

THE IMPLICATIONS OF DEMOGRAPHIC CHANGE IN METROPOLITAN AREAS FOR THE USE OF RECREATION SITES

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Abstract: This paper reports on a study of outdoor recreation preferences and behavior of 618 (non-Hispanic) White, 647 African American, and 346 Hispanic Americans in Cook County, Illinois. Respondents were contacted by a phone survey using random digit dialing and a quota for each group. Binary logistic regression models were estimated to explain the use of 19 sites in and near the Chicago Metropolitan Area and one distant site. These models are used to help explain the implications of demographic change for participation at individual recreation sites. Suggestions are made for improving subsequent modeling efforts aimed at explaining the use of recreation sites in and near Metropolitan areas.

Introduction

Demographic change in metropolitan areas can significantly influence the demands placed on recreation resources. Important demographic changes include increasing racial/ethnic diversity, the aging of the population, and the shift of the population and particular groups from place to place across the metropolitan landscape. These changes have implications for the use of existing resources, revenues generated to support existing resources, and political support for efforts focusing on existing and future resources. As a first step in exploring the implications of demographic changes for the use and support of recreation resources by residents in the Chicago Metropolitan area, we

estimated binary logistic regression models to explain use of 19 sites across the Chicago area and one site in Southern Illinois by residents of Cook County, Illinois. These explanatory models allow us to explore the implications of selected demographic changes on site use while holding other variables constant.

The models are estimated from data generated by a survey of Cook County residents conducted by telephone. We established a sampling quota by racial ethnic group to assure significant minority representation. The results were: African Americans = 647, Non-Hispanic White Americans = 618, and Hispanic Americans = 346. The 20 study sites about which respondents were asked (shown in Figure 1.) include city parks, county forest preserves, state and federal parks, zoos, museums, an arboretum, a botanic garden, conservatories, and the Shawnee National Forest in southern Illinois. Participation was measured by whether respondents reported that they visited or had not visited the site in the previous 12 months. A separate model was estimated for each of the 20 sites. Explanatory variables in the model included distance from the individual's home to the site, race/ethnicity (three categories), age (five categories), area of residence (five areas in Cook County), education (seven categories), annual household income (six categories), household size, and gender (two categories) (Table 1). Travel distance and area in the county where respondents live were calculated from the zip code of residence provided by respondents. Six of the eight explanatory variables were represented as categorical variables. For each of these categorical variables the statistical significance of each category was evaluated relative to one designated reference category (Table 1).

Interpretation of the Models

Sixteen of the 20 models were significant at the .05 level (chi square test). The variance explained by the models, based on the Nagelkerke R square, varied from a low of .034 to a high of .203. The relatively low explanatory power of these models was not unexpected given that the decision of what sites to visit during a 12-month period is the result of a complex choice process that includes many considerations. Despite the low predictive power of some of the models, there were some interesting and informative patterns in the coefficients that are

Table 1. — Coefficients for Binary Logistic Regression Models Estimated to Predict Participation at 20 Recreation Sites In and Near the Chicago Metropolitan Area, by Residents of Cook County, IL

