



Exploring the Impact of the PBS Documentary “The National Parks: America’s Best Idea”

WYSAC Technical Report No. SRC-915

December, 2009
Revised March, 2010

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Exploring the Impact of the PBS Documentary “The National Parks: America’s Best Idea”

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Citation for this document: WYSAC. (2010). *Exploring the Impact of the PBS Documentary “The National Parks: America’s Best Idea,”* by B. Harnisch, B. D. Grandjean & P. A. Taylor. (WYSAC Technical Report No. SRC-915). Laramie, WY: Wyoming Survey & Analysis Center, University of Wyoming.

Short reference: WYSAC (2010), *Impact of the PBS Documentary*.

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1. Executive Summary

In the fall of 2009, the Public Broadcasting System presented a documentary by noted filmmakers Ken Burns and Dayton Duncan entitled “The National Parks: America’s Best Idea.” This six-part series aired on consecutive nights beginning Sunday, September 27, and was seen in millions of U.S. households.

The impact of a media event such as this on the public’s interest in national parks is important to the U.S. National Park Service (NPS). NPS strives to increase public awareness and understanding of national parks. In addition, public attitudes about the parks may affect support for broader elements of the NPS mission, such as preserving and expanding the National Park System.

Here we report an exploratory analysis of data derived from the internet search engine Google to assess selected aspects of the impact of the documentary. Our analysis shows that search volume for the term “national parks,” which had been in slow decline since 2004, increased sharply when the series aired. The average search volume during the broadcast was over six times the average for the same dates in 2008, and it was more than double the previous high in the summer of 2004.

Thus the documentary, along with the media attention that it generated, seems to have led many people to investigate national parks by searching the internet. Supporting this interpretation, we also find increases in search volume for specific parks-related terms that were highlighted in the documentary.

Further analysis suggests some potential geographic differences in the impact of the documentary. However, these apparent differences are modest, and might merely reflect the small samples (and therefore the relatively large margin of sampling error) encountered when the search volume data are broken down by state or city and month.

While the spike in overall search volume waned rather quickly after the series aired, some limited evidence indicates that the impact of the documentary on the public’s interest in national parks was more enduring. For the one NPS website on which detailed data were available for analysis, visits to the site not only increased sharply during the documentary but also stayed elevated thereafter. On average, the typical visitor after the documentary seems not to have used the resources on this technical website as intensively as before, but in the aggregate those resources saw much heavier use by many more visitors.

In general, our results show that data from a search engine like Google can provide useful supplements to the other methods that NPS uses to obtain and monitor information about the National Park System.

2. Introduction

In the fall of 2009, the National Park System was showcased in an especially prominent venue. The Public Broadcasting System (PBS) presented a documentary by noted filmmakers Ken Burns and Dayton Duncan entitled “The National Parks: America’s Best Idea.” This documentary series was initially aired in two-hour episodes over six consecutive nights from Sunday, September 27 through Friday, October 2. It was then re-broadcast in two six-hour blocks on the weekend of October 3-4, and individual episodes were repeated in subsequent weeks. With narration by various celebrities, the series included historical, political and personal accounts of the emergence and evolution of the National Park Service and many of the individual park units.

Like previous PBS documentaries by Ken Burns (see Getler 2007), the series on national parks was seen in millions of U.S. households. Its average Nielsen rating for the six episodes during the premier week was 3.5, which corresponds to about 4 million households per night, and PBS (2010) has estimated that more than 33 million viewers saw at least part of the series. The documentary also generated discussion on other television networks, in the press, and on the internet. This media “buzz” probably extended awareness of the series well beyond its actual viewership.

The potential impact of media exposure such as this on the public’s interest in national parks is of particular importance to the U.S. National Park Service (NPS). NPS strives to increase public awareness and understanding of the 392 units in the National Park System, including not only national parks *per se* but also national historic sites, monuments, seashores, and other areas managed by NPS. In addition, public attitudes about these protected areas may affect support for broader elements of the NPS mission, as defined by the Organic Act of 1916 (see NPS 2008). That legislation makes NPS responsible for managing the natural and cultural resources of the National Park System “so as to leave them unimpaired for the enjoyment of future generations.”

Here we report an exploratory analysis using data from the internet search engine Google to assess some aspects of the impact of the PBS documentary. We make no claim to broad, definitive conclusions. A more comprehensive research effort on the subject would examine the extensive theoretical and empirical literature about media effects on public opinion, and might include national surveys conducted before, during, and after the broadcasts.

Instead, as a low-cost alternative, NPS commissioned the Wyoming Survey & Analysis Center (WYSAC) at the University of Wyoming to undertake this small-scale project, by exploring the research question with tools such as “Google Trends” and “Google Analytics.” These tools are described in the following section on methods. The remainder of the report presents the findings.

3. Methods

3.1. An Overview of Google Trends

Google Trends is gaining attention as a data tool that “can provide one of the most timely, broad-reaching ... monitoring systems available today” for a wide variety of research applications (Ginsberg et al. 2008, p. 14). However, as Google (2009) cautions, “the data Trends produces may contain inaccuracies for a number of reasons, including data-sampling issues and a variety of approximations that are used to compute results.”

Within those limitations, Google Trends (hereafter, GT) can show how often a particular expression or set of expressions is used for internet searches over a given period of time. Of course, it cannot establish with certainty *why* a particular term is searched heavily. When a sharp spike in search volume coincides with a notable public event, it may be plausible to conclude that the spike was caused by the event. But other potential explanations should also be considered.

In this exploratory study, we present comparisons on search volume for NPS-related terms before, during, and after the series aired, and we contrast search volume in the fall of 2009 with the same time period in previous years. Absent other explanations, a spike in search volume at the time of the documentary will provide evidence as to the impact of the series on its viewers and/or the effect on both viewers and non-viewers from the widespread media buzz about the series.

3.2. The Scaling of Search Volume in Google Trends

GT does not report raw search volumes; instead, it generates index numbers for comparison purposes. Typically, the index numbers are scaled so that a value of 1.0 corresponds to the average search traffic for the chosen term in a particular time period. As part of the GT query, the user may specify whether to include worldwide search volume or to refine the results geographically. For purposes of this report, only U.S. search volume was considered.

There are two main ways to construct the basic search volume index, called “relative” and “fixed” scaling. In relative scaling, the index is normed to the average search volume for any selected time period. For example, relative scaling might be used for the term “boating,” with all of 2009 as the reference period. In that case, an index value of 2.0 for the first week of June 2009 would imply that average search volume at the beginning of June was double the average search volume for that term over the full 12-month year. Relative scaling can be especially useful for comparing multiple search terms simultaneously. When analyzing multiple terms, GT scales the first term so that its average search traffic in the chosen time period is 1.0, and scales subsequent terms relative to the first one.

