Colorado Front Range Parks Location Mapping Website

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Abstract

With current technology, using location based services has become easier than ever. There are services that can help a person find a home, save money, or even find a bathroom. In Colorado, parks are managed by the park and recreation department of a city, town, county, or by a district. Depending on the city, information on the parks that they service comes in different formats and information varies. Some department have online maps others have a map in a portable document format, and some offer no mapping but, a list of parks. Finding a park with consistent data formats and information can be difficult. Having the information in one place and using a location based service that allows a user to filter through parks by inputting their location and/or amenities could help with finding a park.

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Acronyms

ADA   Americans with Disabilities Act

API   Application Programming Interface

CDC   Center for Disease Control and Prevention

FTP   File Transfer Protocol

GIS   Geographic Information Science or Systems

I-25   Interstate 25

LBS   Location Based Services

NRPA   National Recreation and Park Association

PDF   Portable Document Format

PRORAGIS   Parks & Recreation Operating Ratio & Geographic

                   Information System

TPL   Trust for Public Land

W3C   World Wide Web Consortium

Overview

Ranked the 13th city out of 40 by ParkScore; Denver, CO parks have a

lot to offer. According to ParkScore, the oldest park in Denver is Mestizo

Curtis Park established in 1881 and the largest and most visited park is City

Park at 314 acres (ParkScore, 2013). The surrounding cities around Denver

also have a lot to offer below are a couple of examples:

- Northglenn Sensory Park built in 2003 is located in E.B. Raines Park in Northglenn, CO. It was designed by Design Concepts Community and Landscape Architects. The park offers different levels of equipment for different level of skills and abilities. The park is 100% accessible, which surpasses the minimal American Disability Act (ADA) requirement for parks of 50%. (Design Concepts, 2013)

- Belleview Park in Englewood, CO in addition to the typical playground and sports fields during the summer offers a children's farm, train rides and an outdoor family aquatic center.

Colorado has many other types of park in addition to the city parks

such as national and state parks. Finding a national or state park is relatively

easy process. These parks are easy to find on the internet and can be easily

found at National Park Service website for national parks and Colorado Parks

and Wildlife website for Colorado state parks. As for the community and

neighborhood parks, finding a park can be a challenge since parks are

managed by the city or town they are located in or by a district. Another

challenge is there is no standardization on what and how the information is

displayed. Information can range from paragraphs descriptions with pictures

to just the park names and locations. The way the information is displayed

can vary from each park having a web page, parks listed on one page or displayed on an interactive map. Mapping varies as well depending on the city or district. The mapping ranges from no maps offered to interactive mapping or a map on a portable document format (PDF). Since there are many ways that parks are displayed a central website that could locate parks based on a location and/or certain amenities would help with the lengthy process of finding a park.

Goals, Benefits, Audience

The goal of this project is to create a website where park information is integrated into one location and the data is displayed on a map. The user could filter park information using a general or specific location, park name, or by amenities.

The benefits of creating a website that uses location based service is to find parks based on a location and/or amenities, to help with navigating through the many parks sites, and to start a data collection of park information in a one location since the information currently scattered among different cities websites.

The audience for the site is for the public since activities listed range from hiking, playgrounds, dog parks, and sports fields.

Preliminary Literature Review

Park and Recreation

Park and Recreation services have a major impact on their communities and the location they reside in. Studies have shown that parks can influence and have a positive benefit in health, society, the economy, and the environment. It has only been recently that the field is taking advantage of the use of Geographic Information Science (GIS) to help plan and manage current parks. With the advancement of technology, portable devices, connected services, and features that are based on location have become prevalent.

Social

Socially parks can help lower crime rates and help create sense of community. This is usually done through activities sponsored by the city park and recreation department or an outside organization. Some examples are after school and summer camp activities, concerts, and events. According to The Benefits of Parks: Why America Needs More City Parks and Open Space by Paul Sherer states that "[a]ccess to public parks and recreational facilities has been strongly linked to reductions in crime and in particular to reduced juvenile delinquency." (Sherer 2006, 21). Parks can create a sense of community. The Trust for Public Land (TPL) report called The Economic Benefits of Denver's Park and Recreation System on the benefits of Denver's Park and Recreation states "[a]long with schools,

churches and other social gathering places, parks are key sources of community" and "the institutions that make up web of human relationships can make a neighborhood stronger, safer and more successful" (Trust for Public Land 2010, 10). Creating a sense of community and lowering crime rate is one of the many benefits of having access to parks and recreation.

Health

Parks can influence someone's health and can help aid in the development in children. Center for Disease Control and Prevention (CDC) website explains that "[m]ore than one-third of U.S. adults (35.7%) are obese" (Center for Disease Control and Prevention) and in Colorado obesity rates in 2011 was 20.7% which is slightly lower than the previous year (Center for Disease Control and Prevention). Obesity can lead to other health issues and can raise an individual's medical cost. TPL stated a study done by the CDC that found "that nearby parks, accessible and safe bike trails, and programming at playground can help people increase their level of physical activity and reduce their medical expenses." (Trust for Public Land 2010, 8). Some parks offer trails for running, walking, cycling, or have exercise stations throughout the park, or have fitness classes such as boot camps or yoga. Playing is very important for a child's development. Sherer discuss this topic and states the following

"For small children, playing is learning. Play has proved to be a critical element in a child's future success. Play helps kids develop muscle strength

and coordination, language, cognitive thinking, and reasoning abilities." (Sherer 2006, 21).