	Grant Park	Museum Science Industry	Field Museum	Shedd Aquarium	Brookfield Zoo	Lincoln Park Cons.	Lincoln Park Cons.	Garfield Park Village	North Park	Montrose Point	Indiana Dunes St. PK.	Illinois Beach St. PK.	Chain-O-Lakes St. PK.	Ryerson Woods St. PK.	Moraine Hills	Shawnee Nat. For. Prairie	Goose Lake	Morton Arb. Garden	Chicago Botanic NTP	Midewin	
Constant	-0.323	.151	-.465	-.565	.140	-1.204**	-2.495**	-3.462**	-2.272**	-1.896**	-.289	-1.049	.330	-4.117**	-1.565	2.852	-1.686	-2.007**	-1.510**	-2.808	
Distance	-0.013	-0.30*	-.021	-.010	-.047**	-.005	-.034*	-.037*	-.074*	-.027	-.026*	-.023	-.037**	.012	-.028	-0.019	-.033	-.031	-.028*	-.007	
Race																					
White	.466**	.106	.119	.201	-.093	.419**	.214	1.633**	.250	-.167	-.164	.013	-1.357**	-.432	.065	-.337	-.138	-1.096**	.177	1.212**	
Black	-.315	-.424*	-.007	.121	-.452**	.386*	.364	.044	-.171	.152	-.091	-1.139	-1.462**	-1.338	-.176	-.460	-.264	-.721**	.220	.364	
Hispanic																					
Age																					
17-25	-.231	-.482*	-.205	-.236	-.214	-.013	.053	.064	-.262	.074	-.215	-.070	.770*	-.147	-.511	-.727	-.547	-.065	-.391	-.577	
26-39	-.530*	-.597**	-.246	-.354	-.383*	-.179	.485*	.433	.415	.104	-.301	.137	1.203**	.285	-.211	-.0425	-.078	.341	.061	-.442	
40-55	-.567*	-.784**	-.335	-.443*	-.488*	-.466*	.565*	.710*	.690	-.227	-.278	.065	1.171**	.069	-1.428*	0.291	.469	.446	.172	-.526	
56-65	-.974**	-.902**	-.529*	-.712**	-.587*	-.566*	.339	.456	.084	-.332	-.510	-1.100	.746	.151	-.016	-0.519	-.129	.593	.057	-1.038	
66-91																					
Residence																					
North Suburbs	.128	-.232	.002	-.057	.286	-.177	.060	.297	.277	.238	.083	.530	.373	-.336	.594	.729	.404	.041	-.165	-.612	
South Suburbs	.652**	-.335	-.172	-.227	-.371*	.684**	.398	.307	.528	.772*	-.322	.005	-.280	-.930	-.440	.884	.869	-.249	-.159	-.065	
North Chicago	.436	-.283	-.226	.062	-.158	.309	.128	.229	.393	.520	-.263	.078	-.211	-.015	-.495	.930	.469	.097	-.016	-.307	
Central Chicago	.713**	-.289	-.006	.006	-.061	.009	-.105	.049	.168	.173	-.220	.367	.123	-.439	.124	.425	.623	-.102	-.258	-.926	
South Chicago																					
Education																					
<HS	.514**	.734**	.439*	.477**	.206	.411*	.531*	.608*	1.380*	.615*	.011	.565	-.340	.776	.981	.577	-.038	.675	.574*	.379	
HS	1.012**	.215	.372	.684**	.092	.063	.640*	.867*	1.265	1.003**	.692*	.683	-.013	-.194	2.046**	1.220	.281	.619	.583	.671	
Trade or Voc	.992**	.781**	.582**	.482**	.152	.296	.759**	.752**	1.378**	.784**	.320	.568	-.167	1.154	.851	.664	-.344	.723*	.768**	-.288	
Some Coll	1.579**	1.064**	.905**	.929**	.166	.684**	.984**	.759*	1.686**	.900**	.716**	.676*	-.341	1.174	1.721*	1.185*	.240	.091**	1.211**	.304	
Col Grad	1.756**	.787*	.750*	.640	.258	.681	1.100**	1.256**	1.663*	1.389**	1.018**	.845	-.766	1.978*	1.247	1.012	1.047	1.546**	.891*	-.137	
Some Graduate	1.522**	1.019**	1.018**	.891**	-.048	.765**	1.075**	1.210**	1.512*	1.046**	.686**	.556	-.735*	1.098	.860	.726	-.256	1.374**	1.258**	.277	
Graduate/Prof. Deg																					
Income																					
<15	.293	.255	.076	.057	.143	.198	.126	.187	.135	.628*	.192	.247	.412	-.012	-.512	-.029	-.159	-.122	-.020	-.151	
15-26	.560**	.307	.255	.195	.486*	.517**	.255	.445	.324	.842**	.188	.078	.322	.617	-.358	.657	.035	.036	.506*	.427	
26-40	.810**	.428*	.339	.008	.711**	.568**	.147	.324	.375	.670*	.372	.272	.956*	.243	-.025	.525	.336	.203	.436	.562	
40-60	1.050**	.246	.341	.063	.310	.304	.487	.581	.056	1.222**	.258	.150	.759	.747	-.246	.490	.391	.660	.647*	.574	
60-80	.405	.668*	.584*	.286	.375	.474	.509	.504	-.666	.776	.301	.232	.543	-.526	-.343	.781	.663	.571	.661*	-.020	
80-100	.528	.194	.212	.135	.344	.120	.110	.233	-.239	.208	.648*	.168	.834	.881	-.438	-.5926	-.862	.034	.485	.241	
100+																					
Number in household	.018	.130**	.078*	.108**	.236**	.108**	.134**	.006	.048	-.093*	.085*	-.015	.054	.122	.021	-.020	.092	-.038	.032	-.016	
Gender																					
% correct	-.305**	-.072	-.021	-.016	-.039	.045	.034	.053	-.508*	-.494**	-.093	-.406*	-.636**	-.509	.582*	-.688**	-.457	.127	.028	-.270	
r squared	.69.5	.62.6	.60.3	.59	.61.8	.62.8	.73.9	.81	.94.9	.82.3	.76.1	.87.8	.88.1	.97	.96.3	.95.5	.96.8	.87.4	.74.1	.96.9	
(estimated)	0.203	0.111	0.067	0.071	0.11	0.118	0.091	0.179	0.112	0.131	0.067	0.034	0.203	0.099	0.102	0.113	0.061	0.145	0.098	0.064	
Number reporting visitation																					
White	388	324	299	278	312	227	153	65	38	125	156	88	142	26	30	37	23	137	183	12	
Black	463	383	330	333	337	340	163	212	29	90	155	77	36	19	22	26	20	44	157	29	
Hispanic	173	155	157	172	177	207	106	31	15	69	72	33	19	3	8	10	9	23	80	9	
Significance of equation	S	S	S	S	S	S	S	S	S	S	S	NS	S	NS	S	S	NS	S	S	S	NS