Unlike relative scaling, in fixed scaling the reference period is a fixed point in time – January 2004. For example, using fixed scaling for a term like “snowboarding,” an index value of 0.5 for June 2009 would mean that average search volume for the term during that month was half what its average search volume had been in January 2004. Fixed scaling provides a firm benchmark for comparing search volumes across multiple time periods.

GT can also provide geographic comparisons. In essence, GT calculates a search ratio for each state, dividing (1) the searches for a specified term that originate in the state by (2) the total of all searches coming from that state over the same time period. The state with the highest proportion of searches for the term is assigned an index value of 1.0; all other states are scored lower than 1.0, in descending order of their search ratio for that term. Alternatively, the geographic focus can be on cities rather than states.

3.3. Estimates of Sampling Error in Google Trends

Google uses undisclosed, proprietary methods to sample search volume for producing the various indices. When total search volume is too low to apply the sampling algorithm, GT suppresses the index number altogether. Otherwise, the results are accompanied by estimates of the likely sampling error. GT presents these estimates in percentages, as relative standard errors.

If the index value is 2.0, a relative standard error of 10% would imply that the standard error itself is 0.2. In that case, using plus or minus twice the standard error to approximate the 95% confidence interval around the sample estimate of 2.0, the population value of the index would be expected to fall between 1.6 and 2.4. Small differences between index values should always be interpreted with caution, and especially so when the relative standard errors exceed 10%.

In general, the relative standard errors reported by GT tend to increase as the analysis becomes more fine-grained. For example, the index values are based on smaller samples when examined month by month than they are when calculated for an entire year. The monthly data are therefore subject to more sampling error.

3.4. Some Data from Google Analytics

In addition to using GT, WYSAC also was given access by NPS to Google Analytics data for the www.nature.nps.gov website. Reports from Google Analytics summarize weekly “hit count” information for a specific site, such as number of visits or pages viewed. To bracket the time when the PBS documentary was aired, the weekly reports analyzed here were collected from August 17 through November 29, 2009.

According to Google (2010), a “pageview” is recorded each time a user loads a page on the site, reloads or refreshes it, or views it again after navigating to another page and returning. “Visits” represent the total number of sessions initiated by all users of the site. Repeat sessions from the same user during the specified timeframe count as additional visits, but do not add further to the count of “unique visitors.” The number of unique visitors is determined based on cookies transmitted to each user’s computer on the initial visit.

The www.nature.nps.gov website is a more technical resource than www.nps.gov, which is the general NPS entry portal for information about national parks. NPS was not able to supply us with Google Analytics data on that general portal.

A further limitation of the Google Analytics data available for this project concerns a change in the accessibility of the technical website via search engines like Google. Until recently, the structure of the www.nature.nps.gov website inhibited the ability of search engines to identify content-specific links to the site in search results. According to NPS, that structure was modified around October 1, 2009 so as to facilitate access by search engines. In other words, the timing of the change in accessibility coincided almost exactly, but by happenstance, with the airing of the documentary. Therefore, any conclusions about an apparent impact from the documentary based on the Google Analytics data must take into account this confounding factor.

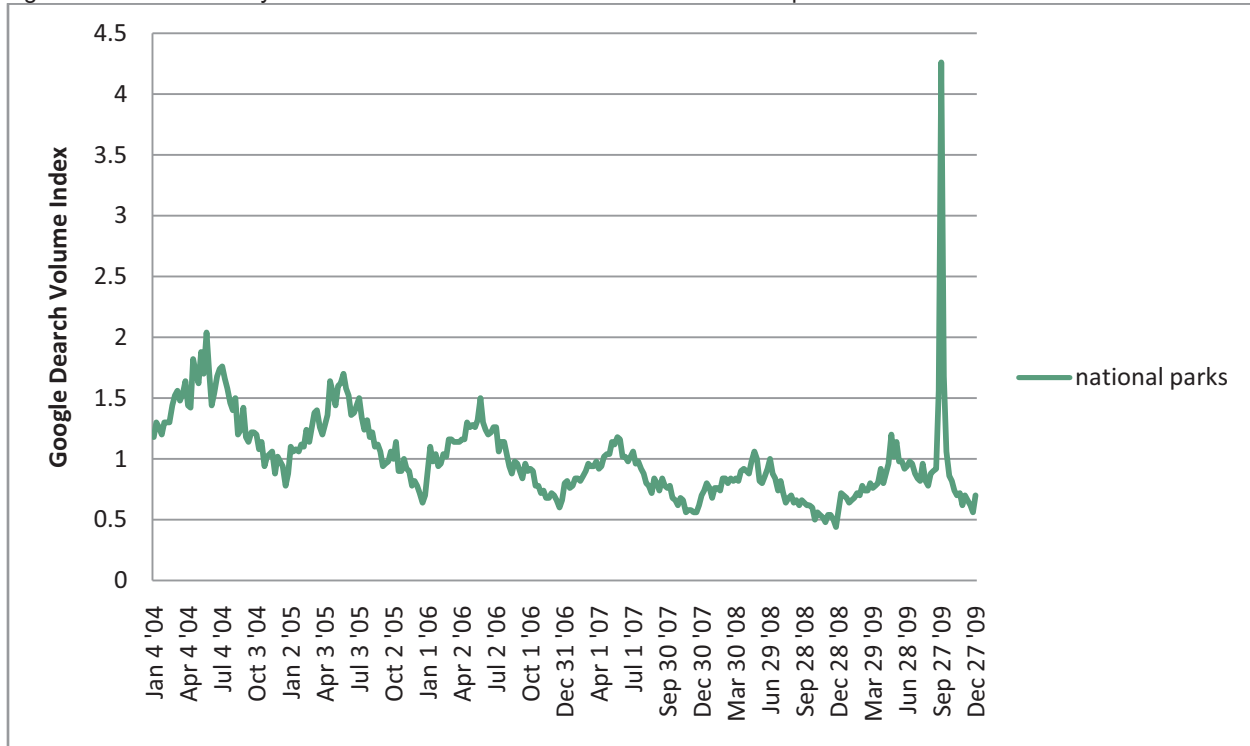
4. Findings

4.1. A Wide-angle View: The Trend in Search Volume, 2004-2009

Figure 1 reveals a large spike in search volume in the fall of 2009 that radically altered an otherwise consistent pattern, for U.S. searches involving the term “national parks.” As the detailed analyses in this report will indicate, the most plausible explanation for this spike is that the documentary had a substantial and immediate impact on the public’s interest in national parks.

Until the recent spike in search volume on “national parks,” a general downward trend since 2004 had been routinely punctuated by cyclical highs in the early summer and lows in the winter. As shown in Figure 1, the search volume peaked every year around Memorial Day, and reached a low point about the third week of December. From 2004 until the fall of 2009, the highest search volume had occurred the week of May 23, 2004, with an index value of just over 2.0 (or double the overall average). The week of December 21, 2008 recorded the lowest search volume to date, with an index slightly under 0.5. In 2009, the end of December showed its first year-to-year increase in the entire time span.

