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Characteristics of Stewardship in the Chicago Wilderness Region

Abstract: We report on the early results of a survey-based assessment of stewardship activities within the Chicago Wilderness region, work conducted as a part of the Chicago ULTRA-Ex project. Chicago Wilderness is a 270 member alliance focused on preserving and enhancing biodiversity throughout northern Illinois and parts of Wisconsin, Indiana and Michigan (USA). The results described include 369 stewardship groups including non-governmental organizations, community groups, municipalities and others who voluntarily filled out the survey between November 2010 and November 2011. Environment, education, community improvement, youth and recreation are the top five foci of the efforts of Chicago Wilderness Area stewards put their effort. Chicago Wilderness stewards work in a wide variety of settings, with prairie, woodland, community gardens, trails, wetlands and parks cited most often. Other stewardship group characteristics are reported, including staffing levels, budget, and number of volunteers and members. Comparison to other metro areas are discussed.

Keywords
Stewardship, Chicago Wilderness

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INTRODUCTION

While volunteer stewardship of local natural resources and the environment is a major interest and core value of the Chicago Wilderness alliance (www.chicagowilderness.org), it has been difficult to characterize its extent and role in a sprawling and complex urban landscape. A better grasp of stewardship's place in the region's constellation of environmental actors will inform both the theory and practice of conservation in the Chicago region.

Chicago Wilderness is rooted in the actions of volunteer stewards who, in the late 1970s, began working to save remnant local habitats like prairie and savanna (Stevens 1995). The name "Chicago Wilderness" refers not only to the alliance itself, but also to the spatially complex network of 545,000 acres across the region that are conserved and managed for biodiversity (Chicago Regional Biodiversity Council 1999). With Chicago and Cook County, Illinois (USA) at its core, the Chicago Wilderness region stretches from southeastern Wisconsin through northeastern Illinois and northwest Indiana into southwest Michigan (Figure 1), and civic stewards are active across the region. Chicago Wilderness' 360 plus member organizations include local and national nonprofits, federal and state agencies, local governments, local associations and clubs, and corporations.

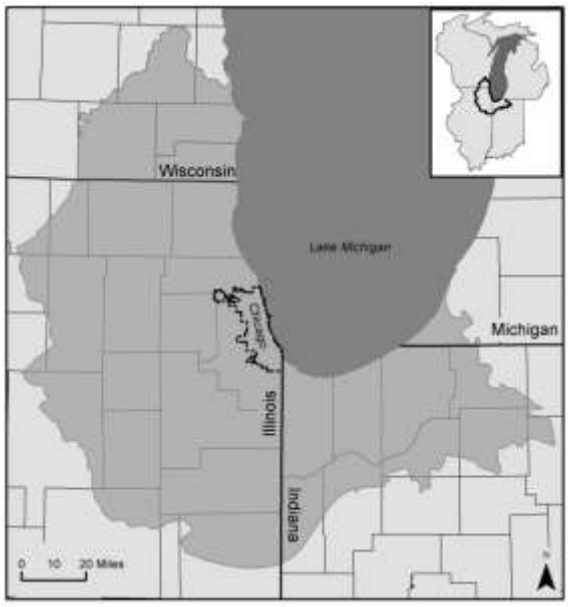

Figure 1. The Chicago Wilderness Region includes all of Chicago and northeast Illinois, and parts of southeast Wisconsin, northwest Indiana, and southwest Michigan (USA).

Chicago is the third largest city in the U.S., with a population of nearly 3 million in the City proper and more than 10 million in the Chicago Wilderness region. There are over 550 county and municipal jurisdictions in the Chicago Wilderness region, and many, many more jurisdictions when townships, Commissions, and Park, Forest Preserve, School and other Special Use Districts are counted as well. The complexity inherent in coordinating biodiversity planning and action across so many overlapping jurisdictions and at such a variety of scales is immense.

One of the primary initiatives of Chicago Wilderness is the development and implementation of the Green Infrastructure Vision. The Chicago Wilderness Green Infrastructure Vision identifies 1.8 million acres that can be restored, protected, or connected through conservation development practices with an eye to creating healthy ecosystems amidst vibrant, economically viable communities – that is, to providing an array of ecosystem services throughout the Chicago Wilderness region (Dreher 2004). The Green Infrastructure Vision is conceived of at four scales from regional to site with suggested implementation strategies for land use planners, communities, and conservation professionals at each scale. Building upon and targeting the extensive network of volunteer stewards are key implementation strategies of the Green Infrastructure Vision (Dreher 2004).

The Chicago ULTRA-Ex[1] is looking at both engagement in and proposed ecological outcomes of management of urban social-ecological systems. One of our suite of studies is assessing stewardship activities and where they occur in the Chicago Wilderness region, replicating a method developed in New York City (Fisher et al. 2012) called the Stewardship Mapping and Assessment Project, or STEW-MAP. The STEW-MAP survey collects information on large and small civic stewardship organizations' activities, characteristics, and the geography in which they operate. The survey data fills a geocoded database that can be used to answer a wide range of questions about stewardship in the urban landscape.

LITERATURE – STEWARDSHIP IN THE CONTEXT OF SOCIAL-ECOLOGICAL SYSTEMS

"Stewardship" is used in different ways by different authors. Chapin et al. (2010) discuss stewardship in the context of very large scale (national, global) ecosystems, their conception of the next step in the evolution of resource management. Barthel et al. (2005) discuss stewardship of a National Urban Park in Stockholm and include anyone – from civic, governmental, or business sectors – who contributes to management, planning, or care of the park as a steward. Silveira (2001) discusses the tensions inherent between stewarding as protest or in concert with those in power. And while some write about stewardship as at risk of being co-opted (Silveira 2001) others write about it being positive and still quite radical (Barry and Smith 2008).

In the first (and all subsequent) Stewardship Mapping and Assessment Project(s), "stewardship" has a broad definition: *conserving, managing, monitoring, advocating for, or educating others about local environments* (Fisher

[1] ULTRA-Ex is an acronym for **U**rban **L**ong **T**erm **R**esearch **A**rea – **Ex**ploratory. The ULTRA-Ex research program was funded by the National Science Foundation and the USDA Forest Service as a precursor to a proposed (but as yet unfunded) network of long-term research sites focused on urban social-ecological systems.

et al. 2012). STEW-MAP data can support inquiry about scale (of land and/or stewardship groups), engagement, and degrees of conservatism or radicalism in stewardship activities, but is itself neutral on these issues.

With the rise of the understanding of social-ecological systems (see for example Pickett et al. 2001; Folke et al. 2002; Moore et al. 2007; Cadenasso et al. 2008) – that is, with the rise of the understanding of the closely intertwined connections of people and the environment in which they live, replete with myriad interdependencies and intricate cause and effect presses and pulses – comes the call for humans to be actively engaged with these systems and in finding solutions for wicked environmental problems (see for example Geist and Galatowitsch 1999; Head and Muir 2006). Nassauer (2011) argues that *care* is the basis on which stewardship and involvement in environmental action can be built, with care being a means by which emotional and aesthetic responses to one's immediate environment can be a catalyst to stewarding environments from the local to global scale. Hunter's (2011) findings support the potential importance of care: residents of streets more impacted by loss of ash trees to the emerald ash borer were more willing to participate in stewardship activities.

One of the issues inherent in understanding social-ecological systems is that of fit between the scale of ecological problems and the social institutions that can address these issues. Folke et al. (2007) updated their 1997 discourse on the problems of fit between ecosystems and institutions – or between the environment and its human populations and their rules of interaction. They argue that the issue of fit is still quite urgent, and that links from global to local scale are at issue in both ecological *and* institutional terms. Most, in fact nearly all, of the research and thinking about the structure and function of institutions in social-ecological systems has been focused on Common Pool Resources, that is, on extractive situations where humans are taking from the environment what they need for subsistence, commerce, or other needs and wants (for example, Ostrom 2005; Folke et al. 2007). Environmental stewardship, on the other hand, offers a look at human interactions with the environment in a value-added context, one where the intention is putting back or maintaining ecosystem structure, function, and/or services (Wolf et al. 2011). Sometimes stewardship may still be for instrumental reasons, but often it is conducted for altruistic reasons (Westphal 1993; Stevens 1995; Geist and Galatowitsch 1999; Head and Muir 2006; Bramston et al. 2011).

STEW-MAP enables the creation of a database of stewardship groups and their activities that permits empirical investigation of how these questions of the scale and scope, structure and function, play out in a particular regional setting. The particularity of the setting makes the investigation of immediate use to practitioners, while the growing set of STEW-MAP projects permits valuable interregional comparison.

METHODS

We followed most of the protocols developed in the New York City Stewardship Mapping and Assessment Project (Fisher et al. 2012) to survey civic stewardship groups, both formal and informal, in the Chicago Wilderness region. Like the New York City STEW-MAP, the primary focus of this project was to gather data on the stewardship activities of volunteers, non-profit groups and others in civic society. Because of Chicago Wilderness' broad interest in citizen engagement on behalf of the environment, we also accepted data from business or government entities that chose to provide it, and will parse our data as needed for a variety of analyses.

We used the same definition of stewardship as did the New York City STEW-MAP team. STEW-MAP projects in Seattle and Baltimore have also adopted this definition of stewardship.

> STEW-MAP uses a broad definition of environmental stewardship: *conserving, managing, monitoring, advocating for, or educating others about local environments*. This can include activities related to water, land, air, waste, toxics, or energy. We are looking for organizations that do some consistent environmental stewardship work *even if it is not their primary focus*. Stewardship groups or organizations can be affiliated with churches, schools, social service organizations, non-profits, community groups, etc., in addition to environmental restoration or advocacy organizations.

For the Chicago Wilderness region STEW-MAP, the Center for Neighborhood Technology and The Field Museum implemented the survey primarily as a web-based instrument (http://stewmap.cnt.org); some hard copies were used for gathering data at face to face meetings where computer use was impractical. The survey questions were the same as New York City's, with some adaptations for the Chicago Wilderness region. For example, we added types of stewardship settings known to be important in this region such as prairie and savanna. The survey was reviewed and approved by the Institutional Review Board of The Field Museum.

The online version of the survey allowed us to add a tool developed in Openlayers for stewards to draw their own stewardship area boundaries on a map. This created polygons that were stored in a spatial database. This was in addition to the question replicated from the New York version that asked respondents to describe in words the area stewarded by their groups (e.g. "Harms Woods north of Golf Road and east of the Chicago River").