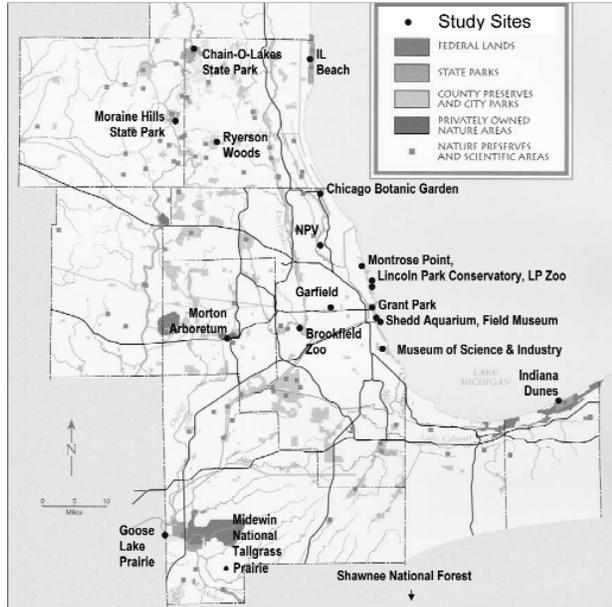


Figure 1: Chicago Area Study Sites

discussed below. The individual coefficients for each variable indicate the association of that variable with site participation, provided that all other variables in the model are held constant. Ways to improve these models are discussed later in the paper.