Figure 1. Relative weekly search volume since 2004 for the term “national parks”



Source: Google Trends (with average U.S. volume in 2004-2009 = 1.0)

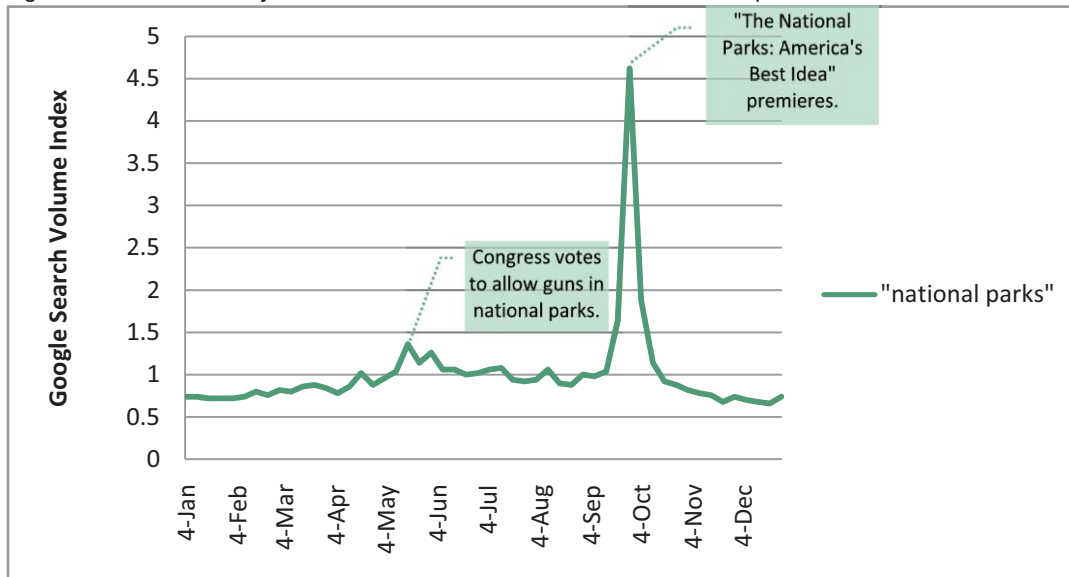
The cyclical pattern for search volume corresponds roughly with NPS figures on visitation at national park units, which is highest in summer and lowest in winter. Consistent with the trend in search volume shown in Figure 1, total visitation to national parks has seen a gradual decline over the past few years (U.S. Departments of the Interior and Agriculture 2009, p. 45). The reasons for the decline in visitation are complex, and may include economic recession, high gasoline prices, and shifting consumer attitudes or vacation preferences.

In striking contrast to the overall downward trend in internet searches (and in visitation), and despite the usual drop-off each fall, the search volume index hit a new high of almost 4.3 in the week of September 27, 2009. Search volume for “national parks” during that week was over four times the average search volume on the same term since 2004. The timing of this pronounced spike in searches corresponds precisely with the initial airing of the documentary series “The National Parks: America’s Best Idea.”

4.2. A Mid-range View: Searches during 2009

To bring the data points for 2009 into sharper focus, Figure 2 re-scales the search index relative to the average for that single year rather than relative to the multi-year average. On this magnified scale, searches involving the term “national parks” peaked at over 4.6 during the last week in September, when the series was first aired. Thus, search volume in the week of the broadcast was more than four and a half times the term’s average search volume for the year. By comparison, a much smaller jump in searches in the middle of May coincided not only with the start of summer visitation but also with Congressional action on the issue of guns in national parks, a topic that attracted considerable media attention. The week of May 17 registered a search volume index of almost 1.4, but this was less than one-third of the index value recorded in late September.

Figure 2. Relative weekly search volume in 2009 for the term “national parks”



Source: Google Trends (with average U.S. volume Jan-Dec 2009 = 1.0)

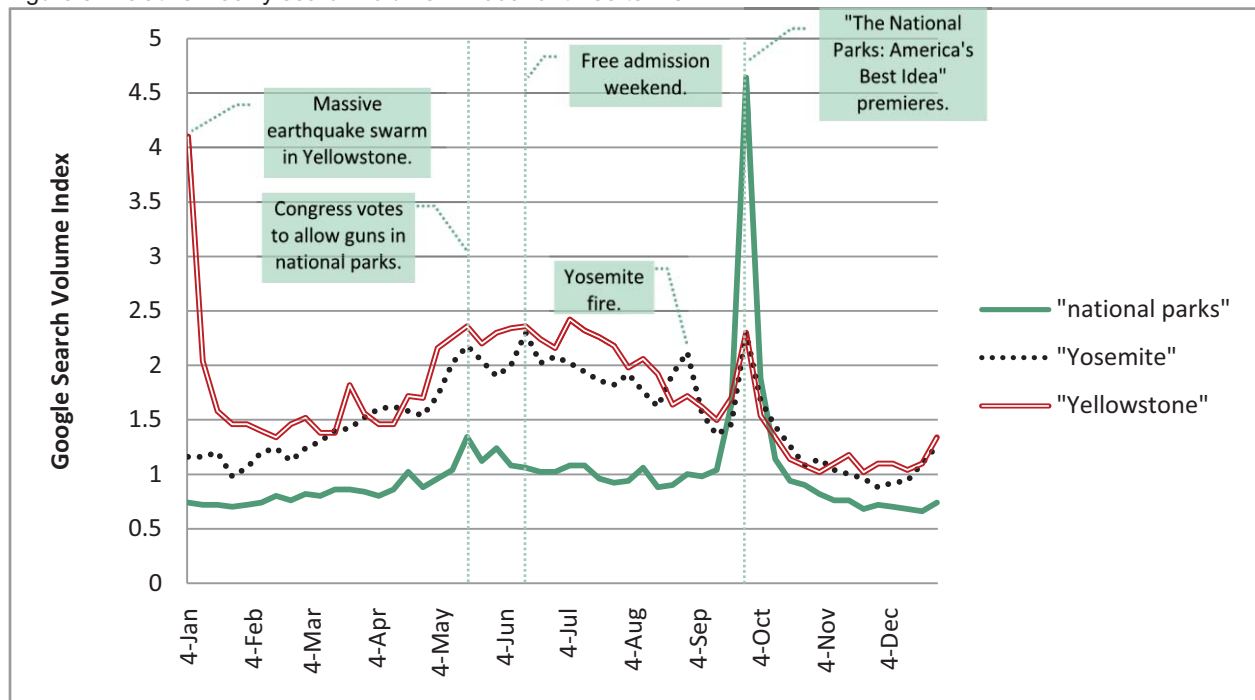
Figure 3 repeats the content of Figure 2, with the addition of data on two other park-related search terms. As in the previous figure, the index for the generic term “national parks” is normed to average 1.0 over the entire year. The index values for two additional terms, “Yellowstone” and “Yosemite,” are scaled relative to that reference level of search volume. As shown in Figure 3, throughout most of 2009 both “Yellowstone” (with an average index value of 1.7) and “Yosemite” (with an average of 1.5) were more frequently searched than the generic “national parks.” Both of these parks were also featured in the first episode of the documentary, and both of the park-specific terms spiked to index values well over 2.0 in the week when the series aired. However, the generic term saw a much higher spike during that week, exceeding 4.6.

