buckthorn and garlic mustard are examples of invasive plants that can shade out other shrubs, flowers, and grasses. Due to the effects of these invasive plants, most preserved natural areas are now different from what they were when Europeans first settled in the area. Some people wish to restore these areas to be more like the healthier pre-European-settlement conditions more optimal ecological conditions. For that reason, in the last twenty to thirty years land owners have begun to manage these areas in an effort to make them as healthy as possible given the limitations of Chicago's urbanized environment.

A Hypothetical Scenario

Below is a discussion of the activities, goals, tools, and costs of restoring Chicago's oak woodlands. While reading this material, put yourself in the place of someone who lives near an oak woodland targeted for restoration and answer the questions at the end.

What is Ecological Restoration?

Ecological restoration refers to a process of treating a natural area to reach a desired condition, usually as close to the pre-settlement environment as possible because at that time, ecological conditions were optimal. Woodland areas with mostly oak trees were one type of environment that was widespread at that time. Removing plants and animals that are deemed invasive is one important part of ecological restoration and is intended to create a better environment for native plants and animals. Other parts of ecological restoration might include removing human-made structures that dry out wetlands, and using prescribed fire (described below) to allow the natural system to function as it once did. Ecological restoration has now become part of a world-wide strategy to preserve biological diversity, especially in areas used heavily by people.

The Case For and Against Restoration

Chicago's oak woodlands have changed dramatically in the past 150 years. The biggest changes are: 1- They are smaller; 2 - They have many invasive species, and; 3- There are changes in water flow across the land because of paving and draining or changes to other parts of the system. Some people see these changes as unhealthy and have looked for ways to reverse them. Restoration is seen as a way to bring back or enhance the natural function of the habitat. Supporters of restoration say that oak woodlands are important examples of Illinois' natural heritage. Restoration is also seen as beneficial to humans. For example, restoration may increase enjoyment of nature and decrease water pollution.

Others, however, say that natural areas have *always* changed over time, and that it is not unusual for new species to come into an area. These people suggest that restoring a natural area to a point in the past ignores the fact that natural areas change over time, with or without humans. They ask, why we should restore places to a period before European settlement? If Native Americans have moved into and out of this region for thousands of years, why is European settlement seen as unnatural? They argue that picking a past date to restore an area to is arbitrary. These individuals believe that we should support a policy they see as allowing nature to take its course.

Those who see restoration as important view restoration projects as works in progress. Depending on the size of the area or the seriousness of problems, it may take many years of hard work to complete a restoration plan. Even then, most areas will require ongoing work to maintain and continue improvements. Those who oppose restoration, however, consider this kind

Many support the protection of native habitats through restoration, but others do not like some of the tools and techniques used in restoration. This difference in attitudes can result in conflicts between people who support or participate in restoration and those who see restoration as interfering with natural change.

Strategies for restoration

Reduction of non-native and invasive plants

In restoration projects, large, non-native trees and shrubs, such as Norway maples and European buckthorn are cut down and chemicals (herbicide) are applied to their stumps to kill the root. The wood from cut trees is either chipped and used on trails, or is burned in large piles. Brushpile fires burn hot and might last for several hours. (These techniques may also be used to remove native species that are deemed too dense and thus keep sunlight from reaching the ground). Leafy plants are often sprayed with herbicides or are removed by hand. Restoration managers are required to post public notices at sites when herbicide has been applied. In Illinois, a state license is required for anyone applying herbicide on public land.

Some people object to the use of herbicides in natural areas. They see it as unnecessarily bringing poison into nature. Also, there are arguments for not removing particular invasive plants. For example, buckthorn is a large shrub that may block unwanted views. Removal can change residents' views in undesirable ways. Buckthorn can also provide places for birds to nest and berries for them to eat. Others object to removal of *any* species, using *any* technique, because they see it as interfering with nature.

Restoration of native plants

Restoration workers replant native plant species in places where they have been lost. They collect seeds where plants are abundant and then plant them in areas where they once grew. Sometimes seedlings are grown in nurseries and planted in restoration sites.

Animal management

Management of native animals such as insects, frogs, or birds is not common. Some managers may set up bird nesting boxes or regularly monitor the numbers of rare species. Restoration often involves controlling the numbers of some animals. For example, there are specific control programs for invasive insects such as gypsy moths and the emerald ash borer.
Some types of animals such as Canada geese and white-tailed deer have been described as "nuisance wildlife." In natural areas deer can be a problem if there are too many. They no longer have natural predators and they eat plants, shrubs, and young tree seedlings. Large numbers of deer can pose risks to human health and to the health of the deer themselves, as well as other wildlife. To reduce deer numbers in urban areas where hunting is not legal, managers may sometimes hire sharp shooters to kill some of them. Some people who oppose these "culling" programs say that deer are a natural part of the forest, and they should be allowed to live in peace. Others say there are different ways to reduce numbers such as birth control. Still others support legal hunting by the public.

Fire in the Chicago Ecosystem

Fire has been present in oak woodlands in the Chicago area for thousands of years**.** Fires were started by lightning or by Native Americans who wanted to keep the woods open for hunting ease. Until recently, different kinds of oak trees were the main trees growing in Chicago region woodlands because fires favor oaks (that are not hurt by fire) and kept other trees, like maple (that can't tolerate fire) from growing.

But European settlers created farms, towns and cities that needed protection from fires. Fire fighting in natural areas allowed more trees to grow. With more trees, the woods are shadier. Because plants on the ground need sunlight to grow, they decrease in number. Trees that can live in shade, such as maples, take over and create even more shade and reduce the number of oak seedlings and the other flowers and grasses that need more light.

As part of restoration, managers intentionally use prescribed fires to reduce the density of trees and shrubs and make the site more open. When weather conditions are right, restoration managers start low fires on the ground that spread through part of a site. This is done according to plans called "prescriptions" that include a description of the required crew size, equipment, and acceptable weather conditions (wind, temperature and humidity). Activities of wildlife using the habitats to be burned are also considered. Permits for prescribed burns are required from the state and from local governments. In some areas, a fire department crew is on standby alert. Neighbors are often notified of prescribed burns.

Some people note problems with these intentional fires. Although fire is used only during optimal weather conditions, intentional fires can sometimes get hotter than planned and could spread to other natural lands or even to buildings. This is a very rare occurrence, however. Another potential problem is that some people are sensitive to the smoke that may blow into residential or commercial areas. Some people think that fire can needlessly harm wildlife such as hibernating snakes or overwintering insects.

