

# Visitation Forecasting and Predicting Use of NPS Parks and Visitor Centers: Focus Group Report

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August 2003



**NPS SOCIAL SCIENCE PROGRAM**

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## Executive Summary

On March 12, 2003 a focus group organized by the NPS Park Planning and Special Studies Program and the NPS Social Science Program met at Turkey Run Park on the George Washington Memorial Parkway. The purpose of the meeting was to assist the NPS in planning visitor centers and related projects that are cost-effective and of appropriate scope and size. The focus group provided information on trends in visitation forecasting and recreation and tourism demand modeling that could inform the planning and design of visitor centers and other park facilities.

Group participants discussed ways in which qualitative and quantitative approaches to forecasting population change and participation in recreation and tourism activities could be applied to predict use of parks and visitor centers up to 20 years into the future. Key points from the discussion include:

- Little change has occurred in the past 50 years in the fundamental approaches to population forecasting; however, the data used in forecasting models has been refined. For example, information on race and ethnicity has become more detailed, and forecasting population change can be done for smaller geographic areas due to developments in GIS and related databases.
- For projections of visitation two to three years into the future, trend line extensions often work well and can be locality-specific.
- Qualitative methods are best for long-term forecasts of park or visitor center use. One approach is to develop alternative scenarios on a large scale, e.g., based on lifestyle or environmental changes, and consider how these might affect visitation in the future. Delphi panels and cross-impact simulations are two methods for doing this.
- In long-term forecasting and planning, one strategy is to work actively to shape the future, rather than wait for it to occur. For example, in “normative forecasting” a desirable future condition is defined and the sequence of steps to achieve it described.
- The amount of visitation a site receives can be influenced by marketing; this will determine the number of visitors to a location more than demographics will.
- The most important key to forecasting park visitation and use of visitor facilities is continuous research that tracks trends in who visitors are and correlates these with factors known to affect visitation and facility use.

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## Introduction

This report describes the results of a focus group conducted for the Park Planning and Special Studies Program of the National Park Service (NPS). The purpose of the focus group was to assist the NPS in planning visitor centers and related projects that are cost-effective and of appropriate scope and size. More specifically, the focus group provided information on the state of the art in visitation forecasting and demand modeling related to recreation, heritage tourism, and the use of associated visitor facilities in the National Park System.

## Background

The House Appropriations Committee Report for FY 2002 expressed concern about the cost and size of proposed visitor centers, heritage centers, and environmental education centers in some national parks.<sup>1</sup> The committee asserted that several recent proposals for visitor facilities were unacceptable because they were predicated on unrealistic increases in visitation and staff. These concerns were repeated in the conference committee report, specifically asserting that NPS General Management Plans (GMPs) tended to include oversized buildings and other projects that were not essential to the missions of the parks.

According to a review by the NPS, plans that appear to have attracted the committee's attention were those for parks with relatively small annual visitation coupled with what seemed to be costly new visitor facilities. Examples included Homestead National Monument, Grand Portage National Monument, and Washita National Battlefield. In response, the NPS Park Planning and Special Studies Program developed a series of actions that could be taken to examine the committee's concerns. Two of these were:

- Analyze the role of visitor facilities in light of the NPS mission, emerging technologies, and changing functions in education, interpretation, and orientation.
- Evaluate the accuracy of past visitation projections in GMPs, and prepare guidelines on effective visitation forecasting methodologies.

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<sup>1</sup>NPS internal discussion paper, "General management plans and visitor facilities," December 7, 2001.

The focus group described in this report is one measure taken to address the second of these two actions. A separate report, “Trends in Demographic and Information Technology Affecting Visitor Center Use,” addresses the first action.

### **Focus-group Planning**

The focus group on visitation forecasting was organized in consultation with a professional facilitator experienced in NPS planning issues. Participants in the focus group were identified by the NPS Visiting Chief Social Scientist with the approval of the Chief of Planning. Those recruited either had national reputations for their work in population forecasting and demand modeling, or were recommended by such individuals.

Population forecasters employ qualitative and quantitative techniques to predict population changes in a region. The qualitative methods used in population forecasting directly incorporate human judgment into projections, while the quantitative methods employ mathematical models. The focus group included experts in population forecasting because change in the regional population around a park is one driver of visitation. The second group of participants were those with expertise in recreation and tourism demand modeling. Demand modelers use statistical methods to describe which types of residents in a region’s population tend to be park-goers and participate in particular recreation activities. (See the appendix for a list of participants.)

### **Method**

The visitation-forecasting focus group met at Turkey Run Park on the George Washington Memorial Parkway on March 12, 2003. Members were sent a detailed guide before the meeting which included an agenda and a list of questions to be discussed. During the session, the facilitator led the participants through the guide, focusing on each question in turn. Participants were asked to consider forecasting up to 20 years into the future, the time frame typical of a park’s GMP. The overall approach was to begin with broad trends and developments in regional forecasting and demand modeling and then turn to the problem of visitation forecasting at a smaller spatial scale, i.e., parks and facilities within parks. To help direct the latter discussion, participants visited Great Falls Park, a nearby NPS unit in northern Virginia. This visit included an evaluation of the park’s visitor center and a discussion with park staff about current visitation and use of park facilities.



**Figure 1** Visitation-forecasting focus group, Turkey Run Park, March 12, 2003.

Comments made by participants during the focus group were recorded on flip charts. In line with the facilitator's preference, no other recording method was used.

Following the group discussion, the facilitator compiled the comments. These were reviewed by the Social Science Program and the Park Planning and Special Studies Program. In addition, the notes were sent to all participants for their review. Clarifications were incorporated into the notes. Additional comments were recorded separately.

It is important to understand what focus groups can and cannot do. Focus groups do *not* provide



Figure 2 Visitation-forecasting focus group.

comprehensive information on a subject, such as visitation forecasting or demand modeling. Other review methods are more suited to that task. Nor are focus groups designed to help a group reach a consensus or make decisions. Instead, focus groups elicit the full range of participants' ideas, experiences, and opinions on a selected topic.<sup>2</sup> Through facilitated, focused interaction, members provide a wealth of qualitative data not typically available from surveys, and group members stimulate each other with an exchange of ideas not possible in individual interviews.