For the park-specific terms, the increase in search volume at the time of the documentary was rivaled or surpassed by earlier surges in search activity coinciding with other events. The peak for searches including the term “Yellowstone” occurred in the first week of January, when an earthquake swarm at Yellowstone National Park received extensive media coverage. Although this geological event seems to have captured public attention, the index value of 4.1 recorded for “Yellowstone” at that time fell short of the 4.6 for “national parks” when the documentary hit the

airwaves. Both “Yellowstone” and “Yosemite” also saw small spikes in search volume at the time of the Congressional vote on guns, as summer visitation was beginning. The two park names showed similar bumps on the first of three weekends in 2009 when NPS offered free admission to the parks (including these two) that ordinarily charge an entrance fee. Near the end of August, when a fire at Yosemite National Park made national news, “Yosemite” alone experienced a notable increase in searches.

Each of these park-specific surges was considerably less than the spike for “national parks” at the time of the PBS series. In that sense, the documentary might be said to have had a greater impact on internet searches than fire, earthquakes, free admission, or Congressional action on guns.

Figure 3. Relative weekly search volume in 2009 for three terms



Source: Google Trends (with average U.S. volume for “national parks” in Jan-Dec 2009 = 1.0)

4.3. A Close-up View: Search Volume in the Fall of 2009

To bring the key time span into even finer resolution, Figure 4 presents results day-by-day from the middle of September through the middle of October 2009, compared to the same dates in 2008. Table 1 provides detailed daily data for the relevant dates in every year since 2004, and Table 2 summarizes the daily data by week, month, and year. To provide a constant reference point for these comparisons across time periods, we use the GT fixed scaling option, where an index value of 1.0 now represents the search volume on the term “national parks” in January of 2004.

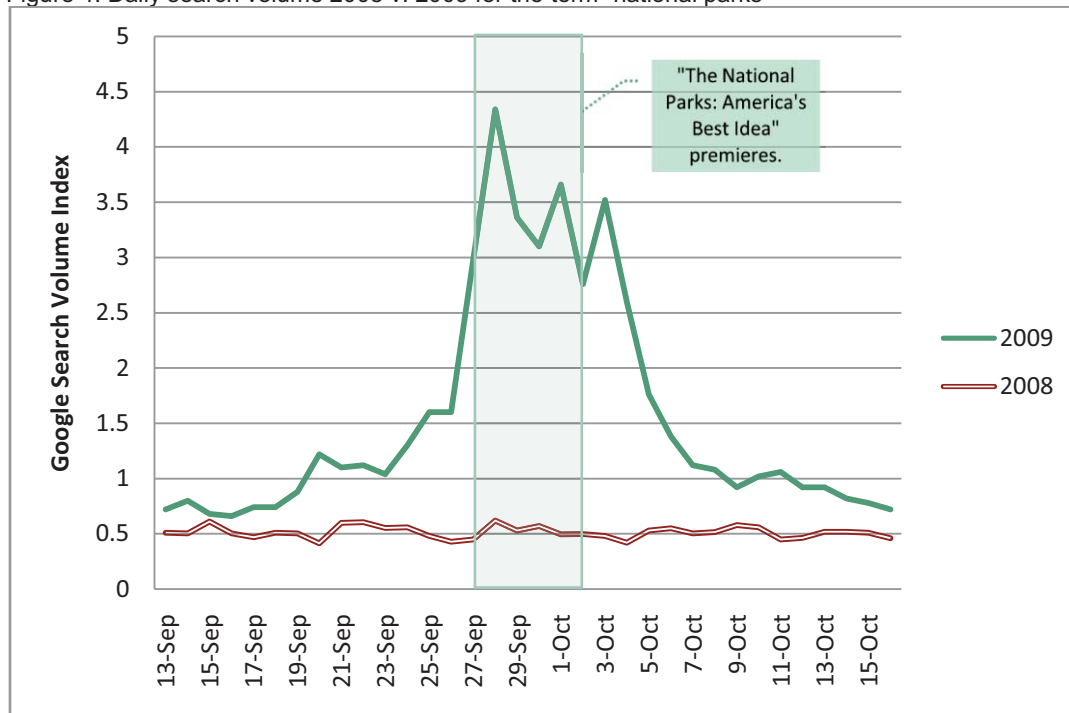
Considerable media buzz about the documentary preceded its actual broadcast. The Google News archive lists nearly 200 news items about “America’s Best Idea” in August and the first three weeks of September, when media outlets featured the impending release of a new Ken Burns documentary as a story in itself. According to PBS (2010), a nation-wide promotional campaign led up to the broadcast, including “more than 538 million paid-media impressions [plus] appearances by Burns and others on every major network, in every major national and regional publication, and in every

major market visited ... creating more than 381,000 additional impressions.” Throughout September of 2009, PBS stations around the country aired previews and promotions about the series.

As an apparent consequence of this pre-broadcast media attention, search volume on “national parks” was already higher by September 13, 2009 than in 2008 (Figure 4). Indeed, by September 20 it was higher than the same date in any year since 2004 (Table 1).

In previous years, search volume on “national parks” remained essentially flat in September and October. As Figure 4 makes clear, in 2009 it rose steeply in the days preceding the first episode on September 27, peaked on the second day of the broadcast, and remained high for all six days (through October 2). With an index value of 4.3, the spike on September 28 reflected a search volume seven times that for the same date in 2008 (when the index was 0.6), and almost quadruple the highest volume for the date (an index of 1.1 on September 28, 2004; see Table 1).

Figure 4. Daily search volume 2008 v. 2009 for the term “national parks”



Source: Google Trends (with average U.S. volume January 2004 = 1.0)

The entire series was re-broadcast in two six-hour blocks on the weekend of October 3-4, and search volume was again quite high (reaching 3.5 on Saturday and 2.6 on Sunday). Individual episodes were then re-broadcast, in order, each Thursday evening beginning October 8. Search volume on “national parks” began to drift downward, with no additional spikes, but remained higher than in most previous years (see Table 1).

Table 2 aggregates the daily data by month and week for the period before, during, and after the initial airing of the series. Average daily search volumes for both August and November were higher in 2009 than for the same months in 2008 or 2007. Apparently, the public’s interest in national parks started to climb with the pre-broadcast buzz, and some effect lingered for a while after the last episode. For September and October, the months that include the initial air dates, search volumes

were higher in 2009 than in any of the previous five years and more than double what they were in 2008. The six days of the actual broadcast (September 27 through October 2) saw a dramatic increase in search volume for the term “national parks,” with the week before and the week afterward also showing elevated search levels. The average search index (3.4) during the initial broadcast was over six times the average (0.5) for the same dates in 2008, and more than triple the previous high (0.9) for those dates in 2004.