The Price of Restoration

Ecological restoration has both benefits and costs. Benefits include clean water, decreased pollution, and greater soil fertility, among others. The costs have to do with the time and money needed to conduct restoration. Restoration is done by a variety of individuals and agencies. While public land owners such as forest preserve districts have professional staff assigned to this work, in some counties much of the work is done by volunteers. Using volunteers reduces the cost of restoration and allows more work to get done. In the Chicago region, thousands of volunteers spend tens of thousands of hours annually working on restoration. They get recreational, educational, and other benefits from their participation. City, county, state and federal tax dollars support restoration costs, including staff, equipment and materials. This is a growing part of public land budgets.

Many restoration activities require a lot of knowledge and skill to reduce risks and make progress. All restoration workers receive special training. Restoration staff typically have advanced degrees in science and some volunteer stewards get formal certification in restoration ecology. "Learning by doing" is common.

The Questions

(1) If you lived near one of the oak woodlands undergoing restoration, would you approve or disapprove of restoration? Why? Or why not? If you would choose certain techniques and not others, please indicate that in your answer. Please continue your answer on the next page, if necessary.

(2) Please place an X on the line below in the location where you would place your decision:

No restoration - Let nature take its course Full restoration of all natural areas

(3) Please place an X on the line below to show us if you think the scenario you read here is biased:

Biased against restoration No bias Biased for restoration

(4) Please rate the level of emotion that you experienced while reading the scenario and answering the questions:

Use a scale from 1-10, with 1 indicating 'not at all' and 10 indicating 'very much.'

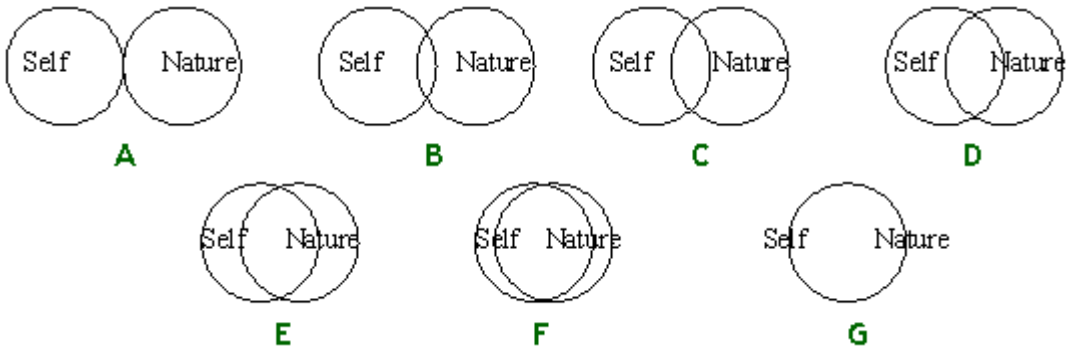
_____ Angry
_____ Sad
_____ Happy
_____ Despair
_____ Fear

(5) Please rate the level of importance that you associate with each of these management goals for urban ecosystems.

Use a scale of 1-10, with 1 indicating 'not at all' and 10 indicating 'very much.'

_____ Reducing effects of overabundant wildlife in natural areas
_____ Strengthening the natural functioning of the habitat's ecology
_____ Increasing enjoyment of recreation at a site
_____ Removing non-native shrubs such as buckthorn so sunshine can support more native species
_____ Removing non-native trees such as maple so sunshine can support more native species
_____ Removing overabundant native species such as ash so sunshine can support more native species
_____ Improving water quality
_____ Improving soil fertility
_____ Providing a place where I can enjoy the spirituality and peace of nature.
_____ Enhancing scenic beauty
_____ Creating jobs

(6) How interconnected are you with nature? Please indicate which of the pictures below best describes your relationship with the natural environment. ***Circle ONE letter*****.**



(7) About you. *This section is for statistical purposes only. All answers will be* **strictly** *confidential.*

a) How many years have you lived in your home/Chicago region? _____ years

b) What is your occupation? _____

c) What is your age? _____ d) Are you □ Male □ Female

e) What was your total household income last year, before taxes? *(Please check ONE answer)*

□ less than $25,000 □ $100,000 up to $150,000 □ $25,000 up to $50,000

□ more than $150,000 □ $50,000 up to $100,000 □ prefer not to answer

(8) Would you like to be entered into a raffle to win a $100 gift card? □ Yes □ No

If yes, please give us your contact information (email or phone number): _____

Do you have any final comments about this topic or the scenario that you would like to add?

Thank you very much!

APPENDIX 8: VOLUNTEER SCENARIO

Scenario_Volunteers

Thank you for participating in the Chicago Wilderness Science Team's RESTORE project's "scenario study."

This study is intended for people who participate in ecological restoration on a voluntary basis. If you do not meet these criteria, please exit the survey now. Please feel free to forward the study link to others you know that do.

Your participation in this survey is voluntary and your answers will be confidential. You must be 18 years of age or older to participate. This survey has been approved by The Field Museum's Institutional Review Board. If you would like more information about the rights of research participants, please contact Deborah Bekken at dbekken -at- fieldmuseum.org.

Please contact Cristy Watkins at cwatkins -at- fieldmuseum.org or Joanne Vining at jvining -at- illinois.edu if you have any other questions.

Thank you!

New Page

1. Have you participated in ecological restoration on a voluntary basis in the last year? *

- ○ Yes
- ○ No

2. How often? Please type the number of days per year

Directions: Please read the scenario on the next three (3) pages and answer the questions that follow.

Chicago's Oak Woodlands

Because the Chicago metropolitan area has a long history of preserving nature through parks and forest preserves, we now have tens of thousands of acres of public land. Before Europeans settled the Chicago region in the 1830's, the woods, wetlands, and prairies (habitats) had 100s of different types of plants and animals. This period is often called "pre-settlement" and the plants, animals and habitats that existed at that time are considered "native." Today, most of the original natural areas have been replaced by cities and towns, but many of these native plants and animals are still found in natural habitats preserved on public land.

Many types of plants from other parts of the world were brought here by settlers because they were useful. Others came accidentally. Some of these plants spread into natural areas and are now growing in the remaining habitats. These plants are considered "non-native." Norway maple is an example of a non-native tree that competes with oak trees, which are native, for water and nutrients. Species that spread quickly and are hard to control are considered "invasive." European Buckthorn and garlic mustard are examples of invasive plants that can shade out other shrubs, flowers, and grasses. Due to the effects of these invasive plants, most preserved natural areas are now different from what they were when Europeans first settled in the area. Some people wish to restore these areas to be more like the healthier, more ecologically optimal, pre-settlement conditions. For that reason, in the last twenty to thirty years land owners have begun to manage these areas in an effort to make them as healthy as possible given the limitations of Chicago's urbanized environment.

A Hypothetical Scenario

Below is a discussion of the activities, goals, tools, and costs of restoring Chicago's oak woodlands. While reading this material, put yourself in the place of someone who lives near an oak woodland targeted for restoration and answer the questions at the end.

