Nikki Warren. Website Log Analysis: Approaches for the Library of the National Institute Of Environmental Health Sciences. A Master's Paper for the M.S. in L.S. degree. July, 2002. 75 pages. Advisor: Gregory B. Newby.

Much of the literature on web log analysis focuses on how to collect summary statistics, the anatomy of web logs, how to choose analysis software, and the strengths and weaknesses of log analysis. These issues are important to understand, but less research has been done on how to comprehensively apply web logs to higher-level issues within libraries. This study shows that web statistics are a tool to help librarians make management, marketing, and collection development decisions. This paper will cover the basic issues of web log analysis in addition to exploring practical application concepts for the library of the National Institute of Environmental Health Sciences (NIEHS). The library's web logs were analyzed from January to March 2002. In addition, a database was queried to track usage of specific resources on the library's website from March to May 2002.

Headings:

Internet -- Environmental libraries and collections.

Internet -- Statistics.

Use studies -- Internet.

Web sites -- Case studies.

World Wide Web -- Statistics.

WEBSITE LOG ANALYSIS:
APPROACHES FOR THE LIBRARY OF THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

by
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INTRODUCTION

In the past, libraries had only a couple of service points for providing information. Patrons could personally consult librarians at the reference desk or use the phone to contact the library. Now, libraries rely on their websites to provide access to electronic journals, online databases, and other services. Although it is standard procedure for most librarians to count the number of questions they receive at the reference desk or via the phone, collecting statistics about library website usage is a more recent practice. Even if libraries collect web statistics, raw web logs must be transformed into a more "readable" format by appropriate software. Librarians must know how to interpret the reports generated from such software in order to understand what web statistics can and cannot measure. Further, web statistics must be interpreted so that the data can impact decision-making practices within libraries.

The Library & Information Services Branch at the National Institute of Environmental Health Sciences (NIEHS) is taking the initiative to integrate web log statistics into its overall management practices. This study will show that web log analysis produces information about the overall use of the NIEHS Library website, in addition to providing insight for collection development, marketing, and management issues within the library. Data for this paper was collected from two utilities: web log analysis software called Analog and a ClickCount script that counted the number of clicks on certain web links. The data was then summarized to highlight trends and provide a template for future analysis of the library's website statistics.

Background: National Institute of Environmental Health Sciences

The National Institute of Environmental Health Sciences (NIEHS) was established in 1966 and is one of the twenty-five institutes and centers of the National Institutes of Health (NIH). NIEHS is located in Research Triangle Park, North Carolina, with a primary mission of exploring how environmental factors impact human health. Scientists at NIEHS are actively pursuing research in the areas of breast cancer, birth defects, neurologic disorders, lead poisoning, signal error, and agricultural pollution. NIEHS also participates in numerous community-outreach programs.

Library and Information Services

The NIEHS Library's mission is to be an integrated and effective partner for the research needs and accomplishments at the Institute. The library staff concentrates its efforts on user services, reference, collection development and access, and document delivery. The library provides access to approximately 20,000 books and 600 journal titles. About 400 of these journal titles are available in electronic format. There are approximately 600 databases available to NIEHS employees, covering everything from toxicology and medicine to public administration. Library staff members provide services that include chemical name searching, literature reviews, bibliography compilations, and current awareness alerts. Librarians also conduct training classes for researchers, demonstrating databases and other products.

NIEHS Library Website

The URL for the library's homepage is http://library.niehs.nih.gov/. There is a link to the library's website from the NIEHS homepage, providing quick access for researchers. The library's site contains a variety of buttons that link to various sections: New Books and Other News, Electronic Journals, Journals in the Library, Photocopy Requests, Database Searching, Web Starting Points (includes Scientific and Consumer Resources), Book Catalog, Reference Resources, NIEHS Publications, Library Staff, FAQs, and an Orientation. The top of the page has space for new products and services.

Each page of the library's site offers the same look and feel as the homepage. Most pages have annotated lists of various resources, arranged in a combination of ways. Some products are arranged alphabetically, such as electronic journals, while others are arranged topically or by date. Other sections of the site, such as the Book Catalog and the NIEHS Publications Database, utilize search interfaces. See Appendix A for screen shots of selected pages on the website.

Web Logs at NIEHS

The Web Services Group at NIEHS collects web log statistics for many different departments at the Institute, including the library. The Web Group's Bill Watson generates monthly reports with these statistics and posts them internally via a web-based directory. In addition to the monthly reports, there are historical statistics available for the past few years. NIEHS uses Analog 5.03 to analyze its raw web logs. Analog is available for free at http://www.analog.cx/. In order to understand what log analysis software does, it is necessary to understand what log files are and what they track.

LITERATURE REVIEW

Web Server Log Files

Log files are simply text files that record website traffic during a certain period of time. Such files range in size and may be anywhere from 1 to 100 megabytes or more, depending on the amount of traffic and the time frame recorded (Bertot, McClure, Moen & Rubin, 1997). There are four different types of web server logs. Almost every web server uses the access (or transfer) log and the error log. Many web servers also utilize the referrer and agent logs (Bertot et al., 1997; Stout, 1997). The web server at NIEHS utilizes all four types of logs (access, agent, error, and referrer) in a combined format.

When an Internet user pulls up a web page, the web server that hosts the page will register the request and make an entry in the access log (Hightower, Sih, & Tilghman, 1998). The access log records the domain name or IP address, the date and time of the request, and the item requested. The agent log provides information about the browser name, browser version, and operating system a host is using. The error log gives the status codes for failed requests to the server. Finally, the referrer log shows what websites link to a particular web server. (Bertot et al., 1997; Stout, 1997). Appendix B shows sample entries from the NIEHS Library website's raw logs. The entries demonstrate how the different log components come together. Note that the host fields of the entries have been altered to ensure the privacy of users.

Distinguishing Hits, Page Views, and Visits

As stated previously, each request for a web page is recorded as a line, or "hit," in the access log (Hightower et al., 1998). A request for a single page, however, may involve a multitude of transactions, each of which is counted. Not only is a hit recorded for the web page itself, each graphic on the page generates a separate hit (Bertot et al., 1997; Stout, 1997; Zawitz 1998). If a request for a page results in a redirect, both the original request for the page and the redirected request are recorded (Stout, 1997). Although hits are a valuable measure for determining whether a web server is robust enough to accommodate demand, hits are likely to overestimate the actual use of a website (Zawitz, 1998).

In order to understand the number of pages that users are actually viewing, it is beneficial to examine HTML page requests only (Hightower et al., 1998; Zawitz, 1998). This excludes other file types such as images files (i.e., .gif, .jpg, .jpeg, .png, etc.). Instead of counting each component of one individual page as a hit, this type of measure more accurately depicts a single page view. Still, using this method may overestimate "true" page views because it is likely that some pages are visited for purely navigational purposes. Also, tracking only HTML page requests may miss important information about the use of downloadable files types such as .pdf, .zip, or .exe (Zawitz, 1998).

If consecutive page views of a unique user are grouped together over a specific time frame, the resulting information describes a user "visit" (Stout, 1997) or "session" (Zawitz, 1998). Data about how unique users navigate websites is interesting to both librarians and advertisers. In fact, Kirsner calls such data "the holy grail of site measurement" (1997, p. 36). There are a few different approaches for identifying user

"visits" to a website, including the utilization of cookies, registered usernames, and hostnames (Stout, 1997).

Many websites utilize "cookies" to track visits. When a client accesses a website, the server sends a packet of information called a cookie to the client browser. When the browser accepts a cookie, it is stored to disk as a data file. The next time the client accesses the same site, the browser sends a cookie back to the server so that the client can be "recognized" as a previous visitor (Stout, 1997). The type of cookie just described is called a persistent, or permanent, cookie. Persistent cookies work well for many commercial websites, but U.S. government websites are legally barred from utilizing persistent cookies because of privacy concerns. Instead, some federal websites employ session cookies in order to increase functionality during a user's visit. Session cookies are temporarily stored in a computer's RAM, not saved to disk, and should automatically expire when a user closes the web browser (Harris, 2001; Houser, 2000). However, session cookies cannot provide insight into patterns of website use by an individual. For many reasons, cookies are not a viable option for federal agencies to consider in the quest to understand user visits.

Some websites can track users by requiring them to register upon their first visit to the site. The user will then be prompted to log in with a username and password for each subsequent visit (Bauer, 2000; Stout, 1997). Websites that require users to register generally offer some sort of special service that would make such registration worthwhile (Stout, 1997). However, many web surfers would not want to bother with registering to use the majority of the sites available on the Internet. Similarly, most websites want to provide easy access to their site so that people can explore the content without

restrictions. It is not feasible for most websites, especially federal government websites, to utilize such authentication methods to track user visits.

A final way to examine visits is to manually peruse raw access log entries. After identifying a unique hostname, the Unix grep command can be used to extract entries for the host and group them together sequentially (Stout, 1997). Such an exercise displays various bits of information about the host's Internet visit: the first page accessed, subsequent pages accessed, the increment of time between different page accesses, and the last page accessed. Although this method could provide detailed insights into a user's visit, it is simply not feasible to manually identify user sessions for websites with substantial traffic and megabytes of log data. Nor would understanding just a few user visits provide information that could be generalized. Issues of privacy and confidentiality would also need to be addressed if individual hostnames were to be tracked (Bauer, 2000; Bertot et al., 1997).

Webmasters frequently use commercial or free software to summarize raw log files, but such software may or may not do a good job of tracking actual *visits*, as opposed to hits (Bertot et al., 1997). If a software package attempts to use a hostname to identify a visit, it must assign a "time out" period to that hostname. Generally, if a host does not generate hits on a website for more than 30 minutes, the software assumes that the user has terminated the session (Nicholas, Huntington, Lievesley, & Withey, 1999; Stout, 1997; Zawitz, 1998). Such logic is not perfect because it is feasible for a unique user to take a break from an Internet session for more than 30 minutes and then resume the same session after the break. Such software makes other assumptions, including that individuals have single-user Windows and Macintosh computers rather than multiuser

computers such as Unix systems. Additionally, the software assumes that users have fixed IP addresses, when in reality some users may have dynamic IPs (Stout, 1997). For these reasons, tracking user visits on a mass scale can be difficult and inaccurate.

Limitations of Web Log Analysis

There are numerous articles that discuss what web logs *cannot* reveal, and it is imperative to understand the limits of web log analysis in order to maximize their potential benefits. Dynamic IP addressing masks some individual users, meaning that there is no foolproof way to determine how many users are new to a website and how many are repeat visitors (Nicholas et al., 1999; Zawitz, 1998). Even if a significant number of users were to have static IPs, one could not total up all of the IP addresses present in the log files and expect to have an accurate "count" of individual users. Since the same static IP could access the Internet numerous times, duplicate IPs would need to be stripped out of the files in order to have a more accurate number of individual users. Unless log analysis software does this, log data simply provides an estimation of hits or page views.

Another limitation to web log analysis stems from a phenomenon known as caching (Bauer, 2000). If an individual visits a web page, the browser stores the page in its memory. When the user requests the same URL later, the browser will search to see if the page is still cached, or stored in memory. If the page is cached, the browser will find it in memory and display it rather than making a request to the web server. The result is that the transaction will never be recorded in the web logs. As Fieber (2002) and

Goldberg (2001) reiterate, caching results in an underestimation of transactions between the client and server.

Finally, web logs in themselves cannot provide insight into who is *not* visiting a website, whether users find the answers to their inquiries, and whether individuals are satisfied with the overall website experience (Zawitz, 1998). However, part of the value of web log analysis is that it requires information professionals to define the goals of their web presence, which in turn leads to more questions about an organization's overall objectives. As Nicholas et al. asserts, "The data raises questions, it does not in itself provide answers. But just knowing what questions to ask is progress in itself" (1999, p. 266). Indeed, web statistics enable librarians to ask more informed questions to patrons during usability studies, questionnaires, and interviews.

Benefits of Web Log Analysis

Web logs provide an unobtrusive way to observe a great deal of information. In summary, web logs can uncover the following: what web pages are being requested, the IP addresses/hostnames of computers making requests, the date and time of requests, whether a request is successful or not, and the web page and/or search terms which lead an individual to the site of interest (Bauer, 2000). Logs also reveal whether a user's computer is able to access enhanced features on a website, such as JavaScript and forms, helping webmasters make appropriate design decisions (Bertot et al., 1997).

Considering all of the raw data that web logs offer, it is easy to see how webmasters could become overwhelmed. Even when software is used to analyze raw logs, the resulting reports must still be interpreted on a consistent basis (Bertot et al.,

1997). It is unfortunate the web logs in many organizations "have a habit of wriggling away from any form of evaluation and assertion" (Nicholas et al., 1999, p. 265-266) Indeed, it takes effort to extrapolate conclusions from web log reports, but the value in such endeavors is the ability to compare patterns over time (Mariner, 2002; Nicholas et al., 1999).