### Presentation of Results

The results of the visitation-forecasting focus group are presented in three sections:

- State of the art in forecasting population change and modeling recreation and heritage tourism demand.
- Implications of the state of the art for predicting use of NPS parks and visitor centers.
- General implications for the NPS.

Each of the sections is prefaced with a synopsis of principal questions asked during the discussion. Following this, sub- topics are introduced with bold- faced titles, and brief background paragraphs place the participants' discussion in the larger context of forecasting and modeling. Specific comments are then detailed in bullet statements drawn from the facilitator's notes. This allows for a broad synthesis of the discussion, while also preserving insights of focus-group participants that illustrate the synthesis.

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<sup>2</sup>Billson, J.M. 2003. *The power of focus groups - A training manual*. Barrington, RI: Skywood Press.

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# State of the Art in Forecasting Population Change and Modeling Recreation and Heritage Tourism Demand

## Synopsis

*Important trends and new developments in forecasting population change and change in recreation and heritage tourism activity:*

- There have been few new developments in population forecasting in the last 50 years.

*Ways population change can be forecast effectively:*

- When forecasting population change, three sub-populations are relevant: permanent residents, seasonal residents, and transients.
- Forecasting population change at smaller spatial scales, such as states and counties, presents more problems than forecasting at a national level.

*Ways recreation organizations can effectively forecast visitation or tourism and recreation activity:*

- For projections two to three years into the future, time-series or trend line extensions usually work well and can be locality-specific.
- For long-term projections, qualitative forecasting methods are often more appropriate than quantitative ones.
- The type of area and facility visited must be considered in projecting visitation.
- When forecasting participation in recreation activities (rather than visits to locations), projections based on demographic change have been of limited accuracy.
- The Army Corps of Engineers is looking at spatial trends in visitation and analyzing them with respect to demographic trends.
- The gap between site-specific forecasts and national forecasts could be reduced if more information were collected regularly from visitors.
- Blips in recreation and tourism participation can be forecast if their causes are known.
- The tourism industry through the Travel Industry Association uses county-level data in projecting tourism demand and arrivals at travel destinations.

*Ways use of a single facility can be effectively forecast:*

- For facilities with a history of use, changes in ease of access, in the market for the facility, and in the mix of products offered by it can all affect future use and should be considered in forecasts.
- For new facilities without a previous history of use, both qualitative and quantitative comparisons with similar facilities can be used to forecast visitation.

*Other ways to forecast visitation not linked to population forecasts:*

- Surveys of travel intentions, trends in recreation equipment sales, and projections of community growth patterns are all used to predict tourism travel and recreation participation.

## **What Are Some of the Important Trends and New Developments in Forecasting Population Change and Change in Recreation and Heritage Tourism Activity?**

The focus group opened with a discussion of current trends in population forecasting and recreation and tourism demand modeling. This was done because most visits to NPS units occur in the context of

recreational outings, including heritage tourism. Focus-group members discussed both population forecasting and estimates. Forecasts are projections of change into the future. Estimates are informed appraisals of current (or past) populations in the absence of actual counts.

*There have been few new developments in population forecasting in the last 50 years:*

- Little change has occurred in how population estimators think about forecasting. However, there has been some refinement of the data used for forecasting and estimating population.
- The US Census Bureau cooperates with the Internal Revenue Service and with Medicare, which has helped it refine its data, but this doesn't represent change in the underlying way forecasts and estimates are calculated.
- Data on race has become more detailed – population forecasts are being made for an increasing number of racial and ethnic categories.
- Forecasting can be done for smaller and smaller areas. Because of GIS and new databases, geographic detail is more precise.
- The frequency of population estimates is also increasing. The Census Bureau is now redoing its estimates every two years. In retail and commerce, estimates of the size and characteristics of market populations are redone annually.

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### **In What Ways Can Population Change Be Forecast Effectively?**

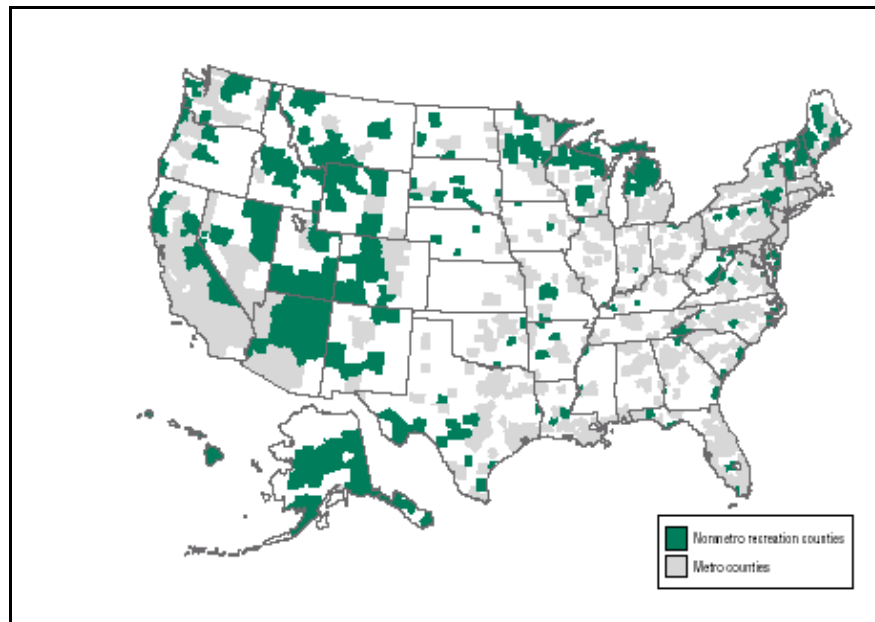
Three demographic factors affect whether the population of an area increases, decreases, or remains stable over time. These are fertility rate, mortality rate, and migration in and out of the region (net migration).<sup>3</sup> Population forecasts start with the current number of people living in an area, then project fertility, mortality, and net migration rates to arrive at a future population. The US Census Bureau projects the size and composition of the US population 100 years into the future using high-, low-, and mid- range forecasts. These variants incorporate different assumptions about changes in birth, death, and migration rates. In most cases, fertility and mortality rates are relatively predictable, especially over the short or medium term. Net migration is less so and tends to be influenced by factors not considered in demographic forecasting models, such as seasonal cycles, economic fluctuations, and geopolitical factors that influence the movement of populations. Migration can be permanent or seasonal. Seasonal migration is characteristic of campus communities, retirement counties, and recreation-dependent regions, including those surrounding many NPS units. Focus-group participants commented on the current state of the art in population forecasting, and on the challenge of doing usable state- and county-level projections of populations.