Examples of how skills are obtained from physical play are playing peek-a-boo to learn about object permanence, building core muscles by using swings, or learning coordination though swimming. With the benefits of health and development in children, parks can help with obtaining an active and healthy lifestyle.

Economy and Environment

Parks can increase property values and help bring in revenue for a city. Parks can bring in tourists which can increase revenue for a city. The TPL report for Denver's Park and Recreation states that "[t]he parks of Denver attract two kinds of users –residents and out-of-towners" (Trust for Public Land 2010, 4). In 2008, the total number of visitors who came to Denver for the parks were 711,396 and 117,250 of them are those who are day visitors and the city made a profit of $18,027,542 (The Public Land 2010, 6). The profit consists of food, lodging, and money spent on events held throughout the year at Denver parks. Parks can have an effect on property values. Paul Sherer mentions that "to protect that positive economic impact of parks, the parks must be well maintained and secure. A park that is dangerous and ill kept is likely to hurt the value of nearby homes" (Sherer 2006, 21) and that in purchasing a home there have been "repeated studies over the years have confirmed that people prefer to buy homes close to parks, open space, and greenery." (Sherer 2006, 21). One study that is mentioned is a study on

greenbelts and properties in Boulder, Colorado. The study found that "there was a $4.20 decrease in the price of residential property for every one foot moved away from the greenbelt, and that the average value of homes next to the greenbelt was 32 percent higher than those 3,200 feet away" (Sherer 2006, 21).

Parks also helps with the environment by helping with stormwater runoff, air pollution, and soil erosion control. The "U.S. Forest Service calculated that over a 50-year lifetime one tree generates $31,250 worth of oxygen, provides $62,000 worth of air pollution control, recycles $37,500 worth of water, and controls $31,250 worth of soil erosion.[72]" (Sherer 2006, 19). In Denver "the trees and vegetation of City Park to the filtering and buffer effect of Commons Park's lawns, reduce stormwater management costs by capturing precipitation and/or slowing its runoff". The vegetation "function[s] like mini storage reservoirs and are the original form of green infrastructure." (The Public Land 2010, 11). Parks not only help with the city economy and property values but, it can also have an effect on the surrounding environment.

GIS and Parks and Recreation

The use of GIS in the field of parks and recreation seem to be in the early stages. An article from 2004 GIS: A tool to Locate New Park and Recreation Services by Bob Lee and Alan Graefe states that the "adoption of GIS technologies in park and recreation services slowly emerged into two

channels: outdoor recreation management and urban park and recreation administration" (Lee and Graefe 2004, 36). In the urban park and recreation field applications is "still in their infancy" stage and that "GIS technology adoption have remained relatively low" (Lee and Graefe 2004, 38). In 2008, the National Recreation and Park Association (NRPA) started a Park GIS Data project. The project "is developing a GIS data model for parks, trails and recreation facilities in an effort to standardize these types of GIS data. The purpose of this project is to have local governments collect consistent information in their GIS systems allowing for better local, regional and statewide management and planning of park and recreation resources." (National Recreation and Park Association). Then in 2011 NRPA launched Parks & Recreation Operating Ratio & Geographic Information System (PRORAGIS) it "is a searchable, online database whereby the user (public park and recreation department) fills in valuable information on their profile and controls that data. The data can then be used to generate a variety of reports and users have access to GIS mapping tools." (National Recreation and Park Association). In the area of park and recreation, the adaptation of GIS seems to be a slow process hopefully with the launch of the PRORAGIS manager and those in the park and recreation field can see the benefits and help with making GIS and the data more prevalent in the field.

Location-based services

Matthew Wilson in Location-based services, conspicuous mobility, and the location aware future explains how a location and web service together changes everything.

"Simply put, location changes everything. This one input – our coordinates - has the potential to change all the outputs. Where we shop, who we talk to, what we read, what we search for, where we go - they all change once we merge location and the Web. (Honon, 2009)" (Wilson 2012, 1272).

Location-based services (LBS) brings location and the Web together though websites and/or applications. Wilson defines LBS as a subset of web services meant to provide functions that are location-aware, where the use of such services is predicated on knowledge of where the services engaged" (Wilson 2012, 1267). There are also some criteria that define what a LBS is. Bin Jiang and Xiaobai Yao explains those factors in Location-based Services and GIS in Perspective that "[l]ocation and context are the key players in LBS which are thereby often called location-ware computing or context-aware services" (Jiang and Yao 2006, 713). LBS can perform a pull or push service which K. Noipithuk, C. Kitkobchai and C. Chantrapornchai describes in Location-based Application based on Prefetching on Mobile Application: Case Study of Finding Interesting Restaurants as "[i]n the push service the information is pushed to the device irregardless of requesting it or not. In the pull service the information request must be sent from the client side explicitly" (Noipithuk, Kitkobchai, Chantrapornchai 2012, 23). With this service, also come privacy concerns. The majority of applications will ask for

permission by using a prompt or notification that the website or application is using their location. The article Location, Location, Location by Jeff Wisniewski states that LBS services can fall into three areas which are the following:

> "Requests for things or information relevant to your current location-this could be a nearby ATM or closest public library. Receiving alerts, such as a notice of a sale on electronics in a store you just passed or a text message reminder when you enter the library that your books are due back in 2 days Tracking individuals or groups of individuals-this could be following a friend or your kids or keeping track of where your conference buddies are." (Wisnieweki 2009, 55)

LBS can be found areas such as gaming, saving money, locating the features such as restrooms, and tracking packages and people. Some examples of location aware applications or websites are Foursquare, Groupon, Facebook, SCVNGR, SitorSquat: Bathroom Finder by Charmin, and Family Finder. Surprisingly there has been little done in the area of parks and recreation in regard to location based services either through an application or website. With the advancement of devices such as IPad, Kindle, and smartphones taking advantage and making wireless and GPS a standard feature, these types of location-based services are becoming more common.

Data

1,251 parks along the Front Range that were managed by municipality or a district were collected. The parks that were omitted from the data were schools, golf courses, cemeteries, and open space. The data

collected was based on what was available on municipal and regional Park and Recreation websites. Below is a map of the general area (IMAGE 1), data table (TABLE 1), and list of cities and towns (TABLE 2).

IMAGE 1. MAP SHOWING GENERAL AREA
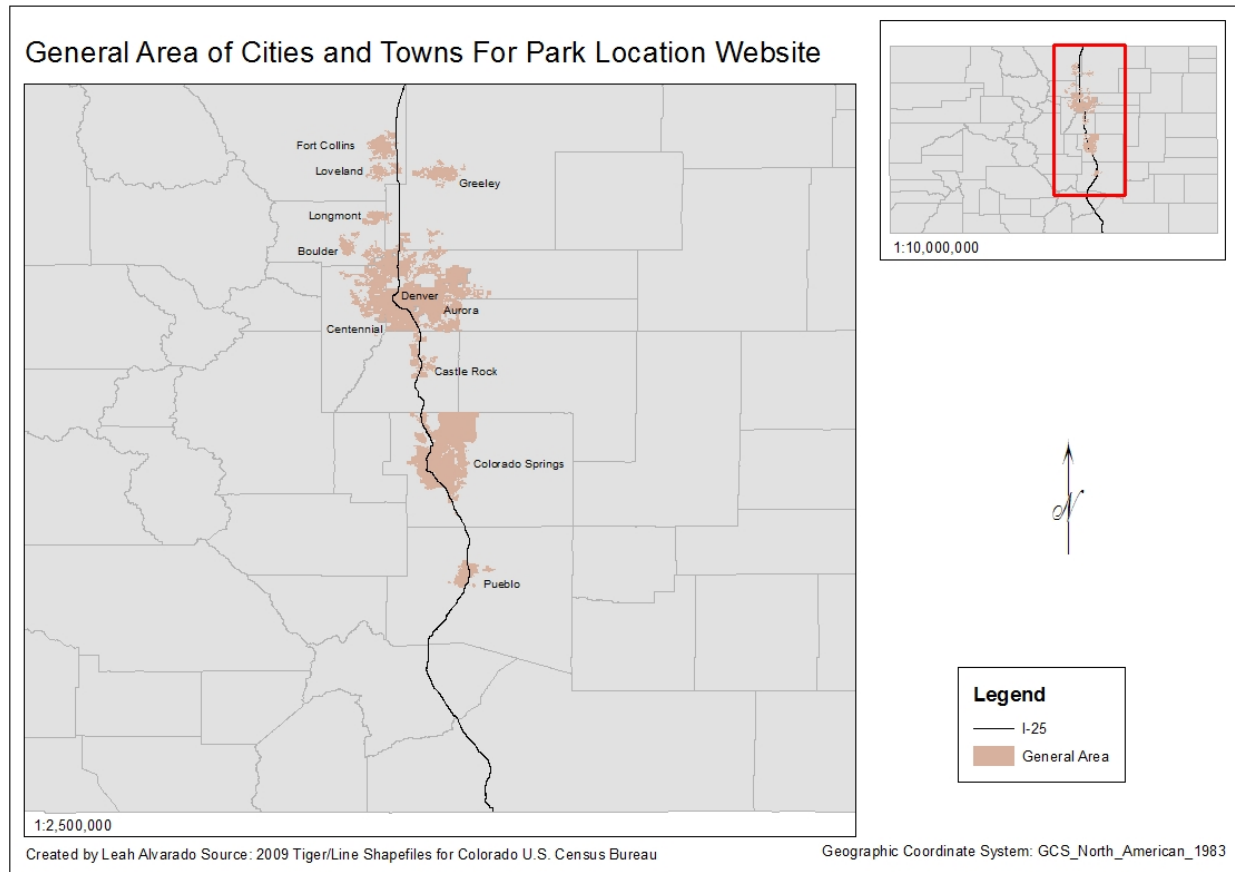
TABLE 1. DATA TABLE

Field Name	Type	Field Text	Description
KeyID	Number	1, 2, 3, 4, 5…	Park ID
Park Name	Text		Name of Park
Address Location	Text	Address, City, State, Zip	Address Location
Address	Text		Address of Park
City	Text		City
State	Text	CO	State
Zip	Text		Zip
County	Text		County
Park Type	Text	community, district, neighborhood, regional,	Type of Park
Website	Text/Link		Website