Table 1. Daily search volume by year for the term “national parks”

	2009	2008	2007	2006	2005	2004
20-Sep	1.22	0.42	0.73	0.77	0.91	1.08
21-Sep	1.10	0.60	0.66	0.78	0.84	1.07
22-Sep	1.12	0.61	0.49	0.68	0.87	0.95*
23-Sep	1.04	0.56	0.72	0.84	0.82	1.10
24-Sep	1.30	0.56	0.68	0.57	0.73*	1.07*
25-Sep	1.60	0.48	0.70	0.94	0.83*	1.13*
26-Sep	1.60	0.43	0.72	0.71	0.89	1.20*
27-Sep	2.98	0.45	0.65	0.76	0.89	0.84*
28-Sep	4.34	0.62	0.57	0.76	0.97	1.10*
29-Sep	3.36	0.53	0.57	0.68	0.91	1.04
30-Sep	3.10	0.57	0.63	0.60*	0.87	0.97
1-Oct	3.66	0.50	0.66	0.86	0.75*	0.76*
2-Oct	2.76	0.50	0.60	0.78	0.79*	0.88*
3-Oct	3.52	0.48	0.60	0.64	1.01	0.81*
4-Oct	2.60	0.42	0.56	0.68	1.03	0.99
5-Oct	1.76	0.53	0.56	0.74	0.78	1.03*
6-Oct	1.38	0.55	0.56	0.67	0.77	0.88
7-Oct	1.12	0.51	0.56	0.65*	0.75	0.78*
8-Oct	1.08	0.52	0.73	0.63	0.71*	0.92*
9-Oct	0.92	0.58	0.70	0.68	0.65*	0.86*

Source: Google Trends (with average U.S. volume January 2004 = 1.0)

*Relative standard error > 10%

Table 2. Daily search volume by week, month, and year for “national parks”

Average daily search volume	2009	2008	2007	2006	2005	2004
August	0.70	0.55	0.65	0.80	0.94	1.07
September	1.23	0.53	0.65	0.74	0.83	1.01
October	1.14	0.48	0.57	0.67	0.80	0.86
November	0.55	0.42	0.50	0.56	0.72	0.84
7 days prior to the series dates	1.28	0.52	0.67	0.75	0.84	1.09
6 days of the series dates	3.37	0.53	0.61	0.74	0.86	0.93
7 days after the series dates	1.77	0.51	0.61	0.67	0.81	0.90

Source: Google Trends (with average U.S. volume January 2004 = 1.0)

4.4. Search Volumes for Episode-specific Terms

The next step in the study involved an exploration of search volume for specific topics, themes, and parks that were featured in the series. Each episode covered a particular time period in the history of the national parks. Different episodes therefore highlighted different parks, although some themes and certain parks were featured in multiple episodes. To identify the major themes, we took detailed

notes during our viewing and re-viewing of the twelve hour documentary, and we also made use of an “episode guide” prepared by Dr. Corliss Outley of Texas A&M University (Outley 2009).

Tables 3 through 8 summarize the results of this phase of our analysis, episode by episode. The index values in these tables are each scaled relative to average volume for a particular search term in 2009. Using that measure, other notable events during the year (e.g., the Yellowstone earthquakes) can raise a term’s overall search volume and thereby make any spike associated with the series less evident. In principle, the effect of the series could stand out in shaper relief if the index values were all normed to the average search volume for the month in which the episode aired, rather than to the year. A still finer-grained analysis might examine search volume for the day that a particular episode was broadcast relative to the series week. However, the Google Trends data proved too sparse for either of these alternative approaches. For example, many of the month-normed index values were suppressed by GT because of inadequate volume for sampling, and others had very large standard errors. We therefore report only the year-normed results.

In translating the park names featured in the series into search terms for a GT query, we omitted the words “National Park” (or at least the word “Park”) from the name if we could do so with little or no ambiguity. Thus, “Yellowstone” alone was assumed to reference Yellowstone National Park, whereas the full name for “Olympic National Park” was used because “Olympic” alone could well refer instead to international sports. The tables indicate the actual search term used in each query. Note also that, for some terms, searches related directly to national parks may be vastly overshadowed in the index values by the sheer volume of other, unrelated searches involving the identical term (e.g., “Teddy Roosevelt,” “Sierra Club”). The exploratory results that follow can shed additional light on the findings discussed above, but they are neither exact nor definitive.

For the first four episodes of the documentary (see Tables 3 through 6), almost all of the episode-specific terms had higher search volume during the week of the series than over the year (as shown by index values greater than 1.0). This is consistent with our earlier conclusions about the apparent impact of the documentary. The exceptions included “Statue of Liberty” (a high visitation site that routinely sees a correspondingly high search volume), along with “Hot Springs National Park” and “El Morro” (for both of which the index values may be unreliable because of relative standard errors above 10%). For these first four episodes, the terms getting the biggest boost in search volume appear to have been “Steven Mather” and “Great Basin National Park,” which were featured in episode 3 (albeit both of these estimates had considerable sampling error). Among terms highlighted in the opening episode, “John Muir” showed almost a fivefold increase in search volume for the week compared to its average for the year (with a relative standard error of only 2%).

The last two episodes featured a number of lesser known parks, monuments, battlefields, and themes (see Tables 7 and 8). As indicated in the table notes, several terms that we identified from these episodes are omitted from the tables because they did not have enough volume in 2009 for sampling purposes. Terms with the greatest increase in search volume during the week of the documentary included “Terry Tempest Williams,” “Biscayne National,” “Guadalupe Mountains,” “Appomattox Court House,” “Sand Creek Massacre,” and “North Cascades.” (However, for each of these terms the relative standard error exceeded 10%.) Terms from these two episodes that experienced a lower search volume during the series than their average search volume for the year included “National Seashores,” “FDR,” “Lincoln Memorial,” “Carlsbad Caverns,” “Manzanar,” “Mount Rushmore,” and “Antietam.” Most of the terms with index values less than 1.0 routinely

receive considerable search volumes at other times of the year, which would tend to obscure any effect from the documentary.

Table 3. Featured parks and themes in Episode 1, "Scriptures of Nature (1851-1890)"

Search term	Search index, week of series
John Muir ²	4.60
Kings Canyon	1.55
Petrified Forest	1.52
Yosemite ^{2,4}	1.47
Sequoia National [Park]	1.33
Yellowstone ^{2,6}	1.32
Denali ^{3,6}	1.20
Mount Rainier	1.09
Hawaii Volcanoes ³	1.07
Civil War National [Battlefields]	1.01*
Statue of Liberty	0.98

Source: Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Superscripts indicate other episodes in which the term was also featured. Terms are only listed in the tables for the first episode in which they were featured.