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<sup>3</sup>US Department of Transportation. (2001). *Population forecasting methods: A report on estimating and forecasting methods*. <http://tmip.fhwa.dot.gov/clearinghouse/docs/landuse/pfm/ch1.stm>

When forecasting population change, three sub-populations are relevant: permanent residents, seasonal residents, and transients (i.e., people who don't live either temporarily or permanently in an area):

- For the resident population, census data provides a good basis for projections.
- The Census Bureau has not done a good job of counting seasonal and transient populations, but this is changing for seasonal residents. The Census Bureau's American Community Survey is a new canvassing of 3 million households per year. The 2003 survey includes a question asking if residents are staying at their address because it is a seasonal or vacation address.
- Internal migration (population movement within the boundaries of a nation or region) is the biggest component of population change, but predicting migration rates is the weakest link in population forecasting. However, if it were known, the number of seasonal residents could be a good predictor of migration rates in many areas.
- The smallest practicable unit for considering migration in population forecasts is the county or metropolitan area. Below this, migration cannot be factored in as well.
- One way to characterize areas at the county level is by migration patterns. Counties in which recreation or tourism are important to the economy can be identified by their migration patterns. Maps exist showing recreation and tourism-dependent counties in the non-metropolitan US (Figure 3).<sup>4</sup>



**Figure 3.** Non-metropolitan recreation counties in the US (Johnson and Beale, *op. cit.*).

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<sup>4</sup>Johnson, K. & Beale, C. 2002. Nonmetro recreation counties – Their identification and rapid growth. *Rural America* 17(4):12-19.



*Forecasting population change at smaller spatial scales, such as states and counties, presents more problems than forecasting at a national level:*

- The Census Bureau produces state population projections and does a good job where population is changing slowly. States with explosive growth (e.g., Nevada) are more difficult to forecast.
- One problem with state-level Census Bureau projections is that the approach is purely demographic, e.g., based on birth rates, death rates, and net migration rates. No effort is made to incorporate the influence of economic swings on population change.
- The Census Bureau does not project population change at the county level. This is left to the individual states. Therefore, the method of forecasting at the county level is not standardized.
- Each state has a data center that works cooperatively with the Census Bureau to do county-level forecasts and other population analyses. Individual state demographers are more familiar with their states than is the Census Bureau.
- Commercially produced population estimates and projections are available. Woods and Poole and NPA Data Services use similar methods, combining economic data from the Bureau of Economic Analysis with a population-cohort model. These include estimates and projections down to the county and metropolitan level, but few analysts are working on them.

### **In What Ways Can Recreation Organizations Effectively Forecast Visitation or Tourism and Recreation Activity?**

For visitation forecasts two to three years ahead, simple trend line extensions often work well. However, in long-term forecasting, qualitative approaches based on expert judgement, or a combination of judgment and quantitative methods, is more appropriate. A factor that is often ignored in forecasting is the power of marketing to influence consumer choice. The future does not simply happen; in many cases it can be influenced toward specific end-goals by marketing and education. More attention has been given to forecasting participation in different recreation activities than to forecasting visits to specific locations. For example, modeling activity participation and forecasting future participation based on the demographic characteristics is a major component of many statewide comprehensive outdoor recreation plans. However, the explanatory power of demographic models is usually low, rarely accounting for more than 30 percent of the variance in current participation, making their utility for long-term forecasts questionable. One area in which locality-based forecasts are made is tourism demand modeling, where travel to specific destinations is predicted based on such factors as surveys of travel intentions, population size at points of origin, distance to destinations, destination attractiveness, and macro-economic trends. Even in this case, projections vary in their accuracy, with short-term forecasts generally being more accurate than long-term predictions of visitor behavior.

*For projections two to three years into the future, time-series or trend line extensions usually work well and can be locality-specific:*

- Trend-line extensions can show good short-term forecasts if visitation data is captured regularly.

- Two- or three-year forecasts off a time-series trend often work well and can be done at the park or facility level. However, it is risky to push this kind of forecast out to 20 years. The confidence level is very low.

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- In time-series data, sometimes the total use is stable, but the mix of users changes. Time-series projections are for the number of visitors, not the mix, so they don't predict changes in the composition of the visitor population.

*For long-term projections, qualitative forecasting methods based on expert judgment are often more appropriate than quantitative ones:*

- One qualitative approach to long-term forecasting is to develop future scenarios on a large scale, e.g., based on lifestyle or environmental changes, and consider how these might affect visitation. A Delphi panel could be used to assess which of the scenarios are most likely.
- For long-term forecasts it's best to look ahead at five- or ten-year intervals.
- One problem with qualitative forecasting is that often the participants are processing the same information, but the world is always changing. Good qualitative approaches involve people with a wide range of expertise and knowledge.
- Some approaches to long-term forecasting, such as cross-impact simulation, quantify expert judgments about important trends and how the elements of a system interact. These simulation models can be used to perform policy experiments that evaluate what happens when a chosen action ripples through the system.

*The type of area and facility visited must be considered in projecting visitation:*

- Facilities that are designed for repeat visitors will be affected differently by changes in the local population than facilities that are designed for one-time visitors or those who travel from distant origin points.
- Non-local use of a facility is generally higher if it is located near a major interstate. For example, Corps of Engineers campgrounds near an interstate receive a lot of non-local use.
- Ideally, several projection models would be developed based on site characteristics: one for urban *vs.* rural sites, a site-age model, and models distinguishing other characteristics of sites, such as size and types of facilities.