Librarians and other information professionals have an opportunity to take the lead in determining how web statistics can benefit their organizations in various realms. Web logs can provide a foundation to study management, marketing, and collection development issues.

Practical Applications

Management

Bauer (2000) utilized web logs to try to determine if the people who accessed her organization's website were the same people who came into the library. Bertot et al. (1997) and Hightower et al. (1998) isolated specific IP ranges in order to identify primary and secondary user groups. Mariner (2002) discusses how to consider web statistics when planning for a website redesign. Peters (1996) and Hightower et al. discuss how web logs can help assess the value-added content on a website, giving concrete statistics on whether the effort to create the content is justified by its use. Librarians can also analyze web logs to gauge interest in certain areas of the site, thereby shaping the direction of future bibliographic instruction efforts.

Marketing

Li (1999) utilized web logs to measure the effectiveness of a web promotional campaign for an academic website. The study compared web statistics that were logged before and after the promotion campaign to determine the effectiveness of marketing efforts. Bauer (2000) looked at referrer URLs in order to understand how patrons found her library's website, whether it be via search engines or links on other sites.

Collection Development

Zawitz (1998) gained insight into user's interests by examining the most requested pages on the U.S. Bureau of Justice Statistics website, as well as the search terms used to find such pages. Nicholas et al. (1999) suggests that libraries go a step further and feature frequently requested pages in a "spotlight" section of the website, which can help new users better navigate the site. Mariner (2002) believes that librarians can use web statistics to evaluate whether good content is buried under too many links. In such cases, the library's collection may not need to be revised, only the structure of the website. Finally, web statistics can capture information about the usage of electronic journal titles, which can be compared to print journal usage and book circulation statistics. Such information can help librarians anticipate future collection development needs, as well as better allocate financial resources and physical space toward specific formats.

METHODOLOGY

As previously stated, NIEHS uses Analog 5.03 to analyze its raw web logs. Analog was developed by Stephen Turner and is available for free at http://www.analog.cx/. Analog works on many platforms, is highly configurable, and reports in 36 languages. It has had limited graphic capabilities in the past, although it recently introduced a free add-on called Report Magic (http://www.reportmagic.org/) to enhance Analog data with more charts and graphs. Although Analog provides a great deal of information in its reports, it does not attempt to estimate the length of user visits. This means that individual sessions cannot be tracked with Analog. Some commercial software packages, such as WebTrends, use mathematical algorithms to estimate user sessions. However, even WebTrends admits that the only way to measure unique visitors to a website is to require visitors to log in with a username and password (Bauer, 2000). Any "unique session" data generated by software, therefore, is an approximation at best.

Standard Reports

Even though Analog does not attempt to estimate the length of unique visits, it still provides a great deal of data. The monthly reports for the NIEHS Library website include the following subsections:

- **General Summary:** Total number of successful and unsuccessful requests (requests for pages, graphic files, scripts, etc.), successful requests for pages (only complete HTML pages), redirected requests for a URL, data transferred (total bytes contained in all of the file types requested), distinct files

requested (each individual file is counted only once), distinct hosts served (each individual computer making requests for files is counted only once)

- **Monthly Report:** Number of requests for pages by month
- **Daily Report:** Number of requests for pages by day
- **Daily Summary:** Displays number of requests for pages, for each day of the week, adding up all requests for each day occurring over the month
- **Organization Report:** List the organizations of the computers that requested files
- **Domain Report:** List of the domains of the computers that requested files
- **Host Report:** Lists the computers which requested files
- **Request Report:** Ranks files on the site by the number of requests
- **File Type Report:** Lists the extensions of requested files
- **Referring Site Report:** Lists which servers people follow links from in order to arrive at the NIEHS Library website
- **Search Query Report:** Lists the top 50 search queries people use in search engines to the find the NIEHS Library website
- **Search Word Report:** Lists the top 50 words used by people in search engines to find the NIEHS Library website
- **Referrer Report:** Lists the URLs people follow to get to NIEHS Library web pages, either from search engine results or other organizations' web pages
- **Status Code Report:** Lists the HTTP status codes of all requests
- **Hourly Summary:** Lists the number of page requests for each hour of the day, summed for the month
- **Browser Summary:** Lists the types of browsers used to access the NIEHS Library website
- **Operating System Report:** Lists the operating systems used by visitors

This study concentrates on some subsections of the monthly reports more than others, such as the request and daily summary reports, but the intention is to extrapolate conclusions from each subsection. Future reports can be streamlined if certain subsections provide less pertinent information than others. The monthly reports can also be customized to better identify trends for certain groups of users, which leads to more useful and accurate conclusions.

Customized Reports

Instead of utilizing the standard web analysis reports generated for the library, ten customized reports have been created for this project. The reports cover January to March 2002. Analog can be configured to exclude certain file types, as well as certain hostnames or IP ranges. The customized reports capitalize on this feature and therefore provide more targeted results. Since many computers at NIEHS have unique hostnames/static IPs, the exclusion of certain hostnames/IP ranges is a way to isolate user groups within the Institute. However, users who access the library's website from outside of the Institute may not have static IPs and cannot be isolated as reliably.

Although the ten reports differ in which IP ranges have been excluded, all of them exclude the following file types in order to provide a better estimation of page views, not hits: .GIF, .JPG, .JPEG, .PNG, .gif, .jpg, .jpeg, .png, .MID, .WAV, .MOV, .mid, .mov, .css, .class, /cgi-bin, robots.txt. All custom reports contain the subsections described previously, but each one targets a particular group of users or a certain URL. The data of interest from the reports was entered into an Excel spreadsheet in order to calculate trends over the three-month period. A description of the ten reports follows:

1. **Default Report** – Includes all IP ranges except for those of NIEHS Library staff and the NIEHS Web Services Group. This report decreases the inflation of statistics generated by updates to the website. The summary statistics in this report serve as a point of reference for most other reports.

2. **NIEHS Library Staff** - Includes IPs for NIEHS Library staff only. Provides a glimpse into the searching patterns of NIEHS librarians, as well as document delivery work. This information can be compared to Report #4 to see if librarians have different usage patterns than other departments at NIEHS.

3. **NIEHS Library Public Workstations** – Includes IPs for the four public workstations in the library only. By comparing this report to Report #4, shows insight into what users are doing on the website while physically in the library, in comparison to what web information users access from their desktops in their offices or labs.

4. **NIEHS Other Staff (Scientists, etc.)** – Includes IP ranges for all scientists and staff at NIEHS, except for library staff and the web services group. This report is one of the most valuable since this group is a primary user group of the NIEHS Library.

5. **NIH** - Includes IP ranges for the National Institutes of Health (NIH) and all of the agencies it supervises *except* NIEHS. Helps determine how much users outside NIEHS, but still within the auspices of NIH, utilize the NIEHS website.

6. **External** – Includes IPs for all users outside of NIEHS and outside of NIH. External users are probably most interested in the library's consumer health resources, and this report is designed to test this theory.

7. **New Books & Other News** - Tracks http://library.niehs.nih.gov/libserv/new.htm, the library's web page that announces new book acquisitions and new articles/manuscripts published by NIEHS researchers. The page is updated each month, after which the library's Director sends out an email to the NIEHS community to announce the new offerings. This report will gauge whether this marketing effort results in more views of the "New Books" page. Excludes IP ranges for NIEHS Library staff and NIH staff.

8. **New Books and Bibliography (January 2002)** – Tracks two links on http://library.niehs.nih.gov/libserv/new.htm(New Books and Other News): http://library.niehs.nih.gov/newsltr/2002/nbks0102.htm (New Books for January 2002) and http://library.niehs.nih.gov/newsltr/2002/bibjan02.htm (New Articles for January 2002). This report will help gauge whether the email marketing effort results in more views of January's acquisitions. It will also show how long patrons continue to view new acquisitions. Excludes IP ranges for NIEHS Library staff and NIH staff.

9. **New Books and Bibliography (February 2002)** – Tracks two links on http://library.niehs.nih.gov/libserv/new.htm (New Books and Other News): http://library.niehs.nih.gov/newsltr/2002/nbks0202.htm (New Books for February 2002) and http://library.niehs.nih.gov/newsltr/2002/bibfeb02.htm (New Articles for February 2002). This report will help gauge whether the email marketing effort results in more views of February's acquisitions. It will also show how long patrons continue to view new acquisitions. Excludes IP ranges for NIEHS Library staff and NIH staff.

10. **New Books and Bibliography (March 2002)** – Tracks two links on http://library.niehs.nih.gov/libserv/new.htm (New Books and Other News): http://library.niehs.nih.gov/newsltr/2002/nbks0302.htm (New Books for March 2002) and http://library.niehs.nih.gov/newsltr/2002/bibmar02.htm (New Articles for March 2002). This report will help gauge whether the email marketing effort results in more views of March's acquisitions. It will also show how long patrons continue to view new acquisitions. Excludes IP ranges for NIEHS Library staff and NIH staff.

ClickCount Database

The reports generated by Analog are an excellent way to track activity on "internal" links of the library's website. However, most pages on the library's site, such as those with electronic journals, consumer resources, and databases, have links that lead to "external" sites. Such links cannot be tracked by Analog reports. In order to better gauge usage for the "external" links, the library started the "ClickCount" project.

The ClickCount script is a PERL script that was applied to specific URLs on the library's website. The script is an adaptation of GuzZzt ClickCount V. 1.2.1, developed by Gustav Evertsson and available for free at http://www.GuzZzt.com. The script counts the number of times people click on the URL for a certain resource (such as an electronic journal title or a database product). After the NIEHS Library tested the script in February 2002, the ClickCount project went live in March.

The Systems Librarian applied the script to all e-journals in early March. The script was gradually applied to all of the links for databases and selected scientific and

consumer resources. The timetable for script application is included in Appendix C. The date that a URL was wrapped with the script is crucial to note because it influences the breadth of the data. If the script was not added to certain types of resources until April, then clicks on those resources will seem low when compared to resources that received the script in March. For this paper, ClickCount data for March, April, and May is evaluated. Although the Analog reports cover January to March, it is reasonable to analyze the ClickCount information in the context of the Analog reports. This is because the library's web logs are fairly consistent from month to month.

The library created an Access database to which the script automatically dumps the ClickCount data. The database was designed with the capability to separate clicks rendered by "internal" and "external" users. Internal users are those employed at NIEHS, while external users include everyone outside of the Institute. IP ranges for library employees, but not the library's public workstations, were excluded in many queries. Queries were designed to extract the following information from the database:

1. Ranked lists of high-use and low-use electronic journals, determined by the number of clicks on the URL for each journal title. Usage of electronic journals can be compared to past usage studies for print titles in order to make collection development decisions (what is the preferred journal format, what are the most popular journal titles). Such information is vital because of the library's space concerns for accommodating print material.

2. Ranked list of selected databases being tracked, determined by the number of clicks on the URL for each resource. This will help gauge which databases are the most popular, as well as those that do not get as much usage. Library staff can use this report to make decisions about which databases should be targeted in bibliographic instruction efforts. This data can also impact subscription decisions.

3. Number of clicks on the three main Medline interfaces offered on the library's site: PubMed, OVID, and Silverplatter. PubMed is linked at two different places on the site, so this query also shows the most popular access point for PubMed.

4. Number of clicks on value-added content (Web of Science abstracts) on the NIEHS Bibliography pages for January - May 2002. The addition of value-added content requires considerable time and effort by the library staff. Using Web of Science as an indicator, this report will determine whether value-added content is being accessed.

5. Number of clicks on links to the Essential Science Indicators (ESI) database, a new library resource, which appears in three places on the library's website (the "New" section on the homepage, the "New Books and Other News" page, and the Database page). This will determine the most prominent position on the website for new products.

6. Ranked list of Scientific Resources, determined by the number of clicks on the URL for each resource. These resources were only tracked from May 29 – June 13. This information will help understand which types of web resources are most used by scientists, and can help shape future selections for this section.

7. Ranked list of selected Consumer Resources, determined by the number of clicks on the URL for each resource. This report has a collection development component in deciding which of library's consumer resources are being used the most, and whether it is NIEHS scientists or the general public who benefit the most from such resources.

RESULTS

This section displays the plethora of information generated by the Analog reports and the ClickCount database queries. The Analog reports cover the time period of January to March, 2002. The ClickCount data covers the period of March to May, 2002. The data from both Analog and ClickCount is presented in an integrated fashion according to topic. There are general topics that provide a comprehensive view of the web log data. These include: the number of successful page requests; requests by month, day, and hour; requests by public workstations in the library; requests by operating system, browser, and status code; requests by domain; requests by referrer; top search queries; and most-requested pages.

There are also specific topics that provide insight into collection development, marketing, and management issues within the library. Such topics deal with certain sections or resources on the library's website. These include: electronic journals (top and low-use); electronic databases; requests for Medline via three different interfaces; requests and referrers for Essential Science Indicators; web starting points; scientific resources; consumer resources; frequently asked questions; new books and other news; Web of Science abstracts on "new articles" pages; and bibliography pages.