What is Ecological Restoration?

Ecological restoration refers to a process of treating a natural area to reach a desired condition, usually as close to the pre-settlement environment as possible because at that time, ecological conditions were optimal. Woodland areas with mostly oak trees were one type of environment that was widespread at that time. Removing plants and animals that are deemed invasive is one important part of ecological restoration and is intended to create a better environment for native plants and animals. Other parts of ecological restoration might include removing human-made structures that dry out wetlands, and using prescribed fire (described below) to allow the natural system to function as it once did. Ecological restoration has now become part of a world-wide

strategy to preserve biological diversity, especially in areas used heavily by people.

The Case For and Against Restoration

Chicago's oak woodlands have changed dramatically in the past 150 years. The biggest changes are: 1- They are smaller; 2- They have many invasive species, and; 3- There are changes in water flow across the land because of paving and draining or changes to other parts of the system. Some people see these changes as unhealthy and have looked for ways to reverse them. Restoration is seen as a way to bring back or enhance the natural function of the habitat. Supporters of restoration say that oak woodlands are important examples of Illinois' natural heritage. Restoration is also seen as beneficial to humans. For example, restoration may increase enjoyment of nature and decrease water pollution.

Others, however, say that natural areas have always changed over time, and that it is not unusual for new species to come into an area. These people suggest that restoring a natural area to a point in the past ignores the fact that natural areas change over time, with or without humans. They ask, why we should restore places to a period before European settlement? If Native Americans have moved into and out of this region for thousands of years, why is European settlement seen as unnatural? They argue that picking a past date to restore an area to is arbitrary. These individuals believe that we should support a policy they see as allowing nature to take its course.

Those who see restoration as important view restoration projects as works in progress. Depending on the size of the area or the seriousness of problems, it may take many years of hard work to complete a restoration plan. Even then, most areas will require ongoing work to maintain and continue improvements. Those who oppose restoration, however, consider this kind of human effort to be "unnatural."

Many support the protection of native habitats through restoration, but others do not like some of the tools and techniques used in restoration. This difference in attitudes can result in conflicts between people who support or participate in restoration and those who see restoration as interfering with natural change.

Strategies for Restoration

Reduction of non-native and invasive plants

In restoration projects, large, non-native trees and shrubs, such as Norway maples and European buckthorn are cut down and chemicals (herbicide) are applied to their stumps to kill the root. The wood from cut trees is either chipped and used on trails, or is burned in large piles. Brushpile fires burn hot and might last for several hours. (These techniques may also be used to remove native species that are deemed too dense and thus keep sunlight from reaching the ground). Leafy plants are often sprayed with herbicides or are removed by hand. Restoration managers are required to post public notices at sites when herbicide has been applied. In Illinois, a state license is required for anyone applying herbicide on public land.

Some people object to the use of herbicides in natural areas. They see it as unnecessarily bringing poison into nature. Also, there are arguments for not removing particular invasive plants. For example, buckthorn is a large shrub that may block unwanted views. Removal can change residents' views in undesirable ways. Buckthorn can also provide places for birds to nest and berries for them to eat. Others object to removal of any species, using any technique, because they see it as interfering with nature.

Restoration of native plants

Restoration workers replant native plant species in places where they have been lost. They collect seeds where plants are abundant and then plant them in areas where they once grew. Sometimes seedlings are grown in nurseries and planted in restoration sites.

Animal management

Management of native animals such as insects, frogs, or birds is not common. Some managers may set up bird nesting boxes or regularly monitor the numbers of rare species. Restoration often involves controlling the numbers of some animals. For example, there are specific control programs for invasive insects such as gypsy moths and the emerald ash borer.

Some types of animals such as Canada geese and white-tailed deer have been described as "nuisance wildlife." In natural areas deer can be a problem if there are too many. They no longer have natural predators and they eat plants, shrubs, and young tree seedlings. Large numbers of deer can pose risks to human health and to the health of the deer themselves, as well as other wildlife. To reduce deer numbers in urban areas where hunting is not legal, managers may sometimes hire sharp shooters to kill some of them. Some people who oppose these "culling" programs say that deer are a natural part of the forest, and they should be allowed to live in peace. Others say there are different ways to reduce numbers such as birth control. Still others support legal hunting by the public.

Fire in the Chicago Ecosystem

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But European settlers created farms, towns and cities that needed protection from fires. Fire fighting in natural areas allowed more trees to grow. With more trees, the woods are shadier. Because plants on the ground need sunlight to grow, they decrease in number. Trees that can live in shade, such as maples, take over and create even more shade and reduce the number of oak seedlings and the other flowers and grasses that need more light.

As part of restoration, managers intentionally use prescribed fires to reduce the density of trees

and shrubs and make the site more open. When weather conditions are right, restoration managers start low fires on the ground that spread through part of a site. This is done according to plans called "prescriptions" that include a description of the required crew size, equipment, and acceptable weather conditions (wind, temperature and humidity). Activities of wildlife using the habitats to be burned are also considered. Permits for prescribed burns are required from the state and from local governments. In some areas, a fire department crew is on standby alert. Neighbors are often notified of prescribed burns.

Some people note problems with these intentional fires. Although fire is used only during optimal weather conditions, intentional fires can sometimes get hotter than planned and could spread to other natural lands or even to buildings. This is a very rare occurrence, however. Another potential problem is that some people are sensitive to the smoke that may blow into residential or commercial areas. Some people think that fire can needlessly harm wildlife such as hibernating snakes or overwintering insects.

The Price of Restoration

Ecological restoration has both benefits and costs. Benefits include clean water, decreased pollution, and greater soil fertility, among others. The costs have to do with the time and money needed to conduct restoration. Restoration is done by a variety of individuals and agencies. While public land owners such as forest preserve districts have professional staff assigned to this work, in some counties much of the work is done by volunteers. Using volunteers reduces the cost of restoration and allows more work to get done. In the Chicago region, thousands of volunteers spend tens of thousands of hours annually working on restoration. They get recreational, educational, and other benefits from their participation. City, county, state and federal tax dollars support restoration costs, including staff, equipment and materials. This is a growing part of public land budgets.

Many restoration activities require a lot of knowledge and skill to reduce risks and make progress. All restoration workers receive special training. Restoration staff typically have advanced degrees in science and some volunteer stewards get formal certification in restoration ecology. "Learning by doing" is common.

