

DISSERTATION

ENGAGING LATINO AUDIENCES IN
INFORMAL SCIENCE EDUCATION

Submitted by

Susan B. Bonfield

Department of Human Dimensions of Natural Resources

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer 2014

Doctoral Committee:

Advisor: Brett Bruyere

Antonette Aragon

Robin Reid

Ernesto Sagás

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ABSTRACT

ENGAGING LATINO AUDIENCES IN INFORMAL SCIENCE EDUCATION

A major challenge facing informal science educators is the low participation rate of Latino youth and adults. Furthermore, studies of low minority participation rates in ISE programs are hampered by anecdotal information and a scarcity of data. More rigorous baseline research is necessary to provide information about Latino audiences, the factors that contribute to their low participation in ISE programs, and the mechanisms that will best address these barriers.

Environment for the Americas (EFTA), a non-profit organization, developed a four-year research project to establish a baseline for Latino participation and to identify practical tools that would enable educators to overcome barriers to Latino participation in ISE. Its national scope and broad suite of governmental and non-governmental, Latino and non-Latino partners ensured that surveys and interviews conducted in Latino communities reflected the cosmopolitan nature of the factors that influence participation in ISE programs. Information about economic and education levels, country of origin, language, length of residence in the US, and perceptions of natural areas combined with existing demographic information at six study sites and one control site provided a broader understanding of Latino communities. The project team's ability to work effectively in these communities was strengthened by the involvement of native, Spanish-speaking Latino interns in the National Park Service's Park Flight Migratory Bird Program. The project also went beyond data gathering by identifying key measures to improve participation in

ISE and implementing these measures at established informal science education programs, such as International Migratory Bird Day, to determine effectiveness.

The goals of *Engaging Latino Audiences in Informal Science Education (ISE)* were to

- 1) identify and reduce the barriers to Latino participation in informal science education;
- 2) provide effective tools to assist educators in connecting Latino families with science education,
- and 3) broadly disseminate these tools to agencies and organizations challenged to engage this audience in informal science education (ISE).

The results answer questions and provide solutions to a challenge experienced by parks, refuges, nature centers, and other informal science education sites across the US. Key findings from this research documented low participation rates in ISE by Latinos, and that the absence of Latinos from ISE was not related to distance from the nearest city with a Latino community or to the size of the Latino population within the nearest community. At five of the six study sites, however, over 50% of Latino participants had visited the site before, showing some preference for repeat visitation. Over 1,000 Latino adults participated in a community survey that identified barriers to their engagement in ISE. The survey used a Likert scale, where 1 was *strongly disagree* and 5 was *strongly agree*. Responses to statements about whether their families were interested in ISE whether nature programs are valuable to their families, and whether they would be interested in participating in an ISE program were strongly positive, and an examination using ANOVA of five factors, including age, generations in the US, university attendance, income, Spanish as the dominant language indicated that age, Spanish language, and university attendance showed some influence on responses to these statements.

ANOVA also revealed that differences existed between the study sites, and Student-Newman-Keuls post hoc tests showed that respondents in Washington answered more positively

to statements about ISE program characteristics across five statements than participants at the other five study sites. ANOVA also showed some site differences in responses to questions about family-related considerations that might influence their decisions to participate in ISE (e.g., opportunities for the family to attend, if the programs introduce youth to new opportunities, and if the program is presented by a Latino). Despite preconceptions about Latino absence from natural areas, neither transportation nor group size were identified as factors that would deter participation in ISE.

Overall, survey participants showed strong program preferences based on day of week, formats that cater to the entire family, content that shows youth opportunities for the future, activities led by another Latino, and are close to home. They expressed intermediate concern about practical considerations, such as cost and transportation, and other program characteristics, such as ISE programs that are conducted by familiar organizations and programs that are led in Spanish. Respondents expressed the least concern about their familiarity with the host organization and the topic of the program.

Using the results of the community survey, ISE programs were adapted and surveys were conducted to determine changes in participation by Latinos. Latino participation increased over a period of three years, doubling and even tripling engagement of this audience at each site, with an overall increase across all sites of 310%. This success was replicated at a different venue, a museum of natural history, where event treatment engaged significantly more Latinos than events that were not adapted for Latinos.

Identifying barriers to Latino participation in ISE and testing approaches for overcoming them advances the practice of ISE by enabling educators to create meaningful experiences for Latino youth and adults. Positive engagement encourages long-term involvement in ISE, helps

adults and youth make connections to the sciences, and contributes to diversification of STEM professions.

ACKNOWLEDGEMENTS

This project was made possible with support from the National Science Foundation (#08402333)

Other Supporting Partners Include:

Environment for the Americas

Colorado State University

Research Partners Include:

National Park Service

Research Partners Include:

Bandelier National Monument

Barr Lake State Park

Fire Island National Seashore

Great Sand Dunes National Park & Preserve

Leavenworth Bird Fest

Muir Woods National Monument

New Jersey Audubon

New Jersey Coastal Heritage Trail

North Cascades National Park

Point Blue Conservation Science

Rocky Mountain Bird Observatory

Wenatchee River Institute

Special thanks to:

Advisor: Brett Bruyere

Committee Members: Antonette Aragon, Robin Reid & Ernesto Sagas

Co-PI: Carol Beidleman, National Audubon Society

Diversity Outreach Coordinator: Natasha Kerr, Environment for the Americas

Intern Liaison: Mariamar Gutierrez

Advisory Committee:

Wendy Hanophy, *Colorado Parks and Wildlife*

Edwin Juarez, *Arizona Department of Game and Fish*

Kim Meyer Ramirez, *Environmental Consultant*

Mike Rizo, *U.S. Forest Service, International Programs*

Greg Stephens, *American Association of Museums*

Fernando Villalba, *National Park Service*

And the more than 21 Project Interns and countless Community Partners

DEDICATION

This thesis is dedicated to my father, Robert L. Bonfield, who planted the idea;
to my mother, Barbara G. Bonfield, whose passion for social justice paved the way;
and to my husband, David S. Schimel, who saw me through.

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INTRODUCTION

The idea for this project evolved after almost two decades of experience in environmental education and over 14 years coordinating an informal science education (ISE) program, International Migratory Bird Day (IMBD), for the non-profit organization, Environment for the Americas (EFTA). Experiences in Latin America and the Caribbean showed that Latinos participated in ISE programs, including IMBD events, as families and through schools and universities. Yet similar programs hosted in the United States failed to reach Latinos audiences. It was evident that despite proximity to Latino communities, staff at both rural and urban ISE centers, including national parks, wildlife refuges, and nature centers were struggling to address issues relating to diversity in their programs.

Preliminary discussions with upper-level management revealed that federal and state agencies and non-governmental organizations felt ill equipped to tackle the challenges of engaging Latino audiences. National Park Service representatives stated that, “We are a long way from considering ourselves integrated into the Latino community” (pers. com., 2008) and “We just don’t have the dedicated time to dig through this.” New Jersey Audubon recognized that “There has been no coordinated effort to reach this audience in New Jersey” (pers. com., 2008). Outreach to 13 ISE sites indicated that staff have little knowledge of how many Latinos visit their sites on a typical day. Some noted that even if Latinos were visited their natural areas, they did not participate in education programs or enter the visitor’s center. Staff recommendations for improving Latino participation ranged from providing more materials in Spanish to increasing school outreach and identifying a “messenger” who could serve as a link between Latinos and ISE centers.

Researchers have described varying attitudes toward Latinos and environmental protection. Whittaker, et.al. (2005) hypothesized that Latinos have become more aware of and concerned about the environment over time, but that their concerns remain focused on issues that affect them and their communities and their health, rather than more abstract environmental issues. Based on Maslow's (1943) hierarchy of needs theory, Whittaker argued that individuals must be able to meet their basic needs, such as food, water, security, and health, before becoming involved in other activities and actions, such as environmental protection. Assuming that Latinos are in general poorer than non-Hispanic Whites, White and/or wealthy individuals would be more likely to get involved in environmental protection. However, if Latinos are directly affected by environmental degradation, such as pollution, they may be more likely to become involved in issues related to the environment. Because Whites tend to be wealthier and therefore live in areas with fewer environmental impacts, they are freer to focus on more abstract or global issues, such as endangered species protection.

Staff of national parks and other environmental organizations echoed these sentiments during the research described in the following papers. In informal conversations with park and other organizational staff, many suggested lack of time and transportation, financial restraints, and long work hours as likely barriers to Latino visitation to national parks. In other words, issues related to poverty were believed to strongly influence Latinos' decisions about how they spend their time. But this population is not monolithic. The primary trait that Latinos share is a common ancestry in Latin America. Otherwise, Latinos as a group consist of peoples that represent diverse cultures and identities and varying family histories in the United States (Pew Research Center, 2005).

Before attempting to address the lack of Latino participation in ISE in general and in IMBD specifically, EFTA determined that efforts to adapt programs for Latino audiences would benefit from an examination of the factors that would motivate their participation and to test these responses by adapting ISE programs accordingly. The five papers that follow address the need for quantitative data that elucidates the barriers to Latino participation in ISE. The results are organized in a series of 5 Chapters.

Chapter I examines survey methodology with Latino audiences. We completed a high number of surveys, including over 1,000, face-to-face community surveys (Appendix I) with Latino adults that were completed at the outset of the project. Surveys were critical to this research, as little information was available on how to ensure success with this audience. We examined the challenges of conducting surveys with Latino participants using interviewer field notes, comments from survey participants, factor analysis, principal components analysis, and tests for validity and reliability. The intent is to highlight the nuances that may affect a survey, such as language and word choice, and to describe ways to improve surveys prior to implementation.

Chapter II establishes the absence of Latinos from ISE programs, based on participation surveys implemented at six study sites and one control site. While most ISE centers are aware that Latino participation lags behind that of other ethnicities and races, few have the capacity to quantify this absence. Our research supports anecdotal awareness of lack of Latino participation at seven sites across the country.

Chapter III confirms that Latinos are interested in ISE, consider it valuable, and would be interested in participating in ISE programs in the future, regardless of language preferences and longevity in the US. Our research would have been altered dramatically if we learned that

the greatest barrier to Latino participation was a strong negative response to any of these statements.

Chapter IV details the factors that influence decisions by Latino adults to participate in ISE. These factors included practical considerations, such as transportation; cultural consideration, such as if programs suited for multigenerational families; and the format of programs, such as the topic. We also examined the influence of generations living in the US, preferred language spoken at home, and other demographic factors on these potential barriers.

Chapter V concludes the research and describes the methods we used to adapt ISE programs in response to our survey results and quantifies the changes in participation that occurred as a result. Samples of our work are included and recommendations for implementation by other organizations provided. Though not described in this thesis, the results of this work have been made broadly available on the web (www.birdday.org), in presentations at conferences and workshops, and through individualized trainings for organizations, such as Americorps.

The research was conducted in three phases over a period of four years (2009 to 2013). These phases are described below.

Phase I. In the project's first year (2009 – 2010), EFTA developed two surveys: a community survey and a participation survey (see Appendix I) and identified communities near six study sites with significant Latino populations. A seventh study site was selected to serve as a control. A single ISE program or event hosted at each of the seven sites was also selected to serve as the focus of research on Latino engagement in ISE. The community survey explored factors that influence decisions by Latino adults to participate in ISE and was implemented in Latino communities within 35 miles of the six study sites. EFTA did not conduct community

surveys near the control site, because no changes would be made to the focus event in an attempt to improve outreach to Latinos. As a result, the information from Latino community members was not required. The participation survey examined race and ethnicity of attendees, group size, prior visitation to the site, and other participant characteristics.

Phase II. Both the community and the participation surveys were implemented in the project's first year (2009 – 2010) at six study sites. The results of the community survey provided information about factors that affect Latino participation in ISE at natural areas. The participation survey was conducted during the selected ISE program or event, such as Junior Ranger Day or IMBD, and provided baseline information about attendance. Analysis of data gathered from participation surveys provided a baseline for Latino participation at each study site.

Phase III. Using the results of the community surveys, EFTA identified the barriers to engaging Latinos in ISE and key approaches to reaching this population. Staff at the study sites worked with EFTA to implement recommended approaches, such as providing Spanish language promotional materials, for two years. EFTA implemented the participation survey for two additional years at each site (2010 – 2012), so that in total, the participation survey was conducted three times at each site. The results from participation survey results conducted during the baseline year (2009 to 2010) were compared with results from the subsequent two years to determine if implementation of the recommended approaches affected Latino participation.

CHAPTER I

Conducting Surveys with Latino Audiences: Design, Implementation, Validity and Reliability

Latinos were the fastest growing population in the US from 2000 to 2010 (Passell & Cohn, 2008; Passell, Cohn, & Lopez, 2011). During that time, the population grew 43% from 35 million to over 40 million and comprised 16.3% of the total U.S. population. As a result, the influence of this group has also grown, most notably in arenas such as politics and economics. By 2050, Latinos are expected to represent one quarter of the nation's population (Saenz, 2010). Despite their growing presence in the U.S., Latinos are strikingly absent from some sectors of American life, including informal science education (ISE). Numerous organizations have noted the lack of participation by Latinos in ISE programs conducted at natural areas, such as parks and wildlife refuges (California State Parks, 2005, 2009; Hong and Anderson, 2006; Taylor, Grandjean & Gramann, 2011), and have worked to better understand this audience and the factors that may serve as barriers to their engagement.

Surveys are a frequently used method to study disparities between Latinos and their non-Latino counterparts across a broad range of fields, but most survey practices are based on methodologies used with Anglo Americans. Little effort has focused on ensuring that these methods, the survey questions, and the approaches used to obtain responses are culturally and linguistically appropriate for Latinos. Furthermore, while research results based on these surveys quantify responses, they do not address the challenges and limitations associated with the survey itself and its delivery. For example, telephone surveys conducted by non-Spanish speakers fail to reach the 30% of Latinos living in the US who do not speak English and the 47% who do not have a landline (Kopicki, 2014; Lopez, Gonzalez-Barrera & Patten, 2013). Online surveys also

pose a problem, because only 55% of Latinos in the US have both Internet access and can read English. Even when conducting surveys face-to-face, information is lacking about how to develop questions for mono- or multi-lingual respondents, how to implement the survey with respondents with different levels of education, and the ability of newer arrivals to the US, who may have little or no experience with surveys, to understand the purpose of a survey.

In 2009, Environment for the Americas (EFTA) received funding from the National Science Foundation to examine barriers to Latino participation in ISE. At the time, survey models addressing Latino participation in ISE were not available, and recommendations for administering surveys with diverse audiences were scarce. EFTA developed a survey, referred to as the Community Survey, that was administered to Latino adults (18 years and over), using some questions from a previous study (Bruyere, 2010) and others that were developed specifically to address the goals of the research. Over 1,000 Community Surveys were administered to Latino adults (18 years and over) in the US to examine the barriers to Latino participation in ISE. Interviewers committed more than 300 hours to gathering these surveys: this experience and the lessons learned have contributed to the growing bank of much-needed information about how to improve the survey process with this audience.

This chapter reports on EFTA's experience with developing and administering surveys to Latino adults. The purpose was to identify strengths and weaknesses of the survey instrument and to explore how reliability and validity analyses can explain problems with the survey. This report combines anecdotal conclusions from field notes taken during the interview process, interviewer reflections on the survey and its implementation, the survey development process and pre-administration review, and postsurvey reliability and validity statistics.

Positionality

Social science research raises questions about the relationships between a researcher and an underserved audience. EFTA conducted this project with a Principal Investigator (PI) who was white, educated, female, middle class, and an English speaker, though with good conversational Spanish skills. It was clear from the project's outset that a researcher outside of the Latino social group could be challenged to accomplish the community surveys with Latinos with varying English language skills, different Spanish dialects, and from diverse backgrounds both economically and socially. Critics of social science research cited the potentially exploitative nature of social science, the position of power held by the researcher, and the professional and economic gains made by the researcher, while the people studied gained nothing (Zinn, 1979). In addition, a white researcher could come to the study with biases that might affect the results. For all of these reasons, the community surveys were conducted by Latinos.

In preparation for the research, the PI completed coursework in Latino politics, multicultural education, and Latino routes to power, which increased her knowledge of some of the obstacles and prejudices Latinos face in the US. She also explored the concepts of white privilege, colonialism, and multicultural education, such as issues related to language, and more. These courses helped to form the foundation for the analysis of the research data and to efforts to adapt ISE programs to meet the needs of Latino participants.

The PI did work with Latino-serving organizations in cities and towns near the study sites. She approached teachers and ministers, business owners, and others to promote participation in ISE programs both as attendees and as partners. Even these interactions had challenges. As a non-Latino, the PI strived to be sensitive to Latino culture, but lacked knowledge of accepted and

characteristic methods of communication. There was also concern about harboring misconceptions or attitudes toward Latino culture that might unknowingly affect the research. Uncertain about how Latinos perceived her, there was always a feeling of slight discomfort and a constant effort to avoid assuming a position of power or authority. These are common sentiments in social science research, whether it is conducted by an insider or outsider to the social group being studied (Sultana, 2007).

Despite the PI's awareness of the challenges to outsider involvement, some incidences occurred that were difficult to interpret. For example, an effort to bring Latino business owners to an event at the Colorado study site seemed promising. A business owner who operated a food truck agreed to participate on the day of the Colorado event and to offer Mexican food for sale. During the final weeks of preparation, however, the business owner stopped responding and did not participate in the event. Was this the result of miscommunication that arose from interactions between two cultures or merely lack of interest on the part of the business owner? A similar incidence occurred with a bakery owner who expressed interest in providing pastries for an ISE program. On the morning of the event, however, he refused to unlock his door, though he was clearly visible in the store.

The PI also worked closely with the Latino interns. Interns who came from countries outside the US struggled with the distance from home, United States culture, and the work expectations. Latino interns from the United States were accustomed to the culture and usually lived at home, but they also found some aspects, such as the surveys and community engagement, challenging. To better understand the barriers to participation in ISE by Latinos, the PI wanted to have frank conversations with the interns about the discussions with Latino survey participants. It seemed an ideal situation to have knowledgeable staff involved in the project, and resulted in

an insider/outsider research methodology, in which both individuals who were part of the social group and researchers worked together (Bartunek & Luis, 1996). Yet the approach to these conversations, though handled as diplomatically as possible, could have seemed patronizing to the interns. Intern reflections were completed by each intern and included responses to a series of questions about their experiences with the project. These descriptions revealed that the PI's commitment to the project was important and served as a motivating factor. As one intern stated,

I think the enthusiasm that Susan Bonfield [the PI] has put into this job has made us want to reach our goals. Also, knowing that this data will help better the environmental programs for Latinos in the U.S. makes me want to do more of it because the environment and the world needs it; You (Sue), because of your efforts and concerns about Latino community. Also you are the author of this project and I noticed that you really like it. Even if you were busy you always had time [to] attend to our difficulties and challenges with this project. Also, you spent time going to the places where the survey took place; you are a person really involved and consistent with your ideas...

Even though the PI may have brought biases to the research, the clearness of her interest in the project and its outcomes helped to overcome discomfort on the part of the interns.

Literature Review

Little research on Latino participation in ISE existed at the time of this research, and, as a result, few details about the cultural and linguistic appropriateness of survey methodologies were available on this specific topic. A number of organizations, such as city, state, and national parks, had begun studying the low visitation to natural areas by Latinos, and these reports provided some information about surveys used with this audience. The National Park Service (Taylor, Grandjean & Gramann, 2011), California State Parks (2009) and The City of Boulder, Colorado (Bowie, 2010; Hickox, 2008), for example, conducted surveys of Latino visitation to parks and open space that examined preferred driving distances, the influence of cost, perceptions of open space, and amount of time spent hiking and in other outdoor activities. The surveys were

provided in both English and Spanish, but the process of developing the surveys and the Spanish-speaking ability and ethnicity of the interviewers were not described, nor were any challenges to survey delivery discussed.

Hong and Anderson (2006) held focus groups and interviews with Latino parents of school-aged children and key community leaders to examine lack of visitation to a nature center. Details of this research did not describe who conducted the interviews or in what language(s). Bruyere, Billingsley, and O'Day (2008) examined Latino interest in science education, Bruyere (2010) questioned Latino parents in focus group discussions of science education, and Conway (2013) examined participation in ISE programs on National Forest lands, but none of these studies explored barriers to participation in ISE. The focus group discussions by Bruyere (2010) offered opportunities to respond in English or Spanish, but the authors did not provide details about survey and question development, methods of delivery, and interviewer linguistic and cultural knowledge. Conway (2013) conducted surveys with Latinos and provided English and Spanish versions; the latter was translated by a native Spanish speaker. In addition, at least some bilingual interviewers were available to conduct the surveys, but the ethnicity and race of these interviewers were not identified. None of the studies described above included discussions of challenges with survey implementation or potential effects of these challenges on the results.

Studies conducted in other fields, however, have addressed the issue of surveys and their use with diverse audiences. The health industry is one of the few that has invested time in improving surveys for culturally diverse audiences. For example, research for health and nursing showed that Chinese, Japanese, and American survey participants responded differently to a Likert scale instrument (Lee, Jones, Mineyama, & Zhang, 2002). Chinese participants skipped more questions; Japanese participants had greater difficulty with the scale; American participants

tended to respond more positively; and both Chinese and Japanese participants chose the midpoint more often than the Americans.

Responses to surveys that focus on health behavior and are administered to culturally diverse audiences varied by race and ethnicity. For example, Pasick, Stewart, Bird, and D'Onofrio (2001) reported that some races and ethnicities tended to over report some behaviors, and some races and ethnicities were more likely to select more extreme response categories. Warnecke, et. al. (1997) found that some races and ethnicities avoided extreme responses and strived to provide socially acceptable responses. Based on these results, the researchers recommended approaches for improving the validity of the questionnaires, including consideration of the question order and ensuring that questions did not contain any ethnic or racial bias.

McCready, Shand-Lubbers and Gray (2010) examined how Hispanic Catholics responded to surveys, with a focus on sensitive questions. The authors found that responses to questions about church attendance differed when respondents answered telephone surveys versus completing self-administered surveys. In telephone surveys, respondents indicated a higher rate of attendance than those completing self-administered surveys, suggesting that there was some pressure to deliver socially desirable responses. The researchers concluded that in-person surveys created the greatest pressure for socially desired responses, while self-administered surveys created the least amount of pressure: they speculated that the pressure created by telephone interviews would fall somewhere between these two.

In contrast, Lopez (2008) suggested that self-administered surveys are the least effective, especially with unacculturated Latinos, and that surveys conducted by phone are too impersonal and structured. He suggested that face-to-face surveys are the most effective with this audience,

because they are more personal and provide opportunities for more informal and emotional discussion. His recommendations, however, were not based on research results, but rather on his own knowledge of Latino culture and communication. Lopez's recommendations for improving the effectiveness of surveys were valuable, however, and included understanding how Latinos share information, including understanding how Latinos share information, explaining surveys and the importance of honesty in the responses, simplicity in the format of the questions, and using linguistically appropriate Spanish versions that are not direct translations from English versions.

A more focused study of Latino communities along the Texas border examined how to adapt surveys to reach Latino respondents. O'Hegarty et al, (2010) recognized that issues related to the different dialects and varieties of Spanish spoken, the many subpopulations from diverse countries that comprise the Latino population, and even the ethnicity of the interviewers and their interviewing skills might impact survey responses. The authors incorporated these considerations into their methodology, modifying some questions and adding items that were considered culturally specific, in their survey of 1,485 Latino adults. They concluded that surveys must be culturally sensitive, be offered in Spanish, and consider nuances, such as the interviewer demeanor and tone.

Litwin (1995) found that care must be taken to ensure that measurements remain the same when survey questions are translated into another language, the measurements remain the same. For example, the author reported that Anglo Americans and Latinos interpreted the concept of family differently. Anglo Americans included children and their parents in the concept of family, while Latinos included children, their parents, grandparents, cousins, aunts,

and uncles. This difference could affect a Latino participant's response or, if the survey administrators were not aware of the differences, the understanding of the results.

Statistical procedures are available for examining survey design, such as factor analysis, principal components analysis, and tests for validity and reliability to evaluate the questions (Fricker, Kulzy, & Appleget, 2012; Herman & Winters, 1992; Litwin, 1995; SAS Corporation, n.d.). Factor analysis is useful when the topic of interest is complex and multiple questions must be used to derive measurable results. Often, a series of questions is developed and the responses are combined to form a single factor or measure. Principal component analysis transforms observed variables into a smaller number of variables that account for the variance. This procedure is especially helpful when surveys gather redundant data, for example when surveys gather redundant data; for example, when variables measure the same construct or are correlated with one another. Tests of reliability examine consistency across respondents and the stability of an instrument when it is repeated. Tests of validity examine whether a survey instrument measures what it is intended to measure.

All of these tools described above are used in social science research, including studies on the human dimensions of natural resources. For example, Ostergren, Solop, and Hagen (2005) studied willingness to pay by using surveys to examine if park fees were a barrier to visitation, Factor analysis showed that entrance fees were not a barrier to visitation, but the overall costs of a trip to a park (e.g., hotel, food, gas) were barriers to respondents with less education and smaller household incomes. Factor analysis enabled researchers on this project to examine whether some survey items were related to others. Whiting and Larson (2010) used factor analysis and tests for validity and reliability in studies of underserved audiences and their use of state parks in Georgia. Their analyses indicated that underlying factors existed relating to place

attachment or respondents' connections to specific locations. They based recommendations for future research on these results, particularly as they pertained to diverse visitors.

The present study employs statistical procedures to examine the community survey that was developed by EFTA to study the barriers to Latino engagement in ISE. Examining the effectiveness of the questionnaire using both experiences in the field delivering the instrument and psychometric analyses of validity and reliability, factor analysis, and principal component analysis may be used strengthen future surveys.

Methods

Survey Instrument. The study presented in this chapter involves data from a previously conducted survey by EFTA to investigate potential barriers to Latino participation in ISE programs offered at natural areas. Before describing the method used in the present study, a description of the survey instrument, its development, and the survey itself is provided.

Referred to as the *community survey*, the survey instrument employed a format that has been implemented in similar studies at Colorado State University (Bruyere, et al., 2008; Chawla, 2007). Prior to the survey, a professional, native Spanish-speaking translator; Spanish-speaking project staff; and the project's five-member Advisory Council and Latino liaison, most of whom were Latino, reviewed the survey to ensure accuracy of the Spanish translation, that the questions in both English and Spanish addressed the goals of the study, and that the survey did not include any ethnic bias.

The survey was two pages and consisted of 30 questions (See Appendix I) and was developed in English before being translated into Spanish, so that it could be administered to both English and Spanish-speaking Latino adults. The survey consisted of five sections that addressed the following issues:

- 1) Latino interest in education programs about the environment and nature (two items);
- 2) characteristics of education programs that influence Latino participation (six items);
- 3) practical considerations, such as cost, that influence decisions to participate in education programs (five items);
- 4) preferences for how, where, and with whom programs are delivered (seven items); and
- 5) respondent demographics (10 items).

Questions in the first four sections employed a five-point Likert scale, where 1 = *strongly disagree* and 5 = *strongly agree*, while the fifth section had 10 close-ended questions. An additional and optional open-ended question asked for a list of the most effective means for increasing awareness of education programs among Latino families (e.g., newspaper, radio, schools). Additional data gathered during the survey included the zip code of the respondent, the interviewer name, date of the survey, and general location in the community where the survey was conducted, such as a school or library.

The community survey included a variety of questions that addressed to following topics. For example, EFTA examined if the number of generations in the United States (e.g., was the respondent the first in his/her family to live in the country, or was he/she preceded by parents, grandparents or great grandparents) influenced decisions to visit natural areas or to participate in informal science education programs at these sites. Several statements asked respondents to rate the importance of language, specifically a preference for programs in Spanish, in decisions to take part in informal science education programs. Overall, the survey was designed to gather information that would help to identify the factors that pose the biggest barriers to Latino participation in informal science education programs offered at natural areas?