*Relative standard error >10%

Table 4. Featured parks and themes in Episode 2, "The Last Refuge (1890-1915)"

Search term	Search index, week of series
Mesa Verde ⁴	1.62
Teddy Roosevelt	1.36
Grand Canyon	1.32
Sierra Club	1.23
Devils Tower	1.18
El Morro	1.00*

Source: Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Superscript indicates another episode in which the term was also featured. Terms are only listed in the tables for the first episode in which they were featured. Additional term for this episode with insufficient volume for sampling: Chaco Culture

*Relative standard error >10%

Table 5. Featured parks and themes in Episode 3, "The Empire of Grandeur (1915-1919)"

Search term	Search index, week of series
Steven Mather	49.00*
Great Basin National Park	6.50*
Wind Cave	1.68*
Acadia National Park	1.65
Rocky Mountain National Park ⁴	1.50
Bryce Canyon	1.27
Zion National Park	1.26
Glacier National Park	1.18

Source: Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Superscript indicates another episode in which the term was also featured. Terms are only listed in the tables for the first episode in which they were featured.

*Relative standard error >10%

Table 6. Featured parks and themes in Episode 4, "Going Home (1920-1933)"

Search term	Search index, week of series
Great Smoky Mountains	1.63
Grand Teton National Park	1.41
Hot Springs National Park	0.94*

Source: Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Terms are only listed in the tables for the first episode in which they were featured. Additional term for this episode with insufficient volume for sampling: Lassen Volcanic

*Relative standard error >10%

Table 7. Featured parks and themes in Episode 5, "Great Nature (1933-1945)"

Search term	Search index, week of series
Appomattox Court House	3.10*
Death Valley National [Park]	1.59
George Wright	1.36
Everglades National [Park]	1.32
Big Bend National [Park]	1.28
Antietam	0.92
Mount Rushmore	0.90
Carlsbad Caverns	0.82
Lincoln Memorial	0.80
FDR	0.75

Source: Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Additional terms for this episode with insufficient volume for sampling: Castillo de San Marcos; Yorktown

*Relative standard error >10%

Table 8. Featured parks and themes in Episode 6, "The Morning of Creation (1946-1980)"

Search term	Search index, week of series
Terry Tempest Williams	49.00*
Biscayne National [Park]	16.30*
Guadalupe Mountains	3.40*
Sand Creek Massacre	2.78*
North Cascades	2.10*
Dinosaur National [Monument]	1.48
Redwood National [Park]	1.47
Vietnam Veterans Memorial	1.20*
National Lakeshores	1.10*
Olympic National Park	1.06
Little Rock Central High	1.05*
Isle Royale	1.00
Manzanar	0.81*
National Seashores	0.74

Source; Google Trends (with average U.S. volume for a given term in Jan-Nov 2009 = 1.0). Terms are only listed in the tables for the first episode in which they were featured. Additional terms for this episode with insufficient volume for sampling: Adolph Murie; Andersonville; Flight 93

*Relative standard error >10%

4.5. Search Volumes by State and City

As discussed in Section 3.2, above, Google Trends also provides geographic scaling of search volume. GT first calculates a search ratio, in essence dividing (1) the searches for a specified term that originate in each geographic unit by (2) the total of all Google searches coming from there over the same time period. Then the geographic unit with the highest proportion of searches for the term is assigned an index value of 1.0; all others are scored lower than 1.0, based on their search ratio for that term. GT uses undisclosed, proprietary methods to sample search volume and to estimate a relative standard error for each index value.

Table 9 presents state results for searches on the term “national parks” for the year 2009 and for the months of August, September, and October. Table 10 does the same for cities. The District of Columbia appears in both tables because GT treats it as both a state and a city.

In the yearly data for 2009, Utah was the state devoting the highest proportion of its searches to “national parks,” followed closely by Montana (see Table 9). Utah (but not Montana) was also at or near the top on this scale during September and October, when the series aired. Only one state, New Hampshire, moved into the top 5 during either of those two months without also being in the top 10 for the year. Iowa and Maine moved from the lower half of the top 10 for the year to the upper half for both months in the fall, with Maine reaching the topmost spot for September.

Arguably, the higher ranks for Maine (and perhaps New Hampshire) during the months the series aired might be attributed in part to episode 3 of the documentary, which featured Acadia National Park among other themes. However, the primary conclusions from Table 9 are that (1) states in the Pacific West and Rocky Mountain regions (where many of the best-known national parks are located) consistently dominated the top 10, and (2) the state rankings did not change much during September and October compared either to August or to the entire year. What changes there were might merely reflect the small samples (and therefore high margin of sampling error) encountered in breaking down the search volume data by both month and state.

Though subject to still greater sampling error, the city rankings (see Table 10) were also fairly stable. Salt Lake City consistently devoted the highest proportion of its searches to “national parks.” Denver ranked second in the yearly figures as well as in both August and September, and third in October. Only Louisville (in September) and Madison (in October) moved into the top 5 without previously ranking among the top 10 cities. Minneapolis, Sacramento, and Pleasanton each moved from the lower half of the top 10 to the upper half for one of the two fall months.

We note that Sacramento, Denver, and Seattle generally ranked near the top on search volume and also had the second, third, and fourth highest Nielsen ratings for the series (PBS 2010). However, the strongest market for the documentary according to Nielsen figures was Nashville, which did not make the top 10 city rankings using GT.

Overall, then, Tables 9 and 10 provide suggestive but mixed evidence for geographic differences in the impact of the documentary. The apparent differences are modest in light of the relative standard errors estimated by Google Trends.

Table 9. Search volume for the top 10 U.S. states, 2009.

Rank	2009	Index	August '09	Index	September '09	Index	October '09	Index
1	Utah	1.00	Utah	1.00	Maine	1.00	Utah	1.00
2	Montana	0.99	Colorado	0.74	New Mexico	0.89*	New Hampshire	0.86*
3	Colorado	0.74	Oregon	0.60*	Utah	0.80*	Maine	0.83*
4	New Mexico	0.67	Washington	0.54	Colorado	0.74	New Mexico	0.79*
5	Oregon	0.52	District of Columbia	0.46	Iowa	0.67*	Iowa	0.70*
6	Maine	0.52	Arizona	0.39*	Oregon	0.61*	Oregon	0.63
7	Washington	0.52	Wisconsin	0.38*	New Hampshire	0.61*	Colorado	0.60
8	Iowa	0.51	Minnesota	0.38*	Minnesota	0.52*	Minnesota	0.58
9	Nevada	0.48	Nevada	0.37*	Washington	0.51	Wisconsin	0.55
10	Wisconsin	0.48	Missouri	0.35*	District of Columbia	0.51*	Indiana	0.52

Source: Google Trends (with the top state in each time period = 1.0; 2009 includes Jan-Nov).