The modified survey was pretested and then launched in 2010 at the Chicago Wilderness Congress, a bi-annual convening that draws more than 750 people from a wide variety of stakeholder groups across the Chicago Wilderness region\. Feedback at the Congress led to a few more adjustments in the survey. The full rollout began in January of 2011 and data collection for the purposes of this paper and for comparison with the first data collection in New York City ended in November of that year. Individual stewards completed the survey on behalf of their stewardship group or organization.

After January 2011, some additional adjustments were made to the survey to make the mapping component easier and to make it clear that mapping was optional. While the map function was easy to use if the respondent had some computer fluency, for many it was difficult and confusing. Those who chose not to use the mapping function had a polygon drawn for them by a member of the research team based on their written description of where their group worked. This is the primary way that the stewardship territories were converted to spatially explicit boundaries in the New York STEW-MAP project as well. The only modifications made to the survey after the pretest were to the mapping functions; no changes were made to the questions.

Announcement of the survey was sent through existing networks of environmentally oriented groups and alliances including the Chicago Wilderness membership list, Chicago Conservation Corps clubs, the Volunteer Stewardship Network, the Energy Action Network, the New Allies for Nature and Culture, Park Advisory Boards, GreenNet and Audubon. The survey was announced at meetings like the Chicago Wilderness Congress and the Wild Things conference (another bi-annual Chicago Wilderness event pitched at a more general public audience than the Congress). Center for Neighborhood Technology also sent newsletters and updates about STEW-MAP to their mailing list, reaching regional residents interested in energy conservation, transportation, and other issues with environmental impacts. A regular Chicago STEW-MAP newsletter was sent to Center for Neighborhood Technology and Chicago Wilderness members with updates about the survey and an invitation to participate in the project.

One change in the methods between the NYC and Chicago Wilderness STEW-MAP projects was the group census. NYC conducted a census of Stewardship groups before implementing their survey (Svendsen and Campbell 2008; Fisher et al. 2012). Because of the high level of networking among local environmentally oriented groups through Chicago Wilderness, and because of the very large geographic area we were covering, we did not perform this step. This decision had two consequences. From a sampling perspective, we cannot report a known response rate (see results). And because what we have is a convenience sample, we are unable to make statistically valid inferences from the stewardship

information we have collected to date and are confined to mostly descriptive statistics and general analysis. Others implementing STEW-MAP projects will need to weigh these concerns against the logistic challenges of conducting a census in a large metropolitan region.

The initial number of responses was low so the project team added incentives to increase participation. Incentives were: a $150 gift card to Home Depot; three separate $50 gift cards or a $50 donation to the respondent's organization; and ten awards of a family four-pack of passes to The Field Museum. News of the added incentives was distributed through the same channels as the initial word of the project and the response rate improved as a result. Everyone who entered their data was eligible for the incentives, not just those who entered their data after the incentives were offered (that is, early responders were not penalized). Incentives were awarded by drawing randomly from completed surveys entered by August 2011.

Data cleaning was intricate. The survey was long and not everyone answered all of the questions. In many cases, stewards were contacted for additional data. Several organizations started multiple surveys. The most complete survey from each organization was selected for inclusion, except for those instances where larger organizations contributed entries for multiple stewardship projects or programs. The mapping tool challenged some respondents, and so all polygons drawn by respondents needed to be checked against the written description of their group's stewardship territory, and, if necessary, corrected, and then verified with the respondent for accuracy.

After data cleaning, analysis was conducted in Excel, R (R Development Core Team 2011), and ArcGIS 10.0 (ESRI). Data reported in this paper include stewardship groups and organizations from the entire Chicago Wilderness region (Figure 1). We also divided the data into two groups: those stewardship groups and organizations with a contact address within the City of Chicago and those with a contact address outside the city boundary. This allows the data to be more accurately compared to STEW-MAP from other cities (for example, the NYC STEW-MAP included only the city's five boroughs) and to better understand stewardship dynamics within the Chicago Wilderness region. Because the categorization of "Chicago" and "outside Chicago" was based on the city listed for each group or organization in their contact information in the survey, a handful of groups that are located in Chicago but that work both in and beyond the City are not reported in the "outside Chicago" set. Conversely, groups not physically located within Chicago but who do work in the City are not reported in the "Chicago" subset. There are only a handful of stewardship groups in each of these categories and so the primary trends in the data are not affected by this artifact of the data sorting process.

We analyzed the spatial data to search for areas that had more or less reported stewardship. Many stewardship polygons overlapped geographically, and these overlapping polygons formed the basis for this analysis[2]. To this we added the reported percent effort of the stewardship group or organization dedicated to stewardship activities. This question in the survey was: "Considering all of the programs, activities, and services your group/organization works on, what percentage of your group/organization's effort has been for stewardship during the past year?" Respondents could pick a set of ranges, e.g. 0-19%, 20-39, etc., as their answer. The median point of each range was assigned to each polygon (stewardship boundary) such that 0-19% was assigned 10% effort, 20-39% was assigned 30% effort, and so on. We then combined this 'stewardship intensity' information in a hotspot[3] analysis to modulate the strength of a hotspot in terms of the extent of stewardship activities for any given group or organization.

In the survey, respondents could select an entire city, county, state, or the U.S. as their group's stewardship territory. For the analysis presented here, we included only the territories that were entirely within the Chicago Wilderness boundary (adding a 15 km buffer so as to include any organizations that work in Chicago Wilderness but had drawn their stewardship area coarsely, e.g. not following the lake front outline). That is, stewardship groups and organizations that reported working throughout the state or country were removed in order to look at stewardship areas within Chicago Wilderness. Out of 1233 polygons entered by survey respondents, 28 were removed because they did not answer the stewardship intensity question, and 100 were removed using the area filter. Thus 1105 polygons were used in the stewardship intensity analysis.

In order to understand stewardship patterns in the context of Chicago's demographics, we looked at stewardship polygons in relation to census data. The census analysis was completed using 2009 five year American Community Survey data, obtained from the American Fact Finder website (www. http://factfinder2.census.gov/). With ArcMap v10.1 (ESRI 2012), the census data was used to map race and ethnicity and income variables at the census tract level.

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[2] Using ArcGIS scripts we identified areas that had overlapping stewardship regions (polygons). We carved out each polygon so that the area covered by any one polygon was unique; we then assigned to each of these newly created polygons the number of original stewardship regions which intersected in that area (http://www.arcgis.com/home/item.html?id=1dd4a6832b3d40b494dbf8521cc5134c, last accessed June 20th, 2013). We thus obtained a count for the number of overlapping polygons in the study area. Using a custom made script we then calculated the sum of the reported stewardship effort for each of the unique (i.e. no longer overlapping) polygons.

[3] Note that we are using the term "hotspot" in its general meaning, not in reference to the ARC GIS hotspot analysis routine.

RESULTS

The results described here include data from 369 stewardship groups (non-governmental organizations, community groups, municipalities and others) who voluntarily filled out the survey between November 2010 and November 2011. Because STEW-MAP focuses on civic stewardship, we included municipalities when they reported working with volunteers and included businesses when they reported pro bono work. These represent hybrid groups, and are of interest in assessing civic stewardship. Data will be reported in three categories: the entire dataset from the entire Chicago Wilderness region and the two subsets of data from within the City of Chicago and outside the City of Chicago. As noted above, this distinction is of interest in order to compare to New York City data and STEW-MAP data from other regions as it becomes available. For example, Wolf et al.'s (2011) census covers the Puget Sound region, which permits comparison of findings to the Chicago Wilderness-wide region; the New York City data, on the other hand, can be compared to findings from Chicago proper.

While we cannot compute a response rate for the overall survey because we do not know the total number of stewardship groups throughout the four-state Chicago Wilderness territory, we can compute a response rate for Chicago Wilderness member organizations. There are 255 Chicago Wilderness members that fit the STEW-MAP criteria of civic-arena stewardship organizations, and of these, 126 completed the survey for a response rate of 49%. The overall response rate for all groups in the region is lower, however, because there are many more stewardship groups in the region than there are members of Chicago Wilderness and because Chicago Wilderness as an organization was very involved in recruiting participants to this project.

What follows are the descriptive summaries of the stewardship groups and organizations in the Chicago Wilderness region STEW-MAP database as of November 2011. Binomial tests to compare the Chicago and non-Chicago subsets of the data were run where appropriate. Any differences noted are significant at .05 or more.

Stewardship Activity. Over 60% of the participating stewardship groups and organizations were involved in each type of stewardship category in the survey – educate the public, conserve the environment, advocate for the environment, take care of a place, restore or transform local habitat, and monitor environmental quality (Table 1). Stewardship groups and organizations could choose all that applied to them. Groups outside Chicago were more likely to be involved in education, restoration and monitoring than those in the city.

Table 1. Stewardship activities (respondents could select all that apply). N stands for the number of respondents who selected that answer. The % column contains the percentage of respondents who selected that answer.

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
Educate the public	330	90.91	165	87.30	165	94.83[1]
Conserve the environment	312	87.15	157	83.96	155	90.64
Advocate for the environment	309	86.31	159	85.48	150	87.21
Take care of a place	308	85.08	155	82.01	153	88.44
Restore...transform habitat	226	64.20	96	51.61	130	78.31[2]
Monitor environmental quality	216	61.71	101	54.30	115	70.12[3]

[1] X-squared = 5.3317, df = 1, p<0.05; [2] X-squared = 26.06, df = 1, p<0.001; [3] X-squared = 8.5752, df = 1, p<0.01

Legal Status. Overall, 46.6% of responding stewardship groups had 501(c)(3) status; an additional 25% were community groups without such formal legal status (Table 2). More of the Chicago stewardship groups were in formal non-profit or informal community groups, while more of the local government agencies were outside the City of Chicago (29.9% outside Chicago compared with 16% of the entire sample). Differences were statistically significant for 501(c)(3), with more stewards in 501(c)(3) groups in the City. "Local governments" was also statistically significant, no doubt because the structure of the dataset is to compare stewardship in the geography of the one local government (the City of Chicago) with the many outside it.