Distance — As might be expected, increasing distance from an individual’s residence to a site was associated with lower levels of participation for 19 of the 20 study sites. The coefficient for distance was significantly different from zero for eight sites, suggesting some important declines in participation with travel distance. The percent that participated dropped from well above 90 percent to as low as 2 percent across the eight sites over a distance of 1 to 50 miles. The one site with the positive coefficient for distance (not significant) was Ryerson Woods, which was the site with the lowest number of participants with which to estimate the model (Table 1. - bottom). The 20 study sites are major resources that draw visitors from across Cook County and beyond, and it is likely that other variables in the model are correlated with travel distance to the sites. Consequently it is not surprising that for some sites participation might not drop significantly with distance from home across Cook County. The largest coefficient (negative) for distance was for North Park Village Nature Center, a relatively new site that most likely does not have as widespread a

reputation as the other sites. This site also has a low number of users in the sample.

Race/Ethnicity — The race/ethnicity coefficients estimate the difference in participation for Black or Hispanic respondents as compared to White respondents. The coefficients for Black and Hispanic were positive in nearly half of the instances across the 20 models (12 sites for Black, 7 sites for Hispanic) and negative in slightly more than half of the instances. This offers little support for reported “underparticipation” by Blacks and Hispanics in outdoor recreation. Coefficients for Black were significant in the models for six sites, and coefficients for Hispanic were significant in the models for five sites. With one site, Lincoln Park Zoo, the model estimates that Blacks and Hispanics were significantly more likely than Whites to report visiting the site (Blacks and Hispanics were each 1.5 times as likely as Whites to participate). This pattern may be attributable to the central location of this site just north of downtown Chicago and the relatively high accessibility of the site, including by mass transit, from neighborhoods with large numbers of Blacks and Hispanics as compared to other sites. Whites, regardless of whether they reported that they visited the site or not, had the longest estimated average travel distance to Lincoln Park Zoo, and Blacks and Hispanics had the shortest. With Chain-O-Lakes State Park and the Morton Arboretum, the models estimate that Black and Hispanic respondents were significantly less likely than White respondents to report visiting these sites (with Morton Arboretum, Blacks were .33 times as likely to participate as Whites, and Hispanics were .49 times as likely to participate, while with Chain-O-Lakes State Park, Blacks were .26 times as likely to participate as Whites and Hispanics were .23 times as likely to participate as Whites). This pattern is most likely a function of the types of outdoor experiences offered and the location of these sites north (Chain-O-Lakes) and west (Morton Arboretum) of Chicago, distant from Black and Hispanic populations. Of the individual respondents in the study, Blacks had a longer estimated travel distance to each of these two sites than Whites. Past studies and an earlier analysis of the data used in this study (Dwyer and Barro 2000) have suggested that Black and Hispanic residents tend to prefer sites where there is a significant amount of development over those that are “natural” or “undeveloped.” With

Garfield Park Conservatory and Grant Park, Blacks were significantly more likely than Whites to report that they had visited the site (with Garfield Park Conservatory, Blacks were 5.1 times as likely to participate as Whites, and with Grant Park, Blacks were 1.6 times as likely as Whites to participate). This is likely a function of site accessibility to Black populations, particularly with Garfield Park Conservatory, which is located in an area of the city with a large Black population. Both sites had a shorter travel distance for Black respondents than White respondents. With Brookfield Zoo and the Museum of Science and Industry, the models estimate that Hispanics are significantly less likely than Whites to report that they have visited (at Brookfield Zoo, Hispanics were .64 times as likely as Whites to participate, while at the Museum of Science and Industry, Hispanics were .65 times as likely as Whites to participate). This difference in participation between Hispanics and Whites does not seem to be attributable to distance, since Hispanics in the sample have a shorter estimated average travel distance to the sites than Whites.