*When forecasting participation in recreation activities (rather than visits to locations), projections based on demographic change have been of limited accuracy:*

- The traditional approach to forecasting recreation demand is to take population data and establish a visitation or participation rate, assuming that if the population doubles then the visitation or participation will double.
- This approach can be refined by breaking the population down into different cohorts based on demographic characteristics, such as age or race, and projecting separately for each cohort.

- However, one reason forecasts of recreation and tourism demand based on demographic change don't work well is that participation rates in some activities are so small that it leads to too much error in the process. When participation rates are two percent plus or minus two percent, forecasts can't be very accurate.
- Another reason for the limited success of demographic- based projections is that the relationship between demographic characteristics and activity-participation rates may not remain constant, especially over the long-term.
- When predicting visits to specific locations, another limitation of standard forecasting techniques is that, although it is known which demographic groups are most likely to participate in many activities, this data is not site-specific.
- A final shortcoming of standard recreation demand projections is that the amount of use a site receives can be affected by marketing; promotion and pricing influence participation and visitor numbers more than demographics do.

The amount of use a site receives can be affected by marketing; promotion and pricing influence participation and visitor numbers more than demographics do.

*The Army Corps of Engineers is looking at spatial trends in visitation and analyzing them with respect to demographic trends:*

- Nationally, visitation to Corps lakes has been flat for the last ten to 12 years, but within the 456 water projects, visitation trends are highly variable. There is huge spatial variability between sites, which affects trends in the use of those sites.
- The Corps of Engineers needs more spatially explicit information to better account for changes in visits at the project level. It also needs to know the extent to which demographic variability and spatial variability interact to influence visitation to locations.
- The Corps sees this interaction in the case of minority recreation use. In areas where there are increases in the Latino population, there are also increases in Latino recreational use.
- There is a lot of internal migration by the US Latino population, and this is affecting use of Corps of Engineers lakes. In 1980, one-quarter of Corps projects were used by Latinos. In 2003, all are.
- If increases in the Asian population in the US are mapped, the areas of increase coincide with upswings in Asian visitation to Corps recreation areas.
- It's possible that the same interaction of space and demographics holds in the case of age, but the Corps has yet to evaluate those numbers.

*The gap between site-specific forecasts and national forecasts could be reduced if more information were collected regularly from visitors:*

- Recreation management agencies need five basic pieces of information that should be asked regularly of visitors: ZIP code, persons-per-vehicle, length of stay in the area, whether there is an overnight stay, and lodging type.

Using ZIP codes a wealth, of additional demographic and lifestyle information about visitors can be profiled at useful levels of accuracy.

- Using ZIP codes, a wealth of additional demographic and lifestyle information about visitors can be profiled at useful levels of accuracy. For example, ESRI<sup>5</sup> publishes descriptive profiles and five- year projections of the population for every residential and non-residential ZIP code in the US.
- There are passive ways to get information about visitors without questioning them. Vehicles can be observed to record party size, gender, race, approximate age, and vehicle model.
- License plates can be converted to ZIP codes, although there is a charge for such a service, and in some states it's very expensive. Also, because of privacy concerns, the trend over the last ten years has been to restrict access to that data. In some recreation areas the utility of license plate data is limited by the high percentage of visitors driving rental vehicles.
- The Army Corps of Engineers and the US Forest Service use the National Recreation Reservation Service for campground reservations. This is a source of additional data about visitors. The NPS is joining this service, but one problem with using reservation data to describe visitors is that reservations don't necessarily translate into visits.
- The Corps of Engineers is also beginning to ask visitors about camping experiences and activity participation.
- Recreation.gov is the online recreation portal for the federal government. Potentially, people who query the site for information could be sampled with a Web-based survey to find out who they are and the types of recreation areas and activities they prefer. However, there are problems in identifying Web-site users in ways that don't violate federal privacy protections.

*Blips in recreation and tourism participation can be forecast if their causes are known:*

- There are both negative blips, such as September 11<sup>th</sup>, and positive blips, such as special events.
- Visitation at special events can be forecast, looking at the market for the event, similar events, and the amount of promotion. Along with use, the economic impact of events can be predicted.
- Changes in gasoline prices and gasoline availability have created blips in travel, but this phenomenon may not continue if people become conditioned to higher prices.
- There are other predictable blips every year tied to season, holidays, and recurring events.
- The visibility of a place or the publicity it receives is an important factor that can create blips. For example, when a site is used as a location in a major motion picture it frequently experiences a subsequent increase in tourism.

*The tourism industry through the Travel Industry Association (TIA) uses county-level data in projecting tourism demand and arrivals at travel destinations:*

- The TIA methodology is high-quality, with good inputs, including age, sex, and race. The forecasting model is re-calibrated at every census.

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<sup>5</sup>ESRI. 2002. *The sourcebook of ZIP code demographics*. ESRI Press, Redlands, CA.

- The TIA forecasts are made with a proprietary model that incorporates macro- economic trends, trend data from a panel of American households, and periodic surveys of travel intentions.
- At the national level the tourism industry does a good job analyzing projected *vs.* actual demand, comparing where people went with where they thought they'd go.

### **In What Ways Can Use of a Single Facility Be Effectively Forecast?**

Because forecasting is more reliable at large spatial scales and over short time periods, doing long-term visitation forecasts for a single visitor center presents many challenges. A further complication is that predicting use of an existing facility differs from predicting visitation to a new facility. In the second case, there are no previous visitor statistics to analyze or trend lines to extend. In long-term projections, an alternative approach to predicting visitation and waiting to see if the forecast is correct is to practice “normative forecasting.” Using this approach, a desired future condition is set and the sequence of steps to achieve it is laid out. Normative forecasting has been popular in the defense and space communities. One example was the plan to put a man on the moon by the end of the 1960s.