TABLE 1. DATA TABLE CONTINUE			
Field Name	Type	Field Text	Description
Acres	Numerical	1	Acres of Park
ADA	Numerical	1	Park Accessibility
BBQ Grill	Numerical	1	Grills
Baseball/Softball	Numerical	1	Baseball or Softball Fields
Basketball	Numerical	1	Basketball Court
Bike Paths/BMX Tracks	Numerical	1	Bike Paths or Tracks
Bocce	Numerical	1	Bocce Court
Disc Golf	Numerical	1	Disc Golf
Electric	Numerical	1	Electric
Fishing	Numerical	1	Fishing
Farm Animals	Numerical	1	Farm Animals
Football	Numerical	1	Football fields
Horseshoe	Numerical	1	Horseshoes
Maze	Numerical	1	Maze
Lacrosse	Numerical	1	Lacrosse
Lake/Pond	Numerical	1	Lake/Pond
Paddle Boat	Numerical	1	Paddle Boat
Park Shelter	Numerical	1	Park Shelter
Picnic Table	Numerical	1	Picnic Table
Playground	Numerical	1	Playground
Sensory Playground	Numerical	1	Sensory Playground
Slides	Numerical	1	Slides
Swings	Numerical	1	Swings
Toddler Equipment	Numerical	1	Toddler Equipment
Restrooms	Numerical	1	Restrooms of any kind
Stream/Creek	Numerical	1	Stream/Creek
Skate Park	Numerical	1	Skate Park
Inline Rink	Numerical	1	Inline Rink
Sledding	Numerical	1	Sledding
Soccer	Numerical	1	Soccer
Swimming	Numerical	1	Swimming
Tennis	Numerical	1	Tennis
Track	Numerical	1	Track
Trail/Walking path	Numerical	1	Trail/Walking path
Volleyball	Numerical	1	Volleyball Courts
Water Spray/ Interactive Water Feature	Numerical	1	Water Spray Parks
Dog Park	Numerical	1	Dog Park
Recreation Center	Numerical	1	Recreation Centers
Misc.	Text		Misc. park features

TABLE 1. DATA TABLE CONTINUE

Field Name	Type	Field Text	Description
Description	Text		Description of parks
Lat/Long	Numerical	Latitude, Longitude	Latitude/Longitude of the park
Location	Location	Lat/Long, Address Location	Used for Geocoding
Blog Post	Text/Link		Blog post for park of week

TABLE 2. LIST OF CITIES AND TOWNS

List of Cities and Towns			
1	Arvada	16	Fort Lupton
2	Aurora	17	Glendale
3	Boulder	18	Golden
4	Brighton	19	Greeley
5	Broomfield	20	Greenwood Village
6	Castle Pines North	21	Lafayette
7	Castle Rock	22	Lakewood
8	Centennial	23	Littleton
9	Colorado Springs	24	Lone Tree
10	Commerce City	25	Longmont
11	Denver	26	Louisville
12	Englewood	27	Loveland
13	Evans	28	Northglenn
14	Federal Heights	29	Pueblo
15	Fort Collins	30	Sheridan

Design and Implementation

The design of the site was to use open source programs, trial software, templates, and programing languages to create a location based website. The website itself has an interactive map that allowed filtering by location, park name, and amenities. Location-based service influenced the behavior of the park website by requesting information through a pull service where the

user enters their location. In addition, the site provides a central location and accessibility to the data. Since cost was a factor, programs, templates, and programing languages must be free and available, twenty dollars or less, or have already been acquired.

The website and data was implemented using the following programs: Microsoft Excel, Notepad, Notepad++, Extendoffice-Kutools, Firebug, Google Fusion Tables, Google Maps, WinSCP, iMacros plugin, and Searchable Map Template with Google Fusion Table developed by Derek Eder; an Open Data Web Developer. The languages that were used were HTML 5 and JavaScript. The web hosting was through DreamHost. The project was done in phases; the data phase, coding phase, and hosting phase, testing and troubleshooting phase, and documentation phase.

Data Phase

The data phase was the most time consuming phase. In this phase, several stages happened. The stages were collection, formatting, storage, uploading data, and geocoding. Collecting is where most the time was spent. Data collection was done manually either by copy and paste or typing in the value in an Excel Spreadsheet. If the text had formatting issues when pasting into Excel the text was then pasted into Notepad to correct any formatting issues then copied and pasted back into Excel. The value of 1 was used to help with the efficiency and processing of the data. The Majority of the zip codes where not provided on the sites, and if the park is managed by

an organization then the city was not provided. To obtain the missing zip

codes a script was written by Michael Sims a Senior System Analyst to

extract the information from Google Maps using iMacros which captured

complete addresses with zip codes. Below is the code that was created:

```
VERSION BUILD=8300326 RECORDER=FX
TAB T=1
SET !DATASOURCE c:\tmp\park3.csv
SET !DATASOURCE_COLUMNS 4
SET !DATASOURCE_LINE {{!LOOP}}
SET !LOOP 1251
SET !ERRORIGNORE YES
set !EXTRACT_TEST_POPUP NO
URL GOTO=https://www.google.com/
TAG POS=1 TYPE=INPUT:TEXT FORM=NAME:gbqf ATTR=ID:gbqfq
CONTENT="{{!COL2}},{{!COL3}},{{!COL4}}"
WAIT SECONDS=1
TAG POS=1 TYPE=BUTTON ATTR=ID:gbqfba
TAG POS=1 TYPE=DIV ATTR=STYLE:padding-top:18px EXTRACT=TXT
SAVEAS TYPE=EXTRACT FOLDER=c:\tmp FILE=zips.csv
```
(Sims, 2013)

 Once the data was collected, the next phase was the formatting stage.