Age — The age coefficients reflect the difference in participation by age group with reference to the youngest age group of 17-25 years. The models for half of the sites indicate that participation is highest with the lowest age group. These sites include zoos (Brookfield and Lincoln Park Zoos), museums (Science and Industry, Shedd Aquarium, Field Museum), and Grant Park that is at the center of downtown Chicago on the lakefront. They also include more distant sites such as the Shawnee National Forest, Moraine Hills State Park, Indiana Dunes National Lakeshore, and the Midewin National Tallgrass Prairie. With these sites, participation often drops off to less than half across all age groups. Significantly higher participation with age is suggested by the model for Chain-O-Lakes State Park, which is north of Chicago (for example, respondents age 40-65 years are three times more likely to report participation than those age 17-25 years). This may be a reflection of the available outdoor activities such as power boating. The coefficients for age are not significant, and there is not a clear pattern in the coefficients across age classes at Ryerson Woods, Goose Lake Prairie, and Illinois Beach State Park, three other quite “natural” sites that are on the periphery of the population concentration in Cook

County. This is also the case at Montrose Point. Significant increases in participation with age are reflected in the models for the Garfield Park Conservatory and the Lincoln Park Conservatory, where the focus is on rare and unusual plants - the appreciation for and interest in which may come with age (at Lincoln Park Conservatory, respondents age 40-55 years are 1.6 times more likely to participate than those age 17-25 years, and those 56-65 years of age are 1.8 times more likely to participate than those age 17-25 years). Patterns of participation with age are similar for Garfield Park Conservatory. While the coefficients were not significant, the models for Morton Arboretum and North Park Village Nature Center, which also focus on unique plants, also suggest increased participation with age. Surprisingly, the model for the Chicago Botanic Garden, a site that has a similar focus on special plants, suggested relatively little variation in participation with age. This may be due to the easy access of the Chicago Botanic Garden to bicyclists, who would tend to be a younger group.

Area of Residence — The patterns of coefficients for the area of Cook County where the respondent lived were not always intuitively obvious in that in several instances they suggested the highest participation for areas distant from a site. This may be attributable to interactions between the area and distance variables. Furthermore, very few of the coefficients for area are statistically significant. This may, in part, be due to correlations between area and other variables in the models, such as distance, race, education, and income. Area was a significant explanatory variable in the models for four sites. Residents of North Chicago were significantly more likely than residents of the North Suburbs to report that they had visited three sites, Montrose Point (2.2 times), Lincoln Park Zoo (2.0 times), and Grant Park (1.9 times) - all sites where residents of North Chicago are likely to be closer to the sites than residents of the North Suburbs. However, coefficients for area suggest that residents of North Chicago are significantly less likely than residents of the North Suburbs to visit Brookfield Zoo (0.69 times). The reason for this does not seem to be related to distance, since residents of North Chicago are likely to be closer to Brookfield Zoo than are the residents of the North Suburbs. One possibility, explored later in the paper, may be due to the availability of a substitute site in the

area, the Lincoln Park Zoo, which may be perceived as providing a similar recreation experience to the Brookfield Zoo. Perhaps public transportation is also a factor here as Chicago residents are less likely to own cars than suburbanites. Residents of South Chicago were significantly more likely than those who live in the North Suburbs to report visiting Grant Park, most likely because they are closer to that site.

Education — Models for nearly all of the sites indicate that individuals with higher levels of education were more likely to report that they had visited a site than those with lower levels of education. The exceptions were Chain-O-Lakes State Park where coefficients suggested significantly lower participation with higher levels of education; and Brookfield Zoo, Goose Lake Prairie, and Midewin National Tallgrass Prairie where there was no clear association between education and participation. Increasing likelihood of participation with increasing education was particularly prominent with the sites that provide for the viewing and study of rare and unusual plants. These included North Park Village Nature Center, Morton Arboretum, Chicago Botanic Garden, Garfield Park Conservatory, and Lincoln Park Conservatory. Higher levels of education were also associated with participation at Grant Park, Montrose Point, and Lincoln Park Zoo. All three of these sites are in relatively close proximity to other sites that provide for the study of rare and unusual plants, and may be a part of trips by individuals who visit those other sites to study plants. As might be expected, participation at museums increased significantly with education (Museum of Science and Industry, Field Museum, Shedd Aquarium). This might have some interesting implications for support for endangered species.