Stewardship Issues. Environment, education, community improvement, youth, and recreation are the top five foci of Chicago Wilderness area stewardship groups (Table 3, Figure 2). Community, youth, arts and culture, public health, energy efficiency, economic development, toxics and pollution are all worked on more by groups located in Chicago than outside it. Groups outside Chicago focused more on animal-related and criminal justice issues. When asked to pick a *primary* focus (as opposed to selecting all areas in which they work), environment was the answer with 49.9% of those sampled (44.2% in Chicago, 56.1% outside Chicago.) Significant differences are noted in Table 3.

Focus on Stewardship. When asked what percentage of a group's programs, activities, and services focused on environmental stewardship, most of the respondents reported doing either a little (0-19%) or a lot (80-100%). The pattern was primarily the same within and outside Chicago (Figure 3).

Table 2. Legal status of stewardship groups (n = 367, 190, and 177 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
501(c)(3) (or has applied)	171	46.59	104	54.74	67	37.85[1]
Community Group	92	25.07	56	29.47	36	20.34[2]
Local government agency	59	16.08	6	3.16	53	29.94[3]
Other: College/University	14	3.81	7	3.68	7	3.95[2]
Other: School	8	2.18	5	2.63	3	1.69[4]
Other	6	1.63	2	1.05	4	2.26[4]
501(c) (4 or 6) status (or has applied)	5	1.36	4	2.11	1	0.56[4]
Private firm, for-profit business	5	1.36	4	2.11	1	0.56[4]
Federal government agency	4	1.09	0	0	4	2.26[4]
State or Regional agency	3	0.82	2	1.05	1	0.56[4]

[1]X-squared = 9.8298, df = 1, p<0.01; [2] Not Significant; [3]X-squared = 46.7645, df = 1, p<0.001; [4] too few observations.

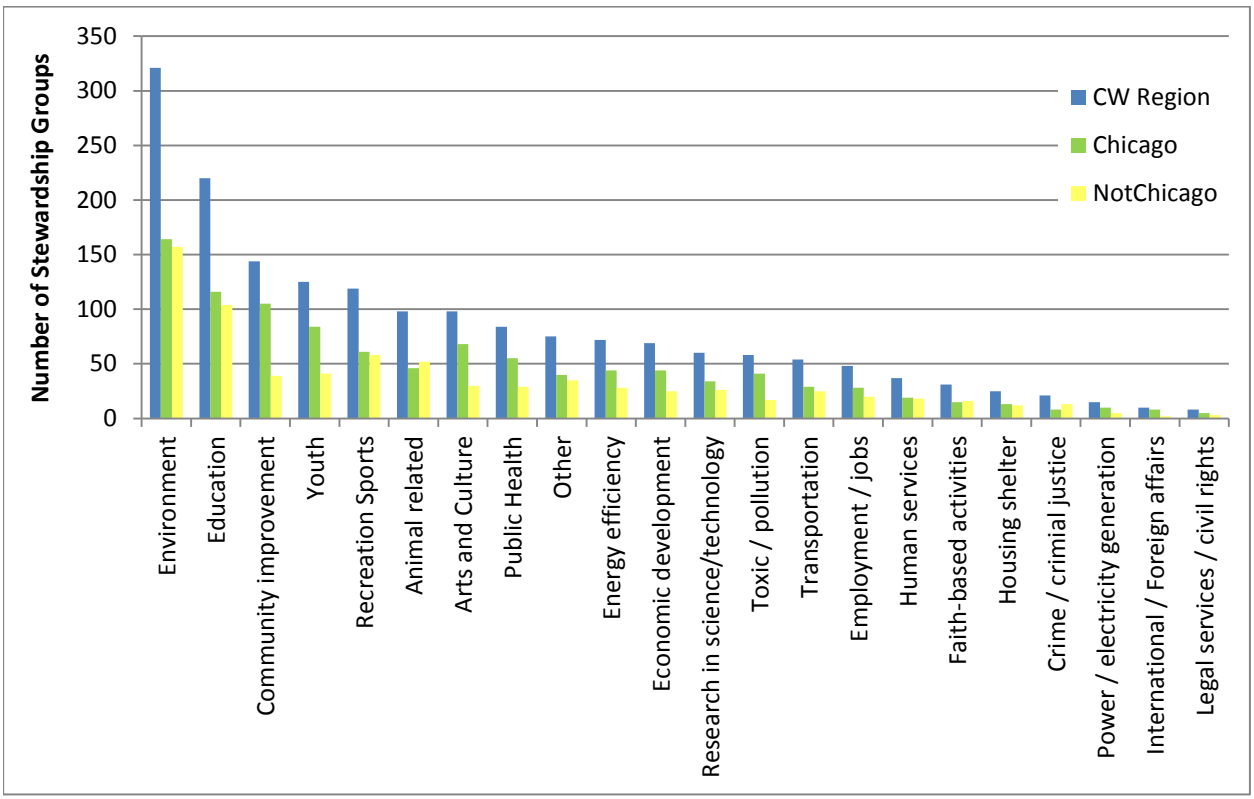

Figure 2. Issues that the stewardship groups work on (each respondent could select all that applied) for all Chicago Wilderness region groups, just Chicago, and just not-Chicago.

Table 3. Issues the stewardship groups work on (respondents could select all that apply). (n = 363, 188, and 175 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not-Chicago subsets of the data, respectively).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
Environment	321	88.43	164	87.23	157	89.71[1]
Education	220	60.61	116	61.70	104	59.43[1]
Community improvement & capacity building	144	39.67	105	55.85	39	22.29[2]
Youth	125	34.44	84	44.68	41	23.43[3]
Recreation sports	119	32.78	61	32.45	58	33.14[1]
Animal related	98	27.00	46	24.47	52	29.71[1]
Arts culture	98	27.00	68	36.17	30	17.14[4]
Public health	84	23.14	55	29.26	29	16.57[5]
Other	75	20.66	40	21.28	35	20.00[1]
Energy efficiency	72	19.83	44	23.40	28	16.00[1]
Economic development	69	19.01	44	23.40	25	14.29[6]
Research & technology	60	16.53	34	18.09	26	14.86[1]
Toxic pollution	58	15.98	41	21.81	17	9.71[7]
Transportation	54	14.88	29	15.43	25	14.29[1]
Employment	48	13.22	28	14.89	20	11.43[1]
Human services	37	10.19	19	10.11	18	10.29[1]
Faith based activities	31	8.54	15	7.98	16	9.14[1]
Housing shelter	25	6.89	13	6.91	12	6.86[1]
Crime criminal justice	21	5.79	8	4.26	13	7.43[1]
Power and electricity generation	15	4.13	10	5.32	5	2.86[1]
International national security	10	2.75	8	4.26	2	1.14[8]
Legal services	8	2.20	5	2.66	3	1.71[8]

[1] Not Significant; [2]X-squared = 41.2747, df = 1, p<0.001; [3]X-squared = 17.2021, df = 1, p<0.001; [4]X-squared = 15.6975, df = 1, p<0.001; [5]X-squared = 7.5007, df = 1, p<0.01; [6]X-squared = 4.3207, df = 1, p<0.05: [7]X-squared = 8.9945, df = 1, p<0.05; [8]Not enough observations.

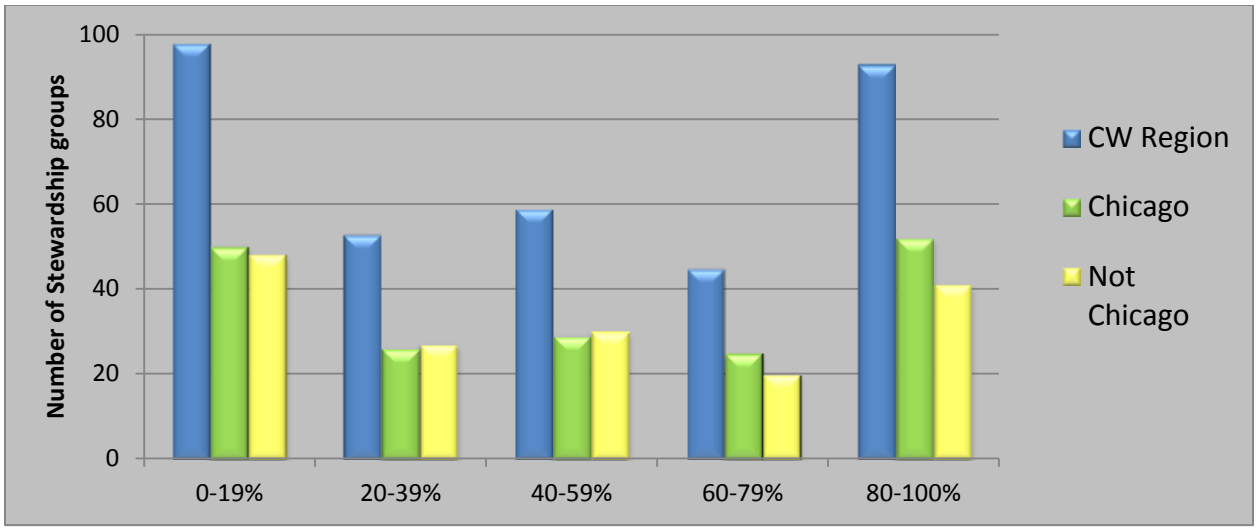

Figure 3. Percent effort on stewardship in the last year for the Chicago Wilderness region (n = 348, 182, & 166 for Chicago Wilderness (CW) region wide data and the Chicago/ not Chicago subsets of the data, respectively).

Stewarded Settings. Chicago Wilderness region stewardship groups and organizations work in a wide variety of settings, with prairie, woodland, community gardens, trails, wetlands and parks topping the list (Table 4). There are significant differences between groups located in and outside Chicago. Chicago stewardship groups and organizations do more than their counterparts in community gardens, parks, school yards, vacant land, public rights of way, planters, beaches and shorelines, residential grounds, rooftops, and urban farms.

Stewardship groups or organizations outside Chicago conduct more stewardship activities in prairies, woodlands, trails, wetlands, watersheds, streams and public grounds than do their Chicago counterparts. Significant differences are reported in Table 4.

Land Ownership at Stewardship Venues. Table 5 reports the owners of the land cared for by the stewardship groups. More Chicagoans are stewarding property owned by local government or nonprofits than their counterparts outside the City. Those outside Chicago are more often stewarding County and individually owned lands. While only 3% of the respondents did not know the owner of the land they cared for, most of these were Chicago stewards.