Communities near six study sites across the United States, were surveyed using the community survey instrument to examine the following constructs and their influence on decisions to participate in ISE programs at a natural area: (a) perceived Importance of ISE, (b) practical considerations (e.g., transportation to the site, cost, day of the week, language spoken), (c) level of awareness (knowledge of the site and the programs it offers), (d) general program characteristics (e.g., suitable for the entire family, hosted in collaboration with a familiar organization, such as church or school), and provides awareness of career opportunities.

Minor edits were made to the questions following the first surveys conducted in 2009 at sites in New York, New Jersey, California, and Washington. Surveys at the six study sites were completed by 2010. While the intent of the questions was not changed, the words used were simplified, especially in the Spanish version, so that the respondents could more easily understand the questions. For example, interviewers found that many Latino respondents did not understand the word *influence*, especially in the Spanish version. The word was removed from the surveys as a result, and the question was rephrased. The visual format of the survey was also altered slightly, so that instead of requiring two full pages, it required slightly over one page. After the survey was reformatted to make it appear shorter in length, respondents were more willing to participate. As the survey was modified, new versions were dated to identify the most recent.

Sample. Participants in the community survey were adult Latinos aged 18 years and older. Trained, bilingual (English and Spanish) Latino/a interviewers from Latin American countries, including Mexico, Venezuela, Bolivia, and Colombia, and from the United States conducted the interviews. When possible, interns were matched with study sites with similar demographics. For example, a Puerto Rican intern was placed in New Jersey, which has a large

Puerto Rican population, and interns from Mexico worked in Washington, where the Latino population is predominantly Mexican. Six international interns and four interns and EFTA staff from the United States conducted the surveys.

The surveys were implemented in communities near six national or state parks across the United States: California, Colorado, Washington, New York, New Jersey, and New Mexico. At least 100 surveys were gathered at each location. The study sites were selected because of their proximity to large Latino populations and because each site hosted science and nature-based programs for the public. Each survey took approximately 20 minutes and was administered to a convenience sample of participants. Interviewers visited schools, libraries, businesses, community colleges, public events, churches, meetings and so forth to reach Latino adults. Only one adult per family was surveyed.

Because Latino visitation to natural areas and participation in ISE are low, interviewers assumed that the respondents might have limited knowledge of ISE and therefore used photos to help describe public science and nature-based programs. These images featured park rangers and other educators standing with groups of youth and adults in an outdoor setting. Interviewers also assumed that survey participants would not be familiar with the survey process, especially a Likert scale. Interviewers explained the scale and the response options verbally.

No personal information that could identify participants was recorded, and the interviewers recorded all responses, engaging in further discussion or explanation about the questions on an as-needed basis. They also provided a one-page flyer, also available in English or Spanish, that described the study and its purpose and provided contact information for participants who wanted information about the survey results. All data were entered into and

analyzed using factor analysis in a statistical software program, Predictive Analytic SoftWare (SPSS v. 17).

Intern Surveys. Interns completed an online survey that examined aspects of their experience, including implementation of the community survey. An open-ended, qualitative self-administered survey was used to gather reflections from the interns for this evaluation (see Appendix I). Reflection surveys, developed during initial phases of the project were given to each of the interns for the purpose of eliciting information about the interns' overall experience with the project.

The present study. Having presented background information on the survey conducted by EFTA, this section discusses the methods used in the present study. The purpose of this study is to identify questions from the EFTA survey that require revision or did not work well and to explore how reliability and validity analyses can explain problems with the survey. Data was obtained from field notes taken during the interview process, interviewer reflections on the surveys and their implementation, the survey development process and pre-administration review, and responses to the surveys.

A statistical software program, Predictive Analytic SoftWare, was used to analyze response data and to provide descriptive statistics. Factor analysis was conducted with the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. Specifically, factor analysis and principal component analysis were performed, along with tests for reliability and validity.

Results

Participant Demographics

In total, EFTA gathered 1,063 face-to-face surveys with Latino adults (aged 18 and over). As shown in Table 1, most respondents were between the ages of 25 and 50 years, had income levels below \$30,000 per year and were of Mexican ancestry. Over 80% were Spanish speakers and indicated that they spoke Spanish with their children in the home. Data were also gathered on country of origin and number of generations living in the United States.

Identification of Survey Challenges

Phrasing and vocabulary of the questions. Though the Spanish version of the survey was prepared by a professional, native Spanish-speaking translator, interviewers experienced several challenges with some of the words used. As already discussed, the use of the word *influence* in both English and Spanish was problematic for Latino respondents. The question with this word was simplified, so that all survey participants understood its meaning. A demographic question that asked about household income was also difficult for respondents, especially those who lived with parents, adult siblings, and extended family, all of whom may have been working. Accordingly, only the income of the respondent was considered.

The survey contained two statements that were intended to ensure consistency of responses. Respondents were asked to respond to the statements “I am not familiar with the programs at [study site name]” and “I feel informed about the programs offered at [study site name]” using a five-point Likert scale. The two items were intended to confirm respondent awareness of programs, but instead of serving as a checks-and-balance, the statement expressed in the negative confused participants. Selecting the correct response to the first statement was difficult, because the statement was expressed in the negative.

Table 1.1

Demographic information about Latino community survey respondents at project study sites.

Site	n	Completed High School	Country of Origin	Generations in US ^a			
				(%)			
				1	2	3	4
Washington	185	47%	96% Mexico 4% Other	70	22	8	0
California	102	38%	71% Mexico 19.7% Guatemala 3% Nicaragua 2% El Salvador 4.3% Other	43	33	22	2
Colorado	196	53%	78% Mexico 2.2% Guatemala	52	20	12	12
New Mexico	209	67%	48% Mexico 38% US 22% Other	22	16	14	41
New Jersey	178	52%	50% Puerto Rico 29.2% Mexico 9% US 4% Panama 3% Dominican Republic 2% Guatemala 3% Other	57	26	8	8
New York	120	37%	80.5% Ecuador 11% El Salvador 3% Guatemala 2% Mexico 2% Puerto Rico	76	23	1	0

^a Generations in the U.S. refers to respondents who were first in their family to live in the country (1), second generation (2) third generation (3), or whose families had been in the country for 4 or more generations (4).

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Survey analysis also revealed that statements regarding the language in which an ISE program might be offered were unclear. One question asked respondents to rate how language would affect their decisions to participate in science education. Subsequent questions asked how “Programs led in Spanish” or “Programs led in English” would affect the likelihood of a family participating in ISE programs.

Challenges to conducting interviews. Intern insights about survey delivery, though not quantifiable, were informed the interview process. In this section, details about this qualitative information are shared. Because all of the interviewers were native Spanish-speakers and Latino, there was no information about participant response to a non-Latino interviewer. However, discussions with interns revealed that some made personal connections with survey respondents,

indicating that many respondents were not intimidated or threatened by the process. One intern stated: “I also liked the fact that I was very popular where I surveyed. When I went back to those places, they stopped me and asked me about the surveys.” Not all interns had the same experience, however. One expressed frustration talking “to people I did not know about a topic which wasn’t as important for them as it was for me.” When individuals declined to be interviewed, another intern said, “It was difficult keeping a positive attitude, especially when I got no for an answer [when surveying].” The length of the survey in a recreational venue where participants were busy with activities may have been an obstacle, regardless of race and ethnicity. Describing the survey process, the Likert scale, and the focus of the study added considerable additional time, and as one intern expressed, “It just made the process longer and people got impatient.”

Data Analysis

Of the original 1,063 surveys conducted by EFTA, 990 were analyzed for results after exclusion criteria were applied. For the present study, the data were further screened using listwise deletion. In addition, one item (“The organization can meet my family’s needs”) was eliminated because almost 50% of responses were missing. Many researchers recommend a minimum sample size needed to use factor analysis (Comrey & Lee, 1992; Hutcheson & Sofroniou, 1999; MacCallum, Widaman, Zhang & Hong, 1999). These recommendations vary widely, from a minimum of 100 to 300 or more. The final sample size of this study, 729, is well above all of these recommendations.

Analysis of the item distributions showed that of the remaining 18 retained items, 13 were negatively skewed, and five were positively skewed. Skewness values ranged from -1.876 to 1.847. No transformations were conducted, because this analysis did not focus on the general

population, but rather on a specific subpopulation, Latinos. Exploratory Factor Analysis (EFA) was conducted on the skewed items.

Exploratory factor analysis. The factorability of the 18 retained items was examined using several criteria. The Kaiser-Meyer-Okin (KMO) measure of sampling adequacy was 0.661, just above the recommended 0.6 value. Bartlett's Test of Sphericity was significant ($p < .0001$) at 2564.11. The communalities were all above 0.3 confirming that all items shared some common variance with the other items. As a result, EFA was conducted with all 18 items (Field, 2005).

A principal components analysis yielded three factors among the 18 items. The initial Eigenvalues showed that Factor 1 explained 15.4% of the variance, Factor 2 explained 13% of the variance, and Factor 3 explained 9.5% of the variance. The remaining factors contributed 8% or less. Consequently, the initial three factors were retained, which collectively explained over 38% of the variance, because of the elbow on the scree plot, and because of the insufficient loadings and challenges to interpreting the subsequent factors. Data for the three factors are shown in Table 1.2. The item "More likely to participate if the program is led in English" was removed because its correlation with other items was $> .9$, demonstrating multidimensionality. The item "Familiarity with the organization" was removed because it did not load on any of the factors. Factors 1, 2, and 3 were labeled as follows: practical considerations of participation, value of programs to the family, and awareness of programs and cultural affinity, respectively.

Table 1.2

Factor loadings and communalities of 18 survey items ($N = 729$)

Variable	Factor		
	1	2	3
Interest in programs		.633	
Programs have value		.696	
Day of week	-		
General Cost	.625		
Transportation	.670		
Language	.616		
Theme of program	.579		
Familiarity with Organization ^a	-		
Specific program cost	.566		
Unaware of programs			.737
Knows about programs			.767
Whole family attends		.611	
Program is near my home		.508	
Shows kids opportunities for the future		.690	
Partners with an organization I know		-	
Is led by a Latino			-.449
Is led in Spanish			-.595
Is led in English	-.419	.362	.356

Note: Factor loadings are based on a principal components analysis with direct oblimin rotation.

^a this item did not load on any factors
 $p > .04$

Scale construction. Descriptive statistics, including mean, standard deviation, and skewness of each factor are presented in Table 1.3. The factors were named based on their loadings (see Table 1.2), so that items in column 1 were Practical Considerations, items in column 2 were Program Value, and items in column 3 were Awareness and Language. The scales were negatively or positively skewed, but none of the values was above 1.96, so no transformations were made (Field, 2005).

Table 1.3

Comparison of Factors			
	Practical Consideration	Program Value	Awareness and Language
Mean	3.3491	4.2733	2.9312
Std. Dev.	.90096	.54797	.78779
Skewness	-.387	-.829	.708

Reliability. Cronbach's alpha, a tool commonly used as an index of reliability, was used to evaluate if the three identified factors were unidimensional. The internal consistency of the scale was assessed and the survey instrument for all subjects emerged as internally consistent, with Cronbach's alpha = .645 for items related to Practical Consideration, .624 for items related to Program Value, and .293 for items related to Awareness. A corrected item-total correlation was also run to determine if any of the items did not correlate with the overall scales. The alpha scale for Practical Consideration improved slightly (.667) with the removal of the item regarding the theme of an environmental education program. It also improved slightly (.656) with the removal of the item addressing partnerships between the host education sites and organizations with which the respondents were familiar. Cronbach's alpha increased more strongly (to .441) when the item addressing programs led in Spanish was removed from the Awareness Factor. The results were also analyzed by study site, and Cronbach's alpha for each factor across the six sites is described in Table 1.4.

Correlation coefficients were computed among the three scales across all sites. A *p* value of less than .05 was required for significance. As shown in Table 1.5, all of the correlations were statistically significant ($p < .05$). However, the correlation coefficients were closer to 0, indicating weak, but positive correlations. Based on the low correlation among the three scales, it supported that the scales were measuring different constructs.

Table 1.4

Reliability statistics for factors at six study sites.

Cronbach's Alpha						
Factor	Washington	New Jersey	New York	Colorado	California	New Mexico
Practical Considerations	.306	.606	.573	.637	.561	.770
Program Value	.404	.647	.735	.541	.673	.626
Awareness and Language	.472	.348	.096	.355	.098	.412

Table 1.5

Correlation matrix for the three factors

	Practical Considerations	Program Value	Awareness & Language
Practical Considerations	1	.168**	.156**
Program Value	.168**	1	.097**
Awareness & Language	.156**	.097**	1

** $p < .01$

Discussion

Increasingly, survey data are being used to better understand the Latino population, but these surveys may be challenged by a number of factors, such as the performance of bilingual surveys, the diversity of Latino populations, and the ability of assessors to successfully implement the instrument considering these factors. As a result, some researchers question the validity of bilingual surveys (Lopez, 2014; Pasick, Stewart, Bird & D'Onofrio, 2001; Pérez, 2009). Research by EFTA aims to eliminate challenges associated with conducting surveys with

Latino audiences by training Latino interns to deliver the surveys and by providing an instrument in English and Spanish that has been reviewed by Latinos for cultural and linguistic appropriateness and translated by a native Spanish speaker. This research also examines how statistical analyses may be used to examine the validity and reliability of surveys.

Statistical analyses. This chapter presents an analysis of previously obtained survey results. Factor analysis, principal component analysis, and tests for reliability were used to identify ways in which the survey could be improved. This analysis suggested three consistent areas of concern for Latinos: Practical Considerations, Value of Programs, and Awareness and Language of Programs. Identification of these broad themes may provides ISE practitioners key elements to consider when developing, promoting, and delivering their programs.

Factor analysis also showed that the alpha coefficients were close to the recommended range for supporting the internal consistency of an instrument (.7 - .95;) for both Factor 1 (Practical Considerations; .645) and Factor 2 (Program Value; .624). However, the alpha coefficient for Factor 3 (Awareness) was low (.293), likely because Factor 3 combined two different constructs, awareness of ISE programs and preferred language of ISE programs. Factors that may affect the value of alpha include item interrelatedness, the number of test items, and dimensionality (Tavakol & Dennick, 2011). The number of test items in the entire data set was sufficient and issues related to dimensionality were resolved by removing items that exhibited multidimensionality. The low values for Cronbach's alpha across all factors may suggest questions about the internal consistency of the survey instrument.

A closer look at the alpha coefficients based on survey location yielded similar results (see Table 4). However, the alpha coefficients for New York and California with regard to Factor 3 were very low (.096 and .098 respectively), suggesting that the assumptions for Cronbach's

alpha may have been violated at these survey sites. It was clear that the statement, “I am unaware of programs at my site” was confusing for respondents. New York was the first site where the community survey was conducted, and the first intern began the surveys with no information about which questions were challenging for respondents and did not benefit from the experience of other interns delivering the survey. These factors may have contributed to the low Cronbach’s alpha values.

Survey expertise or sample size may also have affected the results. The New York, data included 88 valid cases (31 were excluded); however for California, 160 valid cases were obtained (18 were excluded). New Mexico had the highest alpha scores for all three factors. The respondents at this site had lived in the US for four or more generations and had a higher level of education than respondents at the other five sites. It is likely that results were affected by the different responses provided by respondents representing different Latino communities. The Latino population in the United States is not monolithic, and a community in New Jersey with a high proportion of survey participants from Puerto Rico may respond very differently than a community in California, that is predominantly of Mexican origin. In addition, Field (2005) pointed out that while the generally accepted value of Cronbach’s alpha is .7, lower values may be expected in psychological research because the instruments measure diverse constructs at the same time.

Analysis of the items hypothesized to assess Practical Considerations, Program Value, and Awareness and Language revealed significant, yet weak correlations among the three factors. If the scales were measuring three different constructs, these low correlations would be expected. For example, the degree to which Latinos value natural areas and ISE programs may not be

related to how the cost of those programs affects their willingness to participate. Not surprisingly, these correlations were also low within each study site.

Field experiences. Intern experiences as related through formal post-survey interviews were valuable to developing the survey process at the six study sites. The qualitative information gathered contributes to growing knowledge of how to better conduct surveys with Latinos. Previously, the first-hand knowledge of Latino culture and Spanish fluency of the EFTA interns enabled them to recognize potential challenges for respondents in terms of understanding the questions and selecting answers, which resulted in changes to the survey wording. However, even this preparation prior to administering the survey did not eliminate all challenges. In the present study, several more issues were identified. Because most respondents had not participated in ISE and visitation to the study sites was low, they were unfamiliar with education programs at conducted at natural areas. Interviewers described ISE programs, often using pictures, but respondents did not have the opportunity to experience an ISE program firsthand. Thus, their responses were not based on personal experiences with ISE, but rather on the descriptions provided by various interviewers.

In addition, although trained, bilingual interns conducted the surveys, and participants were not required to read the questions themselves, the present study determined that implementing the survey with individuals who could not read was difficult. Some of these respondents were not confident participating in the research, and though they responded to the questions, they tended not to engage in further discussion about the topic. Social science research presents many challenges when working with diverse respondents, and it is unclear if unwillingness to participate in greater depth was simply lack of interest, related to level education, lack of familiarity with the survey process, or another factor.

Various aspects of the questionnaire may have had an effect on the results. As previously discussed, some Latino respondents have little or no experience taking surveys, which may affect their. If they were not familiar with surveys, then the Likert scale could have introduced additional confusion. Interviewer study notes indicated that during the surveys, some respondents had difficulty choosing among the Likert scale options. Such uncertainties may have resulted in respondents selecting a stronger response (e.g., such as *much less likely*) to avoid ambiguity. As Lopez (2014) suggested, respondents may have aimed to be nice or to show respect by choosing more positive responses. The interviewer may also have had difficulty in instructing participants on how to make their decisions.

The clearest challenge with the questionnaire was the phrasing of two statements in Section 3. The second statement in this section, “I do not know about the programs offered at [the study site],” was confusing. Because the instrument had already been used, the statement was retained, but the results were later eliminated from statistical analyses.

Some respondents were confused by the question about total household income in Section 5 and was complicated when multiple income earners, including extended family and grown offspring, lived in one home. As a result, there were often several household incomes. The extent to which these incomes were combined for the general support of all those living in the home was unknown. The question was retained, but interviewers recorded only the income of the respondent.

Finally, the last question in Section 5 required some explanation to clarify generations of residency in the US, because arrival to the US may be complex in some families. For example, one parent may live in the US with some offspring, while another remains in the country of origin. Interviewers had to determine how different scenarios fit into the choices provided.

Few established bilingual surveys are available for use with Latino communities. Studies that address Latino participation in ISE and visitation to natural areas are also lacking. This area of study would benefit from the development of model surveys and of best practices for designing and executing bilingual survey instruments. The instrument developed for this study yielded valuable results, but could be fine tuned to eliminate confusing questions and to better address some of the factors, such as language, that may influence Latinos as they make decisions about their activities. This analysis of the community survey that was implemented with over 1,000 participants endeavors to alert researchers to the need to carefully examine the format, wording, and language of surveys and to consider the delivery method and the competency of the interviewers. Research conducted specifically to identify trends in responses by Latinos, such as tendencies to select less extreme responses, would benefit knowledge of how to better study the needs of this audience.

REFERENCES

- Bartunek, J. M., & Luis, M. R. (1996). *Insider outsider team research*. Thousand Oaks, CA: Sage.
- Bowie, M. (2010). *Boulder county parks and open space: 5-year visitor study – 2010*. Retrieved from the Boulder County website: <http://www.bouldercounty.org/os/culture/posresearch/2010posfiveyear.pdf>
- Bruyere, B. L. (2010). Engaging Latino audiences in out-of-school programs about science. *Journal of Extension*, 48(3), 1–7.
- Bruyere, B. L., Billingsley, E., & O'Day, L. (2008). A closer examination of barriers to participation in informal science education for Latinos and Caucasians. *Journal of Women and Minorities in Science*, 14(4):431-445.
- California State Parks, Planning Division. (2005). *Park and recreation trends in California*. Retrieved from http://www.parks.ca.gov/pages/795/files/recreation_trends_081505.pdf
- California State Parks, Planning Division. (2009). *Complete findings: Survey on public opinions and attitudes on outdoor recreation in California*. Retrieved from http://www.parks.ca.gov/pages/795/files/2009%20spoa%20complete%20findings%209_28_09.pdf
- Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education*, 31(1), 15–26.
- Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis*. Hillsdale, NJ: Erlbaum.
- Conway, T. D. (2013). *An assessment of natural resource outreach and conservation education program needs for Latino audiences associated with the Sam Houston National Forest in Texas* (Unpublished doctoral dissertation). Stephen F. Austin State University, Nacogdoches, TX.
- Field, A. (2005). *Discovering statistics using SPSS*. Thousand Oaks, CA: Sage Publications.
- Fricker, R. D., Kulzy, W. W., & Appleget, J. A. (2012). From data to information : Using factor analysis with survey data, *Phalanx*, 45(4), 30-34.
- Herman, J. L., & Winters, L. (1992). *Tracking your school's success: A guide to sensible evaluation*. Thousand Oaks, CA: Corwin Press.
- Hickox, A. (2008). Latino and Hispanic perceptions of open space in Boulder county. Retrieved from the Boulder County website: <http://www.bouldercounty.org/live/environment/land/.../2008hickcox.pdf>.

- Hong, A., & Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education*, 37(4), 33–44. doi:10.3200/JOEE.37.4.33-44
- Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Thousand Oaks, CA: Sage Publications.
- Introduction: The Basics of Principal Component Analysis. (n.d.). Retrieved from <http://support.sas.com/publishing/pubcat/chaps/55129.pdf>
- Kopicki, A. (2014, May 22). The particular challenges of polling Hispanics. *The New York Times*. Retrieved from http://www.nytimes.com/2014/05/23/upshot/the-particular-challenges-of-polling-hispanics.html?_r=0
- Lee, J. W., Jones, P. S., Mineyama, Y., & Zhang, X. E. (2002). Cultural differences in responses to a Likert scale. *Research in Nursing & Health*, 25(4), 295–306. doi:10.1002/nur.10041
- Litwin, M. (1995). *How to measure survey reliability and validity*. Thousand Oaks, CA: Sage.
- Lopez, R. (2008, July). ¿Por Qué? Questions of validity in Hispanic survey research. *Alert! Magazine*, 46(6). Retrieved from <http://www.greenbook.org/Content/HR/MRA.pdf>
- Lopez, M. H., Gonzalez-Barrera, A., & Patten, E. (2013). Closing the digital divide: Latinos and technology adoption. Retrieved from Pew Research Center, Hispanic Trends Project website: <http://www.pewhispanic.org/2013/03/07/closing-the-digital-divide-latinos-and-technology-adoption/>
- MacCallum, R. C., Widaman, K. F., Preacher, K. J., & Hong S. (2001). Sample size in factor analysis: The role of model error. *Multivariate Behavioral Research*, 36, 611-637.
- McCready, W. C. B., Shand-Lubbers, J., & Gray, M. (2010). *Diversity and social desirability: The response of Hispanic Catholics to sensitive questions*. Presented at the 65th Annual Conference of the American Association of Public Opinion Research, Chicago, IL. Retrieved from <http://www.knowledgenetworks.com/ganp/docs/aapor2010/McCready-DIVERSITY-AND-A-SENSITIVE SOCIAL-ISSUE-PPT.pdf>
- O’Hegarty, M., Pederson, L. L., Thorne, S. L., Caraballo, R. S., Evans, B., Athey, L., & McMichael, J. (2010). Customizing survey instruments and data collection to reach Hispanic/Latino adults in border communities in Texas. *American Journal of Public Health*, 100 (Suppl 1), S159–S164. doi:10.2105/AJPH.2009.167338
- Ostergren, D., Solop, F. I., & Hagen, K. K. (2005). National Park Service fees : Value for the money or a barrier to visitation ? *Journal of Park and Recreation Administration*, 23(1), 18–36.

- Pasick, R. J., Stewart, S. L., Bird, J. A., & D'Onofrio, C. N. (2001). Quality of data in multiethnic health surveys. *Public Health Reports*, 116(Suppl 1), 223–243.
- Passel, J. S., & Cohn, D. V. (2008). *U.S. population projections : 2005 – 2050*. Retrieved from Pew Research Center, Hispanic Trends Project website: <http://www.pewhispanic.org/2008/02/11/us-population-projections-2005-2050/>
- Passel, J. S., Cohn, D., & Lopez, M. H. (2011). *Hispanics account for more than half of nation's growth in past decade*. Retrieved from Pew Research Center, Hispanic Trends Project website: <http://www.pewhispanic.org/files/reports/140.pdf>
- Pérez, E. 2009. Lost in translation? Item validity in bilingual political surveys. *The Journal of Politics*. 71(4):1530-1548.
- Saenz, R. (2010). *Population bulletin update: Latinos in the United States, 2010*. Retrieved from the Population Reference Bureau website: <http://www.prb.org/Publications/Reports/2010/latinosupdate1.aspx>
- SAS Corporation. (n.d.). *The basics of principal component analysis*. Retrieved from <http://support.sas.com/publishing/pubcat/chaps/55129.pdf>
- Sultana, F. (2007). Reflexivity, positionality and participatory ethics: Negotiating fieldwork Dilemmas in international research. *ACME Editorial Collective*, 6(3), 374–385.
- Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*. 2,53-55.
- Taylor, P. A., Grandjean, B. D., & Gramann, J. H. (2011). *National park service comprehensive survey of the American public racial and ethnic diversity of national park system visitors and non-visitors*. Retrieved from the U.S. Department of the Interior, National Park Service website: http://www.nature.nps.gov/socialscience/docs/CompSurvey2008_2009RaceEthnicity.pdf
- U.S. Census Bureau. (2011). *The Hispanic population: 2011*. Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf>.
- Warnecke, R. B., Johnson, T. P., Chávez, N., Sudman, S., O'Rourke, D. P., Lacey, L., & Horm, J. (1997, July 1). Improving question wording in surveys of culturally diverse populations. *Annals of Epidemiology*, 7(5), 334-342.
- Zinn, M. B. (1979). Field research in minority communities: ethical, methodological, and political observations by an insider. *Social Problems*, 27(2), 209–219.

CHAPTER II

Low Participation Rates by Latinos in Nature-based Education Programs

Low visitation and participation rates of Latino youth and adults in nature-based education programs are major challenges facing educators at nature centers, parks, and other informal science centers. The continuing absence of Latinos is troubling given the growth of this population in the United States. According to projections, the Latino population will triple by 2050 and will increase from 14% to 29% of the nation's population (Passel, et. al, 2011; Saenz, 2010). The need to develop science programs that engage Latino youth is evident and more pressing than ever, as the past 30 years have also seen dramatic changes in the demographics of America's schoolchildren. Since 1972, the Latino proportion of K-12 school enrollment has increased from 6% to 20% nationwide, and the number of Latino youth overall has doubled since 1990. By 2035, Latino youth will represent one-third of all children in the country (Passel & Cohn, 2008). Despite their increasing representation in the U.S. population, Latino academic attainment in science, technology, engineering, and math (STEM) has lagged (Crisp & Nora, 2012; LULAC, 2011; Mora, 1996) and remains well below that of White and Black students, even though their aspirations in science careers are similar (Bruyere, 2010). Latino fourth, eighth, and 12th grade students scored much lower on national science assessments than their white counterparts. By 12th grade, only 8% of Latino youth scored at or above proficiency, compared to 27% of White students. At the same time, Latino college enrollment in STEM majors increased 21%, which represents almost 10% of students in these fields (Crisp, 2012; United States Government Accountability Office, 2005). This marked gain is accompanied, however, by low retention and graduation rates of Latinos in STEM fields, as compared to Whites.