*For facilities with a history of use, changes in ease of access, in the market for a facility, and in the mix of products offered by it can all affect future use and should be considered in forecasts:*

- To effectively forecast, it's important to understand the current market for the facility and the segments that make it up. Forecasting changes in the segments can help predict future visitation.
- Some providers, such as Disney, are very good at marketing for local residents. Looking 20 years into the future, this is one way to go: build the facility and promote it to the local population using lecture series and other activities as attractions. In this way, at least a portion of future use is predictable because it is controlled by the park.
- One problem with projecting visitor center use is that, for a resource- based area, the visitor center is not the attraction; it is the resource itself that draws visitors.
- Changes in pricing and maintenance level are other factors affecting visits to existing facilities.

*For new facilities without a previous history of use, both quantitative and qualitative comparisons with similar facilities can be employed to forecast visitation:*

- A multiple regression model can be constructed using variables that predict use at similar existing facilities. One model can be developed from visitation at several existing sites, but the inputs have to be consistent across all sites.
- As predictors, it is important to use measures for which good data exists and which also significantly affect facility visitation. Population within 500 miles, square footage of the visitor center, and average distance traveled are examples of predictors in multiple regression models.
- Forecasting models must be refined over time. This requires an active tracking program in which visitation and the inputs affecting it are monitored continually.
- In the future, access to many types of personal data may be increasingly restricted by privacy concerns. This could affect the ability of the NPS to track the characteristics of visitors and non-visitors.

- When forecasting visits to a specific location or facility, existing substitute sites are important to consider because they compete for visitors with new facilities. But substitutes are one of the most difficult variables to incorporate into quantitative forecasting models. An alternative approach is to employ a measure of the new facility’s uniqueness.
- In long-term forecasting and planning, the NPS could work actively to shape the future, rather than wait for it to occur. This is “normative forecasting,” i.e., setting a goal then systematically laying out the sequence of steps needed to reach it.
- It is desirable to use both qualitative and quantitative approaches to forecasting the use of new facilities. In a qualitative approach, the NPS could look at similar existing facilities and their use patterns when they were opened. Employing a quantitative approach, data on factors affecting visits at similar facilities could be collected and input into a multiple regression model to forecast visitation to the new facility.

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In long-term forecasting and planning, the NPS could work actively to shape the future, rather than wait for it to occur.

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### **Are There Other Ways to Forecast Visitation that Are Not Linked to Population Forecasts?**

Focus-group members discussed several approaches to forecasting that do not rely on applying participation rates to changes in population or to the market segments within a population.

*Surveys of travel intentions, trends in recreation equipment sales, and projections of community growth patterns are all used to predict tourism travel and recreation participation:*

- Surveys of travel intentions can be reliable predictors of actual behavior in the short-term if there is no major event that causes intentions to change on a large scale.
- The Travel Industry Association (<http://www.tia.org/Travel/>) estimates US resident domestic pleasure travel volumes by season (fall, winter, spring, and summer). The forecasts are based on a proprietary forecasting model that includes as inputs a survey of US adults’ intentions to travel in the upcoming season, as well as macro-economic trends and historical travel survey data.
- Economic data, such as recreational equipment sales and license sales, can be used to show the number of hunters, anglers, and boaters in an area and trends in those numbers over time.
- Local communities and major developments such as Disney World map long-term build-out (i.e., development potential). This could help forecast use of parks and recreation facilities that draw their visitors primarily from local populations.

# Implications of the State of the Art for Predicting Use of NPS Parks and Visitor Centers

## Synopsis

*Feasibility of predicting use of the Great Falls Park visitor center 20 years into the future:*

- Forecasting use of Great Falls Park visitor center should be a straightforward task due to the park's capacity constraints and the location of its visitor center with respect to traffic flow.

*Ways to strengthen the NPS methodology for gathering and reporting annual visitation to parks:*

- The current NPS method for counting visits is workable and cost-effective; however, it doesn't meet the need to know who visitors are.
- Tracking data describing visitor populations and how they are changing is critical to many planning and management functions.
- Similar to visitor characteristics, the characteristics of parks change over time and need to be monitored in order to make accurate forecasts of park and facility use.

*Feasibility of forecasting use of different types of NPS visitor centers 20 years into the future:*

- One approach to forecasting use of a visitor facility is to start with visitation to the park, then make the necessary conversions to determine use of the facility.
- Sometimes visitor centers are located outside parks, or there may be no consistent relationship between park use and use of the visitor center. In these cases, other approaches to forecasting must be employed.

*How the NPS should forecast visitation and predict use of parks and visitor centers 20 years from now:*

- The NPS should have a better understanding of who its visitors are.
- The NPS should upgrade the quality of the visitor data it collects, the way it organizes to gather that information, and the way it delivers that data to managers and other customers.

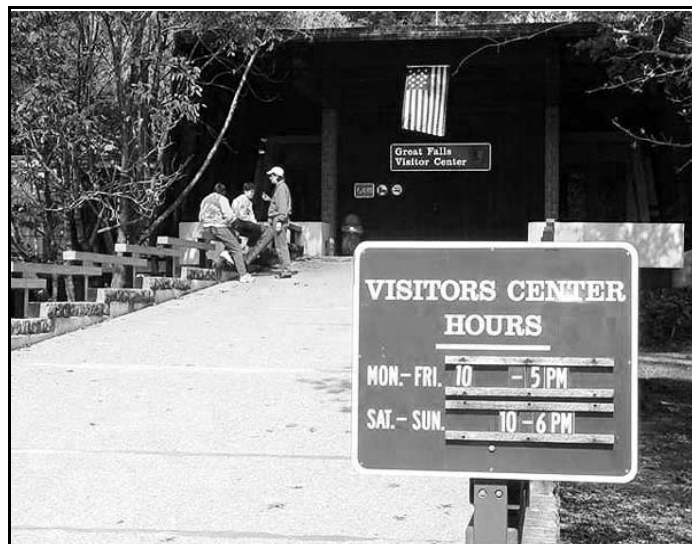


Figure 4 Visitor center, Great Falls Park.