*Relative standard error >10%

Table 10. Search volume for the top 10 U.S. cities, 2009.

Rank	2009	Index	August '09	Index	September '09	Index	October '09	Index
1	Salt Lake City	1.00	Salt Lake City	1.00	Salt Lake City	1.00	Salt Lake City	1.00
2	Denver	0.82	Denver	0.99*	Denver	0.70*	Madison, WI	0.86*
3	Portland, OR	0.51	Seattle	0.64*	Louisville	0.64*	Denver	0.80*
4	Seattle	0.49	Portland, OR	0.59*	Sacramento	0.58*	Portland, OR	0.64*
5	Washington, DC	0.48	Washington, DC	0.50*	Pleasanton, CA	0.56*	Minneapolis	0.60*
6	Sacramento	0.47	San Francisco	0.48*	Minneapolis	0.54*	Austin	0.59*
7	Pleasanton, CA	0.45	Boston	0.42*	Austin	0.54*	Boston	0.59*
8	Phoenix	0.44	Pleasanton, CA	0.42*	Portland, OR	0.53*	Pleasanton, CA	0.58*
9	Minneapolis	0.44	San Diego	0.41*	Pittsburgh	0.53*	Sacramento	0.56*
10	Austin	0.43	St. Louis	0.40*	Reston, VA	0.51*	St. Louis	0.52*

Source: Google Trends (with the top city in each time period = 1.0; 2009 includes Jan-Nov).

*Relative standard error >10%

4.6. Visits to a Particular NPS Website

Yet another perspective on the impact of the documentary can be obtained by using Google Analytics to track hit count information for one particular NPS website, www.nature.nps.gov. This website is a more technical resource than the general NPS entry portal for information about national parks (www.nps.gov). NPS was not able to supply data about the more general portal, and hence we confine our use of Google Analytics to the technical website.

The general portal provides a link, labeled “Explore nature,” to reach the more technical site. There information is organized by five main categories (air, biology, geology, natural sounds, water) and 16 topics (critical issues, fire management, etc.). The technical website can also be accessed directly, without going through the general NPS portal. Either portal can be located through a search engine. However, a Google search for “national parks” shows the general site as the top non-sponsored link on the first page of search returns, whereas the technical site does not appear until many pages later unless the search term is much more specific.

Until recently, the software design underlying the www.nature.nps.gov website restricted the ability of search engines to identify content-specific links to it in search results. According to NPS, the “robots.txt” file for the site was modified around October 1, 2009, so as to facilitate access by search engines. By happenstance, the timing of that change was almost simultaneous with the airing of the

documentary. Our interpretation of the Google Analytics data will consider this potentially confounding factor.

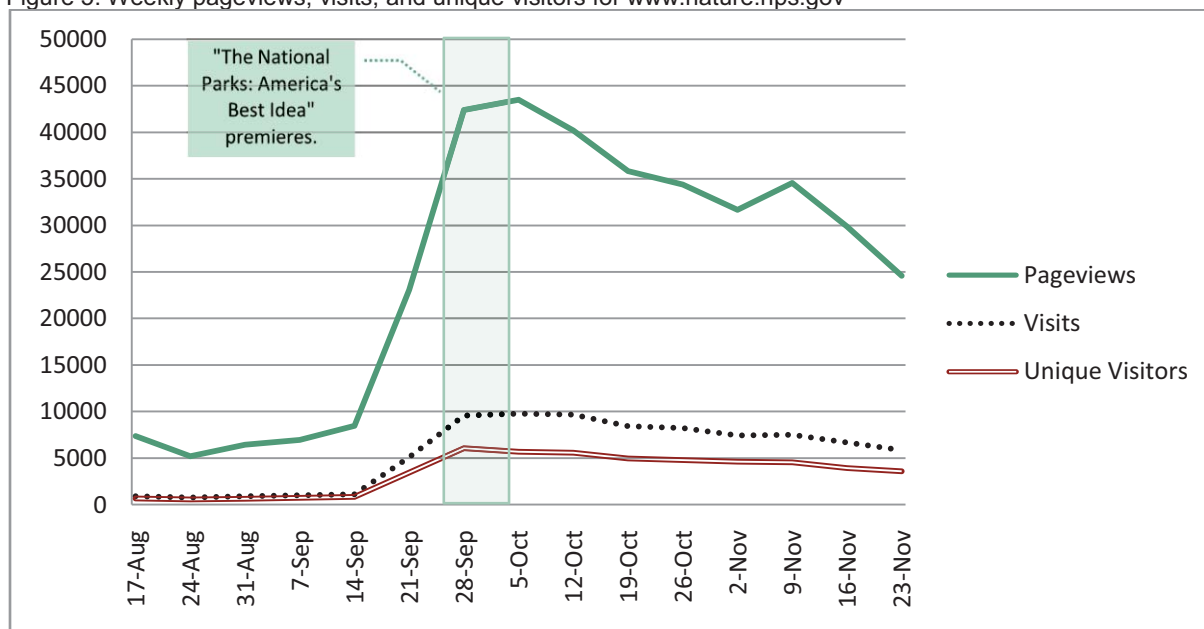
NPS provided us with the weekly reports from Google Analytics for the www.nature.nps.gov website for the period from August 17 through November 29, 2009. The results are summarized in Figure 5 and in Tables 11 and 12.

As is evident in Figure 5, the airing of the documentary coincided with a notable increase in activity on the website. The numbers of pages viewed, visits, and unique visitors all increased during the pre-broadcast media buzz, and peaked when the series aired. For each of these measures, the high point in late September or early October was more than eight times greater than the low point in August.

In contrast to the short-lived spikes in search volume found in the previous graphs, Figure 5 shows that all three measures of website activity remained elevated well into November. This suggests that some searches initially stimulated by the documentary may have led to bookmarking (or otherwise saving) the web addresses of sites that the search identified, such as www.nps.gov or www.nature.nps.gov. Thereafter, a desire for information about the parks could be satisfied by accessing these addresses without additional searches.

Indeed, only a small (and declining) fraction of visits to the technical website came directly from search engines (see the last column in Table 12). In that sense, the increased activity on this website, as shown in Figure 5, does not merely echo the rise in search volume already demonstrated. Instead, it provides largely independent corroboration that the documentary had a substantial impact on the public's interest in national parks.

Figure 5. Weekly pageviews, visits, and unique visitors for www.nature.nps.gov



Source: Google Analytics (courtesy of NPS)

Tables 11 and 12 also reveal that little, if any, of the increase in visits to the technical website can be attributed to the software change that was implemented about October 1. The number of visits that

came via search engine grew from a low of 105 in the week of August 24 (13.7% of 768 total visits) to a high of 527 in the week of October 5 (5.4% of 9,758). Hence, while total visits to the website increased by almost 9,000 over this time span, no more than 422 of the additional visits could have been due to the greater ease of accessing the site directly from a search engine. The effect of that confounding factor was, practically speaking, negligible.