An early interest in nature can be a gateway to an eventual STEM career path. Nationwide, Latinos are underrepresented in STEM careers (Crisp, 2012; Dowd, et. al, 2009; Litow, 2008). Their participation in STEM is projected to continue to lag behind their non-Latino, White counterparts (Chapa & De La Rosa, 2004; Jones, 1997; Taningco, et.al, 2008). In 2006, Latinos were 19% of the college-aged population, but only 8% received bachelor's degrees in a STEM field. This is despite 36% expressing an interest in a STEM field upon enrollment (Dowd, et.al, 2009). According to colleges, a student's decision to enter a STEM field is made long before entering college, and according to Perez (2010), Latino students have little awareness of the types of careers available in science fields. The middle school years are critical for science education. If educators fail to capture "student interest and enthusiasm in science by grade 7, students may never find their way back to science" (NSTA Position Statement, 2003; Tai, et.al, 2006). This challenge is even more difficult with Latino youth, whose families may not view science as relevant or accessible (Peticolas, et.al., 2008) and who struggle on campuses that do not reflect their ethnicity.

A lack of Latino participation has also been observed in informal science education (ISE) settings. For example, Barr Lake State Park in Brighton, Colorado features a lake, trails, picnic areas, and a nature center. The park regularly offers education programs, nature festivals, guided hikes, and many other nature-based activities for families and visitors of all ages. It is a popular site for birdwatching, biking and hiking, and fishing, with entrance fees just \$7 per car. This park is less than one mile from a vibrant Latino community that has a long history in Brighton. Yet this population is rarely seen taking advantage of the opportunities the park provides (Corona, 2009). Of 210 surveys conducted in the park to examine factors related to visitation, Latinos

represented only 7% of respondents. This scenario is echoed at natural areas across the United States.

In 2009, Environment for the Americas (EFTA) sought to address the lack of data available on Latino participation in ISE by conducting baseline participation surveys (Appendix I) at seven nature-based public events held in communities and national and state parks in Colorado, New Mexico, Washington, California, New Jersey, and New York. The goal was to understand what factors influence Latino participation in ISE programs and events at natural areas and in communities. Additionally, EFTA gathered information about the characteristics of Latino participants, such as the size of their groups, distances traveled to the sites, and prior experiences with the study sites. These data were then examined for differences from non-Latino participants. The baseline was intended to examine if any obvious geographic or demographic factors were important influences, and not to provide a detailed analysis of barriers to participation, or mechanisms to address them. Those issues are addressed in subsequent research, detailed in Chapters 3 and 4.

Literature Review

Research indicates that informal education settings, such as museums and nature centers, can support science achievement in minority populations by offering a learning environment that accommodates the needs of people from different cultures and who speak a language other than English (Fadigan & Hammrich, 2004; Falk, et al, 2012; Sorge, et al, 2000). At the same time, these organizations report continued low visitation and participation rates in informal learning opportunities by nontraditional and underrepresented audiences, including Latino audiences (Arcand & Watzke, 2010; Bell, et al, 2009; Jones, 1997). A study of park use in California (California State Parks, 2009) found that Latinos frequented parks and recreation areas more

days than non-Latinos, but these parks were highly developed sites with playgrounds and sports facilities located within five minutes of their homes. They were much less likely to visit natural and undeveloped areas. Responses to questions about barriers to park visitation revealed that cost was an issue, but participation in informal science education ISE programs was not examined (California State Parks, 2009).

Studies also showed that a positive prior visit to a site provides assurances that subsequent visits will be equally satisfactory (Chavez, 2009, Roberts, et al, 2009). Researchers have identified reasons why people return to the same location, including expectations that subsequent visits will be equally satisfactory, that they will be among ‘like’ people, have a personal attachment to the site, and/or have a desire to explore new opportunities at the same site (Gitelson and Crompton, 1984; Hughes & Morrison-Saunders, 2002). Regardless of these factors, distance to the site and ease of accessing a site has been shown to influence the likelihood of repeat visitation (Tiefenbacher, et al, 2000).

The Dodge Nature Center in Minnesota studied engagement of Latino audiences, but broadened their research to include both visitation to the site and participation in ISE programs (Hong & Anderson, 2006). Despite a growing Latino community, White participation in public programs and other activities was predominant. Interviews with 15 key leaders in local Latino communities revealed varying reasons for low visitation rates. The biggest factor was lack of familiarity with the Center. Other factors included cost, language barriers, and the ‘atmosphere’ of the Center.

In 2000 and 2009, the National Park Service conducted comprehensive surveys of both visitors and non-visitors to the National Park System (Taylor, et al., 2011; Taylor, et al., 2011). Results showed that Latinos are among the least likely ethnic groups to visit a national park, and

proportional visitation by Latinos did not change significantly between the two surveys. In 2000, Latinos represented 10% of visitors, and just 9% of visitors in 2009. Latinos were less likely than Whites or Blacks to talk with a park ranger or to visit indoor exhibits. These studies highlighted the lack of progress made toward engaging this audience. They also revealed that even when visiting a park, Latinos did not use public information centers, though no data were gathered to explain their absence from these facilities.

Some researchers suggested that park facilities do not meet the needs of Latino families (Weber & Sultana, 2013). Latino families tend to recreate in larger, multigenerational groups (Abrahms, 2013; Chavez & Olson, 2009). Surveys implemented in the Angeles National Forest located in California's San Bernardino and Los Angeles Counties revealed that most Latino participants were visiting with their families. Chavez studied Latino visitation to parks and found that groups of eight to 15 were common, and that much larger gatherings of 100 or more were possible (Kling, 2009).

Latino visitation to local parks and open space has also been shown to be low. Over the past decade, for example, the Latino population in Boulder County, Colorado grew to over 13% of the population, up from 10.5% in 2000 (U.S. Census Bureau, 2011). The overall population grew just 1.1%. However, a survey of visitors to Boulder County Open Space indicated that Latinos were one of the least likely to use hiking trails and engage in other activities at the more than 98,000 acres of public land (Bowie, 2010; Hickox, 2009). Hickox (2003) expanded the research to consider the Latino perceptions toward parks and open space, the activities they pursued in natural areas, the likelihood that they would visit again, and more. Though the number of surveys was low (<100), she found some factors that influenced decisions by this group to visit natural areas, such as to enjoy nature and spend time with family and friends.

The issue of diversity and concerns about the failure to engage Latino audiences in ISE are persistent across diverse natural areas, including national, state, and city parks, nature centers, and open space. Yet few organizations have expanded their research beyond visitation to quantify participation rates of diverse audiences in their public programs or to examine the characteristics of the individuals and groups that do participate in these programs. EFTA's work fills this gap by quantifying Latino participation in ISE programs across a broad geographic area and at diverse locations.

Methods

We studied Latino participation in ISE using a participation survey (Appendix I) implemented at seven locations across the United States. The study sites were selected because of their proximity to Latino populations (U.S. Census Bureau) and each hosted a public program or event that promoted hands-on, multi-generational explorations of nature. The sites included a variety of natural areas, parks, and communities (states indicated in parentheses): Muir Woods National Park (CA), Bandelier National Monument (NM), Great Sand Dunes National Park and Preserve (CO), Barr Lake State Park (CO), Fire Island National Seashore (NJ), and the cities of Cape May (NJ) and Leavenworth (WA). Most of the public events focused on bird conservation and sciences through an annual event, International Migratory Bird Day. Two sites hosted a Junior Ranger Day that introduced participants to a variety of topics ranging from wildlife to the natural history of the site. Each site, except Bandelier, had a prior history of family-friendly programming hosted prior to the survey year in which they attracted a minimum of 75 participants. Attendance at all study sites was free with the exception of one site where a park entrance fee was required.

The participation survey (Appendix I) was designed to provide information about ethnicity, prior visitation to the site, the number of people in their group, distance traveled (determined by zip code), and how participants learned about the program. The seven-question survey was developed using federal Office of Management and Budget protocol, a requirement of the National Park Service for implementation of the survey at the four study sites that were implemented in national parks (Fire Island National Seashore, Bandelier National Monument, Great Sand Dunes National Park and Preserve, and Muir Woods National Monument). The survey questions included the following:

1. Approximately when was the last month and year you visited [the study site]?
2. How many people are in your group?
3. Are you part of an organized group?
4. Are you Spanish, Hispanic or Latino?
5. Please indicate your race. Check all that apply.
6. Have you ever attended [name of the ISE event]? Will you participate in [name of the ISE event] today?
7. Please indicate the zip code in which you live.
8. Did you come specifically to [site name] for this event? If yes, how did you hear about it?

The survey was available in English and Spanish. A native Spanish-speaker prepared the Spanish version. Respondents selected the survey based on their language preference. All questions except one were close-ended.

A convenience sample of program participants completed the survey, and questions were asked about the individual's entire group. Surveyors roamed events and approached any adult participant in their vicinity to ensure that surveys were conducted in all areas. Only one adult (at

least 18 years old) per group was asked to respond. Each survey required less than one minute to complete. Surveys were anonymous, with no identifying information collected.

The number of completed participation surveys from each site depended on the total number of participants and the length of the event or program, which influenced interviewer capacity to complete surveys. For example, the Leavenworth Bird Fest in Washington is multi-day, with activities taking place throughout the city. Surveys at this site began with early morning activities and continued throughout the day. All other events were single-day and approximately seven hours in length. Because only one adult per family or group was interviewed, the number of surveys completed (n) may reflect single participants, single or multi-family groups, and other types of groups, such as Boy and Girl scouts. Overall, the total number of collected surveys per site ranged from 45 to 148.

An important survey question for purposes of this research addressed ethnicity and race, using concepts of race as a social classification, influenced by differences in appearance and ethnicity as the culture, national heritage, language, and other characteristics that members of a group share (Schaefer, 2008). Survey respondents were asked to identify themselves and their family members by ethnicity as either Hispanic/Latino or not Hispanic/Latino. If applicable, a subsequent question allowed non-Hispanic/Latino respondents to identify their race and included Black, White/Caucasian, Asian, Native American, Polynesian/Pacific Island, and Other. Respondents could select more than one racial category, such as Black *and* White/Caucasian.

Trained, bilingual (English and Spanish), Latina/o interviewers conducted the participation survey on a single day at each site in 2009 or 2010. All data were entered into Statistical Package for the Social Sciences (SPSS v. 17) Data were analyzed using descriptive statistics, such as percentages and means, a Spearman's Rank Order and Pearson's correlation to

explore relationships between factors that might serve as barriers to participation and Latino populations, and a Z-test to compare the means of Latino participation at each site to the surrounding population.

Results

The number of participation surveys completed at each site varied based on size of the event and on the interns at each site. All events attracted more than 100 participants. Because only one adult in each group was surveyed, the number of surveys does not reflect the total number of participants. For example, a single adult could represent a scout group with ten youth. Other factors, such as weather, also affected participation. The number of surveys completed varied from a low of 42 in New Mexico to a high of 148 in California (Figure 2.1).

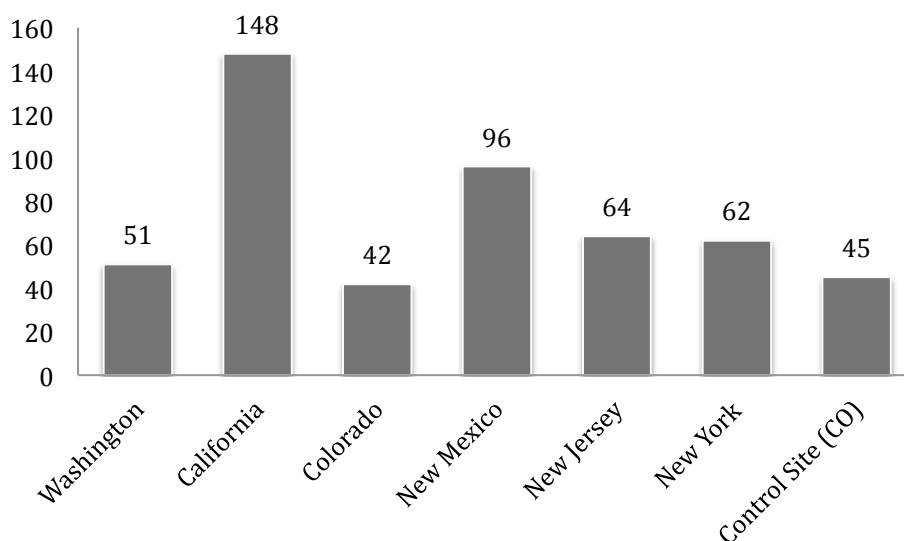


Figure 2.1. The number of participation surveys conducted at each study site and one control site.

Latino participation in events ranged from zero percent in activities hosted in Cape May, New Jersey to 15.6% at Junior Ranger Day at Fire Island National Seashore in New York (see Table 2.1). At all sites, Latino participation was significantly lower than their representation in the closest city or town. Even in New Mexico, where Latinos comprised 87% of the population

in nearby Española, they were markedly absent (4.8%) at a nature festival hosted in Bandelier National Monument, approximately 25 miles away. Despite its more distant location from any sizeable city, however, Junior Ranger Day at Great Sand Dunes National Park and Preserve in southern Colorado had one of the highest Latino participation rates at 16%. Over 70% of these participants traveled more than 60 miles to visit the site, indicating that most Latino participants were not from the nearest community. Non-Latino participation, in contrast, was slightly lower (85.4%) at both the most distant site (Great Sand Dunes) and in New York (84.4%).

Table 2.1

A comparison of Latino and non-Latino participation in ISE programs at seven study sites.

	(a)	(b)	(c)	(d)	(e)
	n	% non-Latino Participation	% Latino Participation	% Latino in nearest city*	Distance from nearest city to study site (miles)*
Leavenworth (WA)	51	90.2	9.8	29%	22.95
Muir Woods National Monument (CA)	148	91.2	8.8	30%	11.45
Bandelier National Monument (NM)	42	95.3	4.8	87%	24.99
Great Sand Dunes National Park & Preserve (CO)	96	85.4	14.6	53%	34.75
Barr Lake State Park (CO)	64	92.2	7.8	40%	7.62
New Jersey Fire Island	62	100	0	31%	7.02
National Seashore (NY)	45	84.4	15.6	30%	13.28
Mean	72.6	91.2	8.8	42.9	17.4

Note: Pearson's Correlation, $p > .05$, $r = 0.2$

Using data from Table 2.1, a Spearman's Rank Order correlation showed that there were no statistically significant relationships ($p > .05$) between percent Latino participation (b) and distance to the study site (d) or between percent Latino participation (b) and the size of the Latino population in the closest city (c). A Pearson's Correlation also showed a negligible linear relationship between these two variables (Figure 2.2, $r = 0.2$).

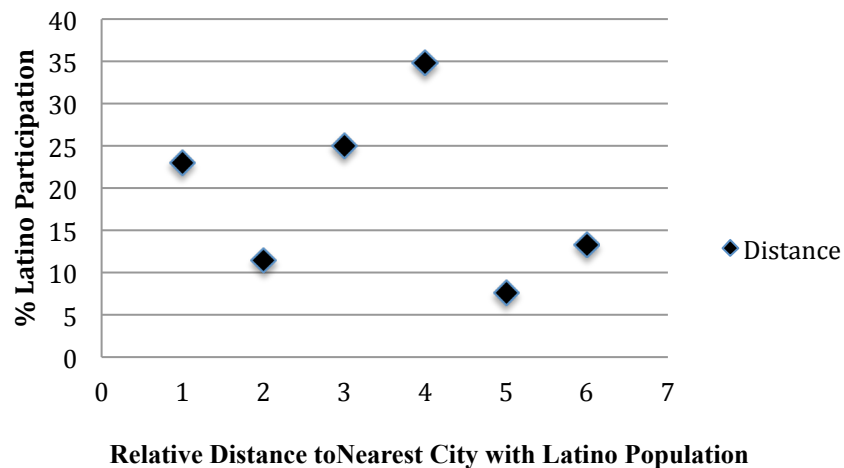


Figure 2.2. Percent Latino participation by distance from the study site to the nearest city with a Latino population.

A Z-test for comparing proportions was conducted to assess whether the observed Latino participation was different from the Latino population in the nearest town. The test statistic was -1.9, which is significant ($p < .05$), indicating that based on the sizes of Latino populations in the vicinity of the natural areas, participation in the events by this audience was much different. We also looked to quantify the relationship between distance and Latino participation.

Group size varied widely across sites (Table 2.2). At two sites (Washington and New Mexico), only non-Latinos attended in groups of six or more people. At the remaining four sites (New Jersey was excluded because there were no Latino participants at the event), Latinos participated in programs in larger groups than non-Latinos. Non-Latinos were more likely to

attend programs alone, even at locations at which they had to travel greater distances to visit. Leavenworth was the only site where Latinos attended alone. Differences in group size between Latinos and non-Latinos were less notable at both Great Sand Dunes National Park and Preserve, which was also farthest away from Alamosa (34.7 miles), the nearest city with a large Latino population, and Leavenworth, which was 22.95 miles from the nearest city with a large Latino population (Wenatchee).

Table 2.2

Percent of Latina/o (L) and non-Latina/o (NL) participants by group size.

	1 person		2-3 people		4-5 people		6 or more	
	L	NL	L	NL	L	NL	L	NL
Leavenworth (WA)	20	17.4	60	58.5	20	15.2	0	9
Muir Woods National Monument (CA)	0	.7	15.3	42.5	53.8	41.8	30.7	14.9
Bandelier National Monument (NM)	0	10	50	60	50	17.5	0	12.5
Great Sand Dunes National Park & Preserve (CO)	0	0	7.1	13.2	49.7	51.6	42.6	33.6
Barr Lake State Park (CO)	0	16.9	40	47.5	20	28.8	40	8.5
New Jersey	-	3.2	-	61.3	-	27.5	-	8.1
Fire Island National Seashore (NY)	0	0	14.3	36.8	42.8	39.4	42.8	23.6

Note: Group sizes ranged from 1 person to groups of 2-3 people, 4-5 people, or 6 or more. No Latinos participated in the ISE event hosted in New Jersey.

Participants were also asked if they had ever visited the site before the surveyed event (Table 2.3). Results from Cape May, New Jersey were excluded, because this event occurred within a neighborhood, so that many participants lived in the location of the event and were

regular visitors to the location. At five of the six remaining sites, at least 50% of participants, both Latino and non-Latino, had visited prior to the date of the event. There were no

Table 2.3

Percent of Latino participation survey respondents who visited the sites prior to the survey event.

	% Prior Visitation	
	Latino	%Non-Latino
Washington	20	57.1
California	50	32.8
New Mexico	50	87.5
Colorado Control Site	57	51.6
Colorado	100	84.7
New York	85.7	92.1
Mean	60.5	67.6
SD		

Note: Respondents indicated the year and month of their last visit to the site, not including the day of the survey.

t= , p>0.05

significant differences between mean Latino participation (60.5%) and mean non-Latino participation (67.6%), using a paired samples *t* test ($p>0.05$). The site with the lowest prior Latino participation was Leavenworth, Washington, where only 20% of participants in the annual Bird Fest had been to the town before May 2009. For non-Latinos, the site with the lowest prior participation (32.8%) was California's Muir Woods National Monument. Distance from the nearest city with a Latino population could also have influenced this group's prior

visitation and participation, and the percentage rose at two sites in close proximity to 85.7% and 100% (Fire Island National Seashore and Barr Lake State Park respectively). Non-Latino participants also had prior visitation rates above 50%, except at Muir Woods National Monument in California, which is the third-closest site to Latino populations, but is much closer to other non-Latino communities.

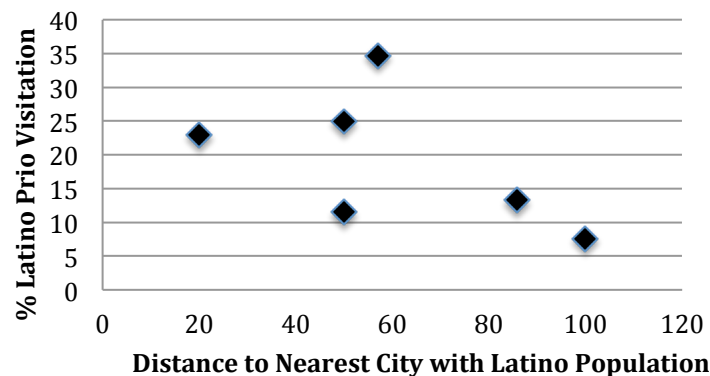


Figure 2.2. Pearson's correlation showed that prior visitation to a site was weakly related to participation in ISE by distance ($r=-0.5$).

Discussion

Our research provides much-needed baseline information about the absence of Latinos from ISE and the influences of the most evident barriers to Latino participation in science learning opportunities at natural areas and in communities – distance from the site, prior visitation to the program location, and group size. These analyses examine some common assumptions made by educators, albeit anecdotally, such as the inability of Latinos to travel to ISE centers and the effects of group size on participation.

Geography or distance of Latino populations from natural areas within the National Park System affects Latino visitation to these sites at a national scale (Weber & Sultana, 2013). We

examined the role of distance at local scales and showed that distance was not a significant factor. In fact, participation by Latinos was lowest at Barr Lake State Park in Colorado and in the town of Cape May, New Jersey, both of which are located within eight miles of communities with significant Latino populations. In contrast, a higher percentage of Latinos participated in nature-based science programs at Great Sand Dunes National Park and Preserve, which is the most distant from a Latino community, and at Fire Island National Seashore, approximately 13 miles from the nearest community. Some nature area staff have expressed, anecdotally, that travel is a barrier to participation, but within the distance range sampled in this study that perception is not supported by our data.

Group size is also advanced as an issue affecting Latino participation. Educators and site managers often perceive that Latinos either come in larger groups and/or require larger group facilities (e.g. large picnic areas). The ability of sites to support the amenities required by large groups is a possible barrier to participation ISE programs, especially those located at greater distances from Latino populations. Lack of large group camping sites and gathering areas, for example, may dissuade groups from visiting a site if all family members cannot be included.

This concern has some basis in the literature, as Latino families are more likely to be multi-generational than their non-Latino White counterparts (Abrahms, 2013). As a result, participating in a program would include not only parents and their children, but also grandparents and even cousins and other relatives. Chavez (Chavez in Kling, 2009) studied Latino visitation to parks and found that groups of eight to 15 were common, and that much larger gatherings of 100 or more were possible. Because Latino participation was low at each study site, the results related to group size are not conclusive, but do suggest patterns of participation. Overall, non-Latinos were more likely to participate in a program alone, while

Latinos comprised a high percent of groups of six or more. Leavenworth, Washington was the only site where any Latino attended a program alone. At most sites, however, both Latinos and non-Latinos tended to come in groups, reflecting the capacity of nature-based ISE to meet the needs of multi-age family members and others, such as scouts. Group size was not affected by location or distance of the event, though there was a tendency for larger group size at national parks. While Latinos were slightly more likely than non-Latinos to attend in groups of six or more, large groups of non-Latinos were not atypical. The data do not show strong biases toward group size between the two populations, which suggests that this concern may be incorrect or overstated.

Even though overall Latino participation in ISE programs was low at all sites, over half appeared to have a prior experience at the site. The similar rates of prior visitation by Latino and non-Latino groups suggests that when Latinos visit these sites, they have positive experiences and are not deterred from another visit and involvement in a program. These data cannot disprove the possibility that other Latino groups do have unsatisfactory visits and do choose not to return. It does show that return visitation occurs, and that it is more likely to occur when the site is closer to home.

Regardless of the size of the Latino community, its proximity to ISE opportunities, or the venue of the program, factors other than distance and group size are barriers to Latino participation. These factors have been explored in the literature and speculated upon by staff at natural areas. A common assumption is that Latino culture does not value nature and that visiting natural areas is, as a study site staff person commented, “just not part of their culture”. Researchers suggest that as Latinos assimilate into the Anglo culture, their appreciation for nature and interest in visiting natural areas will increase (Schauhl & Gramann, 1998; Weber and

Sultana, 2013). A second concern is that low socio-economic status constrains Latinos. In 2012, their unemployment rate was 9.8% compared to 6.3% for Whites (Austin, 2013). Median household income was \$15,000 lower than that of Whites (Taylor, et al, 2011). Lower income, combined with demanding jobs in agriculture, tourism, and food services that may require a longer work-week, may translate into less time to visit natural areas and take part in ISE programs. Given this economic status, educators and managers often assume that Latinos do not own cars and do not have access to natural areas, especially more distant locations.

In summary, we established the following:

- 1) Latino participation in ISE was much lower than that of non-Latinos, and disproportionately lower than their representation in the nearest community;
- 2) Prior visitation by Latinos may predict future visitation, a result that was similar among non-Latinos;
- 3) Latino participation in ISE and distance to the venue are weakly related;
- 4) Latinos do not tend to participate in ISE alone, however group size is not always different from that of non-Latinos.

While factors such as distance, familiarity, and location may influence Latino participation in science and nature based education programs, this research suggests that other factors must be at play. Current efforts to improve Latino participation in these activities often focus on addressing the most evident potential barriers, such as distance. Some organizations have begun hosting programs in Latino communities, rather than addressing how to improve Latino participation at natural areas, for example. Studies of low minority participation rates in ISE programs are hampered by anecdotal information and a scarcity of data and provide few tangible recommendations for improving participation. More rigorous baseline research is necessary to

unravel other underlying factors that may contribute to low Latino participation, such as language and generations in the U.S., to help science educators meet the needs of this audience.