General Summary of Requests

For the period of January – March 2002, there were 121,050 total requests for pages on the NIEHS Library website. NIEHS staff, excluding library staff, made almost 67% of these requests. Library personnel made 4% of requests, while requests from the public workstations in the library accounted for 3% of the total number. The general public (outside of NIEHS and NIH) made about 25% of the requests, while NIH staff (excluding NIEHS) made around 1% of requests. The average number of successful requests for pages per day was 1,347.

The total number of failed requests for the 3-month period equals 7,599. Many of the failed requests for the general public can probably be attributed to the fact that most e-journals and databases are only accessible to staff at NIEHS. There were 973 distinct files requested, and 26,540 distinct hosts served. Table 1 shows requests by user group.

Table 1: General Summary of Activity for NIEHS Library Website, Jan. - Mar. 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff (excludes NIEHS)	General Public	Total:
Successful requests for pages	5,097 (4%)	80,897 (67%)	3,343 (3%)	1,532 (1%)	30,181 (25%)	**121,050 (100%)**
Average successful requests for pages/day	59 (4%)	899 (67%)	37 (3%)	17 (1%)	335 (25%)	**1,347 (100%)**
Failed requests	78 (1%)	3,776 (50%)	5 (.07%)	227 (3%)	3,513 (46%)	**7,599 (100%)**
Distinct files requested	134 (14%)	349 (36%)	70 (7%)	111 (11%)	309 (32%)	**973 (100%)**
Distinct hosts served	10 (.04%)	13,692 (52%)	4 (.02%)	82 (.3%)	12,752 (48%)	**26,540 (100%)**

Requests by Time Period

The library's website shows a consistent pattern of use across the months of January, February, and March 2002. January was slightly busier than the other two months, but each month was only separated by small margins of requests. NIEHS staff, once again, accounted for the most requests, but the general public contributed as well. Table 2 shows a breakdown by month and user group.

Table 2: Requests for Web Pages by Month, Jan. - Mar. 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff (excludes NIEHS)	General Public	Total:
January	1,521 (4%)	27,631 (68%)	1,040 (3%)	564 (1%)	9,982 (24%)	**40,738 (100%)**
February	1,747 (4%)	27,488 (68%)	1,008 (3%)	450 (1%)	9,604 (24%)	**40,297 (100%)**
March	1,829 (5%)	25,778 (64%)	1,295 (3%)	518 (1%)	10,595 (27%)	**40,015 (100%)**

In addition to a monthly breakdown, it is useful to consider weekly requests for pages. Wednesday shows the largest number of requests, making it the busiest day of the week for the library's website. Each day of the weekend shows about half of the requests as the busiest day, but this is still a decent amount of usage. It is especially intriguing to note that the library's public workstations are used during the weekends, even though the library is not staffed at those times. Although it is impossible to accurately depict the number of people who physically use the library solely from public workstation statistics, such data does indicate that NIEHS scientists have a physical presence in the library during the weekend. See Table 3 for further insight.

Table 3: Requests for Web Pages by Day of the Week, Jan. – Mar. 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff (excludes NIEHS)	General Public	Total:
Sunday	0	6,371	149	1	2,522	**9,043**
Monday	945	13,687	779	229	4,699	**20,339**
Tuesday	1,034	14,346	667	131	5,053	**21,231**
Wednesday	1,198	14,957	527	31	5,269	**21,982**
Thursday	914	14,734	415	133	5,306	**21,502**
Friday	1,006	13,706	632	707	4,861	**20,912**
Saturday	0	6,439	174	300	2,471	**9,384**

The hourly page requests at the library's public workstations show an increase of activity in the afternoon. This would lead to the postulation that more patrons are physically present in the library in the afternoon. The majority of page requests by NIEHS staff come from outside of the library, but these requests also increase in the afternoon (see the bolded areas of Table 4). With this knowledge, library staff can be especially cognizant of peak usage times for both the library and the website.

Table 4: Requests for Web Pages by Hour of the Day, Jan. – Mar. 2002

Hour	Public Workstations	NIEHS Other Staff
0	41	1,790
1	48	1,683
2	41	1,504
3	25	1,765
4	25	1,647
5	52	1,631
6	86	1,694
7	108	2,099
8	80	3,357
9	152	4,849
10	268	5,836
11	276	5,671
12	207	5,147
13	**407**	**6,006**
14	**393**	**6,926**
15	**389**	**6,598**
16	**318**	**5,998**
17	123	4,298
18	80	3,388
19	50	2,931
20	60	2,880
21	54	2,394
22	32	2,106
23	28	2,042

When the public workstations were used, no matter what day of the week, patrons had a clear preference for PCs as opposed to Macs. The "Stand-up" Mac and the "Stand-up" PC are beside each other on a table close to the library's entrance. The "Sit-down" Mac and "Sit-down" PC are stationed on separate tables but next to each other. The sit-down machines are slightly farther from the library's entrance. The data indicates that when the Stand-up PC is already occupied, patrons would rather walk to the Sit-down PC than use the Stand-up Mac. See Table 5.

Table 5: Requests for Web Pages by Library Public Workstations, Jan. – Mar. 2002

Workstation	Requests	% Requests
Stand-up PC	1,492	45%
Sit-down PC	1,117	33%
Stand-up Mac	415	12%
Sit-down Mac	319	10%
Total:	**3,343**	**100%**

Although there is a pattern of usage by day of the week and hour of the day, there is not an established pattern of usage by day of the month. In other words, three months of data have not revealed whether the library's website receives more requests at the beginning, middle, or end of the month. In fact, when "requests per day" is the measure of usage, there is a different pattern for each month. In January, the maximum value of 2,284 occurs at the end of the month. In February, the beginning of the month shows the maximum value of 2,163. Finally, March's maximum value of 1,930 occurs in the middle of the month. Although the daily breakdown does not establish a definitive pattern for usage within the month, there is relative consistency in the maximum values. Tables 6, 7, and 8 show a breakdown of requests by day and user group. The maximum daily value for each month is highlighted in bold typeface.

Table 6: Requests for Web Pages by Day, January 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff	General Public	Total:
1/Jan/02:	0	437	4	0	128	569
2/Jan/02:	63	1,037	37	4	340	1,481
3/Jan/02:	0	719	3	1	369	1,092
4/Jan/02:	0	686	18	40	344	1,088
5/Jan/02:	0	603	10	63	262	938
6/Jan/02:	0	498	10	0	166	674
7/Jan/02:	56	1,163	44	3	333	1,599
8/Jan/02:	84	1,239	77	4	402	1,806
9/Jan/02:	74	1,233	29	7	409	1,752
10/Jan/02:	60	1,250	50	4	381	1,745
11/Jan/02:	71	1,152	81	47	373	1,724
12/Jan/02:	0	600	0	50	304	954
13/Jan/02:	0	176	1	0	105	282
14/Jan/02:	47	737	80	5	302	1,171
15/Jan/02:	113	681	28	3	242	1,067
16/Jan/02:	143	904	37	0	285	1,369
17/Jan/02:	72	783	20	3	254	1,132
18/Jan/02:	49	1,048	43	196	377	1,713
19/Jan/02:	0	494	18	0	167	679
20/Jan/02:	0	503	9	0	134	646
21/Jan/02:	98	830	22	1	347	1,298
22/Jan/02:	35	1,169	72	11	432	1,719
23/Jan/02:	58	1,147	33	4	419	1,661
24/Jan/02:	66	1,447	45	101	625	**2,284 (MAX)**
25/Jan/02:	121	1,152	51	3	425	1,752
26/Jan/02:	0	554	8	0	221	783
27/Jan/02:	0	538	8	0	165	711
28/Jan/02:	66	1,405	55	7	503	2,036
29/Jan/02:	74	1,155	60	3	365	1,657
30/Jan/02:	86	1,132	37	0	411	1,666
31/Jan/02:	85	1,159	50	4	392	1,690

Table 7: Requests for Web Pages by Day, February 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff	General Public	Total:
1/Feb/02:	47	1,105	62	112	347	1,673
2/Feb/02:	0	587	19	0	212	818
3/Feb/02:	0	567	14	0	198	779
4/Feb/02:	122	1,309	70	0	386	1,887
5/Feb/02:	76	1,415	56	2	614	**2,163 (MAX)**
6/Feb/02:	97	1,206	24	3	424	1,754
7/Feb/02:	74	1,239	29	1	408	1,751
8/Feb/02:	62	1,151	46	56	431	1,746
9/Feb/02:	0	501	5	74	163	743
10/Feb/02:	0	596	8	0	219	823
11/Feb/02:	78	1,189	57	81	428	1,833
12/Feb/02:	64	1,146	41	3	364	1,618
13/Feb/02:	62	1,258	40	0	335	1,695
14/Feb/02:	48	1,281	28	2	431	1,790
15/Feb/02:	67	987	40	1	336	1,431
16/Feb/02:	0	455	15	0	139	609
17/Feb/02:	0	522	13	0	191	726
18/Feb/02:	0	813	47	0	349	1,209
19/Feb/02:	99	1,128	45	5	367	1,644
20/Feb/02:	176	1,134	38	4	419	1,771
21/Feb/02:	94	1,017	15	1	332	1,459
22/Feb/02:	142	971	49	93	340	1,595
23/Feb/02:	0	518	12	4	142	676
24/Feb/02:	0	503	12	0	195	710
25/Feb/02:	130	1,083	101	2	436	1,752
26/Feb/02:	117	1,091	64	0	391	1,663
27/Feb/02:	121	1,458	34	3	492	2,108
28/Feb/02:	71	1,258	24	3	515	1,871

Table 8: Requests for Web Pages by Day, March 2002

	NIEHS Library Staff	NIEHS Other Staff	NIEHS Library Public Workstations	NIH Staff	General Public	Total:
1/Mar/02:	102	940	43	86	292	1,463
2/Mar/02:	0	513	11	0	152	676
3/Mar/02:	0	556	22	0	203	781
4/Mar/02:	110	1,245	42	0	440	1,837
5/Mar/02:	124	1,202	65	6	502	1,899
6/Mar/02:	93	1,168	41	1	475	1,778
7/Mar/02:	118	1,122	24	1	353	1,618
8/Mar/02:	88	1,154	27	32	387	1,688
9/Mar/02:	0	525	27	70	188	810
10/Mar/02:	0	515	19	0	187	721
11/Mar/02:	92	1,134	57	129	410	1,822
12/Mar/02:	64	1,086	34	1	392	1,577
13/Mar/02:	49	1,100	83	5	454	1,691
14/Mar/02:	48	1,396	29	6	451	**1,930 (MAX)**
15/Mar/02:	104	1,015	51	0	306	1,476
16/Mar/02:	0	497	33	0	188	718
17/Mar/02:	0	621	19	1	248	889
18/Mar/02:	70	940	142	1	345	1,498
19/Mar/02:	85	1,022	38	90	457	1,692
20/Mar/02:	102	758	67	0	443	1,370
21/Mar/02:	85	786	28	2	426	1,327
22/Mar/02:	60	1,021	42	0	601	1,724
23/Mar/02:	0	187	10	0	136	333
24/Mar/02:	0	316	8	0	231	555
25/Mar/02:	76	1,060	62	0	420	1,618
26/Mar/02:	99	908	83	3	397	1,490
27/Mar/02:	74	895	27	0	363	1,359
28/Mar/02:	93	862	70	4	369	1,398
29/Mar/02:	93	692	79	41	302	1,207
30/Mar/02:	0	231	6	39	197	473
31/Mar/02:	0	311	6	0	280	597

Requests by Operating System, Browser, and Status Code

In order to develop and maintain a functional website for patrons, it is important to understand what operating systems and browsers these patrons use. It is also necessary to evaluate the number of requests that are successful (status code 200) versus the number of unsuccessful requests. The primary user group of the NIEHS Library includes its scientists and other staff. The library's staff is not included in this group in order to better portray the library's primary patrons. Table 9 shows that the majority of requests (43%) are generated from Windows machines, although it is worthwhile to note that the operating system for 38% of requests could not be determined.

Table 9: Operating Systems Used to Request Pages by NIEHS Staff (excluding Library Staff), Jan. – Mar. 2002

Operating System	Requests	% Requests
Windows	35,977	43%
Macintosh	15,090	18%
OS Unknown	32,251	38%
Unix	762	.9%
Total:	**84,080**	**100%**

Table 10 shows the top two browsers used by NIEHS staff, Netscape and Internet Explorer. It seems that Netscape 4.75 made 21% of requests, more than any other version of Netscape. Netscape's most current version, 6.2.3, does not seem to be used at all. In terms of Internet Explorer, version 5.5 was the most widely used with 32% of requests. The most current edition of Explorer is version 6.