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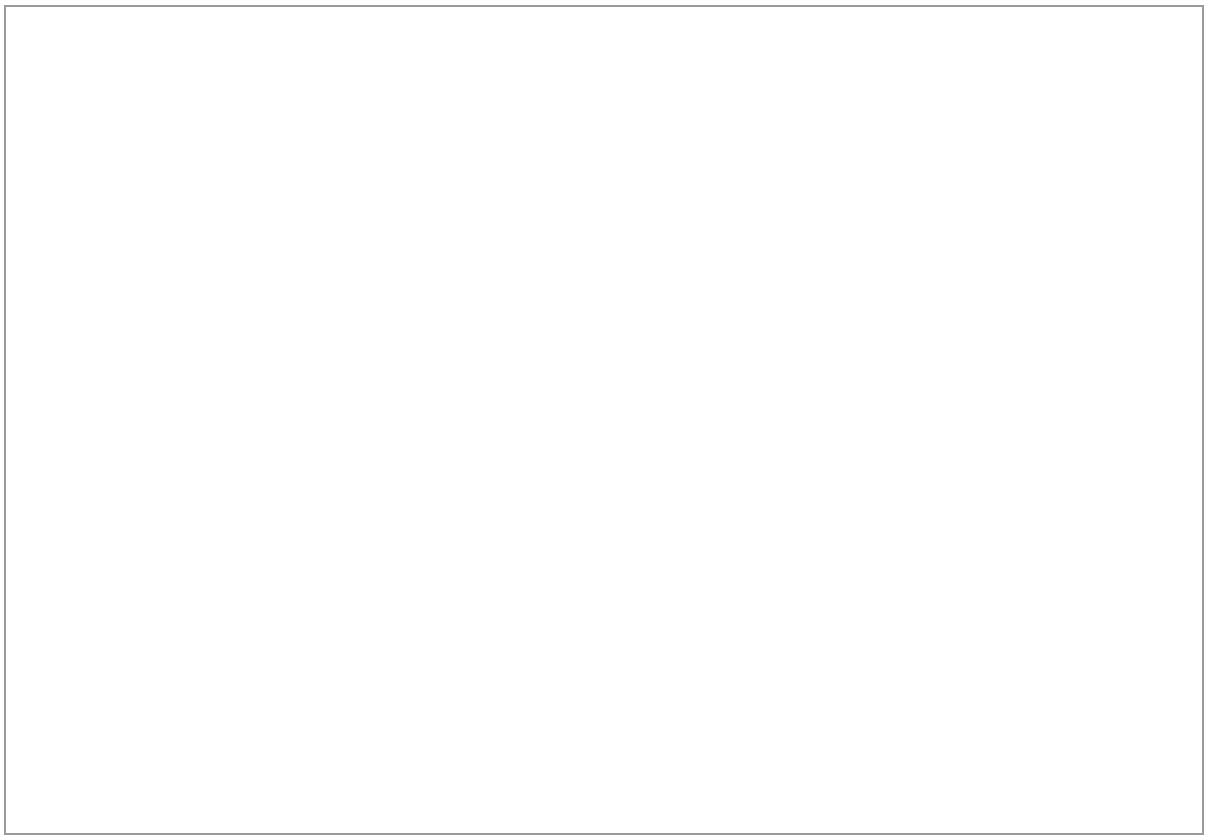
3. If you lived near one of the oak woodlands undergoing restoration, would you approve or disapprove of restoration? Why? Or why not? If you would choose certain techniques and not others, please indicate that in your answer.



4. Please choose a place on the scale that best indicates your decision:

Use a scale from 1-10, with 1 indicating 'No restoration"' and 10 indicating 'Full restoration.'

	1	2	3	4	5	6	7	8	9	10	
No restoration- Let nature take its course	○	○	○	○	○	○	○	○	○	○	**Full restoration of all natural areas**

5. Please choose a place on the scale that indicates whether or not you think the scenario you read here is biased:

Use a scale from 1-10, with 1 indicating 'biased against restoration' and 10 indicating 'biased for restoration.'

	1	2	3	4	5	6	7	8	9	10	
Biased against restoration	○	○	○	○	○	○	○	○	○	○	**Biased for restoration**

6. Please rate the level of emotion that you experienced while reading the scenario and answering the questions:

Use a scale from 1-10, with 1 indicating 'not at all' and 10 indicating 'very much'

4a. Angry

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4b. Sad

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4c. Happy

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4d. Despair

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4e. Fear

	1	2	3	4	5	6	7	8	9	10	
Not	○	○	○	○	○	○	○	○	○	○	**Very**

at all	○	○	○	○	○	○	○	○	○	○	**much**

7. Please rate the level of importance that you associate with each of these management goals for urban ecosystems.

Use a scale from 1-10, with 1 indicating 'not at all' and 10 indicating 'very much'

5a. Reducing the effects of overabundant wildlife in natural areas

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5b. Strengthening the natural functioning of the habitat's ecology

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5c. Increasing enjoyment of recreation at a site

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5d. Removing non-native shrubs such as buckthorn so sunshine can support more native species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5e. Removing non-native trees such as maple so sunshine can support more native species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5f. Removing overabundant native species such as ash so sunshine can support more native

species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5g. Improving water quality

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5h. Improving soil fertility

	1	2	3	4	5 5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5i. Providing a place where I can enjoy the spirituality and peace of nature

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5j. Enhancing scenic beauty

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

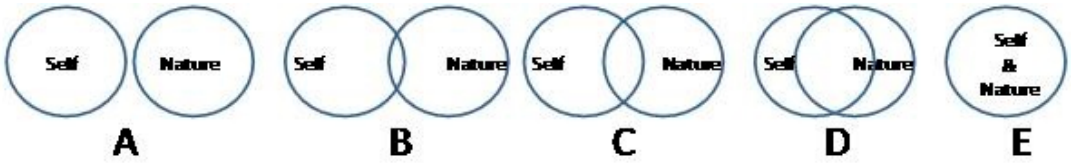
5k. Creating jobs

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

8. How interconnected are you with nature? Please indicate which of the pictures below best describes your relationship with the natural environment. Choose ONE letter.

○ A

- B
- C
- D
- E



9. **About you**. This section is for statistical purposes only. All answers will be **strictly** confidential.

a) How many years have you lived in your home/Chicago region?

b) How would you rate your involvement in on-the-ground ecological restoration planning decisions?

Use a scale from 1-5, with 1 indicating 'not at all involved' and 10 indicating 'heavily involved'

	1	2	3	4	5	
Not at all involved	○	○	○	○	○	**Heavily involved**

c) How many years have you participated in ecological restoration on a voluntary basis?

e) What is your age?

10. Do you have any final comments about this topic that you would like to add?

Thank You!

Thank you for taking our survey. Your response is very important to us.

APPENDIX 9: MANAGER SCENARIO (DOPU VERSION)

Scenario Survey RESTORE

Thank you for participating in the Chicago Wilderness Science Team's RESTORE project's "scenario study."