REFERENCES

- Abrahms, S. (2013). Three generations Under One Roof. *AARP Bulletin*, 5–8. Retrieved from www.aarp.org/home-family/friends-family/info-04-2013/three-generations-household-american-family.print.html
- Arcand, K., & Watzke, M. (2010). Article Bringing the universe to the street . A preliminary look at informal learning implications for a large-scale non- traditional science outreach project. *Journal of Science Communications*, 9(2).
- Austin, B. Y. A. (2013). *Unemployment rates are projected to remain high for whites, Latinos, and African Americans throughout 2013*. Economic Policy Institute, Issue Brief # 350. Retrieved from <http://www.epi.org/files/2013/unemployment-rates-white.pdf>
- Bell, P., Lewenstein, B., Shouse, A. W., & Feder, M. A. (2009). *Learning science in informal environments: People, places, and pursuits*. The National Academies Press. Retrieved from http://www.nap.edu/openbook.php?record_id=12190
- Bowie, M. (2010). *Boulder County Parks and Open Space 5-Year Visitor Study – 2010*. City of Boulder, CO.
- Bruyere, B. L. (2010). Engaging Latino audiences in out-of-school programs about science. *Journal of Extension*, 48(3), 1–7.
- Chapa, J., & De La Rosa, B. (2004). Latino Population Growth, Socioeconomic and Demographic Characteristics, and Implications for Educational Attainment. *Education and Urban Society*, 36(2), 130–149. doi:10.1177/0013124503261320
- Chavez, D. J. (2009). Youth day in Los Angeles: Evaluating the role of technology in children's nature activities. *Children, Youth and Environments*, 19(1), 102–124.
- Corona Research. (2009). *Colorado state parks marketing assessment*. Denver, CO.
- Crisp, G., & Nora, A. (2012). *Overview of Hispanics in science, mathematics, engineering and technology (STEM): K-16 representation, preparation and participation*. Hispanic Association of Colleges and Universities.
- Dowd, A., Malcom, L. E., & Bensimon, E. M. (2009). *Benchmarking the success of Latina and Latino Students in STEM to achieve national graduation goals*. Los Angeles, CA: University of Southern California.
- Fadigan, K. A., & Hammrich, P. L. (2004). A longitudinal study of the educational and career trajectories of female participants of an urban informal science education program. *Journal of Research in Science Teaching*, 41(8), 835–860. doi:10.1002/tea.20026

- Falk, J., Osborne, J., Dierking, L., Dawson, E., Wenger, M., & Wong, B. (2012). *Analysing the UK Science Education Community: The contribution of informal providers*. London: Wellcome Trust.
- Gitelson, R. J., & Crompton, J. L. (1984). Insights into the repeat visitation phenomenon. *Annals of Tourism Research*, 11, 199–217.
- Hickox, A. (2009). *Research report: Latino and Hispanic perceptions of open space in Boulder County*. Boulder, CO.
- Hong, A., & Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education*, 37(4), 33–44. doi:10.3200/JOEE.37.4.33-44
- Hughes, M., & Morrison-Saunders, A. (2002). Repeat and first time visitation in an experience specific context: The valley of the giants tree top walk. *The Journal of Tourism Studies*, 13(1).
- Johnson, C. Y., Bowker, J. M., Bergstrom, J. C., & Ken Cordell, H. (2004). Wilderness values in America: Does immigrant status or ethnicity matter? *Society & Natural Resources*, 17(7), 611–628. doi:10.1080/08941920490466585
- Jones, L. S. (1997). Opening doors with informal science: Exposure and access for our underserved students. *Science Education*, 81(6), 663–677. doi:10.1002
- Kling, J. (2009). *The changing faces of forest recreation*. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.
- Litow, B. S. (2008). A Silent Crisis: The underrepresentation of Latinos in STEM careers. *Education Week*.
- Mora, R. (1996). Latino students' academic literacy in science education: Contextualizing policies. *New England Journal of Public Policy*, 11(2):41-64.
- Passel, J. S., & Cohn, D. V. (2008). *U. S. population projections: 2005 – 2050*. Pew Research Center. Washington, D.C.
- Passel, J. S., Cohn, D., & Lopez, M. H. (2011). *Hispanics account for more than half of nation's growth in past decade*. Pew Research Center. Washington, D.C.
- Roberts, N. S., Chavez, D. J., Lara, B. M., & Sheffield, E. A. (2009). *Serving culturally diverse visitors to forests in California: A resource guide*. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region.
- Saenz, R. (2010). *Population Bulletin Update: Latinos in the United States 2010*.

- Schaefer, R.T. (2008). *Encyclopedia of race, ethnicity and society*. Thousand Oaks, CA: Sage Publications, Inc.
- Schaul, S.L. and Gramann, J.H. (1998). The effect of cultural assimilation on the importance of family-related and nature-related recreation among Hispanic Americans. *Journal of Leisure Research*, 30:47-36.
- Sorge, C., Newsom, H. E., & Hagerty, J. J. (2000). Fun is not enough: Attitudes of Hispanic middle school students toward science and scientists. *Hispanic Journal of Behavioral Sciences*, 22(3), 332–345.
- Survey on Public Opinions and Attitudes on Outdoor Recreation in California*. (2009). State of California: Sacramento.
- Taningco, M. T., Mathew, A. B., & Pachon, H. P. (2008). *STEM professions: Opportunities and challenges for Latinos in science, technology, engineering, and mathematics*. Retrieved from <http://files.eric.ed.gov/fulltext/ED502063.pdf>
- Taylor, P. A., Burke D. G., and Bistra A. (2011). National Park Service comprehensive survey of the American public, 2008–2009: National Technical Report. Natural Resource Report NPS/NRPC/SSD/NRR. Fort Collins, Colorado: National Park Service.
- Taylor, P. A., Grandjean, B. D., & Gramann, J. H. (2011). *National Park Service comprehensive survey of the American public racial and ethnic diversity of National Park System visitors and non-visitors*. Natural Resource Report NPS/NRSS/SSD/NRR-2011432. Fort Collins, Colorado: National Park Service.
- Taylor, P., Kochhar, R., Fry, R., Velasco, G., & Motel, S. (2011). *Wealth gaps rise to record highs between Whites, Blacks and Hispanics*. Retrieved from pewsocialtrends.org/files/2011/07/SDT-Wealth-Report_7-26-11_FINAL.pdf
- Tiefenbacher, J. P., Day, Frederick, A., & Walton, J. A. (2000). Attributes of repeat visitors to small tourist-oriented communities. *The Social Science Journal*, 37(2), 299–308.
- U.S. Census Bureau. (2011). State and county quickfacts: 2011. Retrieved June 21, 2011 from <http://quickfacts.census.gov/qfd/states/08/08013.html>
- Weber, J., & Sultana, S. (2013). Why do so few minority people visit national parks? Visitation and the accessibility of “America’s Best Idea.” *Annals of the Association of American Geographers*, 103(3), 437–464. doi:10.1080/00045608.2012.689240

CHAPTER III

Cultural Stereotypes, Values, and Debunking the Myths of Latino Engagement in Informal Science Education

The topic of the demographic composition of the United States has arguably never been more relevant. Following the 2012 presidential election, analysts reviewed the numbers from every angle, and the consensus was that communities of color played a critical role in reelecting President Obama (Llorente, 2012; Wallace, 2012). Since the last election, the representation of minorities in the electorate has risen from 26% to 28%. From 2000 to 2010, the Latino population grew 43%, from 35.3 million to over 40 million, and accounted for 13% of the total population (U.S. Census Bureau, 2011). Projections indicated that by 2050, Latinos will comprise 26 – 29% of the population (Passel, Cohn & Lopez, 2011).

Yet Latinos have lower participation rates in a number of domains, one of which is their engagement in outdoor, nature-based activities, including visitation to parks and other natural areas and participation in informal science education (Allison & Hibbler, 2004; Bevan & Semper, 2006; Bruyere, Billingsley, & O'Day, 2008; Garcia, 2012). Nature-based organizations are troubled by the absence of this growing population in environmental education programs and the role this may play in Latinos' future decisions, including their decisions as voters, about conservation. Politicians, conservationists, natural resource managers and educators often assume that lack of visitation to natural areas and failure to participate in informal science education programs imply that nature and conservation are not important to Latinos. These perceived differences in values between immigrant and Anglo communities have been a source of tension and conflict during many immigration cycles in the United States. (McDonald &

Balgopal, 1998). Throughout the U.S., organizations and political groups are struggling to better understand how to engage this audience in natural resource issues of national concern, including improving visitation to natural areas and participation in nature-based programs. Understanding Latino values toward the environment is essential to breaking down the barriers between this audience and the sites that are working to engage Latinos.

Low Latino participation at natural areas is well documented, yet very little research has been done on Latino attitudes and values related to natural areas as a basis for designing interventions to increase it. Our goal was to quantify if, despite their absence, Latinos were interested in participating in informal science education, if they felt that such opportunities were valuable, and if they would consider attending ISE programs and to determine if differences existed on these items based on demographic variables. We also explored how Latinos responded to statements about the importance of the family and interest in educational achievement and how these factors might influence decisions about participating in nature-based activities.

Literature Review

Despite their growing presence in the country and evidence of their power to influence decisions of nationwide import, Latinos are notably absent from some sectors of American life, including the conservation arena, natural areas, and informal science programs at natural areas. Natural resource management and conservation groups are concerned by the overall lack of participation for numerous reasons. To traditionally Anglo groups, such as the Sierra Club, support for environment and environmental protection are assumed to derive from experiences in nature and a resulting appreciation for natural places (Walker, 2009). They are concerned that low visitation to natural areas and participation in nature-focused activities and programs will translate to equally low support for the environment in general. The environmental workplace,

from natural resource agencies and non-profit organizations to sustainable energy and other “green job” industries, is also lacking in Latino representation, and efforts to recruit Latinos have not been especially successful (Butz et. al., 2003).

The absence of Latinos from natural areas in the U.S. has been reported time and again. In 2000 and 2009, the National Park Service (2010) conducted comprehensive surveys of both visitors and non-visitors to the National Park System. Results showed that Latinos are among the least likely of any group, including non-Hispanic Whites, African Americans, and Asians, to visit a national park, and visitation did not change significantly between the two surveys. In 2000, Latinos represented 10% of visitors, and just 9% of visitors in 2009, despite being 12.5% of the population overall (U.S. Census Bureau, 2001). These results have been echoed at other sites across the United States, from local and state parks to open space and nature centers (Bowie, 2012; Hickox, 2008; Hong & Anderson, 2006).

Latinos were also underrepresented in Science, Technology, Engineering, and Mathematics (STEM) occupations in the United States (Landivar, 2013). In 2011, they accounted for 15% of the STEM workforce across the country, such as computer sciences (6%), mathematics (6.1%), engineering (7.1%), and life, physical, and social sciences (6.4%). The lack of interaction between ethnic and racial communities perpetuates the dearth of mutual knowledge regarding values toward nature.

Cultural differences between Anglo-Americans and Latinos may be an explanation for why Latino support for the environment and engagement in political actions is rarely recognized (Lynch 1993). Anglo-Americans equate nature with wild places, as described in literature by Henry David Thoreau and Aldo Leopold. Latino cultures identify and focus on different aspects of the natural world: gardens, rural environments, and arroyos, for example. Novelist Cristina

García (1992) describes her Cuban landscape in *Dreaming in Cuban*, “There’s something about the vegetation, too, that I respond to instinctively—the stunning bougainvillea, the flamboyants and jacarandas, the orchids growing from the trunks of the mysterious ceiba trees (p.).” In New York, values about the environment are expressed by some Latinos via community gardens. As a Puerto Rican American described, “I come home and work in the garden, breathe the fresh air” (Lynch, 1993). He uses no chemicals, stating that, “You see these tomatoes, so nice, but not natural. They use gas to make them red. You grow it yourself, you get something fresh”.

Research on environmental values is common in western countries, especially the United States, and it is difficult to locate studies that focus on Latino values toward the environment. In 2009, the U.S. Forest Service prepared a technical report that introduced federal employees to the concepts of values, beliefs, and attitudes, acknowledging that communities and other stakeholders affect the agency’s ability to manage public lands (Allen, Wickwar, Clark et. al., 2009). This document successfully outlined the importance of examining values, described the theoretical framework, and provided guidelines for acquiring more information. It advanced awareness of values, beliefs, and attitudes as the approach best suited to effect sound resource management, decision-making, and planning. It did not, however, touch on issues of how values might vary among different racial and ethnic groups and the growing importance of addressing disparities or similarities.

Similar results were reported in other research (Sorenson, 2010). For example, focus groups with a total of 31 Spanish-speaking Latino parents in northern Colorado revealed that all of the respondents were highly interested in ISE, even though their children had not participated in informal science learning programs. One of the barriers to their participation was the identified as the lack of friends and family, indicating that if programs were available to the

entire family rather than just the children, participation might increase. A subsequent quantitative survey in the same community revealed the same results; high interest in ISE programs by Latino parents. However, the data did not gather information about generations in the U.S., country of origin, or other demographic factors or the interplay with other cultural values, such as family.

A study in California scratched the surface of this issue. For over a decade (1997 – 2008), the California Department of Parks and Recreation conducted in-depth surveys of adults to better understand attitudes and opinions about parks (California State Parks, 2009). Surveys conducted in English and Spanish via mail, telephone, and online, reached California residents throughout the state and included over thirty questions. The results of the survey were complex and addressed diverse topics, but provided insight into the values Hispanic respondents hold toward the environment. When asked to rank the importance of environmental and outdoor education programs, Latinos rated these amenities much lower than non-Hispanics.

Other studies focusing on Latino culture showed that this audience also valued its ethnicity and identified as “Latino” or “Hispanic” first, though a slight majority also identified with their family’s country of origin (Taylor, Lopez, Martínez & Velasco, 2012). Latinos also valued family, and most considered their commitment to family to be one of the building blocks of society (Barna Group, 2013).

Our study is one of the first conducted at multiple sites including at least some of the and diversity that exists among Latino communities, including number of generations in the United States, country of origin, and other demographic characteristics. In 2009, we began a study at six informal science education events hosted in natural areas and in communities across the United States to examine the barriers to Latino participation. We first established that Latino participation across all sites was low (see Chapter II), and then identified the factors that might

contribute to the absence of this audience from ISE. Prior to addressing barriers to participation by this audience, however, it was critical to establish that survey participants were interested in ISE, did believe it is valuable, and would consider participating in an ISE program in the future. If they responded negatively to statements related to these three concepts, our efforts to remove barriers would be ineffective. The discussion that follows focuses 1) the respondents' overall interest in ISE, 2) if this audience valued ISE, and 3) if they expressed interest in attending an ISE event in the future.

Methods

Introduction. EFTA measured if Latinos considered ISE valuable, if they felt that ISE was important, and if they were interested in participating in ISE. EFTA interns and staff administered a survey instrument in six communities that had both significant Latino communities and were in reasonable proximity to natural areas. Surveys were administered by native Spanish speakers and delivered in either English or Spanish at the respondent's preference. Because respondents may not have participated in an ISE program prior to the survey, interviewers also provided images of ISE programs, such as a park ranger with a group of youth and adults, to help describe the topic.

Research instrument. The entire survey was a two-page, 30-question survey developed in English and translated into Spanish (see Appendix I), so that it could be administered to both English and Spanish-speaking Latino adults ages 18 and older. The survey consisted of five sections that addressed the following issues: 1) Latino interest in education programs about nature (two items), 2) characteristics of education programs that influence Latino participation (six items), including day of the week, availability of transportation, and the topic of the event, 3) practical considerations, such as cost and familiarity with the host organization, that influence

decisions to participate in programs (five items), 4) preferences for how, where, and with whom programs are delivered (seven items), and 5) respondent demographics (ten items). Questions in sections one through four used a five point Likert scale, in which 1 indicated *strong disagreement* and 5 indicated *strong agreement*. An additional open-ended question asked about the most effective means of communicating with the respondent about program information (e.g. newspaper, radio, schools). Other data included the zip code of the respondent, the interviewer name, date of the survey, and general location in the community, such as a school or library. This paper focuses on the first section of the survey and the influences of the fifth section on responses. Consideration was also given to statements that reflect Latino values with regard to education, language, and family and to the demographics and character of each study site.

Data were collected by bilingual, native Spanish speakers who were employed as interns at each of the six study sites. They attended community events and festivals, visited local businesses, churches, and schools, and participated in other venues where high numbers of Latino individuals were anticipated. Interns were trained on how to conduct the surveys and each received a bilingual script that detailed their introduction of the survey to participants. Interns also offered respondents a bilingual description of the purpose of the research and the opportunity to request results. Each survey required approximately 20 minutes to complete. Regardless of responses to the statements in Section 1, interviewers completed the entire survey with respondents.

The surveys were implemented in communities near six national or state parks across the United States, including California, Colorado, Washington, New York, New Jersey, and New Mexico, with at least 100 surveys gathered at each location. The study sites were selected because of their proximity to large Latino populations and because each hosted science and

nature-based (ISE) programs for the public. Survey participants were not selected in any way; rather, interviewers questioned any adults willing to take part in the research. Only one adult per family was surveyed.

Study Sites

Six sites were selected at locations across the United States based on their proximity to Latino communities, their proximity to or location within natural areas, and on their prior experience hosting public, science and nature-based events, such as International Migratory Bird Day (a hemispheric celebration of birds), Junior Ranger Day (interactive programs that engage youth and their families in learning about national parks), and similar nature festivals. We also evaluated the characteristics of the Latino communities and aimed for diversity within that population. For example, the residents of many communities were predominantly of Mexican heritage, while one site was near a predominantly Ecuadorean community (New York) and another was near a community of residents with Puerto Rican heritage (New Jersey). The survey was conducted in Latino communities near each event site in 2009 or 2010. Details of each event site and the closest Latino community where surveys were conducted are provided below.

Leavenworth, Washington in North Central Washington (NCW) is the site of an International Migratory Bird Day event that was in its 8th year in 2009. This is one of two sites in which the event was centered in a town, rather than a natural area, though most activities did take place in nearby natural areas, such as national forests. The weekend of bird walks, arts events, and family activities attracted participants from both in and outside the town of Leavenworth. Leavenworth was predominantly White (> 89%), so surveys were conducted in the city of Wenatchee, just 22 miles north, which had a population that was 29.4% Latino. This was much higher than the state average of 11.7% and slightly larger than the county-wide population

(26.8%; U.S. Census, 2012). Some surveys were also completed in other nearby Latino communities in Cashmere, Chelan, and Leavenworth.

The first Mexicans came to the region as braceros or seasonal workers during World War II. After the war, U.S. citizens with Mexican ancestry moved into NCW from California, Texas, the Rocky Mountains, and the Midwest to work in agricultural jobs created by the Columbia Basin Irrigation Project (Garcia 2007). Wenatchee is known as the “Apple Capital of the World”, and it is this industry that supported the seasonal return of Mexican nationals to the city until the late 20th century. From 1990 to 2000, the Latino population in NCW increased 140%. At the same time, Wenatchee’s year-round Latino population, still primarily Mexican American, continued to grow, especially following passage of the Immigration Reform and Control Act (1986) which enabled undocumented laborers to become legal residents.

Muir Woods National Monument in Mill Valley, California is located north of the Golden Gate Bridge and has hosted International Migratory Bird Day events for over a decade. The event was a single day with the center of activities taking place in the main parking lot of the natural area. Individuals could participate in activities without entering the Monument and incurring the required entry fee to do so. Additional activities, such as bird walks and bird banding demonstrations, took place nearby and a shuttle was provided between the parking lot and other programs.

Mill Valley, Bolinas, Stinson Beach, and other towns closest to Muir Woods were predominately White (> 85%), and Latinos represented less than 8% of the populations in those communities. Just 35 minutes to the north, however, San Rafael had a large Latino community that was 23.4% of the city’s population., and in which 21% of the population spoke Spanish. Most of the community surveys were conducted in San Rafael.

Latino history in the city spans almost 200 years. San Rafael was owned by the Mexican government in the 1830s and divided into 21 land grants that were given to Mexican citizens (Marin History Museum, 2008). Following the Mexican War, however, Mexican rule of California ended and the land was annexed by the United States, ending Mexican ownership. Today, much of the city's Latino population lives in the Canal Area on San Francisco Bay, where most of the low-income housing in Marin County is located.

Barr Lake State Park in Brighton, Colorado is located in Adams County, Colorado, just north of Denver, Colorado and less than a half mile from Brighton, Colorado. The 2,715 acre park is administered by Colorado Parks and Wildlife, a state agency, and encompasses a 1,900 acre prairie reservoir surrounded by cottonwood trees, marshes, and grassland habitats. It is known for its diversity of bird life and is home to a nesting pair of Bald Eagles and over 350 other bird species. Visitors may fish and boat on the reservoir and hike, bike, and cross-country ski on the 8.8 mile perimeter trail that surrounds the lake. Each year, the Park hosts a variety of activities and events, from Bald Eagle viewing and story time at the Nature Center to boating safety courses. The Fall Bird Festival is one of its largest events and takes place each year in September, as birds begin their migrations to wintering grounds to the south.

Surveys were conducted in Brighton, Commerce City, and Fort Lupton. Because Brighton is the closest city to Barr Lake State Park and has a large Latino community, most of the interviews were held there. Brighton is a relatively new city founded in the 1860s as a result of Western expansion and the fur trade. Though Latinos, mostly from Mexico, were part of this landscape, their population in Brighton grew in the mid-1900s as a result of the beet, floral, and other agricultural farms. One of the first women-led floral workers' strikes was organized in the city in 1968 by Chicanas and Mexicanas as a result of poor working conditions (Falcon, 2003).

In 2012, the racial composition of the city was 77.4% White and 40.5% Hispanic (U.S. Census Bureau, 2014).

Bandelier National Monument in Los Alamos, New Mexico is known for its long human history and especially renowned for the dwellings the Pueblo people carved into cliffs. The site was selected because of its annual fall Nature Fest hosted in the park to celebrate not only the rich culture of the area, but also the diversity of wildlife. Bandelier is about 30 miles and 45 minutes from Española, New Mexico, where most of the surveys were completed. Española was over 87% Hispanic in 2010 (U.S. Census Bureau, 2014), and residents claim ancestry from both Spain and Mexico.

Española is also known for its rich human history. It is located near Tewa pueblos, a Native American group that has inhabited the area since the thirteenth century. Early European settlers arrived from Spain in the late 1500s, and the 1846 Mexican-American war and the subsequent annexation of New Mexico by the United States resulted in an influx of Anglos into the region (Duren, n.d.). From 1880 to 1960, Española was a railroad town. Today, the Los Alamos National Laboratory in Los Alamos employs over 12% of Española's population. In addition to Española, interns also conducted surveys in Pojoaque, Chimayo, and Santa Fe.

Fire Island National Seashore in Patchogue, New York is a 32-mile long barrier island that protects a globally imperiled maritime forest and a variety of federal and state threatened and endangered birds, reptiles, and plants. Access to Fire Island from the mainland is by public ferry or two bridges that access the site. Ferry rates are \$18 round trip for adults and \$9 for children. There is also a fee to park on the island. Each year, Fire Island hosts a Junior Ranger program that introduces youth and their families to the island and its diverse wildlife and habitats.

Surveys were conducted primarily in Patchogue and also in Medford, New York. Patchogue is approximately 30 miles from the event site, and Medford is about 32 miles.

Long Island, New York is recognized as a Latino “hypergrowth destination” or an area where this population grew by more than 300% after 1980. Patchogue also experienced rapid growth after 1990, and the Latino population increased from 3% of the town’s population to almost 30% in 2010 (U.S. Census, 2014). Surveys were conducted in Patchogue in 2009, less than one year after an Ecuadorian immigrant was stabbed to death by a white teenager (Mize and Delgado, 2012). The incident highlighted the tensions that had arisen as a result of rapid demographic changes.

Cape May, New Jersey was the second site where the focus event was hosted in a town. Harbor Fest, free to the public, is one of the largest events of the year, attracting thousands of local and out-of-town participants to Cape May. While the festival highlights the importance of the sea, the location of the Nature Center of Cape May at the center of activities results in programs that highlight wildlife. This event area, however, encompasses a predominantly white population (>91%), including neighborhoods and businesses (U.S. Census Bureau, 2014).

Surveys with Latino adults were conducted primarily in Wildwood, located just 10 miles and approximately 20 minutes north. A tourist town with over 200 hotels, the town was also racially and ethnically diverse in 2010, with a population that included Whites (11.15%), Black or African Americans (0.73%), Asians (0.13%), Pacific Islanders (16.24%), and Native Americans (0.79%). Latinos were 31.12% of the population and primarily from Puerto Rico. Puerto Rican migrations to New Jersey began in the 1950s, after World War II and during economic upheavals on the Caribbean island (Shaw, 1994). By the 2010 U.S. Census (U.S.

Census Bureau, 2014), Latinos were over 31% of Wildwood's population, almost double from the 2000 Census (17%), and predominately from Puerto Rico.

Analysis. Quantitative data were entered into a statistical software analysis program (SPSS v. 17) and used to generate descriptive results (e.g., averages, percents) and test differences between groups (e.g., differences between income levels, countries of origin, years lived in the United States). Statistical significance was tested in most cases at the .05 level, indicating results in which we can be 95% certain are attributable to something other than random error. ANOVA followed by Student-Newman-Keuls test were conducted to examine the differences between groups, such as age, attendance at university, number of generations in the U.S., and country of origin. The results were used to explore the following questions:

- 1) Are Latinos interested in ISE, consider it valuable, and do they respond positively to opportunities to participate?
- 2) Do demographic factors, such as age, income, education, language, and generations in the United States influence interest in participating in ISE;
- 3) Do Latinos have consistent responses to these questions across sites?

Results

We conducted over 1,000 face-to-face surveys with Latino adults across all six sites, and 990 were retained for analysis. Per site, we completed 185 in Washington, 102 in California, 196 in Colorado, 209 in New Mexico, 178 in New Jersey, and 120 in New York. The demographic questions revealed the unique identities of each Latino community, including the level of education of respondents, the countries of origin, and their number of generations living in the United States (Figure 3.1). Latino communities are diverse, and this research first examined if demographic differences affected responses to the survey.

Study site demographics. The first section of the results characterizes the demographic similarities and differences between the respondents at six study sites. While they may not provide a picture of the entire Latino community, they describe the attributes of a representative sample. These data provide are then used to examine their influence on responses to statements about interest in ISE, the value of ISE, and willingness to participate in ISE.

Demographics: generations. In our research, “first generation” referred to the first person in the family to live in the United States or foreign-born. Second generation indicated that the person was born in the United States and had at least one first-generation parent. New Latino communities were located in Washington and New York, where 70% or more of respondents were the first generation to live in the United States (Tables 3.1 and 3.2). The most established community was in New Mexico, where just 22% of the respondents were first generation, while 41% were 4th generation.

A one-sample chi-square test was conducted to determine if there were significant differences between sites by number of generations in the United States. The results were significant, $\chi^2(2, N = 918) = 26.42, p < .01$. The proportion of Latino respondents across all sites who were first generation in the US was much higher than second, third, or fourth generation respondents. The proportion of third generation respondents was much lower than the other categories. A subsequent ANOVA with Student-Newman-Keuls post hoc test showed that there were significant differences in generations in the United States between the New York, California, and Washington sites, the New Jersey and Colorado sites, and the site in New Mexico ($p < .01$).

Demographics: country of origin. Most respondents in Washington (96%), California (71%), and Colorado (78%) identified Mexico as their country of origin (Tables 3.1 and 3.2).

Fewer Mexican-origin survey participants were interviewed in New Mexico (48%) and New Jersey (29.2). In New York, the proportion of Mexican-origin respondents was low (2%). In New Mexico, almost 40% identified the United States as their country of origin, reflecting their long heritage in the country. In New York, most were first generation immigrants from Ecuador, and though most participants in New Jersey also identified Mexico as their country of origin, almost 40% indicated origins in Puerto Rico.

In addition to examining Latino interest in ISE, whether they felt that ISE programs are valuable, and whether they would participate in ISE, analyses also examined demographic characteristics of each site to explore if they related to the three statements. A Chi-square test for independence examined the relationship between educational achievement and study site. The relationship between these variables was significant, $\chi^2(10, N = 995) = 171.04, p < .01$ (Table 3.3). Survey respondents in California and New York had the least education, and 64% and 42% respectively indicated fewer than nine years of school. Despite these differences, educational attainment only affected responses to the statement about family interest in ISE. Attendance at a university did have some effect ($p = .05$).

Table 3.1

Demographic information about Latino community survey respondents at project study sites.

Site	n	Completed High School	Country of Origin	Generations in US ^a (%)			
				1	2	3	4
Washington	185	47%	96% Mexico 4% Other	70	22	8	0
California	102	38%	71% Mexico 19.7% Guatemala 3% Nicaragua 2% El Salvador 4.3% Other	43	33	22	2
Colorado	196	53%	78% Mexico 2.2% Guatemala	52	20	12	12
New Mexico	209	67%	48% Mexico 38% US 22% Other	22	16	14	41
New Jersey	178	52%	50% Puerto Rico 29.2% Mexico 9% US 4% Panama 3% Dominican Republic 2% Guatemala 3% Other	57	26	8	8
New York	120	37%	80.5% Ecuador 11% El Salvador 3% Guatemala 2% Mexico 2% Puerto Rico	76	23	1	0

^a Generations in the U.S. refers to respondents who were first in their family to live in the country (1), second generation (2) third generation (3), or whose families had been in the country for 4 or more generations (4).

Table 3.2

Comparing country of origin and generations in the US by site using Student-Newman-Keuls^{a,b,e} and Tukey's^d post hoc tests.