## How Feasible Is It to Predict Use of the Great Falls Park Visitor Center 20 Years into the Future?

The approach taken by focus-group members to forecasting use of the Great Falls Park visitor center is illustrative of the reasoning that could be applied to predicting visits to many existing facilities. Group members felt that projecting future use at the Great Falls Park facility would be relatively easy, given that the park already appears near its visitor capacity. This capacity could be increased, but forecasting would still be feasible because the strategies to increase visitor capacity are themselves controllable and predictable.

*Forecasting use of Great Falls Park visitor center should be a straightforward task due to the park's capacity constraints and the location of its visitor center with respect to traffic flow:*

- Because the Great Falls Park visitor center is situated between the parking lot and the park's attractions, predicting use of the facility is easy. This will continue to be the case as long as the design is not changed.
- Use of Great Falls Park is primarily a function of parking spaces, which fill up on nice weekends. The only opportunity to significantly increase use is during the week.
- A capacity factor limiting visitation to Great Falls Park is that people will turn away if the queues at the entrance station are too long. Most people will not wait 2 ½ hours to see the falls and have a picnic.
- But one trend that might increase visits is the growing number of retirees in the area. Retirees have more flexibility with their time, which could result in more visitation during the week, a period of under-used capacity.
- Another way to increase visitor capacity would be to redirect people to under-used areas of Great Falls Park. If this were done, the park could do another forecast taking these changes into account. However, is it desirable to increase the park's visitor capacity? The lesser-used days give the park's resources and staff an opportunity to recover.
- Use of the park's visitor center could also be increased by marketing, e.g., promoting programs for local school children. But this still leads to accurate forecasting because the promotion can be controlled by the park.
- An important constraint on forecasting use of the visitor center is that the park lacks recent data describing who its visitors are. This means that demographic cohorts cannot be identified in the population who visit the park. Thus, projection models cannot be cohort-based.



**Figure 5** Parking lot, Great Falls Park.

### **How Can the NPS Methodology for Gathering and Reporting Annual Visitation to Parks Be Strengthened?**

To forecast visitation to a park (or facilities in a park) current visitation must be known, as well as historical visitation patterns. Thus, a reliable, continuous method for counting visitors is indispensable to forecasting. The focus group reviewed the current methods used by the NPS to count visitors, which are based largely on traffic counters, and offered several comments on their strengths and shortcomings. The most important weakness is that traffic counts tell parks nothing about the composition of their visitor populations.



*The current NPS method for counting visits is workable and cost-effective; however, it doesn't meet the need to know who visitors are:*

- Party size estimates are updated on an irregular basis. Generally, party sizes are decreasing, so caution must be used when doing time-series analyses of visitation data.
- An ongoing visitor survey is needed in all parks, tracking activities, where visitors come from, the reasons for their visits, their demographic characteristics, and whether or not they use a visitor center. Visitor center characteristics should be measured as part of the tracking system.
- An ideal visitor-tracking process would sort out the monitoring data needed for visitor forecasting from the data required for a more comprehensive market survey every five to ten years.
- Traffic counters are not the optimal way to measure visitation. There are re-entry problems and maintenance problems with the equipment. A tremendous amount of research is needed behind the scenes to compute conversion factors, and traffic counters are still not a good way to count.
- Sales receipts are another way to track use of a visitor center. Conversion factors could be developed that are applied to the number of transactions or the total dollar amount.
- Fee collection works well as a way to count visits in some parks. Cave tour fees at Carlsbad Caverns National Park are one example.
- A problem with using entrance-fee collection as a way to count visitors is that there may be little correlation between entrance fees paid and the number of visits. Visitors can use a pass, with one pass representing one visit or 150 visits.
- The US Forest Service is encountering problems with counting visits in situations where one fee pays for use of multiple forests. This could be a problem in the NPS as well, e.g., at Yellowstone-Grand Teton national parks.

An ongoing visitor survey is needed in all parks, tracking activities, where visitors come from, the reasons for their visits, their demographic characteristics, and whether or not they use a visitor center.

*Tracking data describing visitor populations and how they are changing is critical to many planning and management functions, including forecasting:*

- In developing a new way to measure visitation, the initial goal of the US Forest Service was to come up with visitation forecasts and counts that were defensible before Congress. But the agency now realizes that the value added from understanding who its visitors are will drive the future of the Forest Service.
- The NPS has also found that it's useful to know the basic demographics of visitors, even if this information is not used for forecasting. For many reasons, it's also important to understand the customer base at different types of parks, e.g., urban parks *vs.* rural parks.

- To improve visitation forecasts, research is needed on the stability of the relationship between demographic characteristics and the probability of visiting parks. Some demographic groups are more likely to be park-goers than others, but patterns change over generations. Also, differences in visitation rates between racial groups diminish with increasing education.
- What is counted and how it's counted depends on what question needs an answer. The number of nights visitors spend in an area is useful for economic impact analyses, but the number of hours visitors spend in a park is useful for staffing and maintenance.
- Market research helps evaluate the need for new facilities and programs. If residents around a national park demand a Ferris wheel, does the NPS give it to them? Not necessarily, but then the park knows these people are less likely to visit.

*Similar to visitor characteristics, the characteristics of parks change over time and need to be monitored in order to make accurate forecasts of park and facility use:*

- A database is needed for all parks that includes a visitor capacity measure, number of hotels in the area, types of visitor centers, and access to the park. This should be updated at regular intervals.

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Since 1987, NPS visitation has been flat or decreasing. Is this because visitor capacity has been reached in some parks? The NPS needs to know this to do accurate forecasting.

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- Social scientists and planners don't fully understand how a park's visitor capacity functions. This is a serious hindrance to forecasting. Since 1987, NPS visitation has been flat or decreasing. Is this because visitor capacity has been reached in some parks? The NPS needs to know this to do accurate forecasting.

- To improve the ability to forecast visits it would be useful to break the NPS system into sub-systems – parkways, urban parks, rural parks, and destination parks – and develop separate forecasts for each sub-system.

### **How Feasible Is it to Forecast Use of Different Types of NPS Visitor Centers 20 Years into the Future?**

In some cases, forecasting use of a visitor center is tantamount to predicting visitation to the park in which it is located. In other cases, the correlation between park visits and use of the visitor center may be weak. Even so, park visitation is still an essential input into the forecast of visitor center use in most parks.