This study is intended for managers who make decisions related to on-the-ground ecological restoration in the Chicago Wilderness region. If you do not meet these criteria, please exit the survey now. Please feel free to forward the study link to others in your organization that do.

Your participation in this survey is voluntary and your answers will be confidential. You must be 18 years of age or older to participate. This survey has been approved by The Field Museum's Institutional Review Board. If you would like more information about the rights of research participants, please contact Deborah Bekken at dbekken -at- fieldmuseum.org.

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Please contact Cristy Watkins at cwatkins -at- fieldmuseum.org or Joanne Vining at jvining -at- illinois.edu if you have any other questions.

Thank you!

Directions: Please read the scenario on the next three (3) pages and answer the questions that follow.

Chicago's Oak Woodlands

Because the Chicago metropolitan area has a long history of preserving nature through parks and forest preserves, we now have tens of thousands of acres of public land. Before Europeans settled the Chicago region in the 1830's, the woods, wetlands, and prairies (habitats) had 100s of different types of plants and animals. This period is often called "pre-settlement" and the plants, animals and habitats that existed at that time are considered "native." Today, most of the original natural areas have been replaced by cities and towns, but many of these native plants and animals are still found in natural habitats preserved on public land.

Many types of plants from other parts of the world were brought here by settlers because they were useful. Others came accidentally. Some of these plants spread into natural areas and are now growing in the remaining habitats. These plants are considered "non-native." Norway maple is an example of a non-native tree that competes with oak trees, which are native, for water and nutrients. Species that spread quickly and are hard to control are considered "invasive." European Buckthorn and garlic mustard are examples of invasive plants that can shade out other shrubs, flowers, and grasses. Due to the effects of these invasive plants, most preserved natural areas are now different from what they were when Europeans first settled in the area. Some people wish to restore these areas to be more like the healthier, more ecologically optimal, pre-settlement conditions. For that reason, in the last twenty to thirty years land owners have begun to manage these areas in an effort to make them as healthy as possible given the limitations of Chicago's urbanized environment.

A Hypothetical Scenario

Below is a discussion of the activities, goals, tools, and costs of restoring Chicago's oak woodlands. While reading this material, put yourself in the place of someone who lives near an oak woodland targeted for restoration and answer the questions at the end.

What is Ecological Restoration?

Ecological restoration refers to a process of treating a natural area to reach a desired condition, usually as close to the pre-settlement environment as possible because at that time, ecological conditions were optimal. Woodland areas with mostly oak trees were one type of environment that was widespread at that time. Removing plants and animals that are deemed invasive is one important part of ecological restoration and is intended to create a better environment for native plants and animals. Other parts of ecological restoration might include removing human-made structures that dry out wetlands, and using prescribed fire (described below) to allow the natural system to function as it once did. Ecological restoration has now become part of a world-wide strategy to preserve biological diversity, especially in areas used heavily by people.

The Case For and Against Restoration

Chicago's oak woodlands have changed dramatically in the past 150 years. The biggest changes are: 1- They are smaller; 2- They have many invasive species, and; 3- There are changes in water flow across the land because of paving and draining or changes to other parts of the system. Some people see these changes as unhealthy and have looked for ways to reverse them. Restoration is seen as a way to bring back or enhance the natural function of the habitat. Supporters of restoration say that oak woodlands are important examples of Illinois' natural

heritage. Restoration is also seen as beneficial to humans. For example, restoration may increase enjoyment of nature and decrease water pollution.

Others, however, say that natural areas have always changed over time, and that it is not unusual for new species to come into an area. These people suggest that restoring a natural area to a point in the past ignores the fact that natural areas change over time, with or without humans. They ask, why we should restore places to a period before European settlement? If Native Americans have moved into and out of this region for thousands of years, why is European settlement seen as unnatural? They argue that picking a past date to restore an area to is arbitrary. These individuals believe that we should support a policy they see as allowing nature to take its course.

Those who see restoration as important view restoration projects as works in progress. Depending on the size of the area or the seriousness of problems, it may take many years of hard work to complete a restoration plan. Even then, most areas will require ongoing work to maintain and continue improvements. Those who oppose restoration, however, consider this kind of human effort to be "unnatural."

Many support the protection of native habitats through restoration, but others do not like some of the tools and techniques used in restoration. This difference in attitudes can result in conflicts between people who support or participate in restoration and those who see restoration as interfering with natural change.

Strategies for Restoration

Reduction of non-native and invasive plants

In restoration projects, large, non-native trees and shrubs, such as Norway maples and European buckthorn are cut down and chemicals (herbicide) are applied to their stumps to kill the root. The wood from cut trees is either chipped and used on trails, or is burned in large piles. Brushpile fires burn hot and might last for several hours. (These techniques may also be used to remove native species that are deemed too dense and thus keep sunlight from reaching the ground). Leafy plants are often sprayed with herbicides or are removed by hand. Restoration managers are required to post public notices at sites when herbicide has been applied. In Illinois, a state license is required for anyone applying herbicide on public land.

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Restoration of native plants

Restoration workers replant native plant species in places where they have been lost. They collect seeds where plants are abundant and then plant them in areas where they once grew. Sometimes seedlings are grown in nurseries and planted in restoration sites.

Animal management

Management of native animals such as insects, frogs, or birds is not common. Some managers may set up bird nesting boxes or regularly monitor the numbers of rare species. Restoration often involves controlling the numbers of some animals. For example, there are specific control programs for invasive insects such as gypsy moths and the emerald ash borer.

Some types of animals such as Canada geese and white-tailed deer have been described as "nuisance wildlife." In natural areas deer can be a problem if there are too many. They no longer have natural predators and they eat plants, shrubs, and young tree seedlings. Large numbers of deer can pose risks to human health and to the health of the deer themselves, as well as other wildlife. To reduce deer numbers in urban areas where hunting is not legal, managers may sometimes hire sharp shooters to kill some of them. Some people who oppose these "culling" programs say that deer are a natural part of the forest, and they should be allowed to live in peace. Others say there are different ways to reduce numbers such as birth control. Still others support legal hunting by the public.

Fire in the Chicago Ecosystem

Fire has been present in oak woodlands in the Chicago area for thousands of years. Fires were started by lightning or by Native Americans who wanted to keep the woods open for hunting ease. Until recently, different kinds of oak trees were the main trees growing in Chicago region woodlands because fires favor oaks (that are not hurt by fire) and kept other trees, like maple (that can't tolerate fire) from growing.

But European settlers created farms, towns and cities that needed protection from fires. Fire fighting in natural areas allowed more trees to grow. With more trees, the woods are shadier. Because plants on the ground need sunlight to grow, they decrease in number. Trees that can live in shade, such as maples, take over and create even more shade and reduce the number of oak seedlings and the other flowers and grasses that need more light.