Site	n	Mexican Origin	Generations in US ^e Subset for alpha = 0.05
Washington	181	.9613 ³	1.3702 ¹
California	97	.70221 ^{1,2,3}	1.3093 ¹
Colorado	181	.7908 ^{1,2}	1.8674 ²
New Mexico	193	.4638 ^{1,2}	2.8705 ³
New Jersey	150	.2921 ¹	1.6667 ²
New York	115	.3729 ¹	1.2522 ¹

Means for groups in homogeneous subsets are displayed, where superscripts indicate .

a. Uses Harmonic Mean Sample Size = 143.189.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Note: Values indicating generations in the US are the mean, where 1 = first generation, 2 = second generation, 3 = third generation, and 4 = four or more generations.

Table 3.3

Years of education by study site.

		Site						Total
		North Cascades	New Jersey	New York	Colorado	California	New Mexico	
Less than 9 yrs	Count	51	30	50	43	111	18	303
	%	28.7%	20.5%	42.4%	22.9%	64.2%	9.4%	30.5%
9-11 years	Count	41	38	24	44	20	30	197
	%	23.0%	26.0%	20.3%	23.4%	11.6%	15.6%	19.8%
12+ years	Count	86	78	44	101	42	144	495
	%	48.3%	53.4%	37.3%	53.7%	24.3%	75.0%	49.7%
Total	Count	178	146	118	188	173	192	995
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Further analysis focused on responses to three statements about interest in ISE. The first two Likert-scale questions, “My family is interested in outdoor nature programs” and “Educational programs about nature are valuable to my family”, established respondents’ interest in programs about nature and the environment and whether or not they valued such programs. The third statement, “I would be interested in participating in an ISE program” determined whether respondents would consider taking part in ISE. Five demographic factors, age, generations in the US, whether the respondent was a Spanish speaker, whether the respondent had attended university, and income were gathered from each community survey participant and were examined to determine their influence on interest in ISE, whether nature programs were considered valuable, and if the respondent would attend an ISE program. The results are summarized in Table 3.4 and described in detail by statement.

Table 3.4

Effects of five factors on Latino responses to statements about ISE.

	Family Interest in ISE			Nature Programs are Valuable			I would attend an ISE program		
	<i>df</i>	<i>F</i>	<i>p</i>	<i>df</i>	<i>F</i>	<i>P</i>	<i>df</i>	<i>F</i>	<i>p</i>
Age	3	7.98	.000*	3	10.24	.000*	3	2.4	.067
Generations	3	1.083	.355	3	1.52	.207	3	2.075	.102
Spanish Speaker	1	3.305	.069	1	2.96	.086	1	14.25	.000*
Attended University	1	3.680	.05*	1	3.495	.062	1	.295	.587
Income	6	.906	.490	6	.621	.714	6	3.622	.001*

* $p < .05$

Note: Details about statistically significant outcomes are provided later in this paper.

Interest in ISE programs. Responses to these initial questions were positive across all sites (Figure 3.1). Interest in programs by site was highest in New Jersey, where 92% of

respondents *Agreed* and *Strongly Agreed* that they were interested in ISE programs (average 4.7). The lowest Likert scale responses were in California and New York, where 80% *Agreed* and *Strongly Agreed* that they were interested in ISE programs (average 4.1). In New Mexico and Colorado, 84% and 89% of respondents chose *Agree* or *Strongly Agree*. ANOVA showed that level of interest at the Leavenworth (WA) site was significantly higher ($p<.05$) than the five other sites (see Table 3.2). Overall, interest increased with age (Table 3.5), and respondents between the ages of 18 and 25 were least interested in ISE. Neither generations in the U.S. nor language influenced interest in participating ($p>.05$). Respondents who had attended university exhibited a slight influence on overall interest in ISE ($p=0.05$).

Table 3.5

Responses by site to Likert scale statements^a about interest in ISE, value of programs, and interest in attending an ISE program.

	Family Interest in ISE (% Agree/Strongly Agree)	Nature Programs are Valuable (% Agree/Strongly Agree)	I Would Attend an ISE Program (% Agree/Strongly Agree)
Washington	4.7 ³	4.9 ³	4.5 ³
California	4.2 ¹	4.4 ^{1,2}	4.0 ^{1,2}
Colorado	4.2 ^{1,2}	4.3 ¹	4.3 ^{2,3}
New Mexico	4.3 ^{1,2}	4.6 ²	4.2 ^{1,2}
New Jersey	4.4 ²	4.5 ²	4.0 ¹
New York	4.2 ^{1,2}	4.5 ²	4.5 ³
	F=9.7	F=15.8	F=7.0
	M=4.5	M=4.5	M= 4.3
	p<.05	p<.05	-<.05

^aLikert scale from one to five, where one was Strongly Disagree, four was Agree, and five was Strongly Agree.

Value of nature programs to respondents' families. Average responses to the second statement were also strongest in Washington (average of 4.9 on a 5 point Likert scale), and the weakest responses were recorded in Colorado (4.3) (Figure 3.2). In New York, California, New Jersey, and New Mexico, over 90 to 95% of respondents responded *Agree* or *Strongly Agree* to the statement. Age of the respondent did influence responses to the second statement, and on average, respondents between the ages of 18 and 25 had a weaker response (average 4.3 out of 5), and those over age 25 a stronger response (>4.5) (Table 3.5). Whether the respondent was a Spanish speaker had no impact, and participants whose primary language was Spanish responded similarly to those who spoke English. Responses by Latinos who had attended university did not differ significantly from respondents with less education ($p>0.5$).

Table 3.6

Effect of age on statements about interest in ISE programs, value of nature programs, and willingness to attend an ISE program.

	n	Family Interest in ISE	Nature Programs are Valuable	I Would Attend an ISE Program
18-25 years	121	4.0 ¹	4.3 ¹	4.1 ¹
25-35 years	343	4.3 ²	4.5 ²	4.2 ¹
36-50 years	348	4.4 ²	4.6 ²	4.3 ¹
> 50 years	129	4.5 ²	4.6 ²	4.4 ¹
		F=7.98 p<0.5	F=10.24 p<0.05	F=2.4 p>0.05

Note: Superscripts indicate homogeneity among responses by age categories. Groups with the same superscript are not significantly different, but groups with different superscripts are significantly different.

I would attend an ISE program. Age played no role in decisions to participate in an ISE program (Table 3.4), and survey participants 18 years and older indicated a high level of interest in participating in programs at the sites. Generations in the US and education were not indicators of interest in attending an ISE program ($p>.05$). Two factors, when the respondent's dominant language was Spanish and income, however, affected interest in attending ISE programs ($p<.05$).

Despite the influences of the five demographic characteristics to statements about interest in ISE, value of ISE, and interest in attending an ISE program, responses were strongly positive (Likert 4.2 to 4.5) (Figure 3.3).

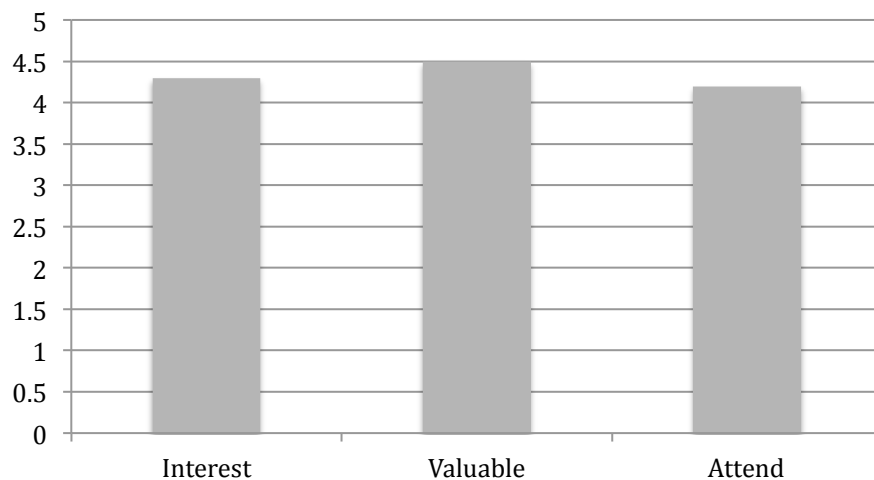


Figure 3.3 Latinos indicated a strong interest in nature programs, that they were valuable to their families, and that they would be interested in attending a program at all sites.

Perceptions about Latino families and about interest in educational attainment were also explored. The opportunity for the entire family to participate was a desired characteristic of ISE programs by Latino respondents, and across sites, the mean response was a Likert 4.3 on a five

point scale. The strongest positive response to any question on the survey, however, was elicited by asking if the family would be more likely to participate “if the program teaches your children about different opportunities for their future”. For this statement, the average response across all sites was 4.5 on the one to five Likert scale, and the mean ranged from a low of 4.25 in Colorado to a high of 4.8 in Washington. On average, 86% of respondents (± 4.8) indicated that this factor would influence their participation in an ISE program.

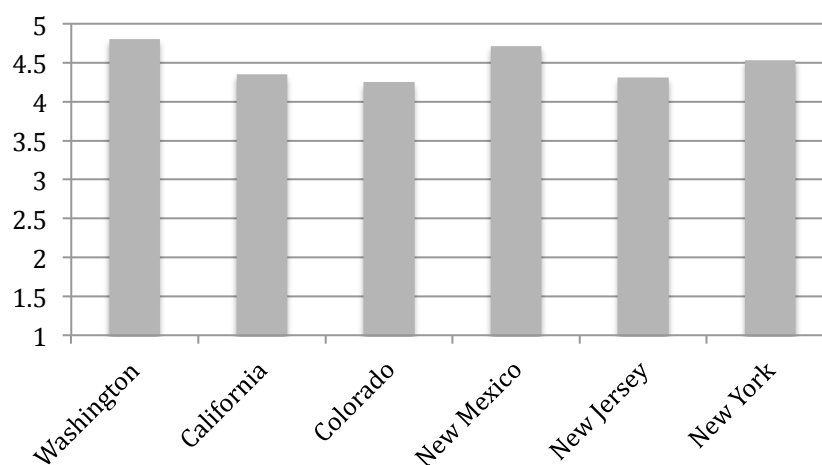


Figure 3.4. Respondents at all sites indicated a strong interest (Likert 4 to 5) in programs that "teach your children about different opportunities for their future".

Discussion

There is widespread confusion over Latino attitudes toward informal science education. As the United States continues to grapple with the growth in the Latino population, environmental organizations and natural areas across the nation are challenged to explain why participation in ISE is low. Like many other agencies and organizations, these groups are working to better understand Latino cultures, to break down stereotypes, and to discover how to merge the nascent power of this group with national efforts to both protect the environment and

to diversify STEM fields. The history of Latinos in the U.S. includes both long-established and new communities, and the influx of new immigrants is mixed with the presence of well-established communities, all with a different story to share about their experiences in the country. The complexity of factors that influence their attitudes toward the environment and their engagement in public science activities is, in part, a reflection of their diverse histories.

Our results highlighted both these similarities and differences among Latino communities across the country and how they affected their participation in informal science education. Though respondents across all sites expressed strong overall interest in ISE programs at natural areas and indicated that they valued these programs, there were slight variations in the strength of the responses depending on various factors, such as the number of generations in the country and respondent age. In Washington, for example, interest in ISE programs, value of ISE programs, and the likelihood of attending ISE programs increased with age. Though we did not examine why the responses became more positive with age, it was likely that these youth were not yet concerned about the needs of a family, including children. Furthermore, most respondents in Washington were first generation, and this newer population has had less time to establish itself in the community. Newer arrivals tend to come to the region to work in the apple orchards or other agricultural crops. Work days and weeks are often long, leaving little leisure time.

Our results echoed more recent findings that showed that Latinos valued their ethnicity and family, and that a slight majority identified with their family's country of origin (Taylor, Lopez, Martínez & Velasco, 2012). Most Latinos considered their commitment to family to be one of the building blocks of society (Barna Group, 2013). Our results supported that family is central to interest in participating in ISE programs. If the entire family can't be included, willingness to participate would drop. Because Latino families tend to be multigenerational and

extend beyond the nuclear family, programs need to address the participation and needs not only of youth and their parents, but also grandparents, and other adults (aunts and uncles).

In informal discussions with non-Latino staff at study sites, various opinions were expressed to explain why Latino participation numbers were low, many of which conflict with the data presented above. According to one respondent, the primary reason is that *education/higher learning/expanding your horizons are – in general – not a significant part of this culture*. Another staff person responded that it was due to *a lack of awareness/appreciation for their natural world*, while an educator lamented that *the Hispanic adults in general seem to have no interest no matter what we do*. Other explanations assumed that lower socioeconomic status translated into lowered concern about the outdoors and the environment. The issues surrounding Latino participation in informal science learning are complex, and barriers may exist on both the part of Latinos and among informal science education non-Latino staff. It is clear, however, that while Latino participation in ISE is low, this audience does value informal science education and is very interested in opportunities to participate. Incorrect preconceptions about Latino values and attitudes may influence natural area staff investment of time and energy in outreach to this group, so providing accurate data on Latino interest in nature and STEM-related activities is critical.

Conclusions and Moving Forward

While political analysts were busy examining the impacts of race and ethnicity on the 2012 presidential campaign, conservations were doing the same, but with a focus on the environment. The good news is the conclusion that protecting the environment is a core value in Latino culture (Fahey, 2012). Protection of the environment is very personal to this audience, and Latinos strongly favor parks and outdoor activities, protection and expansion of public lands,

and actions that slow climate change. These values are strongly related to the importance of family and community to Latinos, as well as a strong sense of faith and responsibility. Over 92% of Latinos expressed a moral responsibility to protect the earth's natural resources, and 94% indicated that outdoor activities, including visiting national parks, is important, despite their absence from these places. A review of Latino voting also revealed that how Latinos value natural resources and their attitudes toward conservation are not incompatible with the goals of natural resource managers. Indeed, this audience will become a powerful player in future conservation decisions, especially as stereotypes about Latino culture continue to be disproved.

Yet these results are also contrary to research. If Latinos rated outdoor activities as important, why aren't they visiting natural areas or participating in informal science education? If the myth of Latino engagement in natural resource conservation has been unmasked, should educators cease their efforts to increase participation by this audience in informal science education programs? While increasing Latino engagement may make no difference in their already strong willingness to support conservation at the polls, encouraging their participation is a social obligation that must be fulfilled to provide opportunities for all people living in the U.S. Further research focusing on visitation to natural areas is clearly needed to help identify the factors that are contributing to the absence of Latinos.

Finally, a complexity of issues may be affecting Latino engagement in informal science education and visitation to natural areas. These factors may include language preferences, cost, country of origin, number of generations in the U.S., and Latino histories in the country, to name a few. It is also essential to examine how natural resource managers, educators, and others are engaging with this audience. Studies have shown that adapting programs to better meet the needs of Latino audiences can be effective in increasing Latino participation (Hobbs & Sawyer, 2009;

Korzenny, 2011; Sorenson, 2010). However, little research has been conducted to examine if, inadvertently, Anglo-American culture and values are negatively impacting Latino participation or if other considerations influence their decisions to take part in informal science learning.

REFERENCES

- Allen, S. D., Wickwar, D. A., Clark, F. P., Dow, R. R., Potts, R., & Snyder, S. A. (2009). *Values, beliefs, and attitudes technical guide for Forest Service land and resource management, planning, and decisionmaking*. Gen. Tech. Rep. PNW-GTR-788. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Allison, M.T. & Hibbler, D.K. (2004). Organizational barriers to inclusion: Perspectives from the recreation professional. *Leisure Sciences*, 26:261-280.
- Barna Group. (2013). *The longer Hispanics experience US culture the less socially conservative they become*. Retrieved April 1, 2014 from: <http://hispanics.barna.org/the-longer-hispanics-experience-u-s-culture-the-less-socially-conservative-they-become/>
- Bevan, B. & Semper, R.J. (2006). *Mapping informal science institutions onto the science education landscape*. San Francisco, CA: The Center for Informal Learning and Schools.
- Bowie, M. (2010). *Boulder county parks and open space: 5-year visitor study – 2010*. Retrieved from the Boulder County website: <http://www.bouldercounty.org/os/culture/posresearch/2010posfiveyear.pdf>
- Bruyere, B. L., Billingsley, E., & O'Day, L. (2008). A closer examination of barriers to participation in informal science education for Latinos and Caucasians. *Journal of Women and Minorities in Science*, 14(4):431-445.
- Butz, W., Gabrielle Bloom, Mihal Gross, K. Kelly, Aaron Kofner and Helga Rippen. (2003). *Is there a shortage of scientists and engineers? How would we know?* Santa Monica, CA: RAND Corporation, 2003. Retrieved November 5, 2011, from http://www.rand.org/pubs/issue_papers/IP241.
- Duren, K. (n.d.) *Española's early history*. Retrieved from <http://www.espanolanmchamber.com/pages/EspanolasHistory>.
- Early San Rafael*. (2008). Marin History Museum. Arcadia Publishing, San Francisco, CA.
- Falcon, P. (2003). Only strong women stayed. *Frontiers*, 24:2 & 3.
- García, C. (1992). *Dreaming in Cuban*. New York: Ballantine Books.
- Garcia, J. (2007). *Mexicans in north central Washington*. Arcadia Publishing, San Francisco, CA.

- Garcia, J. (2012). *Latino politics in America, community, culture, and interests*. Rowman & Littlefield Publishing Group, Inc.
- Hickox, A. (2008). *Latino and Hispanic perceptions of open space in Boulder County*. Retrieved September 22, 2011 from <http://www.bouldercounty.org/live/environment/land/.../2008hickcox.pdf>
- Hobbs, B. B., & Sawyer, B. (2009). *Engaging Latino youth in community-based programs: Findings from the first ten years of the Oregon 4-H Latino outreach project*. Oregon State University, Corvallis: OR.
- Hong, A., & Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education*, 37(4), 33–44. doi:10.3200/JOEE.37.4.33-44
- Korzenny, F. (2011). *Marketing trends in a new multicultural society*. Retrieved from <http://felipekorzenny.blogspot.com/>
- Landivar, L. C. (2013). Disparities in STEM employment by sex, race, and Hispanic origin. *American Community Survey Reports* (p. 25). Retrieved from <http://www.census.gov/prod/2013pubs/acs-24.pdf>
- Llorente, E. (2012). Election 2012: *Obama wins re-election, clinches Latino vote*. Retrieved from <http://latino.foxnews.com/latino/politics/2012/11/06/election-2012-obama-wins-re-election-after-clinching-ohio/>
- Lynch, B.D. (1993). Garden and the sea: U.S. Latino environmental discourses and mainstream environmentalism. *Social Problems*, 40(1): 108-124.
- Mize, R. and Delgado, G.P. (2012). *Latino immigrants in the United States*. Polity Press: Cambridge, UK.
- Office of Personnel Management. (2011). *Hispanics in federal government*.
- Passel, J. S., Cohn, D., & Lopez, M. H. (2011). *Hispanics account for more than half of nation's growth in past decade*. Retrieved from Pew Research Center, Hispanic Trends Project website: <http://www.pewhispanic.org/files/reports/140.pdf>
- Shaw, D. (1994). Immigration and ethnicity in New Jersey history. New Jersey Historical Commission, Dept. of State. Trenton, NJ. Retrieved from: http://sites.bergen.org/ourstory/Resources/industrialrevolution/paterson/secondarysources/NJHS/Immigration_in_NJ.pdf
- Sorensen, E. K. (2010). *A process for building the capacity of informal science education providers to engage Latinos*. Colorado State University.

- California State Parks, Planning Division. (2009). *Complete findings: Survey on public opinions and attitudes on outdoor recreation in California*. Retrieved from http://www.parks.ca.gov/pages/795/files/2009%20spoa%20complete%20findings%209_28_09.pdf
- Taylor, P., Lopez, M.H., Martínez, J.H., & Velasco, G. (2012). *When labels don't fit: Hispanics and their views of identity*. Pew Hispanic Center. Washington, D.C. <http://www.pewhispanic.org/files/2012/04/PHC-Hispanic-Identity.pdf>
- U.S. Census Bureau. (2001). The Hispanic population. U.S. Department of Commerce. Retrieved from <https://www.census.gov/prod/2001pubs/c2kbr01-3.pdf>
- U.S. Census Bureau. (2014). *Brighton QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/08/0808675.html>
- U.S. Census Bureau. (2014). *Cape May County QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/34/34009.html>
- U.S. Census Bureau. (2014). *Española QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/35/3525170.html>
- U.S. Census Bureau. (2014). *Patchogue (Village) QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/36/3656660.html>
- U.S. Census Bureau. (2014). *Wenatchee QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/53/5377105.html>
- U.S. Census Bureau. (2014). *Wildwood QuickFacts: 2013*. Retrieved from <http://quickfacts.census.gov/qfd/states/34/3481170.html>
- Walker, B. (2009). *The Sierra Club racially disparages its mostly white membership*. Retrieved November 5, 2011 from <http://www.vdare.com/posts/the-sierra-club-racially-disparagesits-mostly-white-membership>.
- Wallace, S. J. (2012). It's Complicated: Latinos, President Obama, and the 2012 election. *Social Science Quarterly*, 93(5), 1360–1383. doi:10.1111/j.1540-6237.2012.00922.x

CHAPTER IV

Preferences Associated with Latino Participation in Informal Science Education

Informal science education (ISE) is an important form of education and is thought to play a significant role in recruiting students to STEM formal coursework and careers. ISE events at natural areas are common nationwide and are available to broad audiences in both rural and urban settings. Despite the growing Latino population in the United States, Latino participation in ISE lags behind that of other ethnic groups. Informal science centers and educators have conducted considerable outreach to Latinos, but few studies have examined the barriers to their engagement. Why, given attitudes reported in Chapter III, do Latinos not participate in ISE programs at natural areas, and why are attempts to improve outreach often unsuccessful?

International Migratory Bird Day (IMBD) is a hemispheric celebration of migratory birds and their journeys between non-breeding grounds in Latin America and the Caribbean and nesting sites in the United States and Canada. By 2013, the event was hosted from Canada to Argentina at over 620 sites, including wildlife refuges, national, state and city parks, nature centers, and other diverse locations. Typically, these events are designed for families and offer guided bird walks, bird-focused presentations, birds of prey flight demonstrations, and other activities that help youth and adults learn about bird biology, ecology, and identification.

In the early 2000's, IMBD host organizations in the United States began requesting education materials in Spanish, recognizing both new and growing Latino communities near their sites. Their requests mirrored the changes in the nation's demographics. By 2000, the Latino population had increased to 35.3 million and continued to grow to almost 50 million by 2010 (Kent, 2001; Ennis, Ríos-Vargas & Albert, 2011). The decade from 2000 to 2010 saw not

only overall growth in the Latino population, but also increased diversity (Motel, 2012; Motel & Patten, 2012; U.S. Census Bureau, 2011). While Puerto Ricans, Cubans, and ethnic Mexicans comprised the majority of the population at this time (9.2, 3.5, and 63 percent respectively), by 2010 immigrants had also arrived from Central America and comprised 7.9% of the U.S. population, the Dominican Republic (2.8%), and South America (5.5%). These populations grew at a rapid rate. For example, the Honduran population increased 191% during this time.

Regrettably, the availability of Spanish language materials during IMBD programs and events did not increase Latino participation. While no data were collected, staff at host organizations noted, anecdotally, that this audience's participation continued to lag. This awareness has been expressed by numerous other informal science education (ISE) centers across the United States, but data quantifying the absence of Latinos and the barriers to their participation tended to be site-specific.

In 2009, we began a four-year research project that sought to quantify the absence of Latinos from ISE, to identify some of the barriers to their participation, and to adapt activities at our study sites to determine if we could effect changes in participation. Our baseline studies conducted in 2009 and 2010 accomplished our first goal and revealed that Latino participation in IMBD and other similar nature-based events hosted across the U.S. ranged from complete absence to 15.6%, even though Latinos comprised 29% to 87% of the overall populations in nearby cities (U.S. Census Bureau, 2014). To understand this low rate of participation, we conducted over 1,000 face-to-face interviews with Latino adults at six study sites across the country to identify factors that may influence decisions by this audience to visit a natural area and participate in an ISE program, such as International Migratory Bird Day. These data may

serve as a foundation for developing more effective outreach at other sites, where the barriers are likely to be similar.

Literature Review

Informal science education (ISE) through active participation in inquiry-based experiences has both academic and social benefits for diverse youth and their families and has been shown to improve science literacy and academic achievement, to promote positive attitudes toward science, and to influence youth to pursue careers in science (Bell, et al., 2009; Zoldosova & Prokop, 2006). The challenges of *how to engage* an increasingly diverse population have been largely overlooked and may contribute to continued lack of Latino engagement in ISE, despite considerable attention given to science learning by diverse audiences. Learning Science in Informal Environments (2009), for example, addresses the terms “learner” and “student” three times as often as the terms “educator” and “teacher”. Yet ISE educators are challenged to meet the needs of diverse audiences and lack training in bilingual, multicultural education, though they will continue to provide learning opportunities for an increasingly heterogeneous population (Howard, 2003). While knowledge of barriers to Latino participation in ISE is growing, few data exist that describe barriers to the increasingly diverse Latino population. As a result, research on how to structure programs and events to meet the needs of diverse groups is in its nascence (Bell, et al, 2009; Conway 2013).

The need to develop science programs that engage Latino youth is evident and more pressing than ever, as the past 30 years have seen dramatic changes in the demographics of America’s schoolchildren. Since 1972, the enrollment of Latino students has increased from 6% to 20% nationwide (Passel & Cohn, 2008), yet their performance in the sciences remains well below that of White and Black students, even though their aspirations in science careers are

similar. Headline news at University of Southern California read, “Few Latino students enter science fields” (Perez, 2010), and this was at a university located in Los Angeles, CA, where over 48% of the population is Latino. Nationwide, Latinos in STEM are severely underrepresented (Crisp & Nora, 2012; Landivar, 2013; and Litow, 2013), even though they are one of the fastest growing populations in the U.S. Their participation in STEM has been projected to lag behind their Non-Hispanic White counterparts (Chapa & De La Rosa, 2004; Taningco, Matthew, & Pachon, 2008). According to colleges, a student’s decision to enter a STEM field is made long before entering college, “but Latino students have little awareness of the types of careers available in science fields”. The middle school years are critical for science education, and if we fail to capture “students’ interest and enthusiasm in science by grade 7, students may never find their way back to science” (NSTA Position Statement, 2003; Tai, Liu, Maltese & Fan, 2006). This task is even more challenging with Latino youth, whose families may not view science as relevant and accessible (Peticolas, Mendez, & Hawkins, 2013).

Some research has identified obstacles to Latino engagement. Birnback, Chavez, and Friedman et.al. (2009) highlighted language, legal status, transportation, time, income, lack of familiarity, and cultural inhibitions as leading factors. O’Day (2007) conducted focus groups with Latino parents and found an overlap with some of Birnback’s (2009) results, including cost, transportation, and language, but also identified lack of programs for family engagement and lack of awareness of programs as obstacles. Hong and Anderson’s (2006) research and interviews with Latino parents and leaders echoed these findings, but added lack of familiarity with the program site as the greatest barrier. In his research, the study site was a nature center located across the street from the school which most of the interviewees’ children attended, demonstrating that proximity to a location does not ensure familiarity. Research based on

surveys and focus groups (Chawla, 2007) continued to lengthen the list of barriers: the results of focus group discussions and quantitative surveys conducted in Larimer County, Colorado, which showed that respondents were also concerned about safety.

In 2009 and 2010, we conducted almost 1,000 face-to-face surveys with Latino adults at six sites across the United States. Our goal was to explore a range of factors, from ISE program format and host site characteristics to income, age, and generations in the United States, to explain some of the barriers to Latino participation in ISE. No prior study had examined multiple sites and diverse Latino communities to explore this issue.