Income — The general pattern for all sites was for higher levels of participation with higher levels of income. Peak participation tended to be found in one of three mid to upper categories of income, \$40-60,000, \$60-80,000, and \$80-100,000 per year. In no cases was there a significant negative coefficient for higher levels of income in the models. The sites with significantly higher participation with higher income include Montrose Point, Grant Park, Chicago Botanic Garden, Brookfield Zoo, Lincoln Park Zoo, Chain-O-Lakes

State Park, Indiana Dunes National Lakeshore, Field Museum, and the Museum of Science and Industry. These were not necessarily sites where there is a high cost of travel, entry, or participation - or were they necessarily located close to areas with a concentration of high-income residents. One possibility is that higher levels of income may afford higher amounts of discretionary time, making visitation easier and more likely. There are correlations between education and income that complicate interpretation of the coefficients for each.

Household Size — Household size had both positive (14 sites) and negative (6 sites) associations with participation in the models for the 20 sites. In seven instances the coefficients were significant and positive, indicating that individuals from larger households were more likely to participate. These included sites that are popular with children and are frequently the focus of family outings, including Brookfield Zoo, the Museum of Science and Industry, Lincoln Park Conservatory, Lincoln Park Zoo, Shedd Aquarium, Field Museum, and Indiana Dunes National Lakeshore. In some instances the models suggest that a household with five members is three to five times as likely to visit a site as a family of one. The one significant negative coefficient for household size was in the model for Montrose Point, which includes large areas in Lincoln Park on the Chicago Lakefront that provide a wide range of opportunities. Perhaps this is a somewhat less constrained site than most others, and management of the members of a large household could be a challenge, particularly with the lakefront and lagoons.

Gender — The models suggest a general tendency towards males being more likely to report participation at sites (15 out of 20 sites). A higher participation for males is significant in seven sites; Shawnee National Forest, Chain-O-Lakes State Park, North Park Village Nature Center, Montrose Point, Moraine Hills State Park, Illinois Beach State Park, and Grant Park. Some of these are quite distant and popular for hunting and fishing such as the Shawnee National Forest, while others such as Grant Park are local sites that cater to families and other groups. With the Shawnee National Forest, male respondents were more than twice as likely as female respondents to report visiting the site. With the other sites it is not entirely clear what factors

are operating here with respect to the association between gender and participation. Perhaps security is an issue at or on the route to some sites. It should be noted that in the survey an effort was made to alternate between interviewing male and female heads of households.

Implications for Planning and Management

Demographic change has implications for the management of settings for recreation activities. Research suggests that important demographic changes that are likely to influence recreation participation in the years ahead include shifts in the locations across the landscape where people live, increased racial/ethnic diversity, and aging of the population (Dwyer 1994). Subsequent discussion uses the results of the binary logistic regression models developed in this study to help explore the possible implications of these demographic changes for use of the 20 study sites.

Location —The binary logistic regression models suggest that the likelihood of visiting a site increases with decreasing distance from the site. The coefficient for distance was negative in the models for 19 of the 20 sites. Some examples of the kinds of shifts in the location of the population that may influence the use of particular sites include growth of suburban areas and change in the population of inner-city areas.

Growth of the suburbs increases the population that is located relatively close to suburban sites such as Chain-O-Lakes State Park, Ryerson Woods, Moraine Hills State Park, Goose Lake Prairie, Illinois Beach State Park, Indiana Dunes National Lakeshore, Morton Arboretum, Midewin National Tallgrass Prairie, and Chicago Botanic Garden. This is likely to increase participation at these sites. While the present study looked only at residents of Cook County, the suburbs of Chicago extend to a number of counties in northeastern Illinois, southeastern Wisconsin, and northwestern Indiana. Growth in these areas may influence the future use of a number of sites in suburban areas such as those listed above.