As part of restoration, managers intentionally use prescribed fires to reduce the density of trees and shrubs and make the site more open. When weather conditions are right, restoration managers start low fires on the ground that spread through part of a site. This is done according to plans called "prescriptions" that include a description of the required crew size, equipment, and acceptable weather conditions (wind, temperature and humidity). Activities of wildlife using the habitats to be burned are also considered. Permits for prescribed burns are required from the state and from local governments. In some areas, a fire department crew is on standby alert. Neighbors are often notified of prescribed burns.

Some people note problems with these intentional fires. Although fire is used only during optimal weather conditions, intentional fires can sometimes get hotter than planned and could spread to

other natural lands or even to buildings. This is a very rare occurrence, however. Another potential problem is that some people are sensitive to the smoke that may blow into residential or commercial areas. Some people think that fire can needlessly harm wildlife such as hibernating snakes or overwintering insects.

The Price of Restoration

Ecological restoration has both benefits and costs. Benefits include clean water, decreased pollution, and greater soil fertility, among others. The costs have to do with the time and money needed to conduct restoration. Restoration is done by a variety of individuals and agencies. While public land owners such as forest preserve districts have professional staff assigned to this work, in some counties much of the work is done by volunteers. Using volunteers reduces the cost of restoration and allows more work to get done. In the Chicago region, thousands of volunteers spend tens of thousands of hours annually working on restoration. They get recreational, educational, and other benefits from their participation. City, county, state and federal tax dollars support restoration costs, including staff, equipment and materials. This is a growing part of public land budgets.

Many restoration activities require a lot of knowledge and skill to reduce risks and make progress. All restoration workers receive special training. Restoration staff typically have advanced degrees in science and some volunteer stewards get formal certification in restoration ecology. "Learning by doing" is common.

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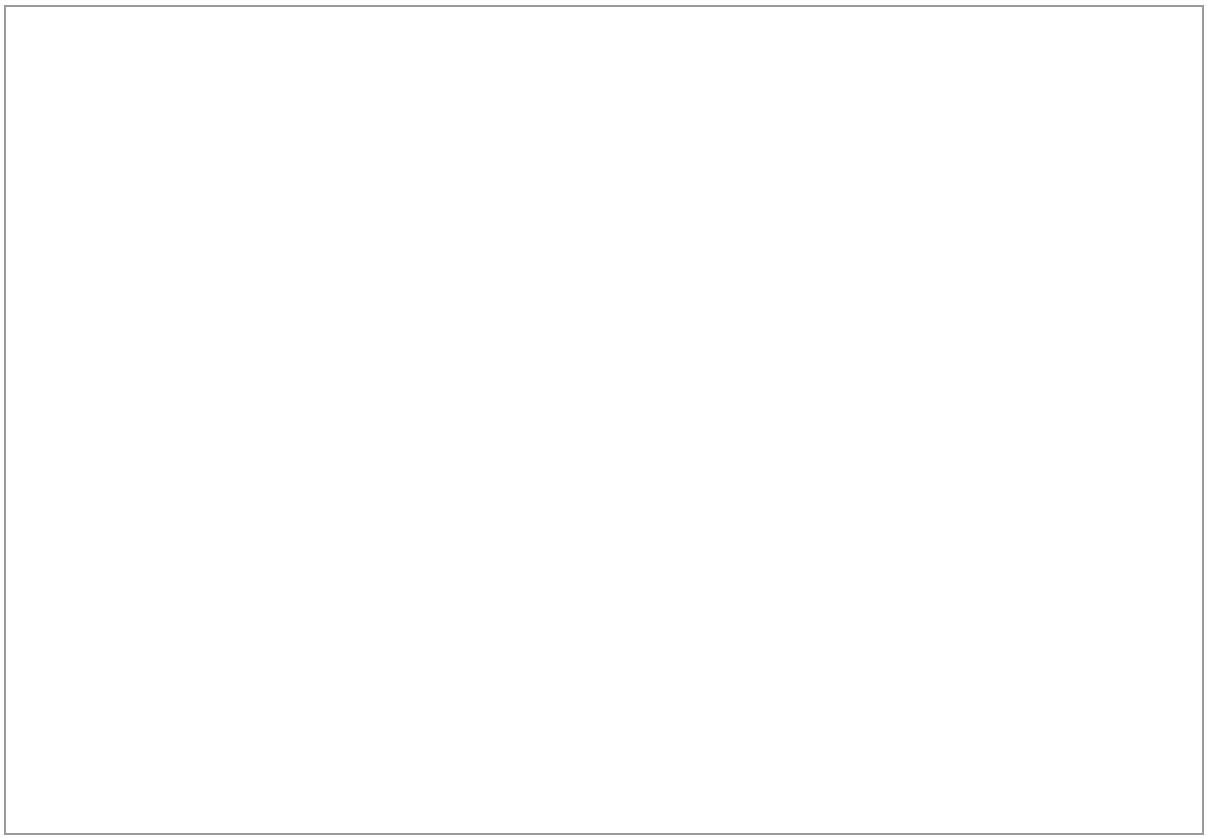
1. If you lived near one of the oak woodlands undergoing restoration, would you approve or disapprove of restoration? Why? Or why not? If you would choose certain techniques and not others, please indicate that in your answer.



2. Please choose a place on the scale that best indicates your decision:

Use a scale from 1-10, with 1 indicating 'No restoration"' and 10 indicating 'Full restoration.'

	1	2	3	4	5	6	7	8	9	10	
No restoration- Let nature take its course	○	○	○	○	○	○	○	○	○	○	**Full restoration of all natural areas**

3. Please choose a place on the scale that indicates whether or not you think the scenario you read here is biased:

Use a scale from 1-10, with 1 indicating 'biased against restoration' and 10 indicating 'biased for restoration.'