Methods

Introduction. We selected six study sites located near significant Latino populations. We used convenience sampling within these communities and approached individuals at businesses and other public events, and worked with local Latino-serving organizations, such as churches and community centers, to reach a broad suite of respondents. Due to the length of the survey (approximately 20 minutes), we offered small incentives, such as t-shirt or water bottles, for completion.

Research Instrument. A two-page, 30-question survey was developed in English and translated into Spanish, so that it could be administered to both English and Spanish-speaking Latino adults ages 18 and older. The survey included four sections that addressed the following issues: 1) characteristics of education programs that influence Latino participation (six items), including day of the week, availability of transportation, and the topic of the event, 2) practical considerations, such as cost and familiarity with the host organization, that influence decisions to participate in education programs (five items), 3) preferences for how, where, and with whom programs are delivered (seven items), and 4) respondent demographics (ten items). Questions in

sections one through three used a five point Likert scale, in which 1 indicated strong disagreement and 5 indicated strong agreement. Section five had ten close-ended questions. An additional open-ended question asked about the most effective means of communicating with the respondent about program information (e.g. newspaper, radio, schools). Other data included the zip code of the respondent, the interviewer name, date of the survey, and general location in the community, such as a school or library.

Data were collected by bilingual, native Spanish speakers who were employed as interns at each of the six study sites. They attended community events and festivals, visited local businesses, churches, and schools, and participated in other venues where high numbers of Latino individuals were anticipated. Interns were trained on how to conduct the surveys and each received a bilingual script that detailed their introduction of the survey to participants. Interns also offered respondents a bilingual description of the purpose of the research and the opportunity to request results. Each survey required approximately 20 minutes to complete.

Analysis. Quantitative data were analyzed using statistical software analysis program (SPSS v. 17) and used to generate descriptive results (e.g., averages, percents), test differences between groups (e.g., differences between income levels, countries of origin, years lived in the United States) and to generate predictive models (e.g., factors that influence future participation). Statistical significance was tested in most cases using ANOVA at the .05 level, indicating results in which we can be 95% certain are attributable to something other than random error.

Results

Demographics. While most survey respondents across all sites identified as Mexican, (57%), others identified as Guatemalan (4%), Ecuadorian (4%), Ecuadorian (9%), and Puerto Rican (9%) (Table 4.1).

Table 4.1

Demographic information about Latino Community Survey respondents at project study sites.

Site	n	Completed High School	Country of Origin	Generations in US ^a			
				(%)			
				1	2	3	4
Washington	185	47%	96% Mexico 4% Other	70	22	8	0
California	102	38%	71% Mexico 19.7% Guatemala 3% Nicaragua 2% El Salvador 4.3% Other	43	33	22	2
Colorado	196	53%	78% Mexico 2.2% Guatemala	52	20	12	12
New Mexico	209	67%	48% Mexico 38% US 22% Other	22	16	14	41
New Jersey	178	52%	50% Puerto Rico 29.2% Mexico 9% US 4% Panama 3% Dominican Republic 2% Guatemala 3% Other	57	26	8	8
New York	120	37%	80.5% Ecuador 11% El Salvador 3% Guatemala 2% Mexico 2% Puerto Rico	76	23	1	0

^a Generations in the U.S. refers to respondents who were first in their family to live in the country (1), second generation (2) third generation (3), or whose families had been in the country for 4 or more generations (4).

The Puerto Rican population was located almost entirely at the New Jersey site, and the Ecuadorian population was only found in New York. The communities surveyed also varied by number of generations living in the United States (Table 4.2). Fifty-six percent of respondents were first generation in the United States, while 22% were second generation, 9% were third

generation, and 14% were fourth generation. The sites differed significantly in the generation of the respondents ($p < .05$, Table 4.2).

Table 4.2

Similarities in generations in the U.S. by site.

Site	n	S-N-K
New York	115	1.2522 ¹
California	97	1.3093 ¹
Washington	181	1.3702 ¹
New Jersey	150	1.667 ²
Barr Lake	181	1.8674 ²
Bandelier	193	2.8705 ³

Note: Subsets indicate average responses by site and groups similarities using the Stewart-Newman-Keuls (S-N-K) test for unequal sample sizes. Significant at the $p < 0.05$ level.

New York, California, and Washington represented predominantly first generation populations, and had only two respondents indicate presence in the country for four or more generations. Sites in Colorado and New Jersey, though primarily first generation (52% and 57%, respectively), also included second, third, and fourth generation respondents. Only Bandelier had a significant proportion of respondents who were fourth generation or more in the country (Table 4.2).

Awareness of programs. Lack of awareness of ISE programs offered at each site was a key factor affecting Latino participation (Figure 1). Respondents in Washington and New Mexico showed the greatest awareness, with approximately 18% and 15% respectively responding with “Agree” or “Strongly” that they did know that programs were offered.

Responses at the remaining four sites did not exceed 10%, and the lowest level of awareness was in New York (6%). Almost 90% of all respondents revealed that they did not know about ISE programs (“Strongly Disagree” and “Disagree”).

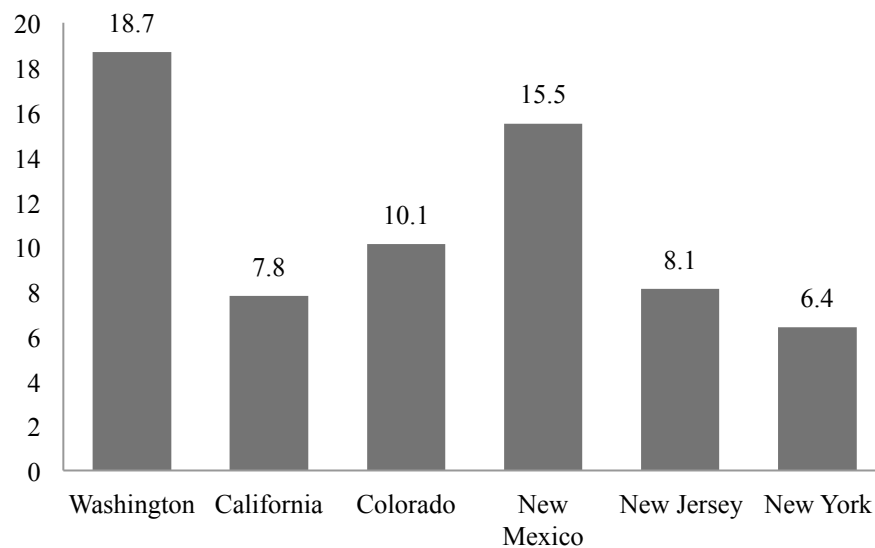


Figure 4.1. Percent of Latino respondents who selected "Agree" or "Strongly Agree" that they were aware of ISE programs at the survey site.

Comparison of Variables by Site

ANOVA with Student-Newman-Keuls post hoc test was used to examine the influences of program characteristics and family considerations on Latino participation in ISE. The results are provided in Tables 4.3 and 4.4. Discussions about the results follow the tables.

Table 4.3

Comparison of responses (mean) to statements about ISE program characteristics that might influence Latino participation at six study sites.

	Day of the Week	Program Cost	Transportation to Program	Program is Led in Spanish	Program Topic
WA	4.7 ²	4.3 ²	4.1 ³	3.6 ²	3.3 ³
CA	4.2 ¹	3.4 ¹	3.2 ²	4.5 ³	2.9 ²
CO	4.3 ²	3.4 ¹	2.0 ¹	3.9 ²	3.0 ²
NM	4.0 ¹	3.5 ¹	2.9 ²	3.3 ¹	3.0 ^{2,3}
NJ	4.1 ¹	3.5 ¹	3.0 ²	3.9 ²	2.5 ²
NY	4.2 ¹	3.8 ¹	4.0 ³	4.6 ³	1.8 ¹
	F=7.4 p<.05	F=12.203 p<.05	F=50.23 p<.05	F=31.10 p<.05	F=16.28 p<.05

Note: Anova results for each Likert item were significant across all sites. A post-hoc Student-Newman-Keuls test of the means (p<.05) showed between-site relationships using groups (superscripts 1,2,3,4).

Table 4.4

Comparison of responses (means) to statements about family-related considerations that might influence Latino participation at six study sites.

	Family May Attend	Program is Near Home	Shows Kids Future Opportunities	Hosted with Familiar Organization	Presented by a Latina/o
WA	4.8 ³	4.5 ²	4.8 ³	3.3 ¹	3.7 ¹
CA	3.8 ¹	4.1 ¹	4.4 ¹	4.0 ³	4.2 ³
CO	4.2 ²	4.0 ¹	4.2 ¹	3.7 ²	3.9 ²
NM	4.0 ^{1,2}	4.5 ²	4.7 ³	4.3 ⁴	4.0 ²
NJ	4.0 ^{1,2}	4.2 ¹	4.3 ¹	3.7 ²	3.9 ²
NY	4.2 ²	4.2 ¹	4.5 ²	4.2 ^{3,4}	4.4 ⁴
	F=18.87 p<.05	F=8.961 p<.05	F=17.538 p<.05	F=26.03 p<.05	F=10.90 p<.05

Note: Anova results for each Likert item were significant across all sites. A post-hoc Student-Newman-Keuls test of the means (p<.05) showed between-site relationships using groups (superscripts 1,2,3,4).

Program characteristics. We examined responses to statements that addressed the day of the week on which a program was offered, cost of a program, transportation, language spoken at the program, topic of the education program, and familiarity with the organization offering the

education program. Responses to program characteristics that might affect participation also showed some differences between sites. The strongest preference for weekend opportunities was recorded in Washington (average 4.7 on a 5 point Likert scale), though responses at all other sites were also above 4 (4.0 to 4.3). Responses issues related to cost were more complicated. No communities indicated that cost was a major factor to participating in ISE (all sites showed scores below 3.2). The Colorado and California sites expressed the least concern about cost (average scores of 2.0 and 2.2 respectively), while respondents in New Jersey, Washington, and Fire Island expressed the most concern (3 to 3.2). New Mexico respondents fell in the middle, with an average response of 2.7.

Family considerations. The results of responses to practical considerations about an ISE program also varied among sites. Participants in Washington had the least confidence in a site's ability to meet its needs, while respondents in California, New York, and New Mexico had greater confidence ($p < 0.05$). Colorado and New Jersey respondents fell in the middle, though like the Washington site, their average responses were below four.

Responses related to transportation to the site did not correspond to actual distance from the study site, indicating that absolute distance was not a major factor (within the ranges examined in this study, Table 4.5). Respondents in New Mexico who are located almost 25 miles from the site showed less concern than respondents in both New York and Washington, which are 13.28 and 22.95 miles (respectively) from the study sites.

Table 4.5

Influence of distance from the study site on willingness to travel to an ISE program.

	Average Response	Distance from nearest city to study site (miles)*
Washington	4.1	22.95
California	3.1	11.45
Bandelier	2.9	24.99
Colorado	1.9	7.62
New York	4.0	13.28
Cape May (NJ)	3.0	7.02

Note: Average response by site where 1 was *No Influence* and 5 was *Strong Influence*. ($p > .05$).

In addition, the responses from New Jersey and New Mexico (3.0 and 2.9 respectively), showed similar levels of concern, even though these sites represented the shortest and farthest distances. If travel was a barrier, the resistance associated with any given distance could be very site specific and reflect, for example, how far people must travel for other necessities and amenities. Our study was not designed to quantify this possibility, so we only conclude that distance is not a direct predictor of participation.

Preferences for how programs are delivered also showed similarities and differences among sites. Opportunities for the whole family to attend evoked the most positive response in Washington, but all other responses averaged 4.0 or above, with the exception of California, where the average response was slightly lower (3.8). The importance of this factor is consistent with results and discussion concerning the role of families, discussed in previous chapters.

The preference for programs led in Spanish almost completely mirrored the number of generations in the U.S. by site. That is, the sites with greater longevity in the U.S. showed a lower preference for programs led in Spanish (New Mexico), while sites with more first

generations respondents showed a stronger and significant ($p < 0.5$) preference for Spanish-led opportunities (California and New York). The preference for Spanish-led programs in Washington, however, was more similar to the responses in Colorado and New Jersey, sites with generations spanning all categories. However, when survey participants were asked more generally if language of the program would influence their decision to participate, these results changed. Fire Island and Washington respondents expressed the strongest response to the importance of language, while the other sites indicated that language was not as important a factor (3.3 to 3.6). The results from California fell in the middle with an average response of 3.8.

The importance of programs that are led by another Latino showed greater disparity among sites and average responses ranged from 3.7 to 4.4. Respondents in New York had the strongest preference for programs led by another Latino, while respondents in Washington showed a lower preference (3.7). For New York and California respondents, this result was also similar to their preference for programs offered in Spanish. New Mexico respondents, however, indicated that while they had a preference for programs led by another Latino, there was only a slight preference for Spanish-led programs.

Preference for programs offered on the weekend also resulted in mixed responses. In New Jersey, respondents did not prefer weekend programs, but in Washington and New York, there was a strong preference for opportunities provided on weekends. The remaining sites, while in New Jersey, weekends were not preferred. The remaining sites also preferred weekends, but their responses were not as strong as Washington and New York.

The result that was strongest across all sites was the preference for programs that offered their children opportunities that might benefit them in the future. Average response at each site

ranged from a low of 4.3 (Colorado) to a high of 4.8 (Washington). The average across all sites was 4.5.

Discussion

In 2000, some International Migratory Bird Day host organizations requested Spanish language materials to meet the needs of Latino event participants. Our research showed that there is not one simple answer or “quick fix” to the challenges of engaging Latinos in ISE. Spanish language materials did not improve Latino participation at IMBD sites over a decade ago, and this simple solution would not suffice today either. The good news is that some of the barriers to Latino participation are clear and may be relatively simple to resolve.

All of our study sites expressed a lack of awareness of natural areas and the ISE programs they offer. This may seem inconceivable to many populations in the United States. National parks, nature centers, and other protected wild areas are part of America’s heritage. The protection of areas of spectacular natural beauty is an American undertaking that remains unparalleled throughout the world. Wild places were not the focus of art, photography, literature, or research in Latin America, as much as in the United States, so there is no environmental history that details the region’s flora, fauna, and wild places equivalent to what has developed in the U.S., nor have most. Furthermore, many Latin American countries have not had a long history of protected areas, nature centers, and ISE programming.

For example, the first field guide to the birds of North America was published in 1934 (Peterson), but the first guide to the birds of Mexico was not published until 1972, and it was in English. Latino residents in the U.S. may have little or no knowledge of the systems of natural areas that are available to them. While we would anticipate that this may be true primarily for first generation Latinos, we found a lack awareness across all generations, though it was much

greater in first generation respondents. Recall that Chawla (2007) had similar results. Parents who participated in his research were unaware of the ISE center, even though it was located across the street from their children's elementary school. As a result, ISE centers should not assume that the longevity of a Latino population in the country translates into greater knowledge of ISE opportunities.

Our research also showed that one of the most important aspect of the program format is its ability to involve the entire family. This was important across all sites, and most important in Washington. This preference is likely the result of the multigenerational nature of Latino families. Over 10% of Latinos lived in multigenerational homes (Abrahms, 2013) and also spent leisure time together. If the extended Latino family is not included in the activities, they will choose other opportunities. This response indicated the importance of informing potential participants of the nature of ISE programs, especially nature-based events and festivals which tend to involve all ages.

A third response that was extraordinarily high was in response to participation in ISE if : *The program teaches your children about different opportunities for their future.* Across all sites, average responses to this statement at each site indicated that Latinos would be *Somewhat More Likely* (4) to *Much More Likely* (5) to attend. Interestingly, the sites with the highest responses were Washington, which was predominantly first generation and had no 4th generation respondents, and New Mexico, which had a large survey pool of 4th generation respondents. Clearly generations in the U.S. did not influence the strength of this response, and while differences between some sites were statistically different ($p < 0.5$), they don't reflect dramatically different preferences between communities.

Language also played an important role in a family's decision to participate in ISE, though the results were complicated. The influence of language was measured in two ways on the survey. First we asked the effect of language on a respondent's decision to participate in ISE. The responses could range from *No Influence* (on the decision) to *Strong Influence* (on the decision). Later in the survey, we asked participants to respond to the statement: *How do the following affect the likelihood of your family participating in an education program at the site* (varied by location). Responses could range from *Much less likely to attend* to *Much more likely to attend*. The variation in the responses among sites could be the result of the way these statements were phrased. The second statement was much clearer and identified Spanish as the alternative.

Generations in the United States contributed to the importance of Spanish-led programs. Communities, such as the study site in Washington, that are comprised mostly of first generation Latinos have had less time to learn English. Though their children may speak English, the adults may not or may be limited in their fluency. The need for Spanish-language programs was highlighted anecdotally during a survey with a Latina adult in Washington. She responded to the statement by sharing that, *I've lived here for 10 years, and I still don't speak English. I can't even order a coke.*

Even though Spanish-led programs may become less important with generations in the country and as family members learn English, Spanish language remains an important part of Latino culture. Research has shown that for Latinos, language has a greater influence on their views than all other factors, including generations in the country, income, religion, political party, and country of origin (Pew Hispanic Center, 2004). Almost half of Latinos in the country (47%) were primarily Spanish speakers, and 28% were bilingual. Even in New Mexico, where the

response to programs offered in Spanish was almost neutral, conversations with survey respondents revealed the importance of language. *I don't need information in Spanish*, an event participant commented, *but when I saw it* (ISE promotional material in Spanish), *I knew you were serious*.

Some of the factors that we anticipated would have a strong influence on decisions to participate in ISE did not seem to play a role. Cost, for example, was a consideration, but concern about cost was not strong across sites. Other factors whose influence we did not measure may have influenced some responses. For example, respondents in New York had a stronger preference for Latino-led programs than all other sites. The New York Latino community has experienced considerable tensions that have arisen as a result of their rapid population growth in this state and resulted in the murder of a young Ecuadorian in our study the year we began the study. California respondents also expressed a preference for Latino-led programs. This study site had experienced immigration raids during the time of the surveys, and respondents were nervous about participating in this research. The ethnic tensions may have also affected their interest in participating in White-led programs.

Conclusions and Moving Forward

Based on our research, there are many factors that might improve Latino participation in ISE. The considerations explored above, however, are elements of programming that any organization may address to improve the likelihood that Latinos will visit their sites and take part in their programs. At the same time, it is important that sites conduct some of their own research to better understand nearby Latino populations. This does not require extensive surveys, but rather examination of the U.S. Census and research on immigration patterns in their state or city.

Once again, however, few studies have examined the barriers to Latino participation and then returned to the sites to adapt programming and determine the subsequent level of success. That is, if a site improves awareness of their location and the ISE programs they offer among Latinos, provides Spanish-led programs, creates activities for the entire family, and ensures that youth receive information about opportunities that will benefit them in the future, will Latinos come? Based on our research, we recommend the following to sites seeking to achieve Latino participation:

- Learn about nearby Latino communities to better understand their composition, longevity in your city, and languages spoken;
- Participate in programs and activities hosted by Latinos and for Latinos, such as Cinco de Mayo events;
- Modify outreach materials to incorporate the following:
 - information in both English and Spanish;
 - images of Latino youth and adults;
 - clear information about any fees;
 - directions to your site by both car and public transportation (if available).
- Adapt the ISE programs to include:
 - activities for multigenerational families;
 - Spanish-led and/or bilingual components.

REFERENCES

- Abrahms, S. (2013). *Three generations under one roof*. American Association of Retired People. Retrieved from: <http://www.aarp.org/home-family/friends-family/info-04-2013/three-generations-household-american-family.html>
- Assimilation and Language*. (2004). Pew Hispanic Center: Washington, DC. Retrieved from <http://www.pewhispanic.org/2004/03/19/assimilation-and-language/>
- Bell, P., Lewenstein, B., Shouse, A.W., & Feder, M.A. (2009). *Learning science in informal environments: people, places, and pursuits*. The National Academies Press. Retrieved from http://www.nap.edu/openbook.php?record_id=12190
- Birnback, L., Chavez, M., Friedman, W., & Rowlett, I. (2009). *Public engagement and America's growing Latino population*. Retrieved from http://www.publicagenda.org/files/CAPE_Public_Engagement_and_Americas_Growing_Latino_Population.pdf
- Chawla. (2007). A comparison of Latino and Caucasian barriers. *Environmental Education Research*, 13(4), 437–452.
- Conway, T. D. (2013). *An assessment of natural resource outreach and conservation education program needs for Latino audiences associated with the Sam Houston National Forest in Texas*. Stephen F. Austin State University.
- Crisp, G., & Nora, A. (2012). *Overview of Hispanics in science, mathematics, engineering and technology (STEM): K-16 representation, preparation and participation*. Hispanic Association of Colleges and Universities.
- Ennis, S. R., Ríos-Vargas, M., & Albert, N. G. (2011). *The Hispanic population: 2010*. Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf>
- Edwards, E. (1972). *A field guide to the birds of Mexico*. Ernest P. Edwards. Sweet Briar: VA.
- Hong, A., & Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education*, 37(4), 33–44. doi:10.3200/JOEE.37.4.33-44
- Kent, M. M., Pollard, K. J., Haaga, J. & Mather, M. (2001). First Glimpses from the 2000 U.S. Census. *Population Bulletin* 56, 2:14.
- Landivar, L. C. (2013). Disparities in STEM employment by sex, race, and Hispanic origin. *American Community Survey Reports*. Retrieved from <http://www.census.gov/prod/2013pubs/acs-24.pdf>

- Motel, S. (2012). *Statistical portrait of Hispanics in the United States, 2011*. Retrieved from <http://www.pewhispanic.org/2012/02/21/statistical-portrait-of-hispanics-in-the-united-states-2010/>
- Motel, S., & Patten. (2012). *The 10 largest Hispanic origin groups: Characteristics , rankings, top counties*. Retrieved from <http://www.pewhispanic.org/files/2012/06/The-10-Largest-Hispanic-Origin-Groups.pdf>
- O'Day, L., Bruyere, B., Billingsley, E. (2007). *Developing a theory for informal science education participation*. Science Education.
- Passel, J.S., & Cohn, D. V. (2008). *U.S. population projections: 2005 – 2050*. Washington, DC.
- Passel, J.S., & Cohn, D. (2011). *How many Hispanics? Comparing new census counts with the latest census estimates*. Retrieved from <http://www.pewhispanic.org/files/reports/139.pdf>
- Perez, A. (2010). Few Latino students enter science fields. *Daily Trojan*. Retrieved from <http://dailytrojan.com/2010/04/12/few-latino-students-enter-science-fields/>
- Peterson, R.T. (1934). *Guide to the birds*. Boston: Houghton Mifflin.
- Peticolas, L.M., Mendez, B., & Hawkins, I. (2008). Effective strategies for engaging Latino/Hispanic audiences in astronomy during the International Year of Astronomy. In M.G. Gibbs, J. Barnes, J.G. Manning, & B. Partridge (Eds.), *Astronomical Society of the Pacific's Conference Series*, #400 (p.422).
- Science Education for Middle Level Students*. (2003). Arlington, VA: NSTA. Retrieved from http://www.nsta.org/docs/PositionStatement_MiddleLevel.pdf
- Tai, R. H., Liu, C. Q., Maltese, A. V, & Fan, X. (2006). Planning Early for Careers in Science. *Science*, 312(ii).
- Taningco, M. T., Mathew, A. B., & Pachon, H. P. (2008). *STEM Professions: Opportunities and challenges for Latinos in science, technology, engineering, and mathematics*. Retrieved from <http://files.eric.ed.gov/fulltext/ED502063.pdf>
- U.S. Census Bureau. (2014). *QuickFacts: 2010*. Retrieved from <http://quickfacts.census.gov/qfd/index.html>
- Wildman, J. (2010). *The effects of ethnic diversity, perceived similarity, and trust on collaborative behavior and performance*. University of Central Florida.
- Zoldosova, K. & Prokop, P. (2006). Education in the field influences children's ideas and interest toward science. *Journal of Science Education and Technology*, 15(3/4), 304–313.

CHAPTER V

Increasing Latino Participation in Informal Science Education: A Success Story

Despite their growing presence in the U.S., Latinos are absent from some sectors of American life, including informal science education (ISE). Research indicates that informal education settings, such as national parks, support science achievement in minority populations by offering a learning environment that accommodates the needs of people from different cultures and who speak languages other than English (Bruyere, Billingsley, & O'Day, 2008). Participation and visitation studies at natural areas have revealed low engagement rates in programs at these sites, especially by Latino audiences. Furthermore, Latino youth scored well below White students on tests of their understanding of earth, life, and space sciences, and only 4 percent of Latinos pursued careers in science and engineering (Chapa & De La Rosa, 2006; Chavez, 2011, Hong and Anderson, 2006). While numerous efforts have been made to increase participation, little information is available about their success, and virtually none have been based on prior research on barriers and impediments as perceived by this demographic.

In this paper, we describe how we increased Latino participation in ISE at events at natural areas, building on previous research that explored the barriers to participation in ISE by this audience. We surveyed Latino participation before and after intervention with extensive, bilingual outreach at sites across the U.S. to evaluate whether by reducing previously identified barriers, participation could be substantially increased. Specifically, we addressed factors related to lack of awareness of natural areas, the nature-based, science programs they offer and language preferences in event promotion as well as day-of-event activities. While many efforts have been

made to increase Latino participation, few have resulted from explicit research-based approaches or been implemented at multiple sites reflecting diverse Latino populations.

Literature Review

Despite these challenges, there is room for optimism. In a study of Black, White, and Latino middle school students, almost 79% of Latino students indicated an interest in science, similar to levels of interest expressed by White (79%) and Black (78.5%) students (Sorge, 2000). Though fewer Latinos pursue careers in science and engineering, college enrollment rates in these fields were similar to students representing other ethnic groups. The challenge for educators is engaging and retaining these students. In Chapters III and IV, I provide some related evidence supporting a potential positive outcome for well-designed programs.

Throughout the United States, staff at state and national parks, wildlife refuges, and natural areas, as well as informal science educators are struggling to better understand how to engage Latino audiences and improve their awareness of natural areas and the natural sciences. In a study of park use in California, Latinos were the least likely to visit state parks and to attend natural science education programs, even though they represented 31.1% of the population. The study was repeated in 2009, and found that Latinos frequented parks and recreation areas more days than non-Latinos. Most Latinos drove short distances (5 minutes or less) to parks and were only slightly less likely than non-Latinos to visit natural and undeveloped sites. Responses to questions about barriers to visitation to natural areas revealed that cost was an issue, but participation in ISE programs was not examined, and no discussion was provided about increases in Latino use of the state's parks (California State Parks, 2009). The Dodge Nature Center in Minnesota also studied engagement of Latino audiences, but broadened their research to include both visitation to the site and participation in informal science education programs. Despite a

growing Latino community, participation in public programs and other activities was predominantly White. Interviews with 15 key leaders in local Latino communities revealed varying reasons for low visitation rates. The biggest factor was lack of familiarity with the Center. Other factors included cost, language barriers, and the “atmosphere” of the Center. Though the Center adapted its programs in response to the interviews, a subsequent report of any changes to Latino engagement was not published (Hong & Anderson, 2006).

In 2000 and 2009, the National Park Service (NPS) conducted comprehensive surveys of both visitors and non-visitors to the National Park System. Results showed that Latinos are among the least likely to visit a national park, and proportional visitation by Latinos did not change significantly between the two surveys. In 2000, Latinos represented 10% of visitors, and just 9% of visitors in 2009. Latinos were less likely than Whites or Blacks to talk with a park ranger or to visit indoor exhibits. Like the Dodge Nature Center study, NPS found that awareness of the NPS was low and that the costs of food, lodging, and camping at parks were barriers to visitation. Transportation time to parks was also identified as an issue, but the study did not address the influence of language on visitation or participation in programs.