        The purpose of the formatting stage was to convert the data into a

usable format for the geocoding and coding phases. Some of the steps that

took place was filling data in the location and description fields and setting

up the fusion table. The location field was composed of the lat/long and

address location field. The description was a combination of the following

columns: ADA, BBQ Grill, Baseball/Softball, Basketball, Bike Paths/BMX

Tracks, Bocce, Disc Golf, Electric, Fishing, Farm Animals, Football,

Horseshoe, Maze, Lacrosse, Lake/Pond, Paddle Boat, Park Shelter, Picnic

Table, Playground, Sensory Playground, Slides, Swings, Toddler Equipment, Restrooms, Stream/Creek, Skate Park, Inline Rink, Sledding, Soccer, Swimming, Tennis, Track, Trail/Walking path, Volleyball, Water Spray/ Interactive Water Feature, Dog Park, Recreation Center, and Misc. To combine the description field the value of 1 was converted to the description and Kutools was used to combine all the fields. Afterwards the description was converted back to the value of 1. The description column was used for the info window in Google Maps and location was used for geocoding. When formatting was complete, the data was then stored in Google Drive and uploaded and converted into a Google Fusion Table. After the upload of the table, the column type for all the columns was verified. The location column was set as location type and geocoding was started. Any highlighted data that was left in the Location column were fixed by geocoding it manually.

Coding Phase

The coding phase consisted of modifying the template by connecting the fusion table, creating queries, creating checkboxes, text search box, adding a wider radius, and styling. The template was from Derek Eder who is an Open Data Web Developer from Chicago, IL. There are two versions of this template. One is a simple version and the other version is for advanced users. The simpler template was chosen due to the features and to keep the coding simple. The features as listed on the website http://derekeder.com/searchable_map_template/ are the following:

- "clean, full-screen layout
- mobile- and tablet-friendly using responsive design
- address search (with variable radius)
- geolocation ("find me")
- RESTful URLs for sharing searches
- results count (using Google's Fusion Tables API)
- ability to easily add additional search filters (checkboxes, sliders, etc.)
- all done with HTML, CSS and Javascript - no server-side code required" (Eder,2012)

The two files that were modified were index file in HTML 5 and maps_lib in JavaScript using Notepad++. In order to connect the fusion table to the template the fusion table was made public. In addition, the Fusion Table ID and Google API ID were added to maps_lib. Next 37 checkboxes were created in the index file an example of the code is below:

```
<ul class='inputs-list unstyled'>
 <li>
   <label class='checkbox inline'>
    <input type='checkbox' id='cbType1' />
    ADA
   </label>
 </li>
```

Due to the data being in multiple columns and fusion tables not supporting OR statements 37 IF statements were created to query the data in the fusion table. Below is an example of the code

```
var searchType = '';
     if ( $("#cbType1").is(':checked')) searchType += "and 'ADA' = 1 ";
whereClause += searchType;
```

The styling was applied to titles, boxes, markers, and formatting was done for user ability and aesthetic purposes. An example of the changes is

the behavior of the checkbox. Initially the all of the checkbox were check

upon loading the map. A line of code was modified to load the checkboxes

unselected. Below is the code:

```
$(":checkbox").prop("checked", false); // reset the whole page with checkbox
http://stackoverflow.com/questions/6169826/propchecked-false-or-removeattrchecked
LA
```

Hosting Phase

The hosting is composed in three parts the data supported by Google

Fusion Tables, mapping through Google Maps, and webpages through

DreamHost. The hosting phase was the easiest phase but only phase that

involved a small cost. In this phase, a domain name

http://www.cofrontrangeparks.com/ was created and setup in DreamHost.

To register the domain name cost $9.95 for one year. Once the domain was

created and setup the files were transferred using WinSCP.

Testing and Troubleshooting Phase

Testing was done on multiple platforms, queries, and usability. The

site was tested on a desktop computer connected through Ethernet cable, a

laptop connected on a wireless network, first generation iPad, Samsung

Galaxy SIII, and IPhone 4. During the testing phase, the index file was

validated through World Wide Web Consortium (W3C) markup validation

service http://validator.w3.org/ to make sure that the additional code met

web standards. Firebug and a dialog box were used to inspect the code

during testing of the queries and search text box. Some issues were the find

me feature, radius size on mobile devices, outdated data, and the size of the list of feature. The lists of features were initially too long for mobile devices. To correct the size of the list the features were grouped by category and an accordion style was added. During the testing of some of the park's websites an issue was found with some of the addresses no longer working particularly, with the parks in the city of Broomfield. This was due a recent website update that the city had done. All the parks in the city were updated with the current information. The find me feature was used on a desktop that was connected through an Ethernet cable and the result location was of the access point of the service provider egress router, not the city of where the device was located. This issue was not a problem when it was tested on a laptop or any other device that was connected wireless. The recommendation is that find me feature works best on wireless devices. Although the find me feature works bests on devices on wireless networks there are some limitations such as, the location that will be displayed is the general area of the device and not a specific location. Solutions for adding a specific location are still being researched. The other find me issue pertains to mobile phones. When the radius was changed, the map reset to the initial location. A couple of solutions are to click the search button again or click the reset button to reset the map then enter the radius first and then click find me.