	1	2	3	4	5	6	7	8	9	10	
Biased against restoration	○	○	○	○	○	○	○	○	○	○	**Biased for restoration**

4. Please rate the level of emotion that you experienced while reading the scenario and answering the questions:

Use a scale from 1-10, with 1 indicating 'not at all' and 10 indicating 'very much'

4a. Angry

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4b. Sad

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4c. Happy

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4d. Despair

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

4e. Fear

	1	2	3	4	5	6	7	8	9	10	
Not	○	○	○	○	○	○	○	○	○	○	**Very**

at all	○	○	○	○	○	○	○	○	○	○	**much**

5. Please rate the level of importance that you associate with each of these management goals for urban ecosystems.

Use a scale from 1-10, with 1 indicating 'not at all' and 10 indicating 'very much'

5a. Reducing the effects of overabundant wildlife in natural areas

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5b. Strengthening the natural functioning of the habitat's ecology

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5c. Increasing enjoyment of recreation at a site

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5d. Removing non-native shrubs such as buckthorn so sunshine can support more native species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5e. Removing non-native trees such as maple so sunshine can support more native species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5f. Removing overabundant native species such as ash so sunshine can support more native

species

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5g. Improving water quality

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5h. Improving soil fertility

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5i. Providing a place where I can enjoy the spirituality and peace of nature

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

5j. Enhancing scenic beauty

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

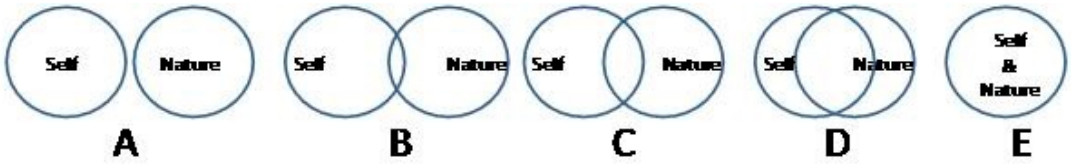
5k. Creating jobs

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	**Very much**

6. How interconnected are you with nature? Please indicate which of the pictures below best describes your relationship with the natural environment. Choose ONE letter.

○ A

- B
- C
- D
- E



New Page

7. How would you describe "the public" whom you serve? How do you think they would respond to this scenario? If you think that different groups would respond differently, please explain.

8. **About you**. This section is for statistical purposes only. All answers will be **strictly** confidential.

a) How many years have you lived in your home/Chicago region?

b) How would you rate your involvement in on-the-ground ecological restoration planning decisions?

Use a scale from 1-10, with 1 indicating 'not at all involved' and 10 indicating 'heavily involved.'

	1	2	3	4	5	
Not at all involved	○	○	○	○	○	**Heavily involved**

c) How many years have you worked for your current employer?

d) Do you participate in ecological restoration on a voluntary basis?

- ○ Never
- ○ Sometimes
- ○ Regularly

e) What is your age?

9. Do you have any final comments about this topic that you would like to add?

Thank You!

Thank you for taking our survey. Your response is very important to us.

APPENDIX 10: DROP OFF – PICK UP (DOPU) MANUAL

RESTORE Project Resident Survey
Drop-Off/Pick-Up Method Implementation Manual

INTRODUCTION

Thank you for working with us as a survey assistant for the RESTORE project (Rethinking Ecological and Social Theories of Restoration Ecology). The RESTORE project is a Chicago Wilderness Science Team project, funded by the National Science Foundation. We are studying planning and management processes and their links to biodiversity outcomes in oak woodlands and savannas in the Chicago Region, as well as the extent to which public support of restoration influences restoration decisions. The resident survey is one of several social science methods we are employing to gather information about how people who live close to a natural area think about the site's management as well as how they manage their own yards.

Your Part in the Survey

Study data will be collected through surveys that are distributed to individual residents at their homes. Your job will be to drop off and pick up the surveys, using the "Drop Off Pick Up" (DOPU). Although brief, you will interact with some residents and inform them of the survey and your plans to return to pick it up.

METHOD OVERVIEW

The DOPU method includes the following steps, with each step taking place on three separate days:

1. Drop off: an attempt to make contact is made and the survey is dropped off, either to the person or by hanging it on a door knob (Time not to exceed 6 hours, plus travel time).
2. Pick-Up #1 / Reminder: each house is revisited and completed surveys are picked up. If it is not completed, a sticky note reminder is left on the door (Time not to exceed 6 hours, plus travel time).
3. Final Pick–Up: each remaining house is visited and the survey is picked up if completed (Time not to exceed 3 hours, plus travel time).

IMPLEMENTATION: RULES TO FOLLOW

1. Map out each site prior to Saturday morning. Plan accordingly for traffic and tollways ($$), and to arrive at the neighborhood by 10a.m.

2. Know where a bathroom spot is!

3. Know your Meet Up Spot, then decide where to go from there. Choose a safe place to park (check parking restrictions; lock your doors, don't leave valuables out).

4. Wear your identification badge; have it visible at all times.

5. When interacting with residents, be brief, yet polite.

6. Do not enter anyone's home, and do not accept anything from anyone.

7. Take a ~20 minute break for lunch and bathroom break; drink/snack whenever needed, in between resident interactions.

8. On the 1st and 2nd day, end your day by 4p.m.; the 3rd day should only take ~3 hours

Day 1 (Saturday) is Drop Off Day.

- Plan to approach up to 350 houses TOTAL (250 Surveys and 100 Scenarios)

- 1/3 of the addresses are **bolded**. This means these houses are to receive a "Scenario Study" not a survey. Scenarios have a small "S" written on the back of the booklet.

Steps:
1. Approach a house at the door closest to the mailbox.
2. Do NOT approach a house if there is a "No Solicitors" sign.
3. Ring the doorbell. Wait 30 seconds or so, and if no one answers, leave a bag on their door knob or other door hook. You may need to wedge the bag through the door knob if it is U-shaped.
4. Do ***not*** leave the bag on/in the mailbox- this is a federal law!

- If someone answers the door, give the following message:

> *"Hi, I am from The Field Museum and we are doing a study of residents who live near natural areas. I'd like to give you this survey and all you have to do is fill it out and leave in on your doorknob on Tuesday. We'll come back and pick it up."*

For each house you approach, document one of the following:

C = contact ***Note if teen or nanny
R = refusal ***Note reason if possible
DO = drop off (no contact)
NA = ***Note reason (e.g. no house, vacant, no solicitation)

Day 2 (Tuesday) is Pick-Up#1/ Reminder Day

- Plan to approach all of the houses that you approached on Saturday (except NAs)

Steps:
1. Approach a house at the door closest to the mailbox.
2. Check for the bag. If the bag is there, check to ensure that the survey/scenario is complete.
3. If it is complete,
    a. write the address on the front of the survey
    b. guard it with your life and put it in your completed survey bag (away from blank surveys).

4. If there is no survey or an incomplete survey on the door, ring the doorbell. Wait 30 seconds or so, and if no one answers, leave a sticky note on their door, preferably in a highly visual spot, such as the glass or at eye-level.

If someone answers the door, have a have a survey handy to show them and give this message:

> *"Hi, I am from the Field Museum and I'm coming around picking up the survey I dropped off on Saturday. Have you completed it? We'll be back around tomorrow so all you have to do is fill it out and leave the completed survey on your doorknob and we'll come back and pick it up."*

Or, if the bag is on the door with an incomplete survey, have a survey handy to show them, and give this message:

> *"Hi, I am from The Field Museum and I'm coming around picking up the survey I dropped off on Saturday. I noticed that the survey is still here on your door-- We'll be back around tomorrow so all you have to do is fill it out and leave the completed survey on your doorknob and we'll come back and pick it up."*

For each house you approach, document one of the following:

C = contact *****Note if teen or nanny
SN = sticky note reminder (no contact)
PU = Pick Up
R = refusal *****Note reason if possible

Day 3 (Wednesday) is Final Pick Up Day

- Depending on what houses/streets you have to go to, you may choose to walk or drive.