Local parks and open space also experienced low visitation by Latinos. Over the past decade, the Latino population in Boulder County, Colorado grew to over 13% of the population, up from 10.46% in 2000. The overall population grew just 1.1%. A survey of visitors to County Open Space indicated that Latinos were one of the least likely to use hiking trails and engage in other activities at the more than 98,000 acres of public land (Bowie, 2010). A separate study gathered information about Latino perceptions of open space lands and revealed that lack of time and distance to open space were the biggest barriers to visitation. Issues related to language were

not addressed, presumably because the survey focused on recreation, rather than participation in ISE (Hickox, 2008).

Science and conservation groups are concerned by this lack of participation for numerous reasons, including the low representation of Latinos in science careers and the anticipated shortage of scientists in the United States. Nature-based organizations are also troubled by the absence of this growing population in environmental education programs and the role that may play in Latinos' future political decisions about conservation. Texas Parks & Wildlife has implemented a variety of methods to reach Latinos. One approach the organization implemented is the "Expo", an event where families learn about nature and fishing near their homes. Instead of hosting the event at a natural area, Texas Parks & Wildlife brought the program to urban centers to better reach new audiences. Partnerships with Spanish-language radio stations, as well as flyers and television productions in Spanish described the "Expo" and encouraged Latino participation. No data were provided to describe how these measures translate into increased participation in similar activities after the Expos (2011).

The challenges of identifying successful measures of engaging Latinos and quantifying the results were evident in the U.S. Fish and Wildlife Service's *Color of Tomorrow* (2007), a video series in which natural resource professionals addressed the urgent issue of reaching diverse audiences. Presenters representing Black, Asian, and Latino ethnic groups acknowledged that engaging minority communities in ISE and natural resource preservation has been an issue for more than 17 years. Their recommendations for improvement, however, lacked studied and measured approaches. For example, one participant stated, "I think that we need to stop talking and do. It's very simple."

While the literature describing Latino population growth, low participation in ISE, and low visitation rates to parks and other natural areas is abundant, information about how to raise Latino involvement is lacking. Many of the factors that act as barriers to participation have been identified, such as cost, lack of knowledge of programs, and language barriers, but most research has been conducted at single sites, does not address the needs of diverse Latino cultures, and is based on small sample sizes.

Prior Research

In 2009, we studied the barriers to Latino participation in science education at state and national parks. One thousand face-to-face community surveys of Latino adults living in the vicinity of six sites across the U.S. showed that lack of awareness was one of the biggest barriers to visitation to these parks and participation in public programs and activities (reference previous paper). Language and the use of bilingual (Spanish/English) programming were also important, especially to first generation Latinos. Using these results, we developed subsequent research at the same six sites to examine if it was possible to engage Latinos in ISE programs at their public nature-based events. Aspects of the Latino communities near each site varied, such as the primary country of origin, proportion of recent arrivals to the U.S., and more. These sites are described in greater detail previously (reference) but included Muir Woods National Park (CA), Bandelier National Monument (NM), Great Sand Dunes National Park and Preserve (CO), Barr Lake State Park (CO), Fire Island National Seashore (NJ), and the cities of Cape May (NJ) and Leavenworth (WA). A seventh site, Great Sand Dunes National Park and Preserve in Colorado, served as a control.

We used a combination of outreach methods to motivate participation by Latinos. We considered both existing levels of awareness and language preferences and worked with each

study site to develop targeted approaches. These approaches were through the media, individual collaborations, and partnerships, including schools, libraries, businesses, and non-governmental organizations, such as The Canal Alliance in San Rafael, (CA) and the Brighton Community Center (CO). The purpose of this paper is to report the results of our efforts to improve Latino participation in ISE, to inform educators of our approaches and methods, and to motivate other sites and organizations to strive for greater diversity in their events and programs.

Methods

We identified a single, ISE event at each study site that had been held in prior years near a significant Latino population. Events included International Migratory Bird Day festivals, Junior Ranger Day, and other nature-based community programs, all of which offered activities for multigenerational families and were either free or required a nominal park entry fee.

Participation data were collected for three years at each site. In Year 1, only participation data were gathered to establish a baseline of attendance. In Years 2 and 3, we adapted each event to address awareness and language barriers and once again, surveyed the attendance. At the control site, surveys were conducted for three years, but no treatment was applied to the event. A total of twenty-one participation surveys were completed across all sites. Depending on the size of the event, the number of surveys gathered ranged from forty to over 100.

Survey instrument. We developed an eight-question participation survey (Appendix I) following protocol established by the Office of Management and Budget. The survey was available in English and Spanish, and respondents selected their language preference. All but one question were close-ended. We used a convenience sample, roaming the events and questioning only one adult per family (at least 18 years old). Surveys were conducted by trained, bilingual (English and Spanish) interviewers. Each survey required less than one minute to complete,

which increased a respondent's willingness to participate and enabled interviewers to survey more participants. No personal information that would identify participants was recorded.

The survey was designed to provide information on: the ethnicity of participants, prior visitation to the study site and participation in study site programs, the number of people in each group, distance from the site (determined by zip code), and how respondents learned about the events. Surveys were conducted throughout the length of each event, which varied from seven hours to one full day. The event in Leavenworth (WA) was three days.

The principal survey question addressed ethnicity and race. Schaefer (2008) defined race as a social classification influenced by differences in appearance. He defined ethnicity as the culture, national heritage, language, and other characteristics that members of a group share. Survey respondents were asked to self-identify themselves and their family members by ethnicity as either Hispanic/Latino or not Hispanic/Latino. The subsequent question allowed respondents to describe their race, and included Black/African American, White/Caucasian, Asian, Native American, Polynesian/Pacific Islander, and Other. Respondents could select more than one racial category, such as Black/African American and White/Caucasian.

The first surveys were administered in 2009 or 2010, prior to adapting each site's methods of community outreach (pre-treatment). These data represented participation in programs accomplished without implementing methods recommended to improve Latino participation in ISE. Instead, each site promoted their programs as they had done in previous years. Though these methods varied slightly by site, they included flyers and posters displayed in community locations, information on websites, direct e-mail to partners, volunteers, and prior participants, and advertising through newspapers and radio.

Description of treatments. Following baseline surveys conducted in Year 1, we worked with study sites and in Latino communities in close proximity to these sites to increase awareness of the event and the location where it was hosted, to adapt the event to address issues related to language, to create bilingual promotional materials, such as flyers and posters, and to involve Spanish-language media (radio and newspaper) in pre-event promotion and post-event coverage. Bilingual, native Spanish speaking interns worked with each event to guide these changes. Five study sites had one intern for three to five months each year, and one site, Bandelier National Monument, had two interns each year. Interns also offered education programs in Latino communities, and attended other festivals and activities, such as Cinco de Mayo celebrations, to promote their sites' programs. On the day of the focus event, interns provided bilingual activities, such as guided bird walks.

Figure 5.1 illustrates a promotional flyer designed to promote the Barr Lake Bird Fest hosted at Barr Lake State Park in Brighton, Colorado. The flyer addressed issues of language preference by its availability in Spanish and English. It also announced that at least one program, a bird walk, would be offered in both English and Spanish and that other activities would be presented in both languages. To address issues related to awareness of education programs and natural areas, directions to Barr Lake State Park were included, a mention of the required entrance fee, and a list of the types of activities that were offered. More subtle adaptations to the outreach included the use of images featuring Latino youth and adults engaged in outdoor nature and science-based activities.



Figure 5.1. A promotional flyer used to advertise a fall bird festival at the Colorado study site.

Survey of intern experiences. Interns responded to an on-line survey regarding their experiences working at the study sites and in Latino communities using a qualitative instrument. The evaluation was open-ended and self-administered. An outside evaluator examined the results by organizing the responses and analyzing the content for recurrent themes. The purposes of the survey and its responses were to summarize the interns' experiences and to address other recommendations for improving Latino participation in ISE that are not easily gathered in quantitative surveys.

Additional research. At two sites, Leavenworth, Washington and Barr Lake State Park, Colorado, we completed a fourth year of research to determine Latino participation after the study was completed. In addition, in 2011 we examined if the outreach methods and event modifications implemented to promote activities at natural areas would also increase Latino participation in ISE programs at another type of ISE venue, a museum. We employed the strategies learned in parks (e.g. bilingual promotion of programs and bilingual staff) at family programs offered by the University of Colorado Museum of Natural History in Boulder (CO).

This Museum was selected because, like other organizations, staff recognized that underserved audiences were not participating in their programs, even though they were free, offered on weekends, created for participation by the entire family, and in a convenient, easily accessed location in the City of Boulder. If results at the Museum were similar to those accomplished at parks, the study could have implications for diverse organizations seeking to engage Latino audiences not only in informal science education, but also in other public education programs.

This Museum advertised its program via e-mail to an established list of participants and University staff, an ad placed in a local newspaper (only in English), and flyers distributed to partners, such as University departments and area schools. We adapted this outreach to include bilingual posters and flyers shared at locations frequented and/or owned by Latino community members, such as restaurants, markets, and recreation centers. Outreach also included visits to schools in Boulder with Latino students, distribution of program flyers at school events and in parks, and an ad placed in a bilingual newspaper (*La Voz*) available at local newsstands.

All data were entered into a statistical software program, SPSS v. 17. Data were analyzed using simple descriptive statistics (percentages) and quantitatively using t-test to compare differences between participants in programs prior to improved outreach with participants at the events in which outreach methods were adapted.

Results

Community survey responses by Latino participants identified factors that influence engagement in ISE (Table 5.1). Strongest preferences were for programs that occurred on a specific day(s) of the week, programs that accommodated the entire family, programs that showed youth opportunities for the future, programs led by another Latino, and programs located closer to home. These preferences were used to adapt programs at each study site.

Table 5.1

ISE program preferences by Latino			
Strong Preferences: Average across Study Sites			
Item	Mean	Std. Deviation	n
Day of Week	4.2	1.2	1028
Programs for the Entire Family	4.1	1.1	1052
Programs Show Youth Future Opportunities	4.5	.79	1039
Led by Another Latino	4.0	.94	1047
Program is Close to Home	4.3	.95	1045
Intermediate Preference: Average across Study Sites			
Language	3.6	1.5	1038
Transportation	3.1	1.7	1047
Cost	3.6	1.4	1052
Partners with a Familiar Organization	3.8	1.1	1049
Led in Spanish	3.9	1.2	1048
Lowest Concern: Average across Study Sites			
Familiarity with Host Organization	2.8	1.7	1040
Topic of the Program	2.8	1.6	1035

Participation in Junior Ranger Day at Great Sand Dunes National Park and Preserve, the control site, revealed no substantial change between years in Latino participation (Table 1). Latinos were 14.6%, 16%, and 15.6% of respondents from 2009 to 2011 and did not differ significantly. Latino participation at all study sites, however, doubled or even tripled from the

baseline year to the two years during which outreach and programming were adapted, with the exception of the Leavenworth (WA) site. In Year 2 at this site, the number of surveys anticipated were not conducted in-person at the event, thus the data from this year were eliminated from analysis. The most dramatic increase occurred at Bandelier National Monument, where Latino/Hispanic participation increased six-fold. In Cape May (NJ), the absolute number of Latino participants was low even after intervention, but the proportional change was large, though much lower than other sites. The results of Year 4 post-study surveys at Barr Lake (CO) and Leavenworth (WA) events were strikingly different. At Barr Lake, Latino participation dropped to just 1%, while participation in the Leavenworth event increased to over 40%.

Table 5.2

Percent change in event attendance by Latinos at six study sites over a three-year period.

Site	Year 1 % Latino Participation (pre- treatment)	Year 2 % Latino Participation (treatment)	Year 3 % Latino Participation (treatment)	% Change Year 1 vs. Year 3
Leavenworth, Washington	5.2	--	6.8	+31
Muir Woods National Monument, California	8.8	21.1	31.7	+260
Barr Lake State Park, Colorado	7.8	20.5	24.2	+210
Bandelier National Monument, New Mexico	4.8	31.6	29.6	+517
Cape May, New Jersey	0	8.6	8.5	~+800
Fire Island National Seashore, New York	15.5	27.3	22.2	+43
Average	7.02	21.82	20.5	16.45/310
Control: Great Sand Dunes National Park & Preserve, Colorado	14.6	16	15.6	±4

In New York, the participation survey was expanded in 2011 to examine how participants in the annual Junior Ranger Day event. The information showed that the ways in which Latino

participants learned about the program was strikingly different from the ways in which non-Latinos learned about the program (Table 5.3). The only overlap in method of learning about the program was information provided by scouting groups, which reached both Latinos and non-Latinos.

Table 5.3

How Latino and non-Latino participants in Junior Ranger Day at Fire Island National Seashore (NY) learned about the event

Method	Latino	Non-Latino
Scouts	X	X
EFTA Intern	X	
ESL (English as Second Language) Announcement	X	
Latino-serving Organization	X	
Prior Visit to Fire Island		X
Internet		X
Newspaper		X
Word of Mouth		X

Intern surveys. Intern surveys offered additional insights about how to reach Latinos. Perhaps the most frequent suggestion for program improvement was to provide materials in Spanish. These materials would include not only program materials, but also promotional (marketing, information about the site) materials and orientation (e.g., directions, maps, signs, fees) materials. In addition, some of the interns reinforced the notion that program publicity should be placed in locations frequented by Latinos, such as schools and churches. As one intern suggested, “go to the Catholic churches in the area, as that is the main congregational area”. Yet, another intern voiced strong disappointment that one Latino priest was not interested at all, although “he could have been instrumental in getting Latinos involved”.

Several interns suggested making materials relevant to the Latino populations who may be attending programs. At least two interns suggested “Latinos are unfamiliar with this type of

activity; they don't know how to participate in nature/science activities". Several other interns recounted instances where Latinos had promised to attend programs, but in fact, did not show up.

Additional research: Engagement of Latinos in ISE at a museum. Increases in Latino participation were echoed at the Museum of Natural History. A total of 41 adults representing 90 family members were surveyed. Twenty-five surveys (representing 38 individuals) were completed during pre-treatment programs, in which no additional outreach to Latino audiences was conducted, and 16 (representing 52 individuals) were completed during a program (post-treatment), for which outreach to Latino audiences was applied.

No Hispanics participated in pre-treatment programs, and participation was 92% Caucasian and 8% Asian. Post-treatment participation showed a marked change, with 56% Caucasian, 38% Latino, and 6% Asian engagement (Figure 5.1).

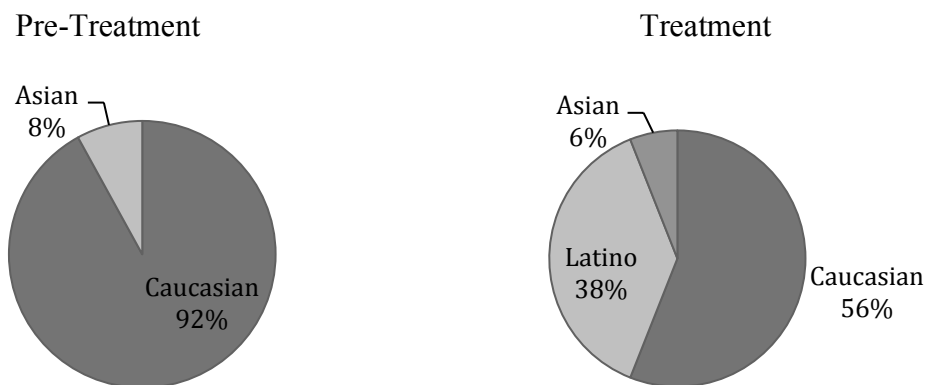


Figure 5.2. Change in Latino participation at the University of Colorado Museum in Boulder (CO) after program outreach and format were adapted.

To understand the significance of this change in participation, the results were compared to data we gathered at two study sites in 2009 and 2010, at Barr Lake State Park and Muir Woods National Monument. Like the results at the Museum, both of these parks exhibited post-

treatment increases in Latino participation. An unpaired t-test was conducted to evaluate if Latino engagement in ISE programs at natural areas and the University of Colorado Museum of Natural History increased significantly from pre-treatment participation. Results indicated that post-treatment events engaged significantly more Latinos ($M = 13.33$, $SD = 6.42$) than pre-treatment events ($M = 6$, $SD = 6.56$), $p = 0.029$.

Discussion

The purpose of this study was to identify methods of engaging Latino audiences in ISE. Although organizations are struggling to reach the growing Latino population in the U.S., our results showed that some simple solutions are available. Though more work is needed to better understand the methods of outreach that are most successful, a mixed-media approach that combined newspaper, direct outreach, and flyers and posters distributed within Latino communities, businesses, and schools were effective. The presence of interns at six study sites certainly contributed to this success, though the value of their time spent in Latino communities cannot be directly quantified. The comparable results at the Museum, however, suggest that similar results may be accomplished with even more limited direct outreach.

We found that our interventions at six study sites and at an additional venue (the Museum) resulted in substantial increases in Latino participation. To achieve this, we used the following approaches: 1) the skills of bilingual Latino interns; 2) modified promotion that included bilingual materials in both English and Spanish; 3) creative approaches to reaching Latinos, including attending *their* events, offering programs in collaboration with Latino-serving organizations, and direct, face-to-face invitation; 4) including details about the programs and events, such as cost, directions, and the availability of Spanish interpretation; and 5) advertising in Spanish-language venues, such as radio and newspaper. Finally, but of importance, was that

we had conducted community surveys prior to modifying events to better understand the character of the Latino communities at each site. Armed with information about language preferences, numbers of generations in the U.S., and other factors, we were able to consider the needs of each location. With regard to the five elements listed above, however, we used all of the approaches at each site and cannot address their relative significance. It is likely, however, that a successful approach will include all or most of these approaches regardless of the location.

The smallest gains in participation were found at Leavenworth (WA) and Fire Island National Seashore (NY). The Junior Ranger Day event at Fire Island National Seashore was already the most diverse event in Year 1. Post-treatment effects were greatest in Year 2, then dropped in Year 3. Because the event already engaged Latinos, gains in subsequent years may have been slighter, as were the gains in Years 2 and 3 for the other sites.

Two factors may have affected the lower increase in Latino participation in Washington. First, though the event offered numerous activities for multigenerational families and was located less than twenty-five minutes from a large Latino community, the event was centered in the town of Leavenworth. Leavenworth was 92.9% White (U.S. Census, 2010), compared to the nearest town (Wenatchee), which was almost 30% Latino. Leavenworth is also a tourist town, and these two factors may have discouraged Latino participation. Similarly, while Cape May, New Jersey showed a significant increase in Latino participation (800% change), the actual number of Latino participants was very low. This event was also hosted in a town that was almost 90% White. All of the other events were hosted at natural areas that were not located within in a town or city and its neighborhoods.

Secondly, outreach and surveys during the second year at Leavenworth did not receive similar effort as the other sites. This may have been due to differences in intern ability to work

with communities and accomplish the adaptations to the program. As a result, Year 3 of the project at this site did not benefit from efforts in Year 2.

Current research suggests that language may play an important role in marketing to Latinos (Korzenny 2011). Studies have shown that even for those Latinos who prefer to speak English, about 25% of their communication with family and friends is in Spanish, and Spanish is a part of Latino life. Marketing experts recommend that using a variety of languages may be very important to reaching diverse consumers, or in the case of this study, participants and visitors. During surveys at Bandelier National Monument (NM), one Latina participant traveled over 40 miles from Santa Fe, NM. During her participant survey, she commented that, “I didn’t need this” (referring to the Spanish language flyer), “but it showed me you were serious”. Based on this study and work with the staff at study sites, further examination of the importance of language should be conducted to further identify the best methods of engaging Latinos in ISE. In addition, our research did not determine specifically the effects that offering the media in both Spanish and English had on Latino participation. That is, did Latinos take part in the treatment events because information in Spanish suggested that the programs would better meet their needs and/or that they would be welcome or was it more important that the information was distributed within Latino communities? Future research could answer these questions.

Collaborations at all sites revealed that non-Latino staff were uncertain about how to reach diverse audiences and had not adapted their methods of outreach to specifically target this audience. In fact, though they expressed the desire to engage this audience, their outreach methods did not reflect this until implementation of this project. Clearly, more work is also needed to educate staff of parks, nature centers, and other ISE centers on simple techniques that will improve Latino participation. Our results suggest that though efforts to adapt events require

time, consideration, and perhaps some additional funding for translations and additional advertising, these modifications are relatively simple overall.

Because the project was replicated at multiple sites, and the results were positive at many of these sites, they indicate that it is possible to engage Latinos in ISE. Numerous other organizations, such as zoos and museums, are also working to interest this audience in their programs. Our research and its positive results will be even more beneficial if they can be implemented successfully at other venues.

REFERENCES

- Boulder County Census Data. (2010). *Boulder County census 2010 data – population*. Retrieved September 24, 2011, from <http://www.cubitplanning.com/county/403-boulder-county-census-2010-population>.
- Bowie, M. (2010). *Boulder county parks and open space: 5-year visitor study – 2010*. Retrieved from the Boulder County website: <http://www.bouldercounty.org/os/culture/posresearch/2010posfiveyear.pdf>
- Bruyere, B. L., Billingsley, E., & O'Day, L. (2008). A closer examination of barriers to participation in informal science education for Latinos and Caucasians. *Journal of Women and Minorities in Science*, 14(4), 431-445.
- California State Parks, Planning Division. (2005). *Park and recreation trends in California*. Retrieved from http://www.parks.ca.gov/pages/795/files/recreation_trends_081505.pdf
- California State Parks, Planning Division. (2009). *Complete findings: Survey on public opinions and attitudes on outdoor recreation in California*. Retrieved from http://www.parks.ca.gov/pages/795/files/2009%20spoa%20complete%20findings%2028_09.pdf
- Chapa, J., & Rosa, B. D. La. (2006). Journal of Hispanic Higher and Mathematics Programs. doi:10.1177/1538192706288808
- Chavez, I. (2011). *Science education and Latino students*. LULAC National Education Policy Department. Retrieved from http://lulac.org/blog/policy_education/.
- Fry, R. (2008). *Latinos account for half of U.S. population growth since 2000*. Pew Research Center Publications. Retrieved from http://pewresearch.org/pubs/1002/latino-population-growth_
- Hickox, A. (2008). Latino and Hispanic perceptions of open space in Boulder county. Retrieved from the Boulder County website: <http://www.bouldercounty.org/live/environment/land/.../2008hickcox.pdf>.
- Hong, A., & Anderson, D.H. (2006). Barriers to participation for Latino people at Dodge Nature Center. *The Journal of Environmental Education*, 37(4), 33–44. doi:10.3200/JOEE.37.4.33-44
- Korzenny, F. (2011). Marketing Trends in a New Multicultural Society. Retrieved from <http://felipekorzenny.blogspot.com/>

- National Park Service. (2010). *National Park Service Comprehensive Survey of the American Public, 2008-2009*. Natural Resource Report NPS/NRSS/SSD/NRR-2011/432.
- Sorge, C., H.E. Newsom, and Hagerty, J.J. (2000). Fun is not enough: Attitudes of Hispanic middle school students toward science and scientists. *Hispanic Journal of Behavioral Sciences*, 22, 332-345.
- Stewart, J., Saladaña, L., Herron, N., and Robinson, R. (2007). *The Color of Tomorrow* (DVD). U.S. Fish and Wildlife Service.
- Schaefer, R.T. (2008). *Encyclopedia of race, ethnicity, and society*. Sage Publications, Inc: Thousand Oaks, CA.
- Taylor, P.A., Grandjean, B.D., & Gramann, J.H. (2011). National Park Service comprehensive survey of the American public, 2008-2009: Racial and ethnic diversity of National Park System visitors and non-visitors. Natural Resource Report NPS/NRSS/SSD/NRR-2011432. Retrieved September 9, 2011 from www.nature.nps.gov/socialscience/docs/archive/MWR_Tech_Rep.pdf

CHAPTER VI

Conclusions

EFTA's four-year research project quantified the low rate of participation by Latinos in ISE across the United States (Chapter II), established that lack of participation was not due to lack of interest, willingness to participate, or attitudes that ISE is not important (Chapter III), identified factors that do serve as barriers to participation (Chapter IV), and demonstrated that it is possible to dramatically increase Latino participation in ISE (Chapter V). The outcome of the research was positive, and Latino participation doubled and tripled at ISE events, successes at the national level have been minimal. Furthermore, the experiences of this study suggest that these outcomes may be accomplished at diverse sites, such as museums, towns, and natural areas, with the assistance of Latinos, improved program promotion and event design, and support from the host site. If this is the case, why are successes at other sites slow to occur? EFTA's research focused on Latino preferences and methods of improving Latino engagement, but in evaluating the entire project, it became clear that lack of understanding and lack of capacity on the part of ISE educators and their sponsoring organizations and agencies is at least as large a barrier.

The barriers that exist within ISE centers include a lack of organizational capacity to adapt methods of reaching Latinos, low awareness of the importance of multicultural education when working with Latinos, and insufficient experience with other cultures, races, and ethnicities. At the nexus of these barriers are preconceived ideas about Latinos and their attitudes toward visiting informal learning centers and the environment, which lead to unproductive efforts to correct the problem. In addition, organizations striving to increase Latino visitation to their sites fail to articulate the reasons why a multicultural audience is important.

In 2014 in an interview with *High Country News*, a superintendent of a national park stated that “we can’t allow millions of people, generations of people to not experience parks and to have no connection to them” (Peterson, 2014). He continued by saying that “When those people get into positions where they’ll influence policy and hold the purse strings, they won’t understand what parks are and how important they are.” This statement reflects preconceptions about Latinos and their presumed lack of support for the environment and ignores contradictory research. Viewing Latinos merely as a voting block also diminishes Latinos as an audience that should be valued only for their future votes, rather than an important sector of the population that should be part of America’s rich cultural heritage at natural areas, whether recreational, educational, or professional.

Latino participation in conservation efforts and visitation to natural areas are considered a reflection of their potential interest in ISE. If this is the case, there may be no need for concern. Latino support for environmental protection often exceeds that of non-Hispanic Whites. A majority of Latinos consider addressing climate change a priority and support presidential actions that consider it (Thompson, 2014). Latinos’ positive attitudes toward the environment and environmental protection are not restricted to those aspects that affect them personally, such as pollution (Burger, et. al., 2004), In the Rocky Mountain States, 83% of Latinos supported federal budgets for environmental protection and land-management agencies, such as the Bureau of Land Management and the U.S. Forest Service (Fox News, 2014). Furthermore, 64% indicated that they would be more likely to vote for candidates who support land-management and conservation agencies and organizations, and 93% of Latinos polled in Colorado and New Mexico showed strong support for the preservation and protection of public lands (Sanchez,

2014). Latinos come from a long history of conserving natural resources at home. Author Graciela Tiscareño-Sato (2010) wrote,

Whether driven by poverty, wisdom of our grandparents or the social consciousness of our parents, or perhaps all three, we are not people who waste much. We hold onto things until we can either reuse them or find a new home for them...Now I know and respect where this tendency comes from, and I appreciate it.

Family traditions, culture, and values may play an important role, regardless of financial status and need, and are shared with subsequent generations.

Some of the new programs that agencies are implementing to reach new generations of underserved audiences are well intentioned, but developed without knowledge of cultural issues. For example, introducing youth to national parks through camps, day-trips, and other opportunities does not consider Latino preferences for opportunities that include the entire family. While no details are available about whether they are Latino-led or provided in Spanish, most sites have limited capability for this, and few bilingual resources are available. These opportunities may be designed based on ideas of what has worked with previous, non-Latino generations.