Table 10: Browsers Used to Request Pages by NIEHS Staff (excluding Library Staff), Jan. – Mar. 2002

Browser	Requests	% Requests
Mozilla (i.e., Netscape)		
Mozilla/4.75	5,627	21%
Mozilla/4 (other)	5,021	19%
Mozilla/4.77	3,346	13%
Mozilla/4.7	2,937	11%
Mozilla/4.72	2,016	8%
Mozilla/4.61	1,830	7%
Mozilla/4.76	1,746	6%
Mozilla/4.77C-CCK-MCD	1,582	6%
Mozilla/4.78	1,508	6%
Mozilla/4.74	868	3%
Total:	**26,481**	**100%**
Internet Explorer		
MSIE/5.5	8,057	32%
MSIE/5.01	6,427	25%
MSIE/5.0	4,793	19%
MSIE/6	4,505	18%
MSIE/4	1,448	6%
Total:	**25,230**	**100%**

According to Table 11, the majority of requests for pages by NIEHS staff have Status Code 200, or "OK" (84%). Only 3% have Status Code 404, or "Document Not Found." The remainder of the status codes are detailed below.

Table 11: Status Codes for Page Requests by NIEHS Staff (excluding Library Staff), Jan. – Mar. 2002

Status Code	Requests	% Requests
200 OK	74,263	84%
206 Partial content	210	0.2%
301 Document moved permanently	11	.01%
304 Not modified since last retrieval	9,961	11%
400 Bad request	14	.02%
403 Access forbidden	1,532	2%
404 Document not found	2,228	3%
405 Method not allowed	2	.002%
Total:	**88,221**	**100%**

Requests by Domain

It is logical that the majority of requests for the NIEHS Library website were made by the .gov domain. Note that requests by library staff were excluded. Taking into account that 12% of requests could not be traced to a particular domain, the .com and .edu domains had the next highest number of requests, respectively. Although many of the country domains were excluded in these results, Table 12 provides specifics for the top domains.

Table 12: Top Number of Page Requests by Domain, Jan. – Mar. 2002

Domain	Requests	% Requests
.gov (USA Government)	54,664	65%
[unresolved numerical addresses]	9,976	12%
.com (Commercial)	6,260	7%
.net (Network)	5,333	6%
.edu (USA Educational)	2,275	3%
.uk (United Kingdom)	684	0.8%
.org (Non-Profit Making Organizations)	634	0.8%

Requests by Referrer

The Analog reports show referring sites, or those servers from which people followed links to pages on the NIEHS Library website. The default report generated the statistics displayed in Table 13, although only the top 20 referring sites are included here. The NIEHS homepage is the top referring site, followed by the NIEHS Library homepage, then the NIEHS Junction. The Junction is a "quick reference" page that links to many departments and items of interest within NIEHS. The library and its services are listed at the Junction, and it is significant to note that the Junction is a top referring site. Other referring sites include servers such as Ultraseek, which powers the search function for the entire NIEHS website. Finally, search engines such as Google (for several country domains), Altavista, and Yahoo are present.

Table 13: Top 20 Referring Sites, Excluding Library Staff, Jan. – Mar. 2002

Site	Requests
http://www.niehs.nih.gov/	19,429
http://library.niehs.nih.gov/	19,282
http://www.niehs.nih.gov/junction/	16,050
http://www.google.com/	4,205
http://google.yahoo.com/	1,569
http://www.niehs.nih.gov/external/	778
http://search.nih.gov/	650
http://ultraseek.niehs.nih.gov/	570
http://search.msn.com/	485
http://www.nih.gov/	460
http://auto.search.msn.com/	275
http://jeeves.niehs.nih.gov/	239
http://www.altavista.com/	185
http://www.google.de/	178
http://www.google.ca/	155
http://addresses.com/	104
http://search.yahoo.com/	92
http://search.netscape.com/	86
http://www.google.co.uk/	72
http://aolsearch.aol.com/	69

Requests by Search Query

Since search engines are part of the list of referring sites, it makes sense to examine the top search queries that are used to access pages on the NIEHS Library website. Table 14 shows many of these queries; there are some trends. For example, various phrases indicate that searchers are looking for information on Chemical Abstracts Service (CAS) Registry Numbers. It is feasible that a searcher types such a query into Google and retrieves the NIEHS Library's list of links on this topic. However, it is improbable that NIEHS scientists would be using Google to search for information on the library's website. It is possible that scientists go to the library website and do not readily find information on CAS Registry Numbers, leading them to use the site's search function. Three sections of the website currently have information about Registry Numbers (Web Starting Points/Scientific Resources, Reference Resources, and Database Searching). It may make sense to move the Registry Number links to a more prominent section of the website, or note that ChemIDplus, one of the "Quick Links" on the Database page, can be used to find Registry Numbers.

Not only can search queries provide insight into navigational behavior, but also indicate topics that are of interest to library patrons. Librarians can use search queries as clues to better develop certain subject areas of the website, in addition to the book and journal collection. More data would need to be gathered for purposes of collection development, but the data in Table 14 is a start. Diethylstilbestrol (DES), birth defects, brain diseases, chemical sensitivity, and lead poisoning are some of the noteworthy search phrases.

Table 14: Top Search Queries, Excluding Library Staff, Jan. – Mar. 2002

Search Query	Requests	Search Query	Requests
diethylstilbestrol	475	environmental health journals	8
cas numbers	460	chemical sensitivity	7
niehs	168	niehs library	7
cas registry	133	microwaves health	7
www.niehs.gov	110	mishina y	7
disaster photos	62	cas numbers list	7
cas registry number	50	information on birth defects	6
cas registry numbers	48	chemical dictionary	6
brain diseases	45	neurotoxicity of fumonisin b1 blood brain barrier	6
chemical cas numbers	32	dopamine	6
neuroscience	31	lead	6
lead poisoning	24	chemical abstracts service number	6
www.niehs.org	24	author huff	6
journal of environmental health	23	emphysema and cadmium neurotoxicity	6
nutrition	22	chemical abstracts service registry	6
metallothionein	19	national institute of environmental health sciences	6
library	18	asthma resources	6
thioglycolic acid	17	chemical abstracts registry	6
multiple chemical sensitivity	17	antioxidants	6
ultraviolet light	15	electromagnetic microwaves	6
chemical abstracts service registry number	12	nitric oxide	6
database searching	12	alternative medicine	6
acta endocrinologica	12	journal of neuroscience research	5
chemical abstracts registry numbers	12	chemical abstracts service registry numbers	5
opioid	11	microwaves	5
birth defects	11	c.a.s numbers	5
cas numbers structures	11	des birth defects	5
niehs.gov	10	scientific database	5
electromagnetic fields	10	environmental emergencies	5
mcs	10	epa cas numbers	5
nih library	10	nethrapalli	5
patty's toxicology	9	environmental health	5
asthma	9	nih library journals	5
brain diseases and disorders	8	diethylstilbestrol des	5
environmental birth defects	8	poster	5
cas numbers structure	8	chemical abstracts registry number	5
impact factor	8	occupational exposure	5
cas	8	[not listed: 4,688 search terms]	5,209

Top Requests for Pages on Library Website

Just as search queries provide information about the needs of library website users, actual page requests can also uncover user needs. Table 15 shows the top page requests by NIEHS staff (excluding library staff) and the general public. Here, the general public is considered to be people who access the library website from outside of the NIEHS campus. Both groups have the same three files as the top three most-requested pages: Library Homepage, Electronic Journals, and Databases. It should be noted that while the public can access the pages that *list* NIEHS e-journals and databases, the public cannot use many of these products because vendor licensing agreements restrict use to NIH staff. Therefore, a member of the public may try to click on a database or e-journal link but will find that the resource is unavailable. The question arises as to whether certain online products should be placed in a restricted part of the library site so that the public will not confront potential frustration when attempting to access such resources. However, it may be better to leave such resources listed so that those outside of NIEHS will know what the library has available on its premises.

The "Consumer Resources" section of the website was designed with the general public in mind, and it appears that the public requests more consumer pages than the NIEHS staff. However, both groups place a significant amount of requests for the following pages: CAS Registry Numbers, NIEHS Book Catalog, List of Journals in the Library, Reference Resources, and Annual Bibliographies of Publications by NIEHS Authors (from 1990-2001). NIEHS staff also access the online photocopy request form, which is used to request journal articles and books. Table 15 includes additional page requests for both groups.

Table 15: Top Pages Requested by NIEHS Staff (excluding Library Staff) and the General Public, Jan. – Mar. 2002

NIEHS Staff (excluding Library Staff)			General Public		
Page	Requests	% Requests	Page	Requests	% Requests
/home.htm	29,736	35.30%	/home.htm	6,117	20.27%
/libserv/ejournal.htm	13,029	15.47%	/libserv/ejournal.htm	2,645	8.76%
/database/database.htm	11,014	13.07%	/database/database.htm	2,012	6.67%
/libserv/ejournalm-z.htm	4,729	5.61%	/start/registry.htm	1,688	5.59%
/start/registry.htm	1,790	2.12%	/journals/journal.htm	1,075	3.56%
/journals/journal.htm	1,742	2.07%	/referenc/resource.htm	838	2.78%
/referenc/resource.htm	1,226	1.46%	/libserv/ejournalm-z.htm	819	2.71%
/ill/photoform.html	1,111	1.32%	/consumer/des.htm	763	2.53%
/libserv/niehswebpac.htm	1,003	1.19%	/libserv/niehspub.htm	589	1.95%
/libserv/new.htm	933	1.11%	/start/www.htm	533	1.77%
/start/www.htm	829	0.98%	/bibliography/1990.htm	482	1.60%
/consumer/des.htm	774	0.92%	/libserv/new.htm	463	1.53%
/libserv/niehspub.htm	716	0.85%	/bibliography/bib-2001.htm	430	1.42%
/restrict/medline.htm	697	0.83%	/libserv/niehswebpac.htm	427	1.41%
/bibliography/1990.htm	486	0.58%	/libserv/search.htm	423	1.40%
/bibliography/bib-2001.htm	483	0.57%	/consumer/altern.htm	381	1.26%
/libserv/search.htm	473	0.56%	/bibliography/bib-1999.htm	354	1.17%
/consumer/altern.htm	389	0.46%	/consumer/birth.htm	352	1.17%
/start/news.htm	384	0.46%	/bibliography/bib-1998.htm	318	1.05%
/libstaff/staff.htm	381	0.45%	/start/news.htm	313	1.04%
/libserv/bib.htm	364	0.43%	/bibliography/bib-2000.htm	311	1.03%
/bibliography/bib-1999.htm	363	0.43%	/libstaff/staff.htm	299	0.99%
/consumer/birth.htm	362	0.43%	/bibliography/1992.htm	294	0.97%
/bibliography/bib-2000.htm	328	0.39%	/ill/photoform.html	289	0.96%
/bibliography/bib-1998.htm	327	0.39%	/bibliography/1993.htm	287	0.95%
/start/start.htm	304	0.36%	/bibliography/1994.htm	277	0.92%
/bibliography/1992.htm	298	0.35%	/bibliography/1991.htm	271	0.90%
/bibliography/1993.htm	292	0.35%	/bibliography/bib-1997.htm	269	0.89%
/bibliography/1994.htm	284	0.34%	/bibliography/1995.htm	240	0.80%
/bibliography/1991.htm	276	0.33%	/start/consumer.htm	239	0.79%
/bibliography/bib-1997.htm	275	0.33%	/bibliography/1996.htm	226	0.75%
/start/consumer.htm	265	0.31%	/start/start.htm	217	0.72%
/bibliography/1995.htm	246	0.29%	/newsltr/2001/nbknov01.htm	207	0.69%
/bibliography/1996.htm	231	0.27%	/consumer/asthma.htm	197	0.65%
/newsltr/2001/nbknov01.htm	223	0.26%	/libserv/bib.htm	197	0.65%
/faqs/faq.htm	211	0.25%	/faqs/faq.htm	176	0.58%
/consumer/asthma.htm	209	0.25%	/consumer/emf.htm	175	0.58%
/consumer/emf.htm	183	0.22%	/consumer/mcs.htm	174	0.58%

Electronic Journals (E-Journals)

The electronic journals are responsible for a large number of page requests, as Table 15 clearly indicated. Approximately 400 of NIEHS' journal titles are available electronically. However, the web statistics cannot track which e-journals people actually select. The ClickCount database provides additional usage data. Table 16 shows the number of clicks on all e-journal titles, from March to May.

Table 16: Total Clicks for All E-journal Titles, Excluding Library Staff, Mar. – May 2002

Month	Total Clicks
March	4,935
April	4,845
May	5,199

Table 17 provides greater detail by displaying the top electronic journal titles, or those that had the highest number of clicks. Only the top e-journals are included because the entire list was extremely long. The top title is not actually one e-journal, but a collection of e-journals provided by the NIH Library. NIH has some e-journals that NIEHS does not have, and the NIEHS staff has access to selected NIH e-journals. The NIEHS Library website has one link to the NIH e-journal page. The ClickCount script can count the number of clicks on this link, but cannot track which NIH journals are used. Even with this limitation, it is insightful to note how many times NIEHS scientists go to the NIH Library site in search of an e-journal title.