*One approach to forecasting use of a visitor facility is to start with visitation to the park, then make the necessary conversions to determine use of the facility:*

- For visitor centers that people must pass through to enter the park, the NPS can forecast use the same way it forecasts visitation to the park as a whole.

- If the visitor center is drawing solely from park users, a good approach is to start with the park's visitation and estimate how much of this the visitor center will capture. As at Great Falls Park, location of the facility is critical in determining this.
- The past history of existing visitor centers in areas with similar visitation levels can be used to forecast use of a new facility.

*Sometimes visitor centers are located outside parks, or there may be no consistent relationship between park use and use of the visitor center. In these cases, other approaches to forecasting must be employed:*

- Gravity models can be used to forecast visitor center use based on the distance from major trip-origin points.
- For facilities located along major travel routes, the number of cars exiting a ramp *vs.* how many pass by on the highway could be a good predictor of use.
- The functions of a visitor center affect its use and should be incorporated into forecasting. Is the facility a learning center that draws school groups or field schools? Does the park host conferences? Are there special events at the visitor center or park?
- If the NPS works actively with communities and school districts to promote use of a visitor center through special programs and events, it is determining a portion of the visitor center's use, making forecasting easier.
- In some cases, an initial forecast might be based on average use of park visitor centers in general, perhaps combined with other methods, such as multiple regression models and qualitative comparisons with existing facilities judged to be similar.
- Some visitor facilities may over-perform or under-perform based on their forecasts or on comparisons with similar facilities. This is not necessarily bad. When predictions are much higher or lower than actual visits, a lot is learned about what affects or does not affect visitation. This can be used to refine future forecasts.
- If a new facility is unique, forecasting use of it is more difficult because there are no similar cases for comparison. The Gettysburg map was an example. Originally, it was a privately owned attraction, but went out of business because admissions did not reach the level forecast.

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### **In Your Dreams, How Should the NPS Forecast Visitation and Predict Use of Parks and Visitor Centers 20 Years from Now?**

The visitation-forecasting focus group concluded its discussion with each participant describing his or her view of the ideal forecasting system of the future. Two points were emphasized: 1) the NPS needs better ways to track who its visitors are, and 2) the NPS needs a better structure for monitoring and forecasting visitation.

*The NPS should have a better understanding of who its visitors are:*

- The most important point is that the NPS needs to know a lot more about its customers. With a tracking system in place, the forecasting models will be developed along the way.
- Everyone entering a park would have an NPS card with their name and address that gets scanned into a database.
- The NPS would conduct a regular national survey to profile visitors and non-visitors, including their demographic characteristics, types of parks visited, and preferred services and facilities.

*The NPS should upgrade the quality of the visitor data it collects, the way it organizes to gather that information, and the way it delivers that data to managers and other customers:*

- The NPS should develop a means to continuously collect high-quality data about its visitors that is based on something more than tire counts. It should forecast visitation from its own information, which would be comprehensive and of good quality.

The NPS should have a continuous planning process. It would predict visitation by park type or attraction. There would be regular tracking of visitors with a feedback loop to compare the forecast with actual counts in order to calibrate the model.

- The NPS should have a continuous planning process. It would predict visitation by park type or attraction. There would be regular tracking of visitors with a feedback loop to compare the forecast with actual counts in order to calibrate the model.
- Park-based visitor data would be input into a large GIS system and mapped, using models that tie all the data together and make forecasts.

- Every park would have a forecaster and an economist who understand the forecasting model. The forecasters in parks would be coordinated through a national research office.
- The NPS would develop various scenarios for visitation and play them out – low, high, and mid-range forecasts. Comparing these projections with actual visitation would result in a better grasp of how to forecast, including an improved understanding of which predictors to use in projection models and the validity of underlying assumptions.

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## General Implications for the National Park Service

This section presents a summary and synthesis of the focus-group proceedings as interpreted by the author. Its purpose is to place the discussion at Turkey Run Park squarely in the context of larger issues faced by the NPS in forecasting visitation and predicting use of visitor centers. A second purpose is to consider the implications of the discussion for social science research in the NPS.

Two important points integrate many of the comments from the group's participants. The first is the need to understand a park's products and markets, as well as the various forecasting approaches. The second is the power of the NPS to influence, as well as predict, future use of visitor centers and related facilities.

- *Forecasting visitation requires an understanding of agency goals, a knowledge of market trends, and continuous tracking to refine visitor projection models. It also requires an understanding of the limitations of quantitative and qualitative approaches to forecasting.*

Fundamental approaches to visitation and population forecasting have not changed for 50 years. Instead, improvements have come largely from refinements in the types and quality of data input into projection models. For example, census information on race and ethnicity is more detailed than in the past and continues to evolve. Also, due to continued advances in geographic information systems and databases, demographic and lifestyle information can be geo-coded at smaller spatial scales than before. This gives forecasters more detailed information on local populations, something that is critical to doing site-specific projections.

But knowledge of the market “out there” is not as important as knowledge of the specific market segments parks want to reach. In one sense, the NPS serves the entire American public – even a global public – but many parks also have populations of visitors and potential visitors that are of special interest, including school children, seasonal residents, local residents, retirees, or specific racial and ethnic groups. Forecasting visitation depends on knowledge of these strategically important market segments, including changes in their size, geographic distribution, and share of the overall population. Because of this, the most important key to forecasting is continuous research that tracks trends in visitation.<sup>6</sup> However, tracking should be more than counting the number of tire tracks over a counter in the road, since that tells little about who park visitors are. It should involve routinely collecting data that describes how the mix of visitors is changing, either in response to outside events, such as September 11<sup>th</sup>, as a result of broad demographic shifts in

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<sup>6</sup>As one example, Disney samples visitors to its parks every day.

a region's population, or because management actions directly or indirectly affect the types of people who visit. Continuous tracking also is helpful in identifying and reliably anticipating recurring blips in visitation caused by time of year, special events, and other recurring factors.