Documentation Phase

A blog was created for documentation and was linked to the website. The blog contained a featured park of the week, how to use the site, about, question, comments, reporting errors, help, and documents. The featured park of the week is a random park chosen with pictures, brief description, and experiences at the park. The link to the post will be available in the info window of the park. How to use the site section are instructions on how to use the website to locate interesting parks. About is the purpose of the site. Questions, comments and reporting error is the area where questions, comments and any errors can be posted. The help section lists any known issues and solutions. Documents section is where the all the code for the site is posted and is available to download.

Results

The results from the project is using open source and free products to create a central location of information on parks and a location based mapping website were a user can use a location or feature to filter through. Appendix A lists links to the website, Fusion table, and blog. In addition, a screenshot of the Colorado Park website can also be found in Appendix A.

Discussion

With GIS being implemented within the past several years, the use of GIS or location aware services for park services has not advanced as much

as other fields. The use of GIS is very inconsistent within the cities that were collected. Some cities had established online mapping service and others did not. Some examples that can be seen in Appendix C are the City of Denver, City of Fort Collins, City of Arvada, and Fort Lupton. Denver and Fort Collins both had mapping services to finds parks. Arvada's Find a Park is a map in PDF which, seems to be hard to read because of the amount of information contained within the page and Fort Lupton has a list of parks on a page. The information also seems to be scattered among the sites. Some parks had their own dedicated web page and others did not. This project helped with some of the inconsistences and standardization of the information by displaying the information in a consistent way and having it in one location. The project also mapped those parks that were not previously mapped before like parks in Fort Lupton. With having the website and information in one location, finding a park is much easier since the user is going to one site instead of many.

Areas for Further Research

Areas for further research would be implementing a social aspect to this website, as well as adding more parks, and web features. A social aspect to the site would allow users to rate and review parks. Including a social aspect would also help keep the information updated by having users submit updates and new information. The next web feature that should be looked into is adding a service to give directions from your location to a

selected park. The current list does not include parks managed at a county level and most cities and towns that are not along the I-25 corridor were not included in the project. Including them should be considered later.

Conclusion

Parks have positive benefits in the areas of real estate, health, the environment. They include increasing property values, access for physical activity, decreasing air pollution and controlling water runoff. Finding a park along the Front Range in Colorado can be a lengthy process due to variations of where and how the information is displayed. With the use of open source and free products, a location based service website was created to help ease the process by providing a service where a user can send their location information to look up parks along the Front Range. Additionally, the user can search by amenities. The site also allows information to be consistent, centralized, and available to everyone. Although the site is only limited to a lookup service, further research should be done to enhance the website such as adding social aspect such as rating system and adding more parks.

References

Castle Pines North Metropolitan District. Parks, trails & open space. http://www.cpnmd.org/parks.php (accessed 5/6/2013, 2013).

Center for Disease Control and Prevention. Adult obesity facts. http://www.cdc.gov/obesity/data/adult.html (accessed 3/27/13, 2013).

City of Arvada. City of Arvada, Colorado parks and open space map. http://maps.arvada.org/opendata/pdf/Parks_and_Open_Space.pdf (accessed 5/6/2013, 2013).

———. Park facilities listing http://arvada.org/pages/park-facilities-listing (accessed 5/6/2013, 2013).

City of Aurora. Park listings. https://www.auroragov.org/ThingsToDo/ParksandOpenSpaces/ParkListings/ (accessed 5/6/2013, 2013).

City of Boulder. Park list. http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=9555&Itemid=3183 (accessed 5/6/2013, 2013).

City of Brighton. City parks list and information. http://www.brightonco.gov/egov/docs/1262194064861.htm (accessed 5/6/2013, 2013).

City of Broomfield. Facilities. http://www.broomfield.org/Facilities.aspx?page=list&search=1&CID=2 (accessed 5/6/2013, 2013).

City of Colorado Springs. Neighborhood parks facilities & maps. http://www.springsgov.com/Page.aspx?NavID=1926 (accessed 5/6/2013, 2013).

City of Denver. Denver parks and recreation - find a park. http://www.denvergov.org/dpr/ParksandRecreation/Parks/FindaPark/tabid/443592/Default.aspx (accessed 5/6/2013, 2013).

City of Englewood. Park locations. http://www.englewoodgov.org/our-community/recreational-opportunities/parks-and-recreation/parks/park-locations (accessed 5/6/2013, 2013).

City of Evans. Parks information. http://www.cityofevans.org/parks/parks-information (accessed 5/6/2013).

City of Fort Collins. Maps: Park and cemeteries. http://www.fcgov.com/parks/map/ (accessed 5/6/2013, 2013).

City of Fort Lupton. Community parks. http://www.fortlupton.org/community-parks (accessed 5/6/2013, 2012).