Some of the top e-journal titles used by NIEHS researchers include: *Journal of Biological Chemistry*, *Nature*, *Proceedings of the National Academy of Sciences*, *Science*, and *Cell*. Journal Citation Reports (JCR), a database that tracks the impact factors of journals, is listed on both the library's E-journal and Database web pages. It is intriguing that JCR receives so many clicks on the E-journal page.

Table 17: Top Electronic Journals, Excluding Library Staff, Mar. – May 2002

March		April		May	
Journal Title	**Clicks**	**Journal Title**	**Clicks**	**Journal Title**	**Clicks**
NIH Library list of full-text online journals	571	NIH Library list of full-text online journals	545	NIH Library list of full-text online journals	589
Journal of Biological Chemistry	263	Journal of Biological Chemistry	307	Journal of Biological Chemistry	309
Nature	187	Nature	168	Science (AAAS). 1997 to present	197
Proceedings of the National Academy of Sciences. 1990 to present.	163	Science (AAAS). 1997 to present	164	Nature	147
Science (AAAS). 1997 to present	148	Proceedings of the National Academy of Sciences. 1990 to present.	117	Proceedings of the National Academy of Sciences. 1990 to present	140
Cell	135	Cell	93	Cell	125
Journal Citation Reports	98	Oncogene	93	Molecular and Cellular Biology	92
Carcinogenesis	75	Cancer Research	81	Journal Citation Reports	85
Cancer Research	64	Biochemistry	77	Cancer Research	78
Oncogene	62	Environmental Health Perspectives	63	Oncogene	75
Biochemistry	58	Journal Citation Reports	59	Environmental Health Perspectives	70
Environmental Health Perspectives	58	Molecular and Cellular Biology	59	Biochemical and Biophysical Research Communications	57
Journal of Pharmacology and Experimental Therapeutics	54	Biochemical and Biophysical Research Communications	51	Nature Genetics	55
Molecular and Cellular Biology	54	EMBO Journal	49	PubMed Central	54
Molecular Endocrinology	47	Journal of Pharmacology and Experimental Therapeutics	48	Biochemistry	52
American Journal of Physiology	46	PubMed Central	46	Biology of Reproduction	47
Biochemical and Biophysical Research Communications	45	Molecular Pharmacology	45	Toxicology and Applied Pharmacology	47
The Lancet	43	Nature Genetics	44	EMBO Journal	45
EMBO Journal	42	Gastroenterology	42	JAMA - Journal of the American Medical Association	45
Current Biology	41	American Journal of Physiology	40	Molecular Endocrinology	45
FASEB Journal	38	JAMA - Journal of the American Medical Association	40	Molecular Pharmacology	43

NIEHS librarians can use the list of top e-journals to help make collection development decisions in the future. However, it is also useful to know which electronic journals are not receiving as much attention by NIEHS researchers. Generally, such titles only receive one or two clicks per month. If certain titles have consistently low usage, they may be candidates for weeding if future financial circumstances call for such a measure. Also, low usage of a journal's electronic format may indicate a parallel low usage of its print format. Because vendors sometimes bundle print and electronic formats, the library has some journals in both formats. Some conclusions about print journal usage may be extrapolated from electronic use, but comparing the ClickCount data to a print usage study would be the safest way to make conclusions. The library has limited space for its constantly expanding print journal collection, so any journal usage data is helpful for maintaining a strong collection while considering space concerns. Table 18 shows a selected list of low-use electronic journals.

Table 18: Low-Use Electronic Journals, Excluding Library Staff, Mar. – May 2002

March		April		May	
Journal Title	**Clicks**	**Journal Title**	**Clicks**	**Journal Title**	**Clicks**
Protein Engineering	1	Progress in Neuro-Psychopharmacology and Biological Psychiatry	1	Peptides	1
Public Health Reports	1	Public Health Reports	1	Pharmacology and Therapeutics	1
Radiation Physics and Chemistry	1	Regulatory Peptides	1	Physiology and Behavior	1
Research in Immunology	1	Research in Virology	1	Phytochemistry	1
Respiration Physiology	1	Scandinavian Journal of Immunology	1	Plant Physiology and Biochemistry	1
Scandinavian Journal of Immunology	1	Seminars in Cancer Biology	1	Plant Science	1
Seminars in Cancer Biology	1	Teratology	1	Postgraduate Medicine	1
Seminars in Cell and Developmental Biology	1	Tissue Antigens	1	Proceedings of the Society for Experimental Biology and Medicine	1
Structure with Folding & Design	1	Toxicology in Vitro	1	Progress in Biophysics and Molecular Biology	1
Surgical Oncology	1	Toxicon	1	Progress in Lipid Research	1
Teratogenesis, Carcinogenesis and Mutagenesis	1	Traffic : the International Journal of Intracellular Transport	1	Progress in Neurobiology	1
Toxicology in Vitro	1	Transfusion Science	1	Prostaglandins and Other Lipid Mediators	1
Transplantation Proceedings	1	Trends in Biotechnology	1	Protein Engineering	1
Trends in Biotechnology	1	Trends in Immunology	1	Public Health Reports	1
Trends in Ecology and Evolution	1	Trends in Molecular Medicine	1	Teratogenesis, Carcinogenesis and Mutagenesis	1
Trends in Immunology	1	Trends in Neurosciences	1	Trends in Biotechnology	1
Trends in Molecular Medicine	1	Ultrasonics	1	Trends in Cardiovascular Medicine	1
Ultramicroscopy	1	Veterinary Journals	1	Trends in Immunology	1
Veterinary Journals	1	Women's Health Issues	1	Wiley Interscience	1
Veterinary Microbiology	1	World Wide Web Journal of Biology	1	Women's Health Issues	1

Electronic Databases

The web statistics show that after the Electronic Journals pages, the Database page is the next most-requested. The ClickCount script was also applied to database products to provide more usage detail. The script was only applied to selected resources in March and April, but was applied to all database products in late May. PubMed, Web of Science, Biological Abstracts, OVID, Current Protocols, and TOMES are some of the most utilized resources. Table 19 provides additional insight.

Table 19: Top Databases, Excluding Library Staff, Mar. – May 2002

March		April		May	
Database	**Clicks**	**Database**	**Clicks**	**Database**	**Clicks**
FirstSearch Search Page	35	PubMed	1,631	PubMed	2,094
Essential Science Indicators (ESI)	22	Web of Science	584	Web of Science	816
Essential Science Indicators	22	Biological Abstracts	85	Current Protocols Online	82
TOMES	20	Essential Science Indicators	77	OVID	67
Guided Tour	1	OVID	65	Biological Abstracts	65
		TOMES	59	TOMES	43
		Essential Science Indicators (ESI)	57	FirstSearch Search Page	35
		FirstSearch Search Page	55	Essential Science Indicators (ESI)	32
		Current Protocols Online	47	SilverPlatter MEDLINE	18
		PubMed Central	11	Journal Citation Reports	13
		Porpoise Alert Service	7	PubMed Central	9
		SilverPlatter MEDLINE	6	ChemIDplus	8
		MeSH Browser (for Indexers)	5	Porpoise	7
		Porpoise	4	Essential Science Indicators	6
		PhyNet MEDLINE Access	3	MeSH Browser (for Indexers)	3
				Porpoise Alert Service	3
				CRISP	2
				Eukaryotic Promoter	2
				SOLV-DB Solvents	2
				TOXNET	2

As Table 19 illustrated, PubMed is a highly-used database. PubMed is the free version of Medline produced by the National Library of Medicine. However, NIEHS Library offers three main interfaces for accessing Medline. OVID and Silverplatter produce proprietary versions of Medline. Each interface has its own look and feel, in addition to syntax differences. Depending on the search need, one interface may offer more functionality than another. NIEHS offers access to each version of Medline via its "Medline" web page (/restrict/medline.htm). PubMed has an additional access point as a "Quick Link" at the top of the Database page (/database/database.htm).

Since Medline is such a vital resource for the biomedical community, it is important to understand how NIEHS researchers access it. Most researchers access PubMed via the "Quick Links" on the Database page. Significantly less access it through the Medline page, and even less use the other Medline interfaces. The "Quick Links" section appears to be a popular access point, and librarians could probably influence searchers by placing new or highly-recommended databases in the section. See Table 20. As an aside, the library frequently offers training sessions for PubMed. It would be interesting to offer more training sessions on the OVID and Silverplatter interfaces and see if usage for these formats increases.

Table 20: Accesses for Medline via three different interfaces, Excluding Library Staff, May 2002

Interface	Clicks	Referrer
PubMed	1,928	http://library.niehs.nih.gov/**database/database.htm**
PubMed	166	http://library.niehs.nih.gov/**restrict/medline.htm**
OVID	67	http://library.niehs.nih.gov/**restrict/medline.htm**
SilverPlatter MEDLINE	18	http://library.niehs.nih.gov/**restrict/medline.htm**

The "Quick Links" section of the Database page is one place for librarians to showcase useful products. The library's homepage is another prime marketing space for new resources. Essential Science Indicators (ESI) is a database that ranks top journals, institutions, companies, and scientists by areas of research. When ESI was purchased, the library's website contained a link to it in three places: the top of the homepage, the Database page, and the "New Books and Other News" page. The library's Director announced this new resource to the NIEHS community via email on February 4th, describing the product and providing instructions to access it via the Database page.

Since the ClickCount project was not operational until March, it was not possible to track researchers' initial responses to ESI. However, ESI was tracked from March 18th to May 8th on the homepage, and from March 18th to the present on the other web pages. The data indicates that the homepage was the best place to showcase the new resource, even though the Database page was listed as the access point in the email announcement. The link to ESI on the New Books and Other News page received very few clicks. Table 21 provides a summary.

Table 21: Requests and Referrers for Essential Science Indicators, Excluding Library Staff, March – May 2002

Referrer	Clicks		
	March	April	May
http://library.niehs.nih.gov/ **(homepage)**	22	77	6
http://library.niehs.nih.gov/database/**database.htm**	18	55	31
http://library.niehs.nih.gov/libserv/**new.htm**	4	3	2

Web Starting Points

For scientists and the public alike, the "Web Starting Points" section of the library site is a gateway to biomedical information on the Internet. The Starting Points page provides links to five main sections of information: Scientific Resources, Consumer Resources, Government Organizations and Publications, Other Libraries, and Newspapers/Magazines. Table 22 shows some high-use Starting Points, with the Chemical Abstracts Service Registry Number page topping the list.

Table 22: Requests for "Web Starting Points" Pages by NIEHS Staff (excluding Library Staff) and the General Public, Jan. – Mar. 2002

NIEHS Staff (excluding Library Staff)		General Public	
File	Requests	File	Requests
/start/registry.htm	1,791	/start/registry.htm	1,688
/start/www.htm	829	/start/www.htm	533
/start/news.htm	384	/start/news.htm	313
/start/start.htm	304	/start/consumer.htm	239
/start/consumer.htm	265	/start/start.htm	217
/start/libs.htm	125	/start/gov.htm	72
/start/gov.htm	111	/start/libs.htm	50
/start/select_con.htm	20	/start/select_con.htm	16
/start/books.htm	17	/start/books.htm	12
/start/select_sci.htm	16	/start/select_sci.htm	12

Two of the most important sections under Web Starting Points are the Scientific Resources (/start/start.htm) and Consumer Resources (/start/consumer.htm). The target audience for Scientific Resources is NIEHS researchers, whereas Consumer Resources are collected with a focus toward the public. However, both audiences can benefit from each collection of links.

The Scientific Resources are arranged topically to provide the best guidance to researchers. The ClickCount database began tracking links on this page in late May, so more data will need to be collected to analyze trends. However, Table 23 shows preliminary results.

Table 23: Clicks on Scientific Resources, Excluding Library Staff, May 29 – June 13, 2002

Resource Name	Clicks
Alternatives to Animal Testing (Altweb)	4
ChemCenter,	3
National Environmental Trust	2
Mouse Atlas Project	2
All the Virology on the WWW	2
Epidemiology Virtual Library Page	1
Animal Welfare Information Center	1
Biomedical Information Resources	1
ChemConnect	1
Chemical Economics Handbook Reports	1
Cold Spring Harbor Laboratory Online	1
EcoJustice Network	1
EcoNet	1
EMF Rapid	1
Endocrine Disruptors Research Initiative	1
Environmental Research Foundation	1
Yahoo=	1
Martindale's	1
Millipore's HYPERfilter	1
National Biological Information Infrastructure	1
National Center for Biotechnology Information	1
NTP Interagency Center for the Evaluation of Alternative Toxicological Methods	1
Physiology Online	1
ScienceWise.com	1
The WWW Virtual Library	1
United Nations Environment Programme	1
Worldwatch Institute	1
EnviroLink Network	1

Consumer Resources

The Consumer Resources page (/start/consumer.htm) has an alphabetical list of consumer resources. However, there are also links to 22 separate topical pages. Interestingly, NIEHS staff access the Consumer pages more than the general public. However, the figures are only slightly different, and the lists are ranked in almost the same order for each group. Refer to Table 24 to view which Consumer topical pages were most popular. The page on DES tops the list.