Age of Stewardship Organizations. When asked when their group or organization was founded, most reported since the first Earth Day in 1970, and most were formed after 1990. These data show a distinct difference between groups within Chicago and those outside Chicago. It is much more likely that groups formed since 2000 were within the City of Chicago (Figure 4; Table 6).

Table 4. Settings where Chicago Wilderness area stewardship groups work (respondents could select all that applied) (n = 343, 180, and 163 for Chicago Wilderness (CW) i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
Prairie	171	49.85	66	36.67	105	64.42[1]
Woodland	158	46.06	55	30.56	103	63.19[1]
Community garden	137	39.94	99	55	38	23.31[1]
Wetland	133	38.78	45	25	88	53.99[1]
Park	111	32.36	70	38.89	41	25.15[2]
Trails bike paths	108	31.49	40	22.22	68	41.72[1]
Rain garden	105	30.61	50	27.78	55	33.74[3]
Watershed / sewershed	99	28.86	33	18.33	66	40.49[1]
Stream / river / canal	93	27.11	30	16.67	63	38.65[1]
School yard	86	25.07	53	29.44	33	20.25[3]
Vacant land	79	23.03	57	31.67	22	13.5[1]
Public right of way	64	18.66	41	22.78	23	14.11[3]
Public grounds	63	18.37	28	15.56	35	21.47[3]
Planter	63	18.37	40	22.22	23	14.11[3]
Waterfront / beach / shoreline	61	17.78	36	20	25	15.34[3]
Green building	56	16.33	32	17.78	24	14.72[3]
Public garden	52	15.16	32	17.78	20	12.27[3]
Other	52	15.16	28	15.56	24	14.72[3]
Residential grounds	44	12.83	31	17.22	13	7.98[4]
Green roof	38	11.08	24	13.33	14	8.59[3]
Playing ball field	32	9.33	15	8.33	17	10.43[3]
Urban farm	26	7.58	38	21.11	13	7.98[2]
Greenway / rail / trail	26	7.58	11	6.11	0	0[2]
Dog run	17	4.96	8	4.44	9	5.52[3]
Brownfield	17	4.96	13	7.22	4	2.45[3]
Courtyard atrium plaza	14	4.08	8	4.44	6	3.68[3]
Landfill	2	0.58	1	0.56	1	0.61[5]

[1] Significant at .001; [2] Significant at .01; [3] Not significant; [4] Significant at .05; [5] Not enough observations

Table 5. Land ownership of stewarded sites (n = 318, 168, and 150 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
City local government	185	58.18	106	63.1	79	52.67[1]
Nonprofit	105	33.02	63	37.5	42	28[1]
County government	86	27.04	37	22.02	49	32.67[2]
Individual	63	19.81	31	18.45	32	21.33[1]
State government	46	14.47	27	16.07	19	12.67[1]
Other	41	12.89	19	11.31	22	14.67[1]
Corporation	29	9.12	20	11.9	9	6[1]
Federal government	27	8.49	16	9.52	11	7.33[1]
Other government	22	6.92	10	5.95	12	8[1]
Don't know	10	3.14	9	5.36	1	0.67[3]

[1] Not Significant; [2] X-squared = 4.026, df = 1, p-value = 0.05; [3] Not enough observations.

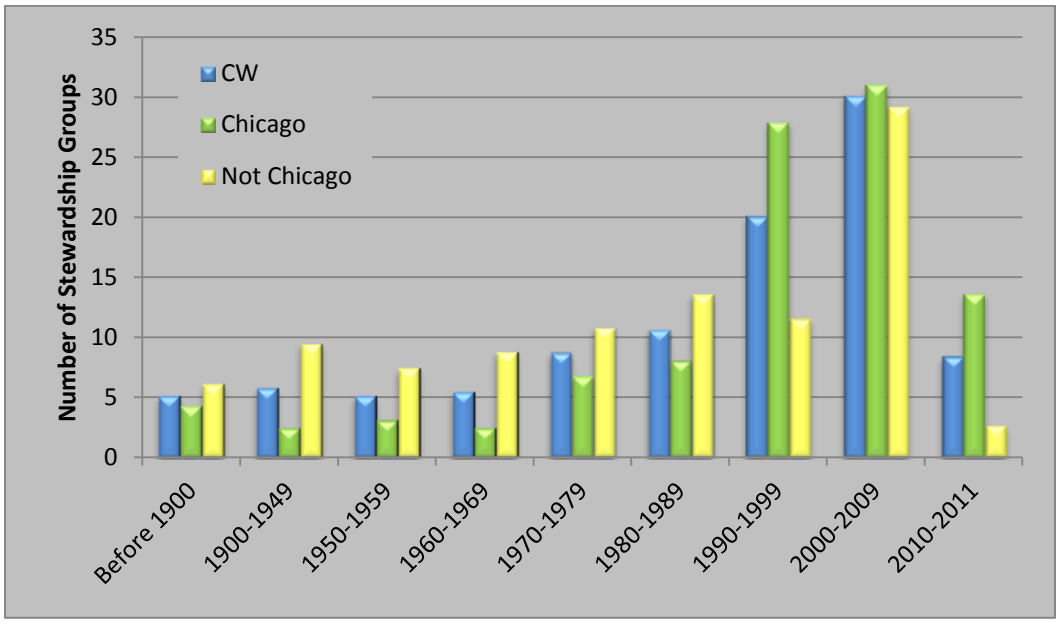

Figure 4. Year founded for the Chicago Wilderness region stewardship groups, the Chicago groups, and the non-Chicago groups.

Table 6. Year respondents reported that their group was founded (n = 292, 161, and 147 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
Before 1900	16	5.19	7	4.35	9	6.12[1]
1900-1949	18	5.84	4	2.48	14	9.52[1]
1950-1959	16	5.19	5	3.11	11	7.48[1]
1960-1969	17	5.52	4	2.48	13	8.84[2]
1970-1979	27	8.77	11	6.83	16	10.88[1]
1980-1989	33	10.71	13	8.07	20	13.61[1]
1990-1999	62	20.13	45	27.95	17	11.56[3]
2000-2009	93	30.19	50	31.06	43	29.25[1]
2010-2011	26	8.44	22	13.66	4	2.72[4]

[1] Not Significant; [2]X-squared = 11.8331, df = 1, p<0.001;
[3]X-squared = 4.8015, df = 1, p<0.05;[4]X-squared = 10.5327, df = 1, p<0.0

Table 7. Full time staff reported (no significant differences).

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
0	99	40.08	51	40.48	48	39.67
1 to 5	62	25.1	35	27.78	27	22.31
6 to 20	27	10.93	16	12.7	11	9.09
21 to 100	37	14.98	17	13.49	20	16.53
101 to 2000	22	8.91	7	5.56	15	12.4

Table 8. Part time staff reported.

	CW Region		Chicago		Not Chicago	
	N	%	N	%	N	%
0	97	41.81	54	46.15	43	37.39
1 to 5	76	32.76	41	35.04	35	30.43
6 to 20	25	10.78	14	11.97	11	9.57
21 to 100	21	9.05	4	3.42	17	14.78[1]
101 to 860	13	5.6	4	3.42	9	7.83

[1] Significant X-squared = 7.7694, df = 1, p-value = 0.005314

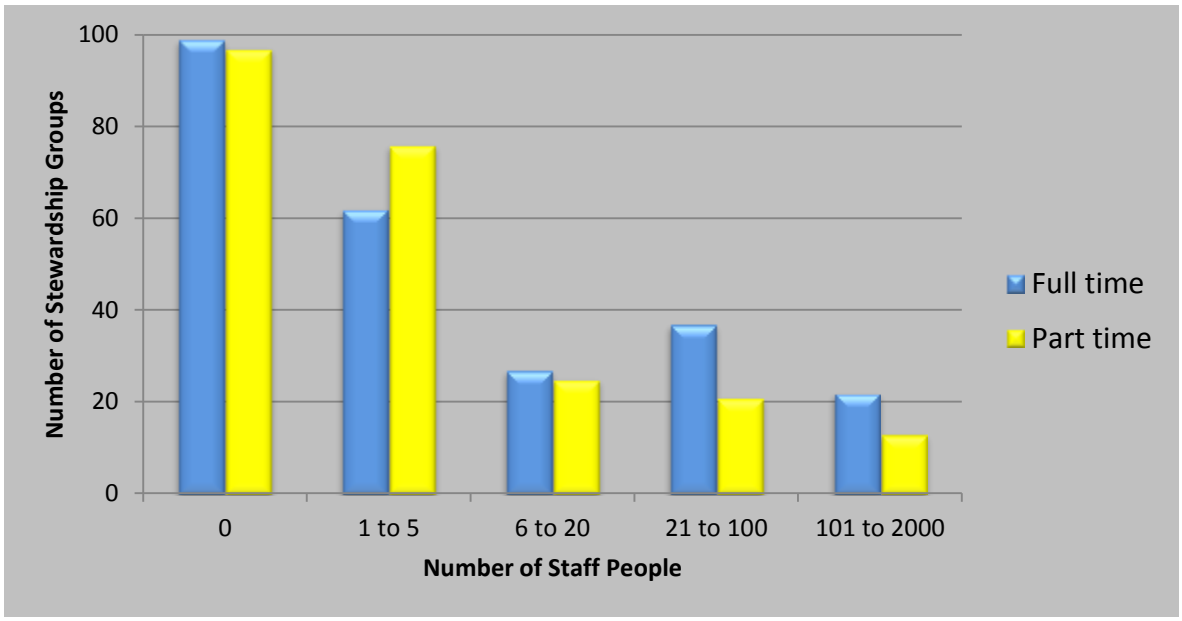

Figure 5. Full-time and part-time staffing at the Chicago Wilderness region stewardship groups.

Staffing Levels. Of those reporting staffing levels, 40% had no full time and 42% had no part time staff (N=247 and 232 respectively; Tables 7 & 8, Figure 5). After no staff, one to five full or part time staff were the next largest category selected, indicating that the respondent stewardship groups were primarily groups with minimal staff or were purely volunteer based. There were few differences between groups within and outside of Chicago.

Volunteer and Membership Levels. Most groups (86%) who reported having volunteers had fewer than 100, and there were no meaningful differences between groups within and outside Chicago. Only 12 of the 240 groups that responded to the question had no volunteers at all. With regards to members, the story is a little different. While 12.8% of respondents reported no members at all, stewardship groups outside Chicago were more likely to report no members (17.2% compared to 9% from Chicago) and Chicago groups were more likely to report between 10 and 100 members (42%; Table 9).