Population losses in inner city areas can reduce the participation at sites located nearby. This may influence participation at sites such as Grant Park, Lincoln Park Conservatory, Montrose Point, Garfield Park Conservatory, Field Museum of

Natural History, Museum of Science and Industry, Shedd Aquarium, and Lincoln Park Zoo. At the same time, revitalization of inner city areas may help to slow decline in population and actually bring increases in population and increase use of nearby sites. In some instances, fairly affluent individuals and households, as well as tourists, may be attracted to inner city areas and influence the use of nearby sites. At the same time, enhancing recreation attractions may be a significant part of programs to revitalize inner-city areas and stabilize or increase their populations, and attract more tourists.

Race/Ethnicity — The binary logistic regression models suggest that increases in the Black and Hispanic populations relative to Whites are likely to increase the use of some sites more than others. Coefficients for Blacks in the models suggest that with a relative increase in the Black population (all else held constant) we will see a significantly greater increase in participants at Garfield Park Conservatory, Grant Park, Midewin National Tallgrass Prairie, and Lincoln Park Zoo; as compared to Morton Arboretum and the Chain-O-Lakes State Park. Similarly, coefficients for Hispanics suggest that a relative increase in the Hispanic population (all else held constant) will bring significantly more participants to Lincoln Park Zoo than to Morton Arboretum, Ryerson Woods, Museum of Science and Industry, Chain-O-Lakes State Park, and Brookfield Zoo. However, as with all interpretations of coefficients in the models, these predictions assume that all other variables in the model remain constant, which may not be the case. Perhaps additional Black and Hispanic residents of Cook County will live in different parts of the County than is currently the case for these groups. For example, there may be more Blacks and Hispanics in the suburbs. They may also be more affluent than current members of these groups. There may also be changes in the age structure of Black and Hispanic populations, which may significantly influence participation patterns of those groups. And perhaps the managers of some sites will increase their efforts to market their sites to Blacks and Hispanics, possibly increasing their participation at these sites.

Age — Coefficients in the binary logistic regression models suggest that, with all else held constant, aging of the population will increase

participation at some sites relative to others. With aging, relatively smaller increases are likely to occur at sites that have relatively high participation rates by the younger age classes, such as Brookfield Zoo, Shawnee National Forest, Grant Park, Moraine Hills State Park, Indiana Dunes National Lakeshore, Field Museum of Natural History, Museum of Science and Industry, Shedd Aquarium, Midewin National Tallgrass Prairie, and Lincoln Park Zoo. With aging, increases are likely to occur at sites with relatively high participation rates for older residents, such as Chain-O-Lakes State Park, Lincoln Park Conservatory, Garfield Park Conservatory, and Morton Arboretum.

Once again these predictions assume that other variables and circumstances remain the same, which may not be the case. Increased aging may be concentrated in particular locations such as inner city areas, while large numbers of younger people may go to the suburbs. The rate of aging may differ between racial/ethnic groups as compared to Whites. Site managers may market their programs to older individuals and thereby change the participation rates of these groups. These and other changes may influence the future participation by Cook County residents at the study sites.

Future Improvements in Modeling

While the models presented here are a useful start for exploring the association between demographic change and use of outdoor recreation sites, a number of suggestions are provided for improving future modeling efforts.

Sample Size — Despite a strong effort to sample heavily in Black and Hispanic populations, the sample size is small enough and the study sites sufficiently diverse that we did not have a large number of individuals in total, or in some racial/ethnic groups, who reported that they visited a particular site. This resulted in the models for four sites not being significant, and relatively few variables being significant in some models, particularly for sites where few respondents reported that they had visited. Thus it is likely that our models would have had greater explanatory power if we had a larger sample size or concentrated on more popular sites.