Table 24: Requests for "Consumer Resources" Pages by NIEHS Staff (excluding Library Staff) and the General Public, Jan. – Mar. 2002

NIEHS Staff (excluding Library Staff)		General Public	
File	Requests	File	Requests
/consumer/des.htm	774	/consumer/des.htm	763
/consumer/altern.htm	389	/consumer/altern.htm	381
/consumer/birth.htm	362	/consumer/birth.htm	352
/consumer/asthma.htm	209	/consumer/asthma.htm	197
/consumer/emf.htm	183	/consumer/emf.htm	175
/consumer/mcs.htm	181	/consumer/mcs.htm	174
/consumer/lead.htm	146	/consumer/lead.htm	136
/consumer/brain.htm	122	/consumer/brain.htm	116
/consumer/children.htm	108	/consumer/children.htm	97
/consumer/uv.htm	101	/consumer/uv.htm	92
/consumer/pest.htm	91	/consumer/pest.htm	83
/consumer/women.htm	83	/consumer/women.htm	67
/consumer/clinics.htm	68	/consumer/clinics.htm	63
/consumer/pollut.htm	53	/consumer/pollut.htm	46
/consumer/food.htm	52	/consumer/food.htm	41
/consumer/occup.htm	49	/consumer/occup.htm	38
/consumer/general.htm	44	/consumer/endocrine.htm	37
/consumer/endocrine.htm	43	/consumer/general.htm	33
/consumer/cancer.htm	36	/consumer/cancer.htm	31
/consumer/hazard.htm	34	/consumer/hazard.htm	28
/consumer/emerg.htm	26	/consumer/emerg.htm	20

At the beginning of March, the ClickCount script was applied to the alphabetical list of resources on /start/consumer.htm. Table 25 shows the clicks on these resources for March through May. These numbers are rather low, indicating that many people do not use the alphabetical list, but rely on the topical links leading to completely separate Consumer pages (those listed in Table 24). In the future, it would be worthwhile to apply the ClickCount script to resources on the topical pages to provide a better picture of use.

Table 25: Top 15 Consumer Resources, Excluding Library Staff, Mar. – May 2002

March		April		May	
Consumer Resource	**Total Clicks**	**Consumer Resource**	**Total Clicks**	**Consumer Resource**	**Total Clicks**
1-800-222-1222	5	Clinics by state	4	Healthy People 2010	3
American Association of Poison Control Centers	4	Cancer News on the Net	2	Childhood Lead Poisoning Prevention Program	2
Hazardous Chemicals	4	Children's Environmental Health Network (CEHN)	2	Endocrine Disrupting Chemicals	2
ToxFAQs	2	MEDLINEplus	2	EMF-Link	1
Association of Occupational and Environmental Clinics	2	MedicineNet	2	Air Pollution and Respiratory Health	1
Quackwatch	2	K-12 Environmental Health Science Education	1	Alternative Medicine Homepage	1
National Institute of Environmental Health Sciences	2	Asthma & Allergy Resources	1	Arsenic (USEPA site)	1
Asthma Research at NIEHS	1	Consumer Health Information (NIH)	1	Asthma Research at NIEHS	1
Endocrine Disruptors Research Initiative	1	EMF-Link	1	Carolina Health and Environment Community Center	1
Drinking Water and Health	1	Allergy Prevention	1	Children's Environmental Health Network (CEHN)	1
Consumer Health Information (NIH)	1	Healthy People 2010	1	Clinics by state	1
Clinics by state	1	WellnessWeb	1	Agency for Toxic Substances and Disease Registry	1
Cancer Causes and Prevention	1	National Report on Human Exposure to Environmental Chemicals	1	Consumer Health Information (NIH)	1
Asthma & Allergy Resources	1	National Toxicology Program Chemical Health & Safety Data	1	ToxFAQs	1
Agency for Toxic Substances and Disease Registry	1	Teaching Aids	1	Endocrine Disruptors Research Initiative	1

Frequently Asked Questions

Librarians prepare FAQ pages to guide patrons toward the answers of regularly-posed questions. However, it is difficult to gauge whether people actually use FAQ pages. The web statistics indicate that the FAQ section of the library website is an active part of the user's experience. It is particularly informative to note that the general public is using the FAQ page to learn about the library's visitor policy. This page was created to provide potential visitors with complete, easy-to-access instructions. Refer to Table 26.

Table 26: Requests for "FAQs" Pages by NIEHS Staff (excluding Library Staff) and the General Public, Jan. – Mar. 2002

NIEHS Staff (excluding Library Staff)		General Public	
File	**Requests**	**File**	**Requests**
/faqs/faq.htm	211	/faqs/faq.htm	176
/faqs/answers.htm	123	/faqs/answers.htm	98
/faqs/wirelesslan.htm	24	/faqs/visitors.htm	74
/foundation/template.htm	11	/faqs/wirelesslan.htm	17

New Books and Other News

Each month, the library posts recently-acquired books on its website. It also posts new publications by NIEHS scientists (both articles and manuscripts). The "New Books and Other News" page is an index page organized by month, with links to separate pages that list the aforementioned publications. An Analog report generated the data in Table 27. The table includes requests for the index page as well as for new books and articles for January – March.

Table 27: Requests for "New Index," "New Books," and "New Articles" Pages, Excluding Library Staff, Jan. - Mar. 2002

Page	Requests
New Index Page (/libserv/new.htm)	979
January New Books (/newsltr/2002/nbks0102.htm)	108
January New Articles (/newsltr/2002/bibjan02.htm)	108
February New Books (/newsltr/2002/nbks0202.htm)	92
February New Articles (/newsltr/2002/bibfeb02.htm)	108
March New Books (/newsltr/2002/nbks0302.htm)	91
March New Articles (/newsltr/2002/bibmar02.htm)	78

Toward the beginning of each month, the library's Director sends an email to the NIEHS community to announce that the previous month's acquisitions and NIEHS-authored publications have been added to the library's website. Without web statistics, it would be difficult to judge whether such emails are effective marketing techniques. However, it is clear from the web logs that the strategy is effective. The email announcing January's new books was sent on February 13th; the email announcing February's acquisitions was sent on March 14th, and the email announcing March's acquisitions was sent on April 10th. The daily breakdowns in Tables 28, 29, and 30

clearly show a spike of requests on the days that emails were sent (see the bolded text). Even though the new books were posted a couple of days before the email notice, very few people were aware of the new acquisitions before the email announcements. After the spike of requests, however, the number of requests quickly drops off. This helps provide a guideline for how long items are still considered "new."

Table 28: Requests for "January New Books" and "January New Bibliography" Pages by Day, Excluding Library Staff, February 11 – March 18, 2002

February		March	
Day	**Requests**	**Day**	**Requests**
11/Feb/02:	2	1/Mar/02:	7
12/Feb/02:	4	2/Mar/02:	1
13/Feb/02:	**60**	3/Mar/02:	2
14/Feb/02:	22	4/Mar/02:	3
15/Feb/02:	6	5/Mar/02:	8
16/Feb/02:	0	6/Mar/02:	4
17/Feb/02:	1	7/Mar/02:	6
18/Feb/02:	2	8/Mar/02:	1
19/Feb/02:	4	9/Mar/02:	1
20/Feb/02:	4	10/Mar/02:	2
21/Feb/02:	1	11/Mar/02:	1
22/Feb/02:	4	12/Mar/02:	1
23/Feb/02:	4	13/Mar/02:	0
24/Feb/02:	1	14/Mar/02:	8
25/Feb/02:	3	15/Mar/02:	0
26/Feb/02:	4	16/Mar/02:	0
27/Feb/02:	9	17/Mar/02:	1
28/Feb/02:	4	18/Mar/02:	0

Table 29: Requests for "February New Books" and "February New Bibliography" Pages by Day, Excluding Library Staff, March 7 – April 25, 2002

March		April	
Day	**Requests**	**Day**	**Requests**
7/Mar/02:	2	1/Apr/02:	6
8/Mar/02:	5	2/Apr/02:	2
9/Mar/02:	2	3/Apr/02:	1
10/Mar/02:	2	4/Apr/02:	2
11/Mar/02:	2	5/Apr/02:	1
12/Mar/02:	2	6/Apr/02:	2
13/Mar/02:	1	7/Apr/02:	0
14/Mar/02:	**55**	8/Apr/02:	2
15/Mar/02:	3	9/Apr/02:	1
16/Mar/02:	1	10/Apr/02:	6
17/Mar/02:	2	11/Apr/02:	3
18/Mar/02:	3	12/Apr/02:	1
19/Mar/02:	4	13/Apr/02:	0
20/Mar/02:	8	14/Apr/02:	0
21/Mar/02:	3	15/Apr/02:	0
22/Mar/02:	5	16/Apr/02:	1
23/Mar/02:	0	17/Apr/02:	0
24/Mar/02:	2	18/Apr/02:	2
25/Mar/02:	5	19/Apr/02:	0
26/Mar/02:	3	20/Apr/02:	2
27/Mar/02:	3	21/Apr/02:	1
28/Mar/02:	6	22/Apr/02:	0
29/Mar/02:	3	23/Apr/02:	1
30/Mar/02:	1	24/Apr/02:	2
31/Mar/02:	2	25/Apr/02:	2

Table 30: Total Requests for "March New Books" and "March New Bibliography" Pages by Day, Excluding Library Staff, April 4 – May 9, 2002

April		May	
Day	**Requests**	**Day**	**Requests**
4/Apr/02:	5	1/May/02:	4
5/Apr/02:	4	2/May/02:	6
6/Apr/02:	2	3/May/02:	6
7/Apr/02:	1	4/May/02:	1
8/Apr/02:	6	5/May/02:	1
9/Apr/02:	5	6/May/02:	9
10/Apr/02:	**42**	7/May/02:	4
11/Apr/02:	12	8/May/02:	8
12/Apr/02:	4	9/May/02:	2
13/Apr/02:	0		
14/Apr/02:	1		
15/Apr/02:	4		
16/Apr/02:	2		
17/Apr/02:	2		
18/Apr/02:	2		
19/Apr/02:	2		
20/Apr/02:	3		
21/Apr/02:	0		
22/Apr/02:	3		
23/Apr/02:	2		
24/Apr/02:	5		
25/Apr/02:	6		
26/Apr/02:	1		
27/Apr/02:	1		
28/Apr/02:	2		
29/Apr/02:	8		
30/Apr/02:	3		

Beginning with January's New Articles, the User Services Librarian began linking article citations to corresponding abstracts in the Web of Science (WOS) database. This value-added feature was announced in each monthly email. In order to see if this new service was well-received, the ClickCount script was applied to the WOS links. In proportion to the number of articles that are posted each month, it does appear that patrons were clicking on the WOS abstracts. See Table 31. The numbers for April and May do not reflect the actual figures because the script was not applied to those pages until early June. The query to extract this data was performed shortly thereafter.

Table 31: Clicks on Web of Science Abstracts from "New Articles" Pages, Excluding Library Staff, Jan. – May 2002

Page	Clicks on WOS
bib2002	71
bibjan02	29
bibfeb02	33
bibmar02	41
bibapr02	2
bibmay02	4
unknown	13

All publications by NIEHS authors that appear in the monthly listings are also compiled into an annual bibliography. There are annual bibliographies from 1990 – present. It is hard to estimate how long these bibliographies continue to be viewed without the help of web logs. From the Analog statistics in Table 32, it is evident that patrons continue to use the bibliographies, even those that are older.

Table 32: Requests for "Bibliography" Pages by NIEHS Staff (excluding Library Staff) and the General Public, Jan. – Mar. 2002

NIEHS Staff (excluding Library Staff)		General Public	
File	**Requests**	**File**	**Requests**
/bibliography/1990.htm	486	/bibliography/1990.htm	482
/bibliography/bib-2001.htm	483	/bibliography/bib-2001.htm	430
/bibliography/bib-1999.htm	363	/bibliography/bib-1999.htm	354
/bibliography/bib-2000.htm	328	/bibliography/bib-1998.htm	318
/bibliography/bib-1998.htm	327	/bibliography/bib-2000.htm	311
/bibliography/1992.htm	298	/bibliography/1992.htm	294
/bibliography/1993.htm	292	/bibliography/1993.htm	287
/bibliography/1994.htm	284	/bibliography/1994.htm	277
/bibliography/1991.htm	276	/bibliography/1991.htm	271
/bibliography/bib-1997.htm	275	/bibliography/bib-1997.htm	269
/bibliography/1995.htm	246	/bibliography/1995.htm	240
/bibliography/1996.htm	231	/bibliography/1996.htm	226
/bibliography/bib2002.htm	37	/bibliography/bib2002.htm	21
/bibliography/1997.htm	2	/bibliography/1997.htm	1

DISCUSSION

This study gives focus to the large amount of data generated by the NIEHS Library web logs and the ClickCount database. It shows that web statistics can be customized to better capture usage patterns for different groups. It also shows that other data-gathering methods, such as the ClickCount script, can be developed to complement data from web logs. Although the results of this study may be difficult to generalize to other types of libraries, the methodology of this project has characteristics that should be useful to a wide range of information professionals.