The type of forecasting depends on the time period for which projections are made and the desired level of precision. Short-term forecasts are more amenable to formal quantitative approaches, such as time-

Applying quantitative methods to the long term is almost certain to yield inaccurate forecasts because most such models make the dubious assumption that conditions that prevail in the present will continue into the future.

series extensions, moving averages, and structural equation models.<sup>7</sup> However, applying these methods to the long term is almost certain to yield inaccurate forecasts because most such models make the dubious assumption that conditions that prevail in the present will continue into the future. In the case of long-term projections, e.g., 20 years ahead, various qualitative approaches are more useful. These include models in which expert judgment is a

direct input, as in describing alternative future conditions or in evaluating the trends and relationships employed in cross-impact simulation models. Even more than in the short term, when forecasting visitation into the distant future it is essential to understand market segments and the many extraneous factors affecting their behavior, including competing opportunities. It is also important to understand that precision will differ substantially between short- term and long- term forecasts. Planners and policy-makers should expect greater precision in short-term predictions than is possible in the long-term.

- *The NPS does not have to wait for the future to happen. It can play an active role in shaping future events, including use of its parks and visitor centers.*

How many people visit parks is not totally under the control of the NPS. In both the long term and the short term many events and trends beyond the agency's reach significantly affect visitation. But some of the factors influencing use are controllable, such as marketing, pricing, and promoting a visitor center's programs and services. Forecasting is much easier if

Some of the factors influencing use are controllable, such as marketing, pricing, and promoting a visitor center's programs and services.

the effects of these factors on the populations the facility is trying to attract are understood. One school of practice – normative forecasting – establishes desirable future conditions and then lays out the steps necessary to reach them. This approach could be applied to forecasting use of new visitor centers. Important steps toward reaching future visitation goals might include establishing visitor- capacity limits and square footage for facilities, managing ease of access through location, using publicity and special events to reach targeted populations, cooperating with partners in offering programs, and employing

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<sup>7</sup>The NPS uses trend-line extensions in its two-year forecasts of park visitation.

promotional pricing. Continuous tracking of visitation would allow the park to understand how these controllable factors influence the market segments the park is trying to reach, providing an understanding of customer behavior that could be used to refine forecasts for other parks and facilities.

### **Implications for Social Science Research in the NPS**

Just as improvements in population forecasting have their roots in better data employed in prediction models, improvements in projecting use of NPS parks and visitor centers will come from better and more detailed social science data tracking visitor populations and describing market segments. For example, visitors' ZIP codes – input into cash registers at purchase points in park stores and fee stations – would provide a wealth of market information helpful in understanding the populations that are being served and in refining projection models. The US Forest Service has developed such a system – Point O Sale – at its Land-Between-the-Lakes demonstration forest. The Smithsonian Institution employs a similar system in its museum stores.

There is much that social scientists and planners do not yet understand about the factors affecting future demand for park experiences and use of visitor centers. These knowledge gaps have been detailed in previous sections of this report, but the most important are summarized here.

In order to improve its ability to forecast visitation, the NPS needs social science research to:

- Continuously track the characteristics of park visitors.
- Accurately describe non-visitors and their reasons for not using parks and visitor facilities.
- Identify the significant factors influencing visitation at the national level, including:
  - macro-economic cycles and other large-scale trends;
  - park-specific events, including natural disasters and changes in regional access;
  - changes in the size and composition of populations in terms of age, race, and ethnicity;
  - management actions, including facility development and fee policies;
  - the effects of marketing.
- Better understand the effects on demand of crowding, traffic congestion, and waiting times for reservations.
- Identify factors affecting visitation to different types of NPS units, such as parkways, destination parks, urban sites, and remote parks.

In summary, the success of the NPS in forecasting use of parks and visitor centers will depend on its understanding of the variables affecting visitation at different types of units and its ability to measure these on a continual basis. As one focus-group member stated, “In forecasting, any information is helpful if it’s a predictor and you measure it at all of your sites.”

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## Appendix: Focus-Group Participants, Affiliations, and Interests

### **Dr. Donald English**

Research Scientist, US Forest Service Southern Center for Urban Forestry Research and Information. Interests: Outdoor recreation demand modeling and visitation counting.

### **Dr. Ashley Goldhor-Wilcock**

Social Scientist, Bureau of Land Management National Recreation Group. Interests: Environmental economics, visitor counting systems, carrying capacity, economic impacts, and other recreation and visitor issues.

### **Mr. Richard Kasul**

Statistician, Engineer Research and Development Center, US Army Engineers Waterways Experiment Station. Interests: Statistical design and analysis associated with wildlife and recreation resources, projecting demographic change in visitation.

### **Mr. Butch Street**

Management Analyst, National Park Service Public Use Statistics Office. Interests: Measuring national park visitation, short-term forecasts of national park visitation.

### **Dr. Daniel Stynes**

Professor of Recreation Economics, Michigan State University. Interests: Recreation demand modeling and forecasting, economic significance of national park visitation.

### **Mr. Stephen Tordella**

President, Decision Demographics. Interests: Demographic analysis as applied to market research, population estimates and projections, strategic planning, and evaluations.

### **Dr. Timothy Tyrrell**

Professor of Natural Resource Economics and Director, Office of Travel, Tourism, and Recreation, University of Rhode Island. Interests: Recreation and tourism demand modeling, spatial analysis of tourism growth and sustainability.

### **Dr. Paul Voss**

Professor of Rural Sociology and Director, Applied Population Laboratory, University of Wisconsin-Madison. Interests: Applied demography, census survey development, population projections.

Cover photo: Rickey Ridge visitor center, Shenandoah National Park. All photos courtesy NPS Social Science Program.



### **About the NPS Social Science Program**

The role and functions of the NPS Social Science Program are to: provide leadership and direction to the social science activities of the NPS, coordinate social science activities with other programs of the NPS, act as liaison with the USGS Biological Resources Division and other federal agencies on social science activities, provide technical support to parks, park clusters, support offices, and regional offices, and support a program of applied social science research related to national research needs of the NPS.

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Cover photo: Rickey Ridge visitor center, Shenandoah National Park. All photos courtesy NPS Social Science Program.