Efforts to improve outreach to diverse audiences also mention training programs, but do not reference who participates (staff?) or how trainings improve organizational ability to connect with this audience. The U.S. Fish and Wildlife Service's National Conservation Training Center provides courses for multiple agencies, including U.S. Fish and Wildlife Service, National Park Service, and U.S. Forest Service. The 2014 list of online and classroom courses include some opportunities for supervisors and mentors to learn about working with diverse audiences, but has no trainings that focus on staff, their outreach to diverse audiences, and methods that may be used to increase engagement.

Not surprisingly, Latino employment within the federal workforce is also a small fraction (8%) of that of Whites. Within organizations that manage and conserve public lands, their representation is equally low. Latinos represent less than 10% of the National Park Service's permanent staff (Peterson, 2014). The federal government has renewed efforts to increase Latino representation in the federal workforce by selecting Katherine Archuleta, a Latina, to head the Office of Personnel Management (Rector, 2014). The status of Latinos in the federal workforce will, however, require years before significant changes are seen.

EFTA's research shows that to effectively increase authentic participation in ISE by Latinas/os, programs must include: 1) multi-generational Latina/o families, so that the home environment supports participation and future consideration of careers in ISE; 2) role models who reflect Latina/o culture and ethnicity; and 3) programs that are relevant to Latino culture so that both children and parents recognize the role it plays in their own lives. These results signal that Latino faces must become more common in ISE. Current staff must shed their preconceived notions about Latinos and increase Latino engagement not just as an audience, but also to develop them as leaders in the field.

REFERENCES

- Burger, J., Myers, O., Boring, C.S., Dixon, C. Lord, C., Ramos, R. Shukla, S., Gochfeld, M. (2004). Perceptions of general environmental problems, willingness to expend federal funds on these problems, and concerns regarding the Los Alamos national laboratory: Hispanics are more concerned than Whites. *Environmental Research*, 95:174-183.
- Latino voters back protection of environment*. (2014). Retrieved from <http://latino.foxnews.com/latino/news/2014/02/13/latino-voters-back-protection-environment/>
- Peterson, Jodi. (2014). Parks for all? *High Country News*. 46, 10-18.
- Rector, K. (2014, June 5). Hispanic representation in federal workforce. The Baltimore Sun. Retrieved from <http://campaign.r20.constantcontact.com/render?ca=b775e3e9-8ee4-4bb2-a604-d0c56afb70f0&c=ae847e20-32a8-11e3-8c98-d4ae52753a3b&ch=af88a7b0-32a8-11e3-8d86-d4ae52753a3b>
- Sanchez, G. (2014). New poll confirms Hispanics overwhelmingly support protecting public lands. *Latino Decisions*. Retrieved from <http://www.latinodecisions.com/blog/2014/06/11/new-poll-confirms-hispanics-overwhelmingly-support-protecting-public-lands/>
- Thompson, J. (2014). *Overwhelming majority of Latinos want strong presidential action to combat climate change, poll shows*. Retrieved from <http://www.nrdc.org/media/2014/140123b.asp>
- Tiscareño-Sato, G. (2011). *Latinnovating: Green American jobs and the Latinos creating them*. Hayward, CA: Gracefully Global Group LLC.

APPENDIX I: SURVEYS

Community Survey, English

Community Survey, Spanish

Participation Survey, English

Participation Survey, Spanish

Community Survey

Town_____ Zip_____

Location of Survey_____

Section 1: Please describe the extent to which you agree or disagree with the following:

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
My family is interested in outdoor nature programs.	1	2	3	4	5
Educational programs about nature are valuable to my family.	1	2	3	4	5

Section 2: How do each of the following affect your decisions about participating in science education?

	<i>No affect at all</i>				<i>Strong Influence</i>
Day of the Week _____ Weekday _____ Weekend (check one if there is a preference)	1	2	3	4	5
Cost of the Program	1	2	3	4	5
Transportation to the Program	1	2	3	4	5
Language spoken at the program	1	2	3	4	5
Topic of the program	1	2	3	4	5
Familiarity with the organization.	1	2	3	4	5

Section 3: Please describe the extent to which you agree or disagree with the following:

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	
The \$6 per car entry fee to Barr Lake State Park is a problem for my family.	1	2	3	4	5	<i>I don't know</i>
I am not familiar with the programs offered at Barr Lake State Park.	1	2	3	4	5	<i>I don't know</i>
I trust Barr Lake State Park to meet my family's needs.	1	2	3	4	5	<i>I don't know</i>
I would like to attend a program at Barr Lake State Park within the next 12 months.	1	2	3	4	5	<i>I don't know</i>
I feel informed about the programs offered at Barr Lake State Park.	1	2	3	4	5	<i>I don't know</i>

Section 4: How do the following affect the likelihood of your family participating in an educational program at Barr Lake State Park?

Programs your whole family can attend	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that occur in your neighborhood.	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that expose your children to different opportunities for their future.	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that partner with organizations that are familiar to you.	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that are led by another Latino/Hispanic.	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that are led in Spanish	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>
Programs that are led in English	<i>Much less likely to attend</i>	<i>Somewhat less likely</i>	<i>No effect</i>	<i>Somewhat more likely</i>	<i>Much more likely to attend</i>

Section 5: Demographics

What was your gross household income for the year 2008?

- ☐ Less than \$18,000
☐ \$18,001 – 30,000
☐ \$30,001 – 50,000
☐ \$50,001 – 70,000
☐ Greater than \$70,000
☐ No Answer

What is your family's home country? (Check all that apply)

- ☐ Mexico ☐ Dominican Republic
☐ Guatemala ☐ Puerto Rico
☐ Honduras ☐ Haiti
☐ Nicaragua ☐ Brazil
☐ El Salvador ☐ USA
☐ Panama ☐ Other: _____

What is your age: _____

How many years of school did you complete, not including university? ____

Did you attend university? ☐ yes ☐ no

How many people live in your home at least 50% of the time: ____ adults (≥18) ____ children (<18)

Approximately how many years have you lived in the United States at least part of the year? _____ years

What language(s) do you speak?

- ☐ English
☐ Spanish
☐ Portuguese
☐ Other (specify): _____

What language(s) do children in your household speak?

- ☐ English
☐ Spanish
☐ Portuguese
☐ Other (specify): _____

Choose the statement that best describes your family's history of living in the United States:

- ☐ I am the first generation from our family to live in the United States.
☐ My parents were the first generation in our family to live in the United States.
☐ My grandparents were the first generation in our family to live in the United States.
☐ At least four generations of my family have lived in the United States.
☐ Other / I don't know

Do you have any other advise and/or recommendations for us? _____

Please list the two **most effective** ways you find out about programs for your family to attend. Please be specific.

1) _____ 2) _____

Encuesta Comunitaria: Ciudad _____ Código Postal _____ Localidad _____
08/10/09

Sección 1: Por favor describa cuánto está de acuerdo o en desacuerdo con lo siguiente:

	<i>Muy en Desacuerdo</i>	<i>Desacuerdo</i>	<i>Neutral</i>	<i>De Acuerdo</i>	<i>Muy de Acuerdo</i>
Mi familia está interesada en programas educativos sobre la naturaleza al aire libre.	1	2	3	4	5
Los programas educativos sobre la naturaleza son valiosos para mi familia.	1	2	3	4	5

Sección 2: ¿Qué influencia tienen cada uno de los siguientes puntos en su decisión de participar en programas sobre las ciencias naturales?

	<i>Ninguna influencia del todo</i>				<i>Fuerte influencia</i>
Día de la Semana ____ Lunes-Viernes ____ Sábado/Domingo (escoja uno si hay una preferencia)	1	2	3	4	5
Costo del programa/actividad	1	2	3	4	5
Transporte al programa educativo	1	2	3	4	5
Idioma hablado en el programa/actividad	1	2	3	4	5
Tema del programa/actividad	1	2	3	4	5
Familiaridad con la organización/entidad que presenta la actividad	1	2	3	4	5

Sección 3: Por favor describa cuánto está de acuerdo o en desacuerdo con lo siguiente:

	<i>Muy en desacuerdo</i>	<i>En desacuerdo</i>	<i>Neutral</i>	<i>De Acuerdo</i>	<i>Muy De Acuerdo</i>	
El costo de entrada, \$6, a Barr Lake State Park es un problema para mi familia.	1	2	3	4	5	No sé
No conozco los programas ofrecidos por Barr Lake State Park.	1	2	3	4	5	No sé
Yo confío en Barr Lake State Park para satisfacer las necesidades de mi familia.	1	2	3	4	5	No sé
Me gustaría participar en un programa en Barr Lake State Park en los próximos 12 meses.	1	2	3	4	5	No sé
Sí, conozco los programas ofrecidos por Barr Lake State Park.	1	2	3	4	5	No sé

Sección 4: Es más o menos probable que participe en un programa educativo por Barr Lake State Park si...

	<i>Mucho menos probable</i>	<i>Menos probable</i>	<i>Ningún efecto</i>	<i>Mas probable</i>	<i>Mucho mas probable</i>
Su familia entera puede participar	1	2	3	4	5
El programa ocurre en su vecindad.	1	2	3	4	5
El programa le enseña a sus hijos sobre diferentes oportunidades para su futuro.	1	2	3	4	5
El programa está desarrollado en colaboración con organizaciones que usted conoce.	1	2	3	4	5
El programa está presentado por otro Latino/Hispano.	1	2	3	4	5
El programa está hablado en español.	1	2	3	4	5
El programa está hablado en inglés.	1	2	3	4	5

2012 Event Survey: Muir Woods	Surveyor: _____ Date: _____
--------------------------------------	-----------------------------

1. Approximately when was the last month and year you visited Muir Woods National Monument?

Circle Month:	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Never				
Circle Year:	2005			2006			2007			2008			2009		2010	2011	2012

2. How many people are in your group today? _____

3. Are you part of an organized group? _____ Yes _____ No

4. Are you Spanish, Hispanic, or Latino? Yes _____ No _____

5. Please indicate your race. Check all that apply:

a.	_____	Native American or American Eskimo
b.	_____	Caucasian
c.	_____	Asian
d.	_____	African-American
e.	_____	Polynesian/Pacific Islander
f.	_____	Other: _____

6. a. Have you ever participated in our International Migratory Bird Day? Yes _____ No _____

b. Did you or will you participate in a festival activity today? Yes _____ No _____

7. Please indicate the zip code in which you live. _____

8. Did you come to Muir Woods specifically for this event? Yes _____ No _____

b. If yes, how did you hear about it? _____

2 Encuesta del Evento : Muir Woods	Surveyor: _____ Date: _____
---	-----------------------------

Aproximadamente cuando fue el ultimo mes y año que visitó Muir Woods?

de/a con un círculo:	Ene	Feb	Marzo	Abril	Mayo	Junio	Julio	Agosto	Sept	Oct	Nov	Dic	Nunca				
de/a con un círculo:	2005			2006			2007			2008			2009		2010	2011	2012

Cuántas personas están en su grupo hoy? _____

Está visitando con un grupo hoy? _____ Sí _____ No _____ No

¿Eres español, hispano, o Latino? _____ Sí _____ No

Por favor indique su raza. Marque todas las que aplican:

a.	_____	Americano Nativo o Eskimo Americano
b.	_____	Caucásico
c.	_____	Asiático
d.	_____	Africano-Americano
e.	_____	Polinesio/Islands del Pacifico
f.	_____	Otro _____

¿Ha participado alguna vez en el Día Internacional de las Aves Migratorias? _____ Sí _____ No

¿Planeó o planea participar hoy en una actividad de la Fiesta? _____ Sí _____ No

Por favor indique el código postal donde vive. _____

¿Usted vino a Muir Woods específicamente para la Fiesta? _____ Sí _____ No

De ser así, cómo se dio cuenta de este evento? _____

APPENDIX II: SURVEYS

Intern Survey

Intern Survey

The purpose of this reflection exercise is to better understand your experience as an intern on this project. Your thorough and honest responses to the following questions will help the project team improve educational experiences for Latino/Hispanic populations across the country. Thank you!

Name: _____ Home Country: _____
Home Address: City: _____ State: _____ Zip: _____ Project Start Date: *September 2009*

First, a few questions about you and your intern experience...

1. Before you arrived here for this project, describe your expectations about the project. What did you expect the experience would be like?

Before I arrive here, I spent some time thinking in the project because I think it is a great idea. When I read the summary I was impressed with it. I thought in something different. I couldn't imagine that this is a project for 3 years with products as the toolkit for environmental education.

About the experience, I expected to have more events, but as you could see, in the area near to Muir Woods there are not many Latino events. Also I thought that I could have time separately from PRBO activities.

I was concern about how Latino people could receive me, because I had a wrong idea about them. I thought that they don't like Mexican people and they are not friendly, also that they don't like to speak Spanish here.

The truth is they are so friendly!

2. What has been the best part? For example, what parts have made you feel excited? Why?

I had known all those wonderful Latino people, and I had the opportunity to learn about each one. I listened their stories about their families or how they cross the border. I think this experience with them make me more sensitive and change my mind in some aspects. More than one time I feel sadness about their situation, or their stories. They are here because they don't have another choice in Latino America. When I hear all that stories about immigrants in US I couldn't imagine how they live here.

Also I was very popular in all these towns where I gave them the surveys. When I went back to those places, they stopped me and ask me about the surveys.

I recommended these people to have fun in US. They can have great experiences and bring something interesting or a gift for their families.

3. What has been the worst part? For example, what parts have made you feel uncomfortable? Why?
My schedule, because it never could become fixed.

4. What has been the biggest challenge for you on the project?

The biggest challenge was organize my schedule, because it was difficult to make compatible this project with PRBO programs. Divide my time between PRBO and this project. I know that this is the first time

for PRBO in this project and I tried to be understanding as much as possible. I tried to do my best effort for both, but not always was possible.

But I think the next years will be more relaxed than this first part.

5. Is there anyone who has served (is serving) as a role model for you on this project?

You (Susan), because of your efforts and concerns about Latino community. Also, you are the author of this project, and I noticed that you really like it. Even if you were busy you always had time for attend our difficulties and challenges with this project.

Also you spent time going to the places where the survey took place (it was not my case, but I knew you did as much as you can). You are a person really involve and consistent with your ideas as few.

Now a few questions about what you are hearing from people in the interviews for this project

6. In your discussions with visitors to your project site, what words or phrases are you hearing that are used to describe America's Latino/Hispanic populations?

They are busy and don't have time.

They are very worker and this is their priority.

They are here because of the work.

They have fear (government, or to be deported).

They are a very united community.

They are not interested in environmental programs.

7. Based on what you are hearing in the interviews, describe how Latino/Hispanic cultures here seem to be different from your home country?

I can divide this community in two very different groups (with exceptions): the first one is people who have their families here, and the other one is people who are living alone here.

People with their families here look relaxed and happy. These people have "adopted" US as their country. They don't look worried about the problems that we have now in Mexico (economy, violence, etc.). Unfortunately in Mexico we have fear on the street and in our homes. This is not the case for this people, they feel safe here. Also in US these people have economical security, and even when they didn't attend the school they look as if do (how they talk, and how they understand the questions of the survey, they seem with some level of culture). Children have good education here as well.

Besides these people help each others, this is each time less frequently in Mexico because of the violence and others factors. People in Mexico are distrust in this moment.

The kids are different too. When they learn English is easier for them to speak in this language when they grow up. Also they have poor knowledge about their origin countries. They could hear something about these countries from their parents, like words or names of towns. But they don't know something else.

People, who are without their families, have fear. They have fear to be deported, to the government. For this reason they are distrust of all the people who they don't know. They look nostalgic and sad. Also I found people who are really poor and modest. They made me noticed the poor areas that are hidden in this area. They are saving money as many as possible, and they live with the minimum. They don't want to spend money in amusement. If they work far from their home they always stressed and rushed.

If they are women alone here, they are very religious. However, if they are men, they spend time together drinking alcohol or watching sports on TV.

8. How are they the same?

They are helpful and they form a united community.

These people are very religious as in our countries; mainly catholic and they obey the priest as a leader.

They keep their traditions as much as possible.

The family is very important for them.

9. What specific suggestions or ideas are you hearing from visitors that might help the project develop educational materials or programs for Latino/Hispanic visitors to your project location?

Develop these materials and programs in Spanish because Latinos can understand better and learn more.

Have different topics.

These programs should have publicity in places frequented by Latinos. This publicity need to be specifically directed to this audience. You should make publicity in media and announcements in public places.

Develop these programs together with the church or the school.

10. Is there anything else about your experience in this project that you would like to share? For example, is there anything you would like to see changed about the program at this point?

I suggest education materials should be reviewed by somebody who is a native Spanish speaker (for avoid mistakes or confusion). Also be careful with the meaning of some words, because even when in Latino America all speak Spanish it has many varieties.

I had changed the survey for something more friendlily and quick, it was difficult for some people. Because when people saw the back part of the survey they don't like it. But this work was end now.

I think is ok to develop something general, but the toolkit should be able to be adapting for different conditions in every place.

APPENDIX III: SURVEY TOOLS

Survey Training Materials

Introduction Script, Spanish

Introduction Script, English

Environment for the Americas
CONSERVING BIRDS BY CONNECTING PEOPLE



Science Education for Everyone..... ✖

Make it Happen!

Research shows that Latinos/Hispanics are less likely to take part in nature and science programs than other ethnic groups. To learn how we can better meet the needs of Latinos and Hispanics in science education programs, Environment for the Americas is conducting a nationwide study.

Through face-to-face surveys in communities in Washington, California, New Mexico, Colorado, New Jersey and New York, we will identify ways to improve our programs and our outreach. You can help by taking our survey, sharing your interest in science education, and telling us how we can get you and your family involved.

Thanks for your help!



Environment for the Americas is a non-profit organization committed to providing education about birds and other animals to people throughout the Western Hemisphere. Learn more about us at:

www.birdday.org

Interested in the results of this study? Please give us a call at:
866.334.3330

Leaflet to share the importance of the research project and how participants could receive information about the results.



Integrando a las audiencias Latinas en actividades educativas sobre ciencias

La población Latina está creciendo rápidamente en los Estados Unidos. A pesar de ello, no se ha experimentado un incremento en su participación en actividades educativas sobre ciencias ofrecidos en los museos y parques nacionales en áreas cercanas a las comunidades Latinas. La pregunta es:

¿Por qué?

Ambiente para las Américas (Environment for the Americas, <http://www.birdday.org>) es una organización sin fines de lucro comprometida a proporcionar oportunidades de educación ambiental a lo largo del Hemisferio Occidental con la meta de incrementar el conocimiento del público sobre los recursos naturales y su conservación. Este año, con financiamiento de la Fundación Nacional de Ciencias (National Science Foundation, <http://www.nsf.gov>) y el apoyo del Servicio Nacional de Parques (National Park Service, <http://www.nps.gov>) y la Universidad de Colorado, Ambiente para las Américas tratará de responder a esta pregunta.

Para contestar esta pregunta, se estarán levantando encuestas en 6 localidades en Estados Unidos donde se han identificado poblaciones Latinas cercanas a parques nacionales. Muir Woods National Monument, localizado cerca de ¿???, es uno de ellos. El fin de la encuesta es obtener información sobre cómo mejorar las actividades educativas sobre ciencias ofrecidas por Muir Woods National Monument para que más miembros de la comunidad Latina estén interesados en participar. Las sugerencias obtenidas serán implementadas en 2010 y 2011 para evaluar si son efectivas atrayendo a la comunidad Latina a este tipo de actividades.

La encuesta toma 5-7 minutos, es completamente anónima y, en agradecimiento, estaremos obsequiando playeras del Día Internacional de las Aves Migratorias (una por familia) y calcomanías a quien responda la encuesta.

Si queremos que nuestra comunidad Latina sea tomada en cuenta, participemos en las actividades que promueven dicha inclusión.

¡Esperamos contar con su valiosa participación!

Para más información comunicarse con Susan Bonfield, Directora del Ambiente para las Americas, 970.393.1183 o sbonfield@aol.com.



Engaging Latino Audiences in Science Education Activities

The Latino/Hispanic population is rapidly growing in the United States. However, there has not been a participation increase in science education activities offered in museums and national parks close to Latino/Hispanic populations. The question is: Why?

Environment for the Americas (<http://www.birdday.org>) is a non-profit organization working to provide environmental education opportunities throughout the Western Hemisphere, with the goal to improve public knowledge about natural resources and their conservation. This year, with funding from National Science Foundation (<http://www.nsf.gov>) and support from the National Park Service (<http://www.nps.gov>) and the University of Colorado, Environment for the Americas will try to answer this question.

To answer this question, surveys will be conducted in 6 locations in the United States with Latino/Hispanic populations identified near national parks. North Cascades National Park is one of the sites. The purpose of the survey is to obtain information on how to improve science education activities offered by North Cascades National Park and the Leavenworth Bird Festival, so more member of the Latino/Hispanic community will be interested in participating. The suggestions we obtain will be implemented in 2010 and 2011 to evaluate if they are effective in attracting the Latino/Hispanic community to these types of activities.

The survey takes 10 minutes and is completely anonymous, and as appreciation we will be giving away International Migratory Bird Day t-shirts (one per family) and stickers to survey respondents.

If we want our Latino/Hispanic community to be taken into account, let's participate in the activities that promote inclusion.

We hope to have your valuable participation!

For more information contact Susan Bonfield, Director, Environment for the Americas, 970.393.1183 or sbonfield@aol.com.

APPENDIX IV: EVENT FLYERS

Samples of Outreach Materials

FIRE ISLAND

National Park Service
U.S. Department of the Interior

Fire Island National Seashore
Long Island, New York



FREE FUN! • ¡DIVIÉRTETE GRATIS!

All Ages Welcome • Todas las edades son bienvenidas

Join us for

National Junior Ranger Day

Acompáñanos en el

Día Nacional del Guardaparque Junior



Saturday
April 21, 2012

11 am - 4 pm

Fire Island
National Seashore

Rain or Shine!
Meet inside Lighthouse building

Ranger Led Programs include:

- **Animal Tracking**  **12 noon**
- Hands-On Activities
- Meet a biologist from Mexico
- Learn about international conservation efforts
- And more...

Sábado
21 de Abril del 2012

De 11 am a 4 pm

En el Parque Nacional
Fire Island

En caso de lluvia,
estaremos adentro del Faro.

Podrás asistir a los programas guiados por Guardaparques:

- **Rastreo de huellas de animales**  **12 del Día**
- Manualidades y Actividades
- Converse con un biólogo de México
- Aprenda acerca de los esfuerzos internacionales de conservación
- Y mucho más ...

Directions: (from Patchogue) • Take Sunrise Hwy/27 West • Take Robert Moses Causeway South until it ends • Go around traffic circle head east (left) toward lighthouse
Parking: (Field #5)

Dirección (desde Patchogue) • Toma la Sunrise Hwy/27 West • Luego la Robert Moses Causeway sur hasta el final de la vía • Cruce a la izquierda en la rotunda hacia el faro
Estacionamiento: (Field #5)

For more information
631-687-4780

Para más información
631-873-7002



Fire Island National Seashore www.nps.gov/fiis





Acompañanos para celebrar
Leavenworth
Fiesta de las Aves
17 - 20 mayo • viernes - domingo
 en el "Gazebo" en el centro de Leavenworth, WA

Sábado, 19 de mayo

El centro de la fiesta 5:30 am - 5:30 pm • Caminata con guía Michael Carlos 9:30 am - 11 am & 2:30 pm - 4:00pm
 Almuerzo afuera con Equipo Naturaleza 11 am - 1 pm • Raptores en la mano 11 am - 1 pm • Bailando con las aves 1:30 pm and 2 pm

Domingo, 20 de mayo

Concierto para las aves 2 pm - 3:30 pm • Donaciones sugerido pero no requerido

Para más información: www.LeavenworthSpringBirdFest.com



Patrocinado por:
 Wenatchee National Forest • Wenatchee River Institute
 Leavenworth National Fish Hatchery



Agradecimiento a: Team Naturaleza & Dancing With Birds • Dan's Food Market • Cornell Lab of Ornithology
 Wenatchee Valley Museum and Cultural Center • Chelan-Douglas Land Trust • Walleye Cards • The Michael Carlos Band • North Central Washington Audubon



Festival del Puerto Cape May

Sábado Junio 19
10:00 AM- 5:00 PM

Diversión para toda la familia

Junta a Gishlaine, una bióloga de Colombia, y aprenden sobre la naturaleza y las aves de Cape May.

10:00 AM- 5:00 PM Observación de Aves en el Patio

¡Es un programa interactivo y entretenido para toda la familia!
Traducción al español.

1:30 PM- Presentación de Aves para Principiantes

Aprenda como identificar la aves de nuestra comunidad en Nueva Jersey. Traducción al español.

Una celebración de mariscos y canto en Cape May Harbor. Musica en vivo! Mariscos frescos! (this is the part on the English Harbor Fest flyer) Puestos de comida, artesanía, y mucho mas.



Direcciones en el bus desde Wildwood:

Bus - 313 – Hacia: 313 Cape May
Servicio de NJ TRANSIT BUS (20 minutos)

Llega a calle Laffayette y calle Schellenger en Cape May. Camine 15 minutos hacia el puerto por la calle Delaware.

Direcciones en carro:

1. Toma el Garden State Parkway y continua en la misma ruta sobre el Puente hacia o Cape May.
2. Contina recto en la calle Lafayette, una izquierda en la Avenida Sydney.
3. Sigue una cuadra en la Avenida Sydney, despues una izquierda en la Avenida Washington. Despues una derecha en la Avenida Texas.



Join us for the 13th Annual

Barr Lake Fall Birding Festival

Barr Lake State Park • Brighton
Saturday, Sept. 8, 2012 • 7 a.m. - 12 p.m.

Great family event
with something for everyone!

Free snacks!

15% OFF
ALL bookstore and clothing items in the Barr Lake Gift Shop!







Activities include:

- Songbird Banding Station Demonstrations with Live Birds
- Guided Bird Walks (7, 8, 9, and 10 a.m.)
- Eagle Express Tours
- Live Raptors
- Kids' Activities, Crafts, and Educational Booths

Barr Lake's Fall Birding Festival is supported by:












For more information call: (303) 659-6005 **Entrance to the park: \$7.00 per vehicle** or annual park pass required

Barr Lake State Park is located north of Denver International Airport

Directions (From Denver): • Take I-76 northeast, exit on Bromley Lane • Go east to Picadilly Road • Go south to the park entrance

Directions (E-470): • Take E-470, exit 34 (120th Ave) • Go east, turn left Tower Road • Left on Picadilly Road • Park entrance is about a mile ahead on the left



Acompáñanos para el 13^{avo}

Fiesta otoñal de aves en Barr Lake

Parque Estatal Barr Lake • Brighton
Sábado, 8 de sept. 2012 • 7 a.m. - 12 p.m.

Gran diversión
hay algo para todos

¡Comida gratis!

¡15% de descuento
en todos los artículos de la librería y la ropa en la tienda de regalos en Barr Lake!







Actividades incluyen:

- Aves cantoras en vivo, con estación de anillamiento
- Caminatas guiadas de aves (a las 7, 8, 9am)
- Excursiones conducidas del Eagle Express
- Aves rapaces en vivo
- Actividades educativa y de artesanía para niños

La Fiesta Otoñal de Barr Lake está patrocinada por:












Más información: (303) 659-6005 **Entrada al parque: \$7.00 por vehículo** o carnet de los parques estatales requerido

Parque Estatal Barr Lake está localizado al norte del Aeropuerto Internacional de Denver

Direcciones (desde Denver): • Toma la autopista I-76 al noreste, Toma la salida Bromley Lane • Dobla al este hasta Picadilly Road • sigue al sur hasta la entrada del parque

Direcciones (E-470): • Toma E-470, hasta la salida 34 (Avenida 120) • Diríjase al este, dobla izquierda en Tower Road • y izquierda en Picadilly Road • La entrada se queda una milla adelante en la izquierda