This paper's significance is two-fold. First, it seeks to fill a gap in the literature by providing concrete examples of how website statistics can be utilized to address management, marketing, and collection development issues in libraries. There needs to be more information available about how to interpret logs for decision-making, not just how to analyze logs with software.

Second, this paper's results have practical implications for decision-making at NIEHS Library. The library is considering a redesign project for its website sometime in the future, so the input from this paper will be valuable in such efforts. If the library completes a redesign project, it will need to have statistics about the "old" website to serve as a point of comparison. This paper will serve not only as a point of reference, but also as a guide for analyzing web statistics collected in the future.

General Usage Patterns

Web logs provide much of the nuts-and-bolts data that is necessary to understand a user population. For example, NIEHS Library can look at the total number of successful requests for web pages for January through March (121,050) and decide if the number is on target. Information on peak usage times (the afternoon) can help the library anticipate questions from patrons. Knowledge about users' browsers and operating systems will help library staff maintain a website that provides the most functionality to the greatest number of patrons. Such insight is especially important in the context of the library's possible website redesign. The status code information shows that the library does a good job keeping its site free of broken links, but also allows librarians to decide whether Linkbot reports should be run more frequently to identify problems sooner.

A domain report provides a snapshot of a website's user populations, including a surprising amount of .com and .edu users in addition to government employees. Isolating certain IP ranges within NIEHS produces a more accurate understanding of usage, although this technique could be refined in the future to understand departmental usage within the Institute. Knowing more about departmental usage would help the library better anticipate service and product needs in the future.

Specific Usage Patterns

What are the most requested pages on the library's website? Which web pages refer patrons to heavily-used resources? These questions can be addressed to some extent with web logs and ClickCount data. The electronic journals and database pages are the most requested on the website. This comes as no surprise, but having numeric data to

confirm hunches in valuable. It helps justify the financial expense that these products create. Further, knowing the specific titles of heavily-used electronic resources allows librarians to make smart decisions regarding future collection development. For products that have different interfaces, such as Medline, the statistics show that placement on the site may impact usage. It is probable that PubMed receives a high level of usage because it appears as a Quick Link on the Database page. It would be intriguing to test this theory by placing another version of Medline in Quick Links, such as Ovid, to see if usage increases.

Referrer URLs can provide a sense of how users navigate the library's website. Although a user session *cannot* be recreated through referrer links, referrers can be a valuable tool for analyzing product placement. As previously discussed, Analog reports helped determine that the Quick Links are a prime spot to place databases. The ClickCount script helped determine that the library's homepage is the best position to place new products. By diligently applying such techniques to new resources, or by modifying current product placement, web data provides a way to test navigational structure.

The ability to track daily requests for specific types of web pages, those related to "New Books and Other News," allowed the library to test whether email is an effective marketing tool. Today's organizations are sometimes inundated with email, so it is challenging to know whether mass emails are well-received. When used with some reserve, as the library has done, email carries an impact that will produce a result.

Finally, web data has shown that the human capital invested in the library's website is beneficial. For example, the Consumer section of the website started as a trial

service, but is now a staple according to the number of requests it receives. The effort of creating links to WOS abstracts from the monthly bibliographies is clearly valuable. The library's vigilance in maintaining a strong selection of electronic journals and databases is rewarded with consistent use for many titles. The librarians' initiative to maintain its FAQ section does pay off because patrons actually consult it. Measuring the value of human effort can be difficult, but the Analog and ClickCount data provide a context for such measurement.

Future Directions

Libraries cannot be alone in the quest to utilize web log data with consistency. Vendors of electronic products must also cooperate with libraries to provide the fullest picture of usage. For example, if the ClickCount script tracks all of the clicks on a certain e-journal, how can librarians know what volume/issue the patron retrieves? How can the librarians understand patterns in regard to subject matter or date coverage? As Keiser (2002) asserts, "Usage data is a tool vendors have on-hand, but share with their subscribers only when it serves their own needs – often when negotiations for license renewals are not going well" (p. 43).

If vendors do not share usage data for their products, they may not have much incentive to improve a clunky interface or clarify vague error messages. However, it makes sense for vendors to provide user-friendly products so that patrons will find them essential (Keiser, 2002). Further, if a library is paying for a certain service with its budget, it makes sense for librarians to know how that resource is being used. Keiser points to OneSource, a business database, as an example of a vendor that voluntarily

supplies usage data to clients on a monthly basis. OneSource provides the following information: Reports Generated by Module, Usage by Report Category, Usage Valuation, Usage by Product, Monthly Usage by Product, Seat Utilization, Report Usage Intensity, Average Days Used per Month, Usage by Country, Active User Report, Inactive User Report, and User Details (p. 47, 49). The fact that OneSource informs its clients with so much data shows that it has confidence in its product. If vendors and libraries can work together to collect and share usage data, then products can be improved and customized in a way that will provide better service to the library patron. These types of partnerships must develop for usage data to deliver the most comprehensive perspective.

CONCLUSION

Libraries are discovering that web logs provide vast amounts of information about the use of their websites. Web logs can provide information about which user groups access the website, which resources are viewed the most, and the links users follow to arrive at the site. In order to process the large amounts of data generated by most websites, log analysis software must be utilized. Such software produces reports with summary statistics about website use.

In addition to the benefits of log analysis, there are limitations. Caching and dynamic IP addressing are two phenomena that could cause web statistics to be less valid measures of website use. For these reasons and others, web log analysis is not a substitute for measurement techniques such as usability studies, questionnaires, and interviews.

NIEHS Library is incorporating web log analysis into higher-level decision-making processes. In order to accomplish this, customized reports were created by the Analog software to analyze "internal" URLs on the library's website. A "ClickCount" database was designed to count clicks on "external" links to resources such as electronic journal titles. Both the Analog custom reports and ClickCount reports can help the library target management, marketing, and collection development issues.

Finally, the NIEHS Library needs a methodology for how to explicate web log data that it can use on a continual basis. Since log reports require interpretation, there should be a formula for what data to capture and how to organize it. This paper provides

a template so that web log statistics will be a valuable asset to the library's future planning.

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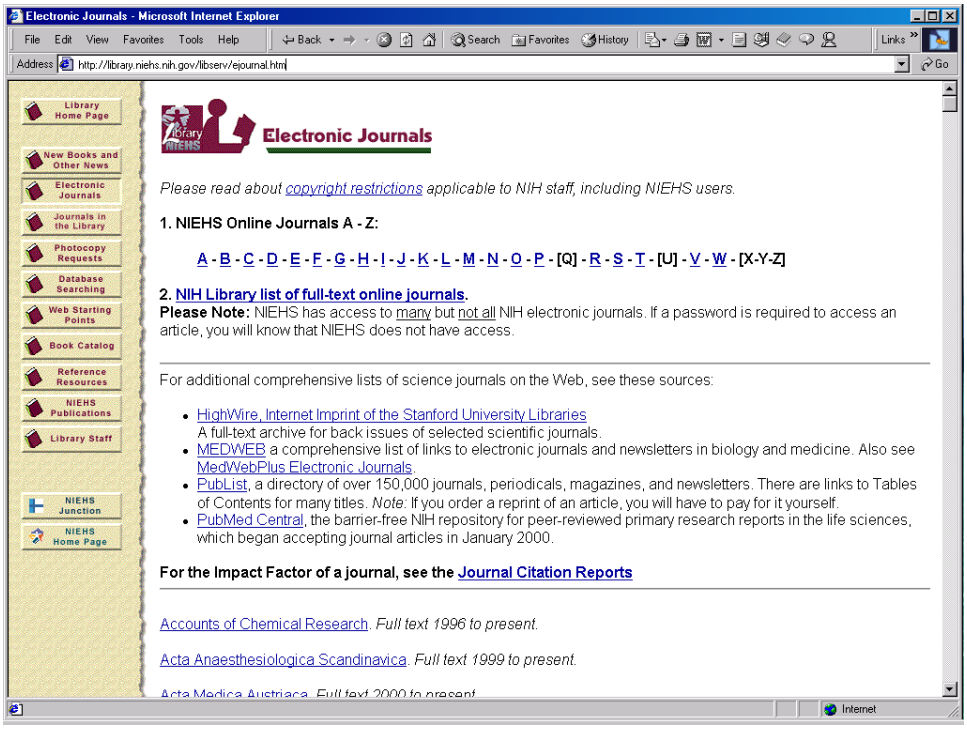
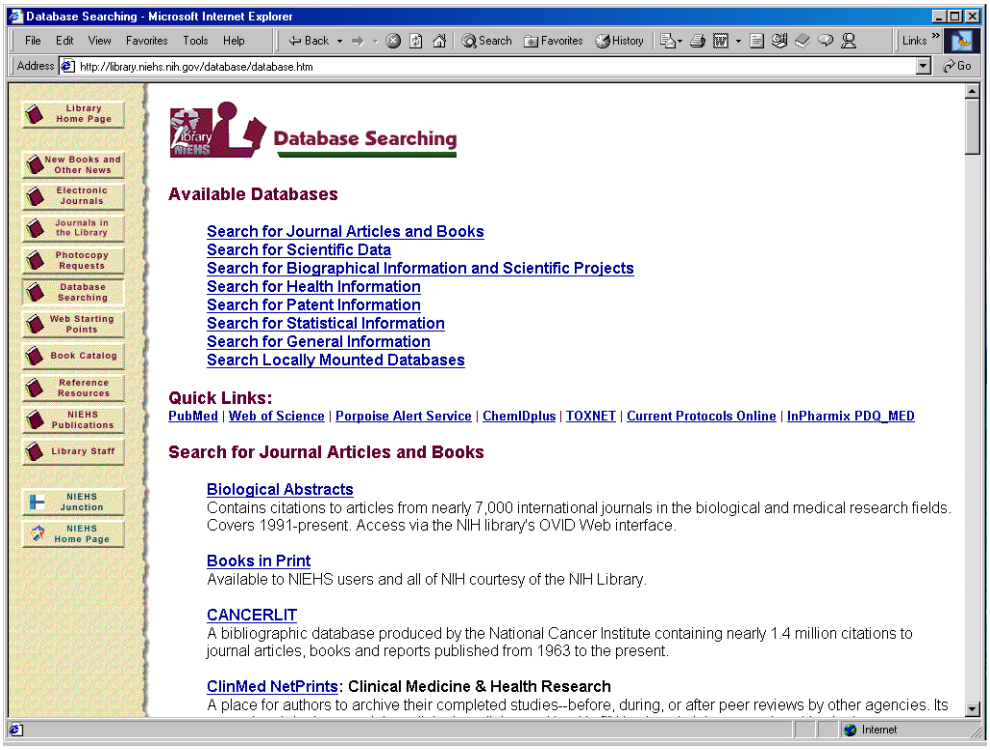
APPENDIX A: Screen Shots of Selected NIEHS Library Web Pages

Library Homepage, http://library.niehs.nih.gov/home.htm

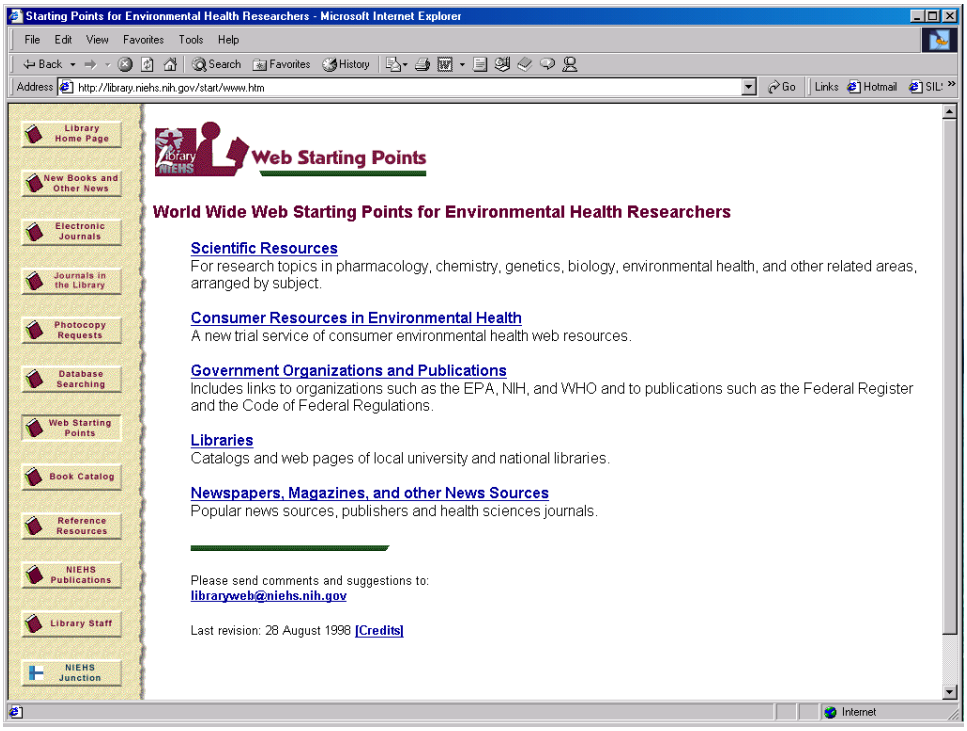
Electronic Journals, http://library.niehs.nih.gov/libserv/ejournal.htm