Awareness — It is not entirely clear whether all respondents were aware of each of the 20 study

sites or knew where they were located. Many reported that they “had never heard of” particular sites (Dwyer and Barro 2001). It is possible that individuals had visited sites but were unaware of their official names, or thought that they have visited sites that they had not actually visited. This latter situation appears likely with the Midewin National Tallgrass Prairie, where a number of individuals reported that they had visited the site, despite the limited access policy for the site and a locked fence. With Chicago Botanic Garden there were a fairly large number of Black and Hispanic respondents who reported that they had visited the site. This seems unlikely given the location and characteristics of the site. Perhaps some respondents confused it with another “Botanic Garden” or had participated in one of the numerous outreach programs of the Chicago Botanic Garden. In any case, it is possible that there may be a number of errors in responses concerning which sites they had visited, and this would introduce some errors into the models. A possible solution to this problem in the future is to clarify and possibly test for knowledge of the location and character of the sites during data collection.

Participant Groups — A number of the sites are popular with children and are often the site of household outings. However, number of children in the household was not included in the model, and it was not clear in what size groups individual respondents participated in for each site. Information on family structure might have improved the explanatory power of the models for some sites. Furthermore it might be useful to learn more about the type of group in which trips to individual sites are made. A general question on visitation behavior by type of social group was part of the questionnaire; but it was not tied to any particular site or group of sites.

Origin of Trip — By using estimated distance from the respondent’s place of residence to the site as a variable in the model, the assumption is made that individuals travel from their homes to the site. However, many of the study sites are in close proximity to each other and several could be visited on one trip. At the same time, some of these sites could be visited on a trip that started at work or school, rather than at home. Group outings sponsored by churches or other social organizations

may also be an important means of visiting some of the sites. Lack of information on these aspects of site choice and participation behavior, to include multiple destinations and non-home origins, may have reduced the explanatory power of some models.

Alternative Destinations — The proximity of alternative destinations to an individual may influence their use of particular sites. Some sites may substitute for other sites while some may complement others. With substitute sites an individual is likely to choose one over another, while with sites that are complements they are likely to choose both. An initial test of models for the two conservatories and two zoos suggested that the alternative site in each category tended to serve as a substitute for the other site in the model. That is, individuals that live close to one site (e.g., the Lincoln Park Zoo) tended to be less likely to visit the other site in that category (the Brookfield Zoo).

Trip Purposes — It was not clear why individuals visited each site. All of the sites provide a wide range of experiences; but we were unaware of the purpose or reason why individuals visited each site. This information would help us better understand the substitutability and complementarity among sites. Perhaps something can be learned by looking at the recreation activities participated in by individuals who use each of the sites.

Characteristics of Origins — Models for predicting trips to a site often include characteristics of the neighborhood in which the individual lives, assuming that with the absence of certain experiences in a neighborhood the individual would be more likely to seek those experiences elsewhere. No such variables were included in this study. It might be possible to include these considerations by reformulating the model to predict the number of individuals from each zip code origin who would visit a site, and use characteristics of those origins as the explanatory variables in the model. A map of characteristics by zip code might help explain origin-destination patterns and correlations of distance with these variables.

Multicollinearity — A significant problem in the model is that many of the variables are correlated with each other. Multicollinearity does not affect

the explanatory power of the model; but it can make it difficult to interpret the sign, magnitude, and significance of the coefficients in the model. This most likely had an effect on some coefficients in the models, particularly race. It may be desirable to estimate separate site use models by race; but our preliminary efforts to do that were hampered by small numbers of site participants by race.

Summary and Conclusions

While the future patterns of participation at the 20 study sites are not entirely clear, the results of the site participation models in conjunction with expected demographic shifts, such as increased racial/ethnic diversity, an aging population, and geographic/location shifts from place to place, suggest significant implications for changing participation at sites across the landscape. This argues that managers, planners, and marketers monitor the situation and trends with respect to the use and users of the sites and be prepared to respond to changes. The policies, programs, and facilities that they implement are likely to help shape the influence of demographic change on site use in the years ahead.

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