City of Glendale. Parks & recreation http://glendale.co.us/index.php?option=com_content&view=article&id=103:parks-a-recreation&catid=15:public-works&Itemid=58 (accessed 5/6/2013, 2013).

City of Golden. City parks. http://www.cityofgolden.net/play/recreation-attractions/city-parks/ (accessed 5/6/2013, 2013).

City of Greeley. City of Greeley Parks Map. http://greeleygov.com/Parks/newmaps.htm (accessed 5/6/2013, 2013).

———. Parks information. http://greeleygov.com/Parks/information.aspx (accessed 5/6/2013, 2013).

City of Greenwood Village. Neighborhood Parks/Playgrounds. http://greenwoodvillage.com/index.aspx?NID=134 (accessed 5/6/2013, 2013).

City of Lafayette. Facilities. http://www.cityoflafayette.com/facilities.aspx?page=list&search=1&CID=11 (accessed 5/6/2013, 2013).

City of Lakewood. Park listing http://www.lakewood.org/Community_Resources/Parks,_Forestry_and_Open_Space/A_to_Z_Park_Listing/Park_Listing.aspx (accessed 5/6/2013, 2013).

City of Longmont. List of parks. http://www.ci.longmont.co.us/parks/park_list/overview/index.htm (accessed 5/6/2013, 2013).

———. Map of parks in Longmont. http://www.ci.longmont.co.us/parks/park_list/parkmap.htm (accessed 5/6/2013, 2013).

City of Louisville. Parks division. http://www.louisvilleco.gov/SERVICES/ParksRecreation/ParksDivision/tabid/290/Default.aspx (accessed 5/6/2013, 2013).

City of Loveland. Park & rec facilities. http://www.cityofloveland.org/index.aspx?page=486 (accessed 5/6/2013, 2013).

City of Northglenn. Parks amenities. http://www.northglenn.org/parklist (accessed 5/6/2013, 2013).

City of Pueblo. Facilities. http://www.pueblo.us/Facilities?clear=True (accessed 5/6/2013, 2013).

Commerce City. Recreation & outdoors. http://www.c3gov.com/index.aspx?NID=25 (accessed 5/6/2013, 2013).

———. Recreation/Parks map. http://maps.c3gov.com/parkstrails/ (accessed 5/6/2013, 2013).

Design Concepts. Design concepts :: Portfolio :: Destination playgrounds :: Northglenn sensory park http://www.dcla.net/northglenn-sensory-playground/ (accessed 4/3/2013, 2013).

DreamHost. Web hosting, shared web hosting, virtual private server, dedicated servers by DreamHost http://dreamhost.com/ (accessed 5/5/2013, 2013).

Eder, Derek. Searchable map template with Google fusion tables. http://derekeder.com/searchable_map_template/ (accessed 4/30/2013, 2013).

Extendoffice. Kutools for excel. http://www.extendoffice.com/product/kutools-for-excel/excel-combine-columns-rows.html (accessed 5/6/2013, 2013).

Google. About fusion tables. https://support.google.com/fusiontables/answer/2571232?hl=en&ref_topic=1652595 (accessed 5/6/2013, 2013).

———. Change placemark icon - fusion tables help
https://support.google.com/fusiontables/answer/2679986?hl=en (accessed 5/17/2013, 2013).

Hyland Hills Park & Recreation District. Listing of hyland hills facilities.
http://www.hylandhills.org/2013%20facilities%20map.pdf (accessed 5/6/2013, 2013).

iOpus. iMacros the unique tool for instant web automation, web testing & data extraction.
http://www.iopus.com/imacros/firefox/ (accessed 5/6/2013, 2013).

Jiang, Bin and Xiaobai Yao. 2006. Location-based services and GIS in perspective. *Computers,
Environment and Urban Systems* 30, no. 6: 712-725.

Metropolitan District Castle Pines North. Parks. http://www.cpnmd.org/parks.php (accessed
5/6/2013).

Mozilla Foundation. Firebug http://getfirebug.com/ (accessed 5/6/2013, 2013).

Noipithuk, K., C. Kitkobchai, and C. Chantrapornchai. 2012. Location-based application based on
prefetching on mobile applications: Case study of finding interesting restaurants. *International
Journal of Computer Applications* 58, no. 13: 22-25.

National Recreation and Park Association. About park and recreation operating ratio and geographic
information system http://www.nrpa.org/PRORAGIS/About/ (accessed 3/31/2013, 2013).

Notepad++. About. http://notepad-plus-plus.org/ (accessed 5/6/2013, 2013).

Sherer, Paul. The benefits of parks: Why America need more city parks and open space. The Trust for
Public Land. http://www.eastshorepark.org/benefits_of_parks tpl.pdf (accessed 3/31/2013,
2013).

Sims, Michael. 2013. *Missing zip codes*. Script for Finding Missing Zip Codes.

South Suburban Parks and Recreation. Parks list. http://www.ssprd.org/Parks.aspx (accessed
5/6/2013, 2013).

Stackoverflow. Jquery - .prop('checked',false) or .removeAttr('checked')?
http://stackoverflow.com/questions/6169826/propchecked-false-or-removeattrchecked (accessed
5/5/2013, 2013).