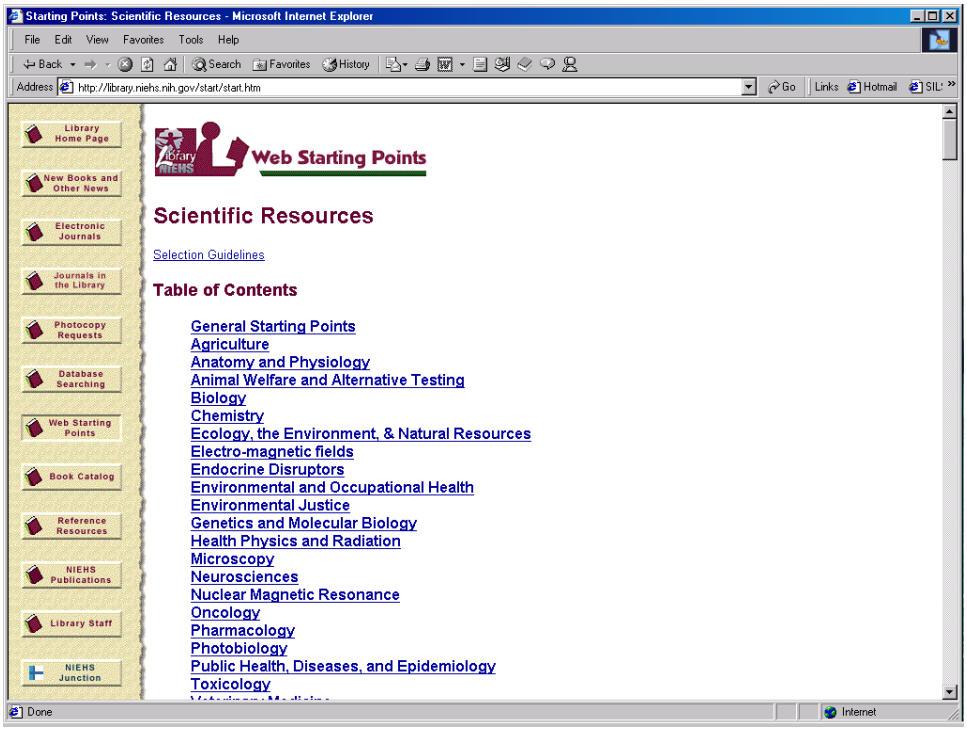
Database Searching, http://library.niehs.nih.gov/database/database.htm



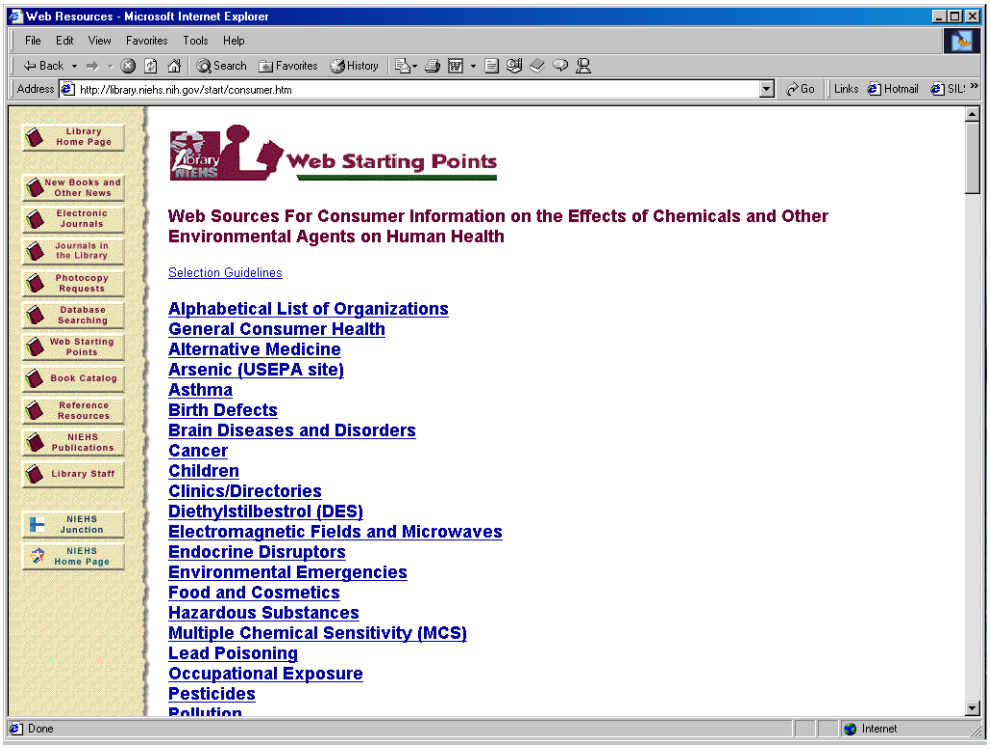
Web Starting Points, http://library.niehs.nih.gov/start/www.htm



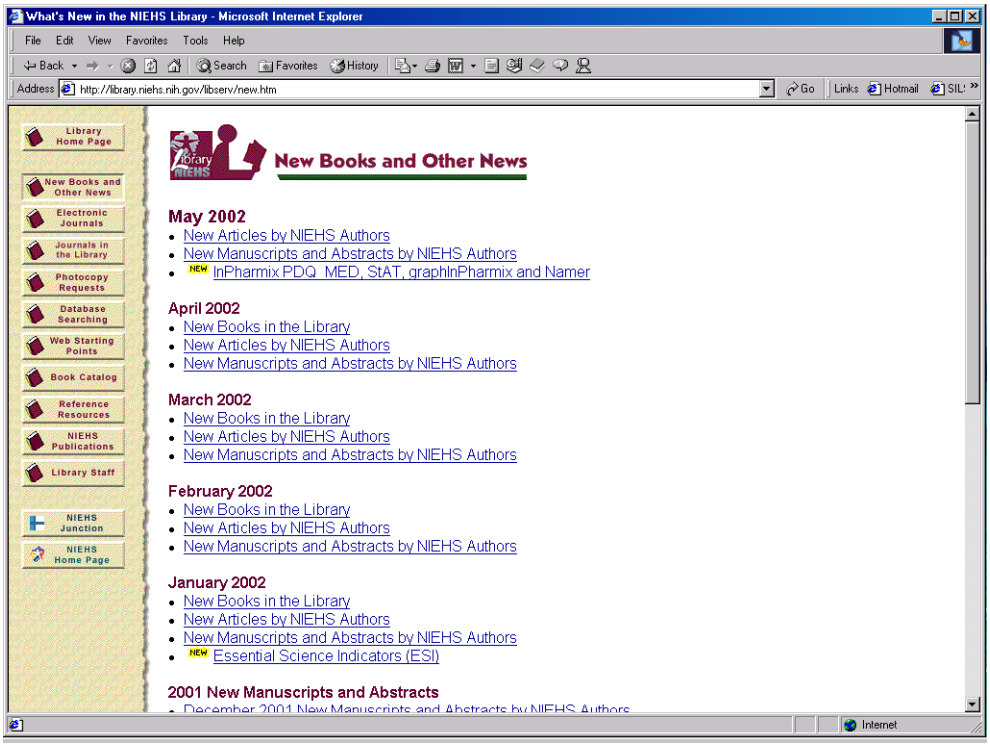
Scientific Resources, http://library.niehs.nih.gov/start/start.htm



Consumer Resources, http://library.niehs.nih.gov/start/consumer.htm



New Books and Other News, http://library.niehs.nih.gov/libserv/new.htm



APPENDIX B: Sample Entries from NIEHS Library's Raw Logs

Host - - [Date/time of transaction] "HTTP Request for File" Status Code Size of File "Referrer" "Browser (Operating System)"

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xxxx.xxx.xxx.xx - - [01/Feb/2002:02:05:49 -0500] "GET /bibliography/bib-2000.htm HTTP/1.0" 200 133587
"http://www.google.com/search?q=instability+of++%22au+rich+elements%22+&hl=en&start=40&sa=N" "Mozilla/4.0 (compatible; MSIE 5.5; Windows 98)"

xxxxxxxx.xxxxx.xxx.xxx - - [01/Feb/2002:01:35:56 -0500] "GET /images/libback1.gif HTTP/1.0" 200 20229 "http://library.niehs.nih.gov/" "Mozilla/4.0 (compatible; MSIE 5.5; Windows NT 4.0)"

xxxxxxxxxx.xxxxx.xxx.xxx - - [01/Feb/2002:07:44:15 -0500] "GET /database/database.htm HTTP/1.0" 200 29168 "http://www.niehs.nih.gov/junction/" "Mozilla/4.77 (Macintosh; U; PPC)"

xxxxxxxxxx.xxxxx.xxx.xxx - - [01/Feb/2002:07:44:15 -0500] "GET /images/border2.gif HTTP/1.0" 200 4902 "http://library.niehs.nih.gov/database/database.htm" "Mozilla/4.77 (Macintosh; U; PPC)"

xxxx.xxxxx.xx.xx - - [01/Feb/2002:05:44:19 -0500] "GET /bibliography/1990.htm HTTP/1.0" 200 66852
"http://google.yahoo.com/bin/query?p=AH+64+suppressor+infrared&b=21&hc=0&hs=0&xargs=" "Mozilla/4.0 (compatible; MSIE 5.5; Windows 98)"

xxxxxx.xxxxxxxxxx.xx - - [01/Feb/2002:07:25:57 -0500] "GET /images/border2.gif HTTP/1.0" 200 4902
"http://translate.google.com/translate_c?hl=de&sl=en&u=http://library.niehs.nih.gov/start/registry.htm&prev=/search%3Fq%3DChemical%2BAbstracts%2BSystem%26hl%3Dde%26sa%3DG" "Mozilla/4.0 (compatible; MSIE 5.0; Windows 95)"

xxxxxxxxxx.xxxxx.xxx.xxx - - [01/Feb/2002:08:03:13 -0500] "GET /libserv/ejournal.htm HTTP/1.0" 200 91632 "http://www.niehs.nih.gov/junction/" "Mozilla/4.75 (Macintosh; U; PPC)"

xxxxxxxxxx.xxxxx.xxx.xxx - - [01/Feb/2002:08:03:13 -0500] "GET /images/border2.gif HTTP/1.0" 304 - "http://library.niehs.nih.gov/libserv/ejournal.htm" "Mozilla/4.75 (Macintosh; U; PPC)"

APPENDIX C: Timetable for ClickCount Project

All links on the following pages are being tracked:

Beginning 3/1/02:
start/consumer.htm
libserv/ejournal.htm
libserv/ejournalm-z.htm
newsltr/2002/bibjan02.htm
restrict/nejm.htm
restrict/jrnlpediatrics.htm
restrict/jrnlallergyclinicalimm.htm
restrict/jnlamacaddermatology.htm
restrict/amjrnlobsgyn.htm
restrict/clinpharmtherapeutics.htm
restrict/tomes.htm
restrict/firstsearch.htm

Beginning 3/7/02:
newsltr/2002/bibfeb02.htm
bibliography/bib2002.htm

Beginning 4/4/02:
newsltr/2002/bibmar02.htm
restrict/medline.htm

Beginning 5/28/02:
start/start.htm
database/database.htm

Beginning 6/4/02:
newsltr/2002/bibapr02.htm
newsltr/2002/bibmay02.htm

One link tracked on home.htm:
Essential Science Indicators *(3/18/02 - 5/8/02)*

One link tracked on libserv/new.htm:
Essential Science Indicators *(beginning 3/19/02)*

Resources tracked on database/database.htm:

Beginning 3/19/02:
Essential Science Indicators

Beginning 4/4/02:
PubMed
Web of Science
Porpoise
Current Protocols Online
Biological Abstracts

Beginning 5/28/02:
All resources tracked

Resources tracked on referenc/resource.htm *(beginning 5/28/02)*:
Kirk-Othmer Online
Patty's Toxicology
Current Protocols Online