Budgets. Of the respondents who reported on budgets (N=142), 38.7% reported an annual budget of $1000 or less. The reported budgets, however, ranged nearly equally across all budget categories from zero to over $1,000,000 annually. There was little meaningful difference by location in or out of Chicago, so data is reported for the Chicago Wilderness region only (Figure 6).

Table 9. Numbers of members and volunteers reported (n = 172, 100, and 87 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively for members. And n = 240, 121, and 119 for Chicago Wilderness (CW), i.e. region wide data, and the Chicago and not Chicago subsets of the data, respectively for volunteers.

MEMBERS	CW		Chicago		Not Chicago	
	N	%	N	%	N	%
0	24	12.83	9	9.00	15	17.24
1 to 10	29	15.51	15	15.00	14	16.09
11 to 100	68	36.36	42	42.00	26	29.89
101 to 1000	51	27.27	27	27.00	24	27.59
1001 to 30000	15	8.02	7	7.00	8	9.2

VOLUNTEERS	CW		Chicago		Not Chicago	
	N	%	N	%	N	%
0	12	5.00	2	1.65	10	8.40
1 to 10	88	36.67	48	39.67	40	33.61
11 to 100	111	46.25	56	46.28	55	46.22
101 to 1000	24	10.00	13	10.74	11	9.24
1001 to 20000	5	2.08	2	1.65	3	2.52

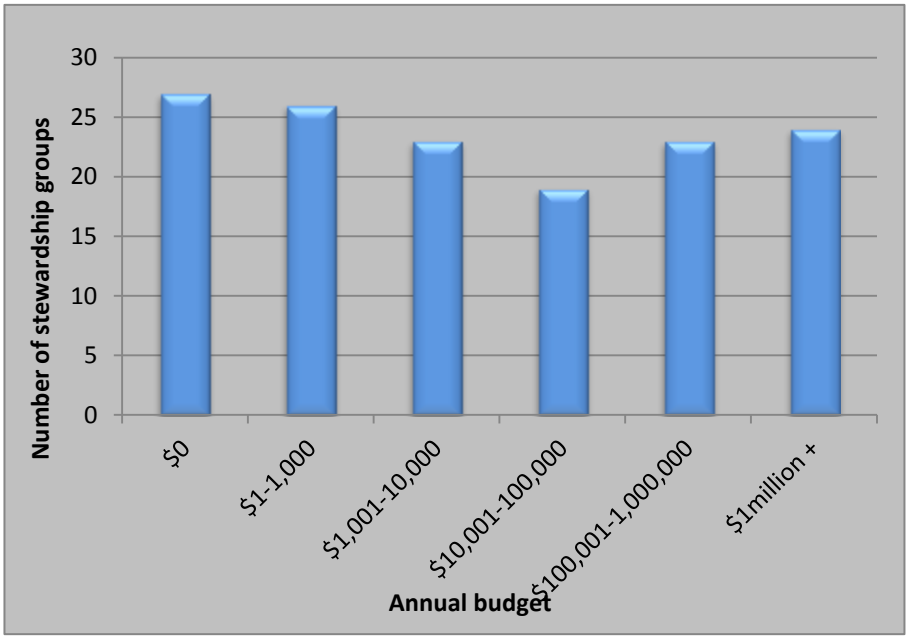

Figure 6. Annual budgets for the Chicago Wilderness region stewardship groups.

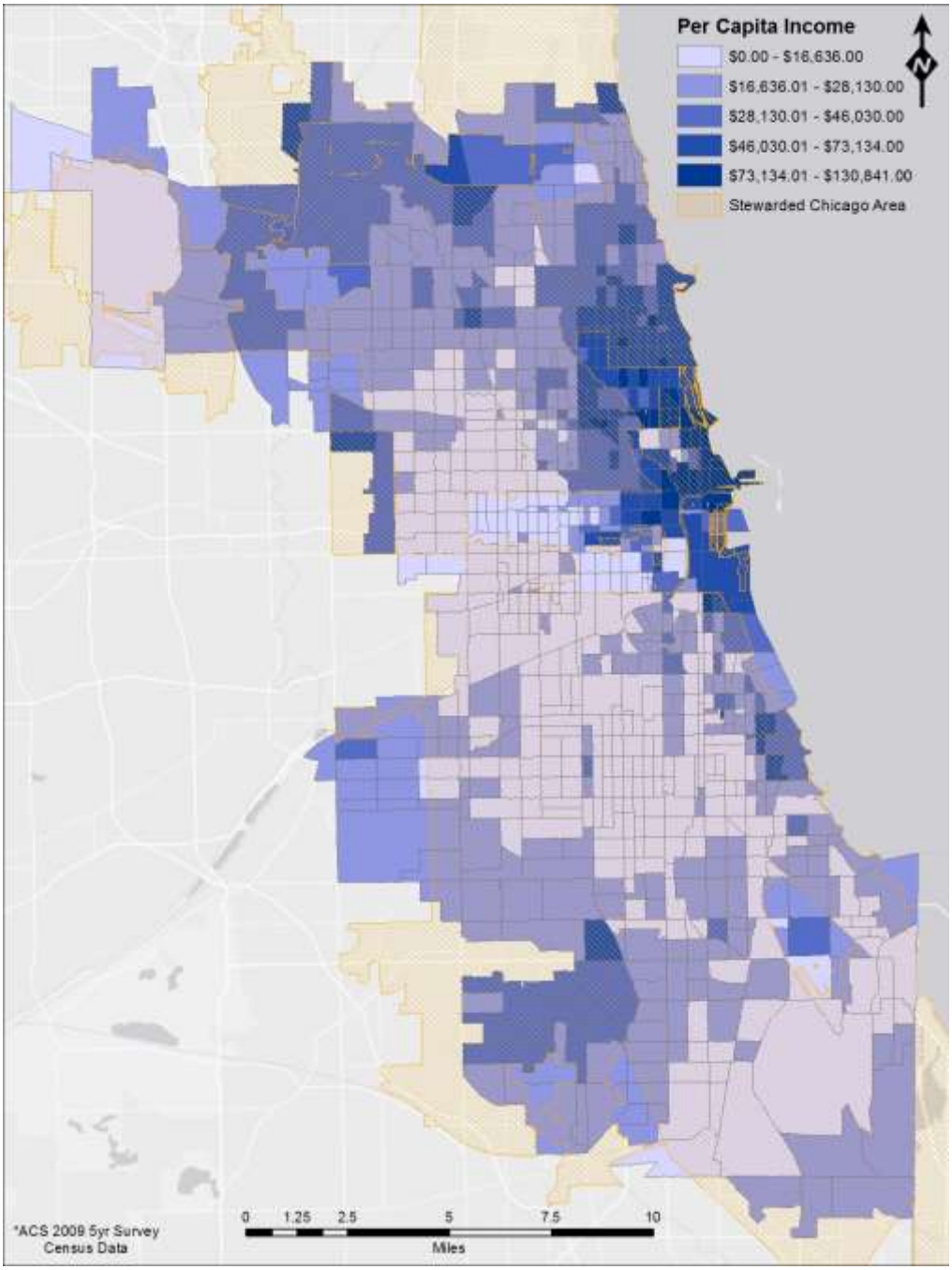

Figure 7. Stewardship and per capita income in the city of Chicago.

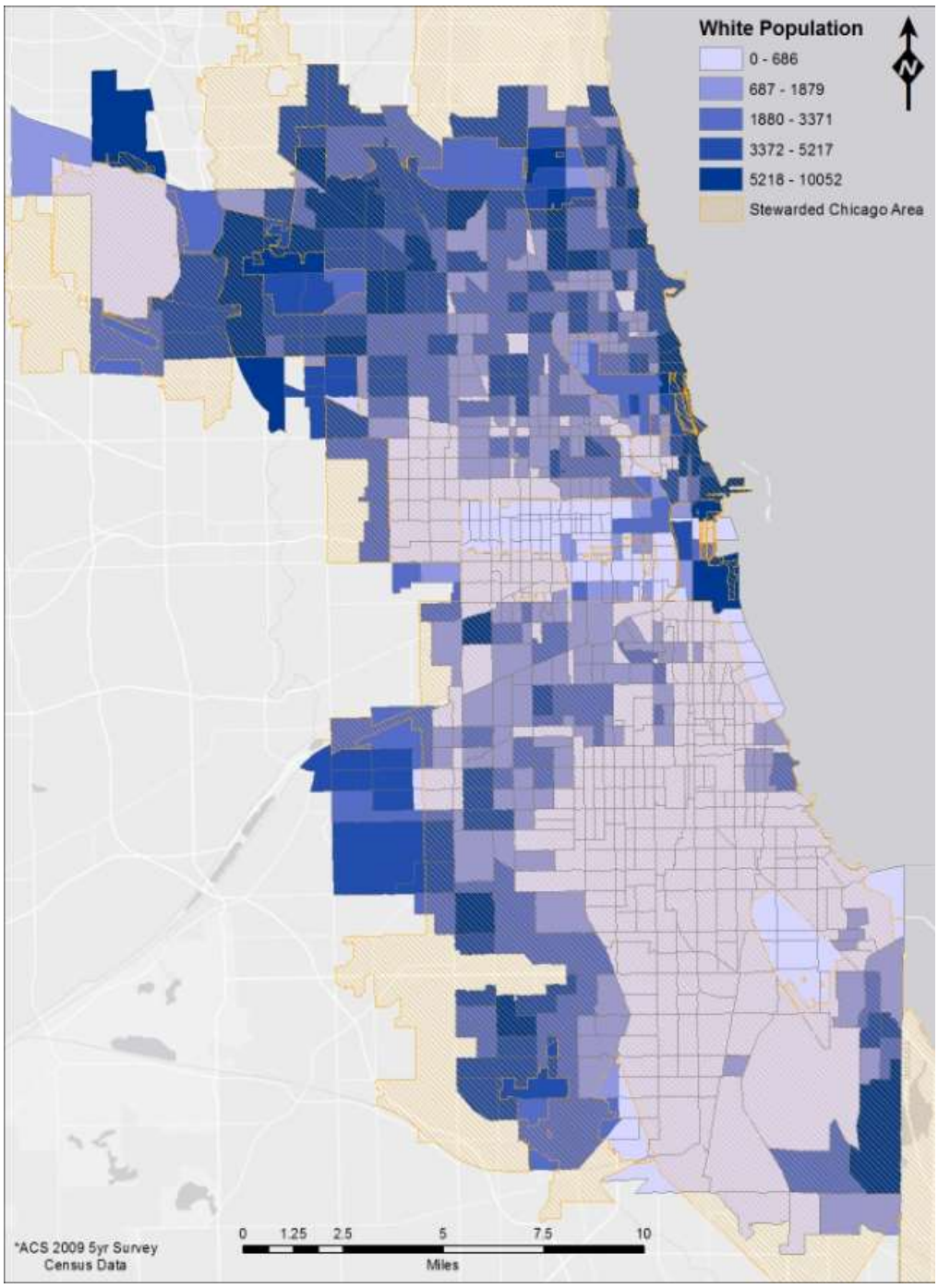

Figure 8. Stewardship by percent White population in the city of Chicago.