Table 11. Weekly pageviews, visits, and unique visitors for www.nature.nps.gov

Week	Page-views	Visits	Unique visitors
17-Aug	7387	918	656
24-Aug	5206	768	569
31-Aug	6451	903	630
7-Sep	6954	1002	731
14-Sep	8460	1109	844
21-Sep	23097	5091	3467
28-Sep	42405	9540	6078
5-Oct	43505	9758	5698
12-Oct	40211	9646	5603
19-Oct	35838	8431	4974
26-Oct	34387	8231	4810
2-Nov	31683	7411	4615
9-Nov	34561	7487	4556
16-Nov	29875	6661	3960
23-Nov	24607	5852	3585

Source: Google Analytics (courtesy of NPS)

Table 12. Summary statistics for www.nature.nps.gov

Week	Pages per Visit	% Unique Visitors	Avg. Time on Site	Bounce Rate	% Referring Sites	% Direct Traffic	% Search Engines
17-Aug	8.05	71.5%	5:23	20.8%	49.4%	35.5%	15.1%
24-Aug	6.78	74.1%	4:26	22.3%	55.5%	30.9%	13.7%
31-Aug	7.14	69.8%	4:36	21.2%	51.1%	35.2%	13.7%
7-Sep	6.94	73.0%	4:01	20.8%	53.3%	35.0%	11.7%
14-Sep	7.63	76.1%	5:13	19.6%	51.9%	31.2%	17.0%
21-Sep	4.54	68.1%	3:29	40.9%	62.5%	31.1%	6.4%
28-Sep	4.44	63.7%	3:31	42.2%	63.6%	31.9%	4.6%
5-Oct	4.46	58.4%	3:55	40.4%	65.9%	28.7%	5.4%
12-Oct	4.17	58.1%	3:28	41.4%	69.7%	24.9%	5.4%
19-Oct	4.25	59.0%	4:04	42.7%	70.0%	24.6%	5.5%
26-Oct	4.18	58.4%	3:34	42.2%	67.8%	27.2%	5.0%
2-Nov	4.28	62.3%	3:20	42.4%	67.2%	28.2%	4.6%
9-Nov	4.62	60.9%	3:27	41.8%	66.3%	29.3%	4.4%
16-Nov	4.49	59.5%	3:50	40.7%	66.5%	29.3%	4.2%
23-Nov	4.20	61.3%	3:27	45.1%	66.9%	28.8%	4.3%

Source: Google Analytics (courtesy of NPS)

Table 12 further suggests that the typical visitor to www.nature.nps.gov changed as a result of the documentary. From the middle of August through early September, visits to the site had averaged 4 to 5 minutes in duration, with an average of 7 or 8 distinct pages within the site being viewed on each visit. About half of all visitors accessed the site from a link on a referring site (perhaps from

www.nps.gov), while a third accessed the site directly and about one-sixth came to the site from a search engine.

At the end of September, there was a pronounced shift toward shorter visits, fewer pages viewed per visit, a higher proportion of repeat visitors, and a higher “bounce rate” (visits in which the visitor left the site from the entry page, without viewing any other pages within the site.) At the same time, the proportion of visitors who accessed the site directly or through a search engine decreased, while the proportion referred there from another site increased.

All of these changes are consistent with an increase in general-interest visits to the site, as would be expected for visitors whose interest in the parks had been piqued by the documentary. Visitors who were prompted by the documentary to browse for general information about national parks might arrive at the technical site from a referring site like www.nps.gov, then scan only the entry page and move on, perhaps returning later for another look. Prior to the documentary, a higher proportion of visitors would likely have had a specific interest in the technical content of www.nature.nps.gov. Such visitors would more often access the site directly, or perhaps after searching on a technical term; they would stay longer on the site and work down through more pages to pursue their technical questions.

Such changes in the typical visitor profile might not be an altogether positive development for those who design and manage the NPS technical website. Visits to the site increased, but many of the new visitors seem to have made only superficial use of its resources. Still, it is important to distinguish between the typical profile, as expressed in averages and percentages, and the absolute number of each type of visitor. In the week of September 14, for example, the bounce rate stood at only 19.6% and hence there were 819 visits that went deeper than the entry page (80.4% of 1109 visits). By the week of September 28, an apparent increase in superficial visits more than doubled the bounce rate, to 42.2%. Nevertheless, because the total number of visits increased even more over those two weeks, the number of visits that went deeper than the opening page had increased almost sevenfold, to 5,514 (57.8% of 9,540). Even in the week of November 23, when the bounce rate reached 45.1%, there were more than 3,200 non-bounce visits (54.9% of 5,852).

In short, the average visitor after the documentary may not have used the resources on this website as intensively as the average user did before it was aired. Yet in the aggregate, those resources saw much heavier use after the broadcast, by many more visitors. Such changes point to an impact from the documentary that persisted longer than the spike in search volume described earlier.

4.7. Some Other Measures of Impact

We close this section by briefly summarizing a few other indicators of the interest generated by the documentary, as reported by PBS.

According to PBS (2010), the web page for the series was the most visited program page on www.pbs.org during the week of the initial broadcast. In September and October it had over half a million unique visitors and 2.5 million page views. The documentary had a Facebook page with more than 50,000 fans enrolled. PBS made the entire series available for online streaming for two weeks, during which more than 185,000 streams of the episodes were viewed for an average of 55 minutes per viewer. A companion book, authored by Dayton Duncan with an introduction by Ken Burns, was on the New York Times best-seller list for seven weeks (PBS 2010).

5. Discussion

The PBS documentary, “The National Parks: America’s Best Idea,” appears to have generated a marked increase in the public’s interest in the National Park System. Using Google Trends, we find that a slow decline since 2004 in U.S. search volume for the term “national parks” was dramatically reversed when the series aired. The record high search volumes during the series suggest that public awareness of national parks was heightened as a result of the documentary, leading many people to investigate national parks on their own by searching the internet. Increases in search volume for specific parks-related terms highlighted in various episodes of the series support this interpretation.

While the spike in search volume waned rather quickly after the documentary was initially aired, data from Google Analytics show that visits to www.nature.nps.gov increased at the same time as overall search volume and then remained high through November. New visitors to this technical NPS website may have been prompted by the documentary to search for general information about national parks; after finding the technical site from a more general referring site like www.nps.gov, some of them may have returned later for a further look. Thus, the impact of the documentary on the public’s interest in national parks seems to have been more enduring than the search volume data alone might imply.

More generally, our results suggest that Google Trends and Google Analytics can supplement other methods that NPS uses to obtain and monitor information about the National Park System. For example, park visitation figures typically take months to be compiled and analyzed. Google data, in contrast, are available almost immediately. Google tools have limitations, as noted throughout this report, but have shown their value for gauging public interest in a variety of practical applications (see Ginsberg et al. 2008). They could provide a valuable early warning system for NPS.

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