- Plan to approach all of the remaining houses that you have not received a survey from (excluding those who have refused).

Steps
1. You may collect all surveys, but you must still check to see if it is complete.
2. If it is complete,
    a. write the address on the front of the survey
    b. guard it with your life and put it in your completed survey bag (away from blank surveys).

3. For each house you approach, document whether you have picked up a survey with a ***PU***.
4. The team leader (or other designated person) must bring **the completed surveys and all of the address lists** to The Field Museum and pick up the next set of surveys.

MATERIALS

☐ Surveys
☐ A bag to hold surveys to distribute, and another bag to hold completed surveys.
☐ Scenarios
☐ Clipboard with address list and map
☐ Pens, pens, pens (or pencils, pencils, pencils)
☐ Field Museum ID Badge
☐ Project manager's business cards, in case someone wants more information

☐ Comfortable, yet professional and appropriate clothing
☐ Water
☐ Food
☐ Hat, sunglasses, sunscreen
☐ Good walking shoes
☐ Cell phone (charged)
☐ Team phone numbers

LIABILITY

The Museum assumes no liability for injuries and accidents incurred while performing field work. Although there is minimal risk involved, please be aware of the people around you and act safely while in the neighborhood.

TEAM COMMUNICATION: IS ESSENTIAL!!

1. **Project manager → Set Team Leader(s)**
    a. **Friday prior to start of set**
    b. **Wednesday upon turning in surveys and picking up next set**
2. **Team member ← → Team member**

RESEARCH TEAM CONTACT INFORMATION

(Omitted for publication)

FURTHER EXPLANATION OF THE SURVEY & INDIVIDUAL QUESTIONS

Read and refer to this information if respondents want further information about the purpose of the study and individual survey questions.

General Questions About the Survey

Q: What is the purpose of the survey? The purpose of the survey is to collect information about how resident's think about the site's management as well as how they manage their own yards.

Q: What will the information be used for? This information will be put together in a report to the Chicago Wilderness, to tell land managers and other restorationists about resident's thoughts about natural area management and the management of their own yards.

Chicago Wilderness is an alliance of conservation is a regional alliance of over 250 different organizations that work together to improve the quality of life of the individuals and the many other species living in the Chicago area. The information you and others provide in this survey will help to steer the future direction of regional natural areas management.

Q: Why should I take the time to fill it out? Your input is important in order to get a representative sample of resident-- this is your chance to voice your opinion and maybe make a change. The information you provide will be very helpful to the management of existing natural areas and the planning of future ones.

Q: How long will it take to fill out? About fifteen to twenty minutes is all it takes.

Q: Why do you want to know my income and other "personal" questions? This information is very helpful to managers in profiling who might benefit (directly or indirectly) from the natural areas. All of the information you supply in this questionnaire will be strictly confidential, and will only be reported in summary form. ** If they still persist, or get really turned off about volunteering this information, tell them to leave the "offensive" questions blank, and please fill out the rest of the questionnaire.

Q: Who is in charge of this study? Show them names and address on the research contacts.

APPENDIX 11: SOCIAL SCIENCE MATRIX

CarCode	SiteNum	GroupSize	Board	PubLand	MtgStyle	DmStyle	DifView	VolAuton	Research	Public	Membership	OverEmo	NumbRule	NumbNorm	NumbStrat	NumbAggr	NumbCol	NumbOper	SeedCol	SeedPurch	SeedDist	Progress	Impact
R1	1	1	1	1	3	3	3	1	4	5	1	3.05	18	9	18	4	22	40	4	2	25	4	4
C4	2	1	1	1	1	1	3	4	2	2	1	4.21	15	22	83	5	65	52	5	1	50	3	3
C3	3	3	2	1	5	4	5	3	2	1	0	18.4	142	64	318	69	329	189	5	1	25	4	1
C2	4	2	2	1	1	3	4	3	1	1	0	13.9	150	46	336	67	313	210	1	3	20	1	1
M2	5	2	2	1	2	3	1	2	3	3	0	6.34	45	11	115	19	92	76	4	3	100	2	1
C1	6	3	2	1	5	4	5	3	2	4	0	15.7	189	57	401	85	384	253	5	1	25	5	2
R2	7	1	1	0	4	1	2	2	3	2	1	1.52	34	11	127	10	95	75	2	1	200	3	2
M3	8	1	3	0	5	3	3	1	2	5	1	2.04	24	54	94	11	98	74	3	3	100	2	2
M1M5	9	2	2	1	5	2	1	2	3	3	0	5.54	41	37	107	16	99	84	3	3	100	5	4
M2	10	2	2	1	2	3	1	2	3	3	0	6.34	45	11	115	19	92	76	4	3	200	4	3
M3	11	1	3	0	5	3	3	1	2	5	1	2.04	24	54	94	11	98	74	3	3	100	2	3
M4	12	1	1	1	3	2	3	1	2	2	0	9.03	37	9	80	10	56	65	2	3	100	3	3
M2	13	2	2	1	2	3	1	2	3	3	0	6.34	45	11	115	19	92	76	4	3	200	4	2
M1M5	14	2	2	1	5	2	1	2	3	3	0	5.54	41	37	107	16	99	84	3	3	100	5	4

Westphal, Lynne M.; Watkins, Cristy; Gobster, Paul H.; Heneghan, Liam; Ross, Kristen; Ross, Laurel; Tudor, Madeleine; Wali, Alaka; Wise, David H.; Vining, Joanne; Zellner, Moira. 2014. **Social Science Methods Used in the RESTORE Project.** Gen. Tech. Rep. NRS-138. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 116 p.

The RESTORE (Rethinking Ecological and Social Theories of Restoration Ecology) project is an interdisciplinary, multi-institutional research endeavor funded by the National Science Foundation's Dynamics of Coupled Natural Human Systems program. The goal of the project is to understand the links between organizational type, decision making processes, and biodiversity outcomes in the context of ecological restoration of oak woodlands in the Chicago metropolitan area. This paper describes the procedures used to design, implement, and analyze the social data gathered for the project. Here we provide the useful details about methods that rarely fit in journal articles. We also provide appendices of all research tools. The size and interdisciplinary nature of the project make such documentation necessary. We hope this report can also serve as a guide for future large-scale interdisciplinary projects.

KEY WORDS: ecological restoration, Chicago Wilderness, social science, qualitative analysis, integrated research, cross disciplinary research

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