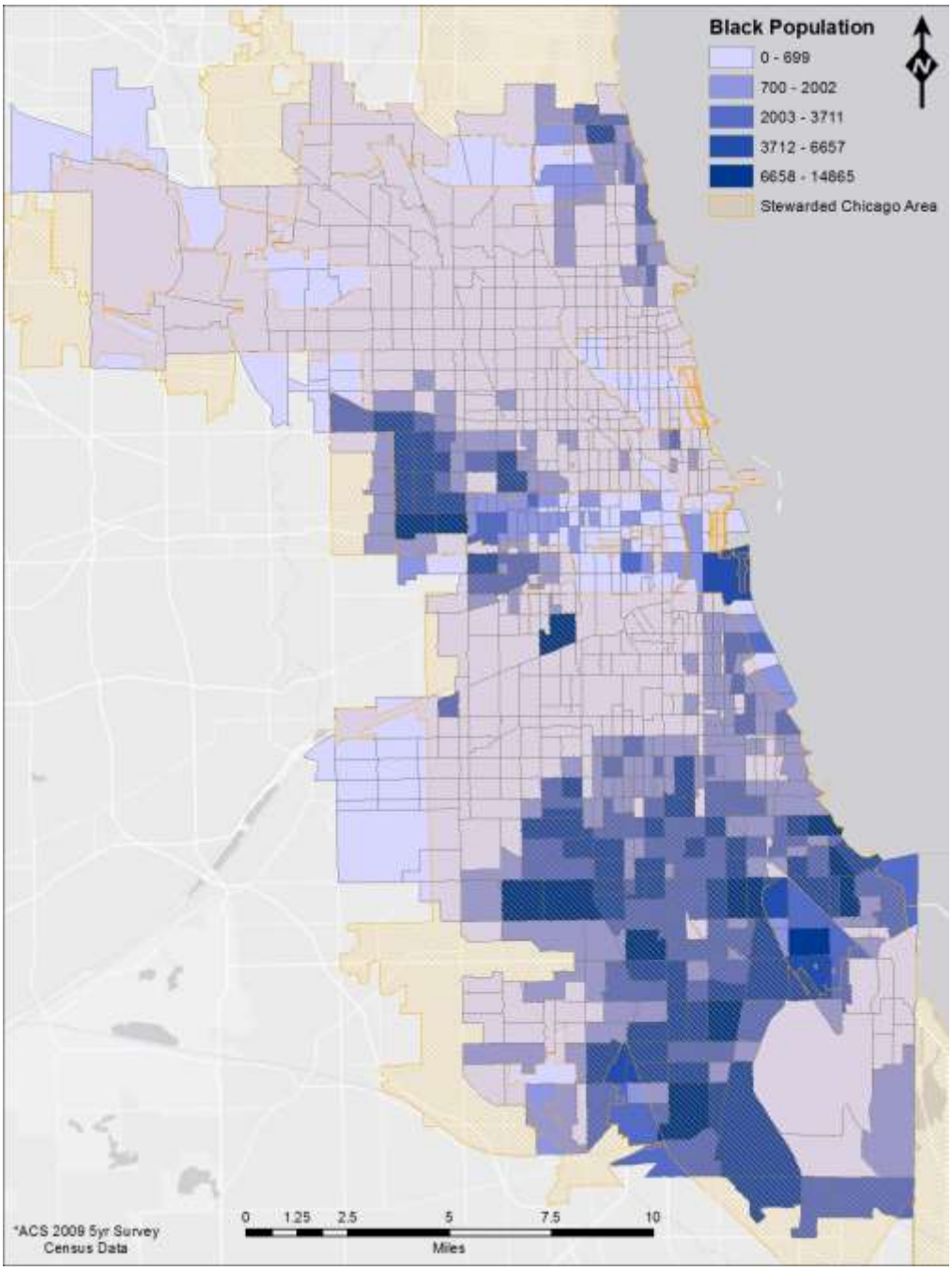

Figure 9. Stewardship by percent Black population in the city of Chicago.

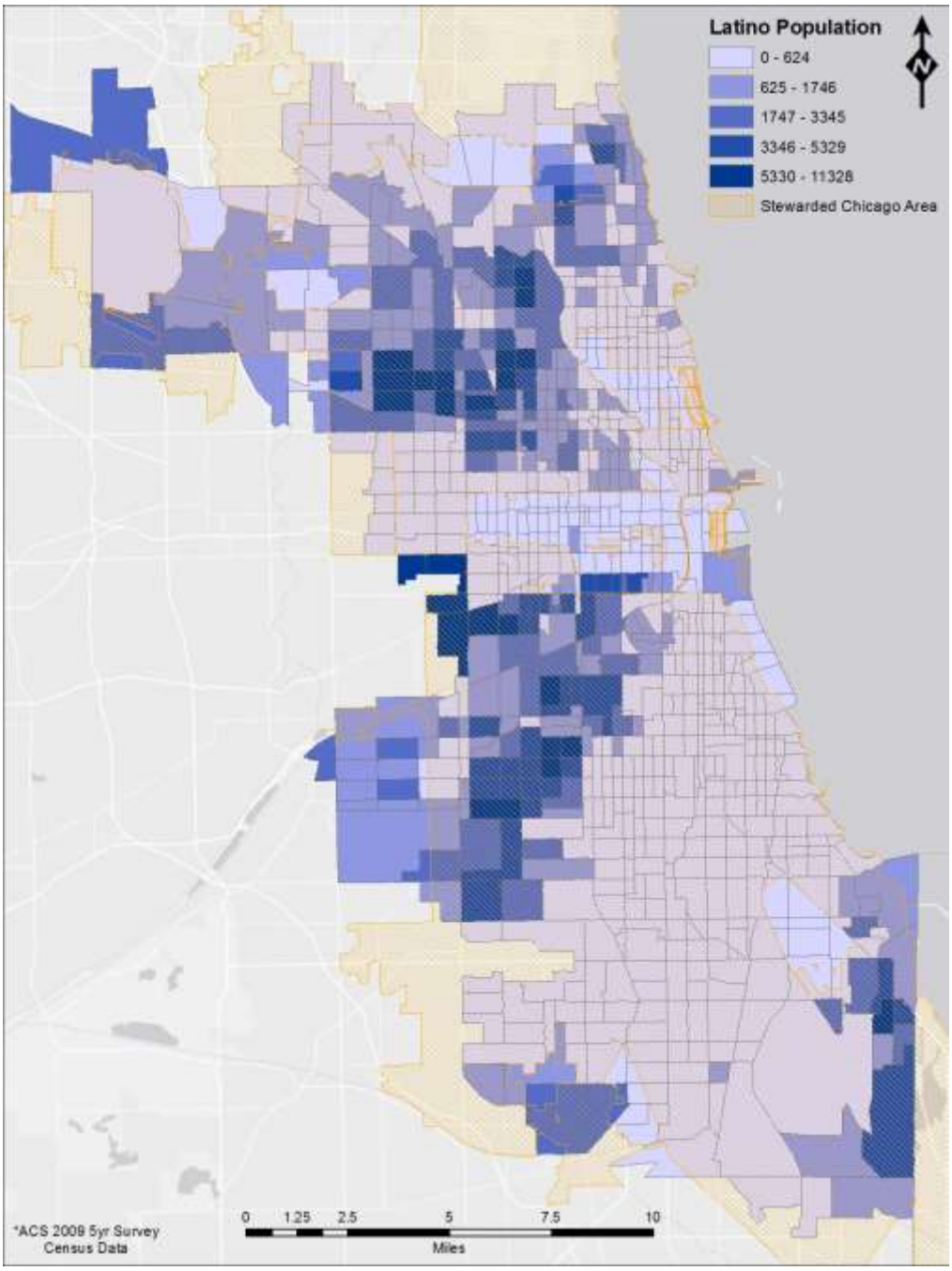

Figure 10. Stewardship by percent Latino in the City of Chicago.

Stewardship Patterns by Income and by Race and Ethnicity. To be able to consider issues of environmental justice and equity, we looked at the stewardship data within the City of Chicago in the context of 2009 census data at the block group level. Figure 7 shows the outlines of stewardship territories (yellow hash marks) by income, while Figures 8, 9, and 10 show territories by percentage White, Black, and Latino population. Most of the city was claimed as stewardship territory by at least one group (recall that the groups that selected the entire city as their stewardship territory are not included in this analysis).

Montrose Point and the Uptown Neighborhood. Looking in depth at the overlapping stewardship territories in a single community can help us understand some of the questions regarding equity and potential power imbalances if outside groups are stewarding in an area. Therefore, we took a deeper dive into the stewardship patterns in the Uptown neighborhood and adjacent Montrose Point. Montrose Point is a hook of land in Lincoln Park on the north side of Chicago. It projects into Lake Michigan and is on the Lake Michigan bird migration flyway, and therefore it is a hotspot for birds and birders. It is also of cultural and historical significance. Montrose Point, in fact most of Lincoln Park, is landfill. The Montrose Point area landscape was designed by renowned landscape architect Alfred Caldwell (Gobster and Barro 2000). Uptown is one of Chicago's most diverse neighborhoods; in the 1980s, Chicago's second Chinatown emerged in Uptown and 33% of the population was foreign born in the 1990 census (this figure is not reported in the 2000 or in subsequent American Community Survey data). Uptown has a mix of incomes, from the wealthy in near-lake mansions to residents of Single Room Occupancy buildings and the neighborhood's large stock of small, inexpensive apartments (Chicago Community Fact Book 1995 and City of Chicago website).

The first five panels of Figure 11 shows Montrose Point and the surrounding neighborhoods' overlapping stewardship territories. Of the twenty organizations that reported doing some stewardship activity in and around Uptown and Montrose Point, seven report stewardship as 80-100 percent of what they do, and seven report it to be 0-19 percent of their group or organization's activities (see Table 10). Three groups each reported 20-39 percent and 40-59 percent stewardship activities. This bimodality mirrors the database as a whole with an even split at the two ends of the spectrum and the rest divided between. Only six of these stewardship groups indicated that the environment was their primary focus; the rest focus on arts and culture, economic development, public health, community improvement and other issues. But collectively, they steward all of Uptown and Montrose Point, reporting over 952 regular volunteers and 82 full or part time staff. These groups typically reported a single polygon of stewardship territory, but one Uptown stewardship group reported polygons for

eight stewardship territories. All but one are community groups or formal nonprofits with 501(c)(3) status, although the size and scope of these organizations ranged from small to large.

The final panel in Figure 11 shows the varying intensity of stewardship activity in the Uptown/Montrose Point area, with some areas under a considerable amount of stewardship and a few areas (primarily along the lakefront in Lincoln Park) with less. It also highlights one problem with the mapping tool. Montrose Point is an odd hook shape that was hard for survey participants to draw with the tool. Therefore, while we know from descriptions of stewardship activities that Montrose Point is something of a hotspot, it does not show up as one on this map. This suggests that if very detailed analysis of stewardship territories is desired, the polygons need to be drawn by project staff with GIS expertise. In our data, it means that we need to be especially cautious about interpretation of hotspots.

All but three of the stewardship groups reporting activity in the Uptown/Montrose Point area are from the immediate or very nearby neighborhoods. The three that are not are north-side, or city-wide groups. Therefore, the primary stewardship activities in Uptown are from locally-based groups and Montrose Point has a mixture of local groups and those focused on Lincoln Park as a whole.

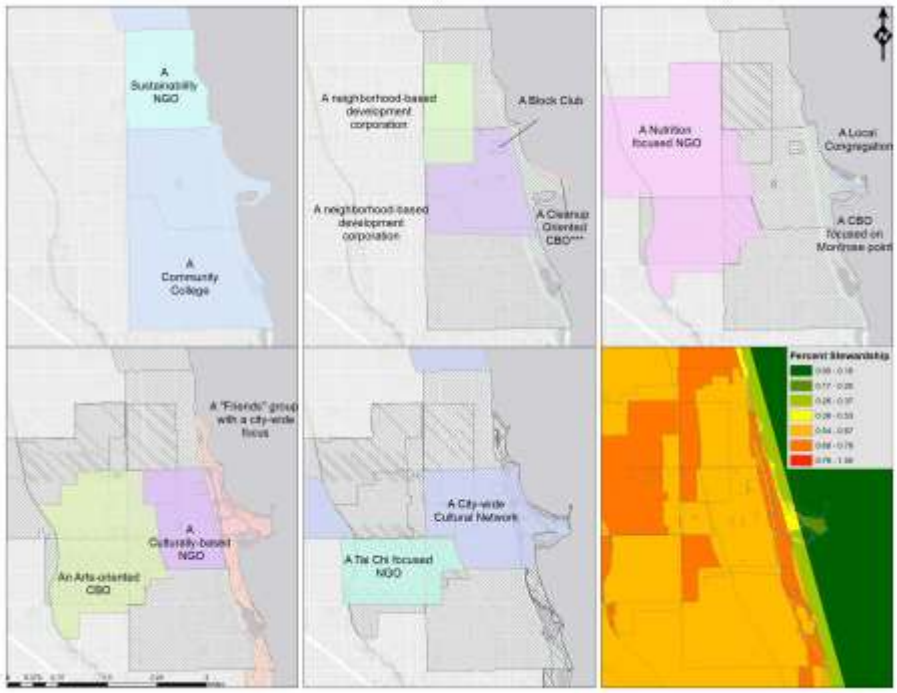

Figure 11. Stewardship polygons in the Uptown neighborhood and at Montrose Point in the city of Chicago.

Table 10. Stewardship groups working in and near the Uptown neighborhood of Chicago

					Staff		Volunteers	
Organization Name	**Legal status**	**Primary Focus**	**# Places Stewarded***	**% Stewardship**	**Full time**	**Part time**	**Regular**	**Occasional**
A Local Congregation	501(c)(3)	Faith based	?	0-19	0	0	**25**	**75**
A Culturally-based NGO**	501(c)(3)	Art/culture	2	20-39	8	8	-	-
A Block Club	Community group/org	Community improvement	1	0-19	-	-	-	-
A Park Advisory Council	Community group/org	Community improvement	1	0-19	0	0	-	-
A Cleanup Oriented CBO***	Community group/org	Environment	1	80-100	0	0	10	4
A City-wide Cultural Network	501(c)(3)	Community improvement	?	0-19	3	0	0	-
A Culturally-based NGO	501(c)(3)	Human Services	1	0-19	30	10	50	150
A neighborhood-based development corporation	501(c)(3)	Community improvement	1	40-59	4	1	-	-
A Sustainability NGO	501(c)(3)	Environment	1	80-100	0	0	30	15
A "Friends" group with a city-wide focus.	501(c)(3)	Environment	?	80-100	8	1	500	-
A Community Garden	501(c)(3)	Environment	2	80-100	0	0	20	4
A Community College	College/University	Education	3	20-39	-	-	-	-
A Park Advisory Council	Community group/org	Other	1	80-100	0	0	20	50
A Lincoln Park focused NGO	501(c)(3)	Environment	1	80-100	2	4	200	-
A Block Club	Community group/org	Crime/criminal justice	1	20-39	0	0	5	-
A CBO focused on Montrose Point	Community group/org	Animals/wildlife	1	80-100	-	-	-	-
A Nutrition-focused NGO	501(c)(3)	Public health	2	40-59	0	0	10	5
An Arts-oriented CBO	Community group/org	Faith-based activities	1	0-19	0	0	12	6
A Tai Chi focused CBO	Community group/org	Environment	1	40-59	-	-	20	30
A neighborhood-based development corporation	501(c)(3)	Economic development	8	0-19	2	1	50	-

* Number of polygons reported in Uptown. ** NGO is a Nongovernmental Organization. *** CBO is a Community Based Organization.

DISCUSSION

Stewardship groups in the Chicago Wilderness region engaged in a wide range of activities, from those more specific to Chicago like prairie restoration to those pertinent in many urban areas like work on community gardens or toxic pollutants. Like stewards in other cities, Chicago Wilderness area stewards focused on both environmental and social issues including youth development, economic development, and capacity building (Svendsen and Campbell 2008; Wolf et al. 2011; Fisher et al. 2012). This is further evidence of the merging of community and environmental issues in the grassroots environmental movement (Weber 2000), and stands in contrast to those who claim that earlier links between environmental and social actions have diverged (Mol 2000). It suggests that environmental issues are often seen as a part of overall social well-being rather than separate issues. This offers avenues for engagement for those looking to address environmental issues – reach out beyond the core environmental groups because many see environmental issues as part of what they do even if it is not their focus. Further evidence of the diversity of groups that engage in environmental stewardship can be found in the diversity of funding, staffing, and size of Chicago Wilderness region stewardship groups. They ranged from large to small, staffed to all volunteer, funded to not. This range of characteristics is also found in the other stewardship censuses (Wolf et al. 2011; Fisher et al. 2012).

Earlier we raised the issue of fit between ecosystems and institutions (Folke et al. 2007). Our stewardship data offers a look at smaller scale links between ecosystems and the institutions that connect with them. In this case that connection is caring (Nassauer 2011), and the scale can be quite small – a city lot, a point of land. It can also be larger – parks of hundreds of hectares, the entire city. The data allows asking questions about scale and scope of the groups (the institutions) actively caring for the local environment and to understand them in the full context of their work. Doing so can help to address the issue of fit from the bottom up, while many of the scholars and activists addressing these issues approach it form the top down (Folke et al. 2007).

We can also compare Chicago stewards in our data set to published data from New York City (Fisher et al. 2012). The New York City stewardship data indicate a significantly higher percentage of groups (over 65%) reporting the environment as their primary focus (Svendsen and Campbell 2009) compared to just under 50% for the Chicago Wilderness region data and just over 44% for the more comparable Chicago-only subset of our data. While in our dataset "environment" ranks at the top for primary focus, fewer overall stewardship groups selected it as the primary emphasis of their work, again supporting the

blending of environmental issues into a broader array of issues addressed by civic groups in the Chicago Wilderness region.

In New York, parks were the most common stewardship location, with community gardens second. In Chicago, this is reversed where 55 percent of Chicago stewardship groups report working in community gardens and nearly 39% report working in parks. Chicago stewards also work in prairies (36.67%), school yards (31.67%), and vacant land (30.56%). Noticeably lacking from our data set is stewardship of street trees. This is odd given the strong core of Openlands' TreeKeepers – over 1,500 Chicagoans trained in the care and planting of trees, many of whom take on specific sets of trees to care for. We will investigate this gap in our data and rectify if necessary in future STEW-MAP data collection in the Chicago Wilderness area. Like in New York, stewarding in dog runs was ranked towards the bottom of the set in Chicago. Last in our data set of potential stewardship areas was "landfills," a physical setting we added to the Chicago version of the survey because we knew some local groups have an interest landfills, especially on Chicago's southeast side. Future analyses will look more in-depth into differences across Chicago, Chicago Wilderness, New York, Seattle, Baltimore and other cities as they develop comparable datasets.

Future analysis will also test the distribution of stewardship by demographic characteristics as seen in Figures 7-10, but the stewardship territories in Uptown indicate that as much or more stewardship occurs locally, and from a diverse set of Uptown's residents (e.g., culturally-based and economically-based organizations; Table 10). The City-wide maps (Figures 7-10) indicate that stewardship is taking place in both rich and poor neighborhoods, and in neighborhoods of different races and ethnicities. So while the environmental movement is often critiqued as being the domain of the white middle class while issues raised by the poor or people of color are sidelined, our data indicate a different pattern. Therefore, mapping stewardship efforts, and using a broad definition of stewardship, may be an important step in achieving environmental equity: in STEW-MAP no one set of issues is privileged over another and we can see the patterns of environmental activism that occur in a region.

In our analysis of stewardship by demographic characteristics of the neighborhood, one area of the city – the Southwest side – shows little activity. While the map shows much of this area as under some sort of stewardship, it is primarily one organization that indicated the entire south side of Chicago as its stewardship territory. This area may be a "stewardship desert," but we do not know for sure. Before determining that, we need to look once more for stewardship groups and activities that we may not have captured in our STEW-

MAP dataset. However, if it is a stewardship desert, this may have implications for the community in terms of resources, connections to organizations within and outside the neighborhoods of this area, and for the production of environmental services that can improve local quality of life.

These analyses also show that most of the City of Chicago is under some form of volunteer stewardship, or, to frame it in the terms Nassauer (2011) uses, it is being cared for. Recall that Nassauer posits that care can be the catalyst to connect local actions to larger, even global, environmental actions and issues. To effectively make such links, we first need to understand the caring work of myriad local groups and the ways in which these groups are (or are not) already linked to larger forces, institutions, and issues.

While some academics argue that the mere use of the term "stewardship" adds a political dimension to the questions we ask (e.g., Silveira 2001), and perhaps creates some expectation of assumptions on the part of respondents, the goal of STEW-MAP itself is not to privilege a particular type of stewardship – such as stewardship in cooperation with, or in resistance to, governmental efforts to manage land. Instead, STEW-MAP data, especially as it is gathered in more communities across the country, builds a database that allows researchers to ask questions about the nature of a wide array of types of stewardship activities and organizational arrangements. What environmental activity takes place in partnership with various governmental agencies? What environmental activity is set up to challenge or rectify past governmental actions? What environmental activities are small scale and entirely grassroot? Which show evidence of hybrid governance? What are the individual and collective ecological impacts of stewardship? Are there creative adaptation approaches – whether to climate change, social issues, or other areas of concern – being developed at the grassroots level that may be applicable more broadly? Analysis of STEW-MAP data can help to answer these questions and more. With the growing number of metropolitan areas with STEW-MAP data, additional inquiry about stewardship engagement is possible.

Future analysis of the Chicago Wilderness region's STEW-MAP data will investigate the ecological footprint of these activities. As Wolf et al. (2011) point out, we need to understand the ecological impacts of stewardship in all its variety and to broaden the concept of an ecological footprint to recognize that humans and their settlements are not *only* a negative influence on the environment.

The Chicago Wilderness alliance places a great emphasis on citizen engagement in stewardship activities, so much so that stewardship is one of the

key strategies for implementing the alliance's Green Infrastructure Vision. Stewards can be active contributors to achieving the Green Infrastructure Vision at each of the four scales envisioned for action (regional, local, community and site). Future analysis of our stewardship data will examine existing activities with regard to the Green Infrastructure Vision priorities. This analysis may lead to more effective engagement of local stewards while also highlighting issues that need to be addressed with means other than local stewardship.

It is also critical to understand the ecological impact of stewardship as cities and regions implement sustainability programs, especially those that rely on stewardship as a key means of reaching sustainability goals. Gaining this understanding will help managers, policy makers, and grassroots groups themselves choose processes and activities that are more likely to have the intended ecological outcomes. It can also help to avoid the pitfalls of adopting a stewardship paradigm, where stewardship is regarded not just as the powerful and potent means of change that it can be, but as a panacea. Weber (2000), for example, discusses the promise of Grassroots Ecosystem Management as an answer to top-down, government driven management systems. This is an important recognition. The danger comes when grassroots work in turn is seen as the *only* successful mechanism for environmental management. As indicated in the New York analysis of the networks between stewards (Fisher et al. 2012) some of the strength of stewardship activities comes in the relationships across levels and groups, allowing for problems of different scales and complexity to be addressed in a variety of ways.

These potential pitfalls aside, engagement in environmental stewardship by a wide range of civic, governmental and business entities holds great promise, and is already having significant impact in cities, suburbs, and rural communities coast to coast. Stewardship can bolster delivery of some ecosystem services by increasing biodiversity, improving water infiltration, pollination, and air and water quality. It can also strengthen, or even be an example of, cultural ecosystem services as stewards engage with the local natural and cultural heritage and find aesthetic and recreational experiences in their local environments (Millennium Ecosystem Assessment 2005a, 2005b). Future research will address these and other interactions between stewardship and ecosystem services in the Chicago Wilderness region.

LITERATURE CITED

Barry, J., K. Smith. 2008. Landscape, politics, labour and identity: Stewardship and the contribution of green political theory. *Landscape Research* 33(5):565-585.

Barthel, S., J. Colding, T. Elmqvist, C. Folke. 2005. History and local management of a biodiversity-rich, urban cultural landscape. *Ecology and Society* 10(2):10. [online] URL: http://www.ecologyandsociety.org/vol10/iss2/art10/

Bramston, P., G. Pretty, C. Zammit. 2011. Assessing environmental stewardship motivation. *Environment and Behavior* 43(6):776-788.

Cadenasso, M. L., S. T. A. Pickett, J. M. Grove. 2008. Dimensions of ecosystem complexity: Heterogeneity, connectivity, and history. *Ecological Complexity* 3(1):1-12.

Chapin III, F. S., S.R. Carpenter, G.P. Kofinas, C. Folke, N. Abel, W.C. Clark, . . . F. J. Swanson. 2010. Ecosystem stewardship: Sustainability strategies for a rapidly changing planet. *Trends in Ecology and Evolution* 25(4):241-249.

Chicago Fact Book Consortium. 1995. *Local Community Fact Book: Chicago Metropolitan Area, 1990*. Chicago Fact Book Consortium, 494 pp.

Chicago Regional Biodiversity Council. 1999. *Biodiversity Recovery Plan*. Chicago IL: Council, Chicago Regional Biodiversity Council. 195 pp. http://www.chicagowilderness.org/files/3413/3034/7640/biodiversity_recovery_plan.pdf. Accessed September 22, 2012.

City of Chicago. 1990 and 2000 Census Data by Community Area. Uptown. http://www.cityofchicago.org/content/dam/city/depts/zlup/Zoning_Main_Page/Publications/Census_2000_Community_Area_Profiles/PDF_03.pdf. Accessed June 12, 2013.

Dreher, D. 2004. Chicago Wilderness Green Infrastructure Vision. *Chicago Wilderness Journal* 2(2):27-34.

ESRI (Environmental Systems Research Institute). 2012. ArcMap 10.1 ESRI, Redlands, California.

Fisher, D. R., L. K. Campbell, E. S. Svendsen. 2012. The organizational structure of urban environmental stewardship. *Environmental Politics* 21(1):26-48.

Folke C., S. Carpenter, T. Elmqvist, L. Gunderson, C. Holling, et al. 2002. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *AMBIO: A Journal of the Human Environment* 31(5):437–440.

Folke, C., L. Pritchard, Jr., F. Berkes, J. Colding, U. Svedin. 2007. The problem of fit between ecosystems and institutions: ten years later. *Ecology and Society* 12(1):30 [online] URL: www.ecologyandsociety.org/vol12/iss1/art30

Geist, C., S.M. Galatowitsch.1999. Reciprocal model for meeting ecological and human needs in restoration projects. *Conservation Biology* 13(5):970-979.

Gobster, P.H., and Barro, S.C. (2000). Negotiating Nature: Making Restoration Happen in an Urban Park Context. In Gobster, P.H., and Hull R.B. (Eds.), *Restoring Nature: Perspectives from the Social Sciences and Humanities,* pp. 185-208. Washington, DC: Island Press.

Head, L., P. Muir. 2006. Edges of connection: reconceptualising the human role in urban biogeography. *Australian Geographer* 37(1): 87-101.

Hunter, M.R. 2011. Impact of ecological disturbance on awareness of urban nature and sense of environmental stewardship in residential neighborhoods. *Landscape and Urban Planning* 101(2011):131-138.

Millennium Ecosystem Assessment. 2005a. *Ecosystems and Human Well-being: Synthesis*. World Resources Institute, Washington, DC. 160 p.

Millennium Ecosystem Assessment. 2005b. *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC. 86 p.

Mol, A.P.J. 2000. The environmental movement in an era of ecological moderisation. *Geoforum* 31(2000):45-56.

Moore, M., M. Townsend, and J. Oldroyd. 2007. Linking Human and Ecosystem Health: The Benefits of Community Involvement in Conservation Groups. *EcoHealth* 3: 255-261.

Nassauer, J.I. 2011. Care and stewardship: from home to planet. *Landscape and Urban Planning* 100(4): 321-323.

Ostrom, E. 2005. *Understanding Institutional Diversity*. Princeton University Press. 376 pp.

Pickett, S. T. A.; M. L. Cadenasso; J. M. Grove; C. H. Nilon; R. V. Pouyat; W. C. Zipperer; R. Costanza. 2001. Urban Ecological Systems: Linking Terrestrial Ecological, Physical, and Socioeconomic Components of Metropolitan Areas. *Annual Review of Ecology and Systematics*, v. 32, pp. 127-157

R Development Core Team. 2011. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org/.

Silveira, S. 2001. The American environmental movement: surviving through diversity. *Boston College Environmental Affairs Law Review* 28(2): 497-532.

Stevens, W. K. 1995 *Miracle Under the Oaks: the Revival of Nature in America* New York: Pocket Books. 332 pp.

Svendsen, E. S. and L. K. Campbell. 2008. Urban ecological stewardship: understanding the structure, function and network of community-based urban land management. *Cities and the Environment*. v.1, n. 1. Article 4. http://digitalcommons.lmu.edu/cate/vol1/iss1/4.

Svendsen, E. S., L. K. Campbell. 2009. Personal communication.

Weber, E. P. 2000. A new vanguard for the environment: Grass-roots ecosystem management as a new environmental movement. *Society & Natural Resources* 13(3):237-260.

Westphal, L. M. (1993). Why trees? Urban forestry volunteers values and motivations. IN: *Managing Urban and High Use Recreation Settings.* PH Gobster, ed. (GTR NC 163). St. Paul: USDA Forest Service.

Wolf, K. D. J. Blahna, W. Brinkley, M. Romolini. 2011. Environmental stewardship footprint research: linking human agency and ecosystem health in the Puget Sound region. *Urban Ecosystems*. p 1-20. Doi: 10.1007/s11252-011-0175-6.