The Trust for Public Land. The economic benefits of Denver's park and recreation system.
http://cloud.tpl.org/pubs/ccpe-denver-park-value-report.pdf (accessed 3/31/2013, 2013).

———. Parkscore http://parkscore.tpl.org/city.php?city=Denver (accessed 4/3/2013, 2013).

Town of Castle Rock. Facilities. http://www.crgov.com/facilities.aspx?page=list&search=1&CID=2
(accessed 5/6/2013, 2013).

Ultraloveninja. JSFIDDLE: +,- accordion code. http://jsfiddle.net/ultraloveninja/xBxa4/5/ (accessed
5/21/2013, 2013).

W3C. The W3C markup validation service http://validator.w3.org/ (accessed 5/23/2013, 2013).

Wilson, Matthew W. 2012. Location-based services, conspicuous mobility, and the location-aware
future. *Geoforum* 43, no. 6: 1266-1275.

WinSCP. WinSCP: Free SFTP and FTP client for windows. http://winscp.net/eng/index.php (accessed 5/7/2013, 2013).

Wisniewski, Jeff. 2009. Location, location, location. *Online* 33, no. 6: 54-57.
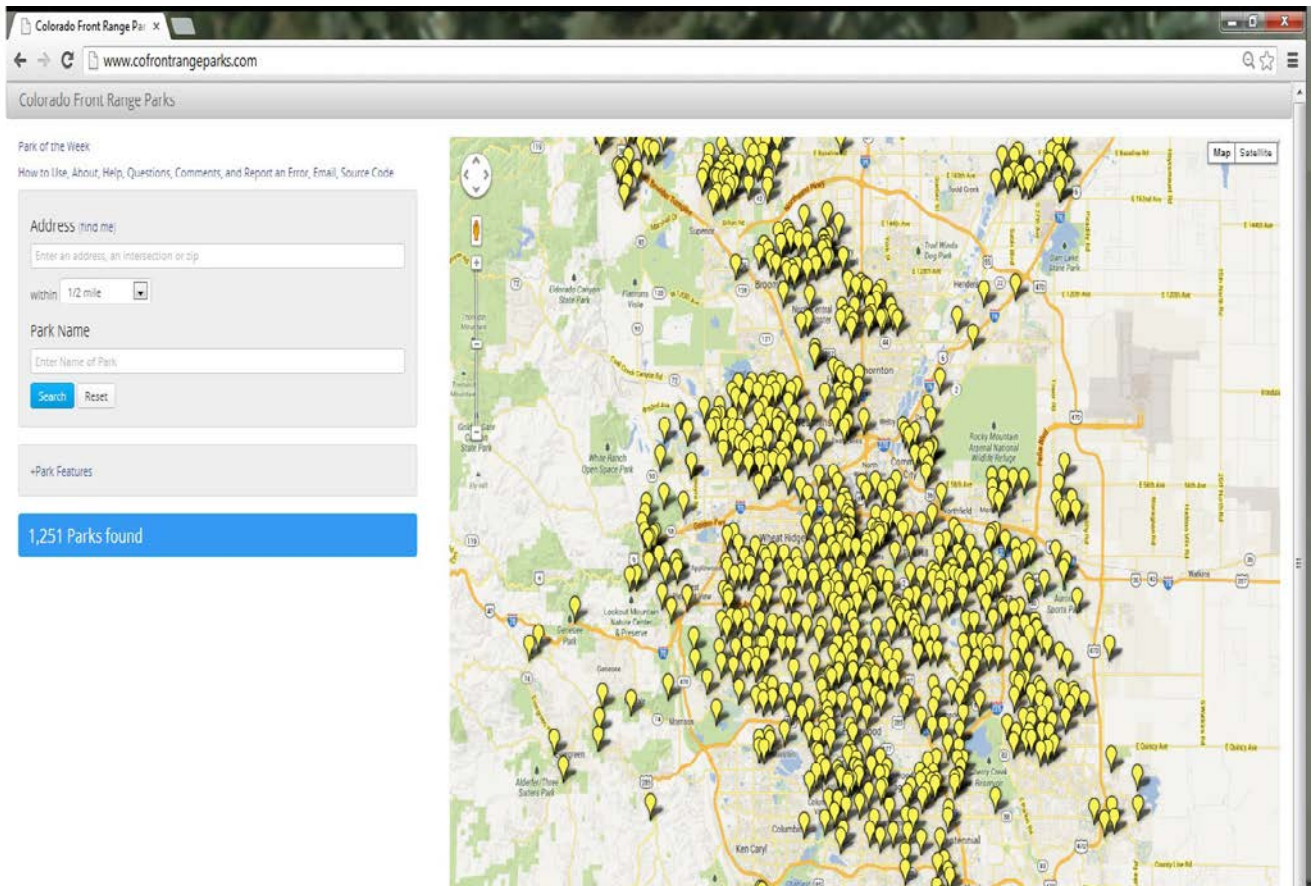
Appendix A Link to Fusion Table and Website

Blog: http://www.cofrontrangeparks.com/blog/

Fusion Table:
https://www.google.com/fusiontables/DataSource?docid=1z9CDczg0HmcLNT0FCl1uvHWPixbqcxEDLx-Hy4Q

Website:
http://www.cofrontrangeparks.com/

Appendix B Software List

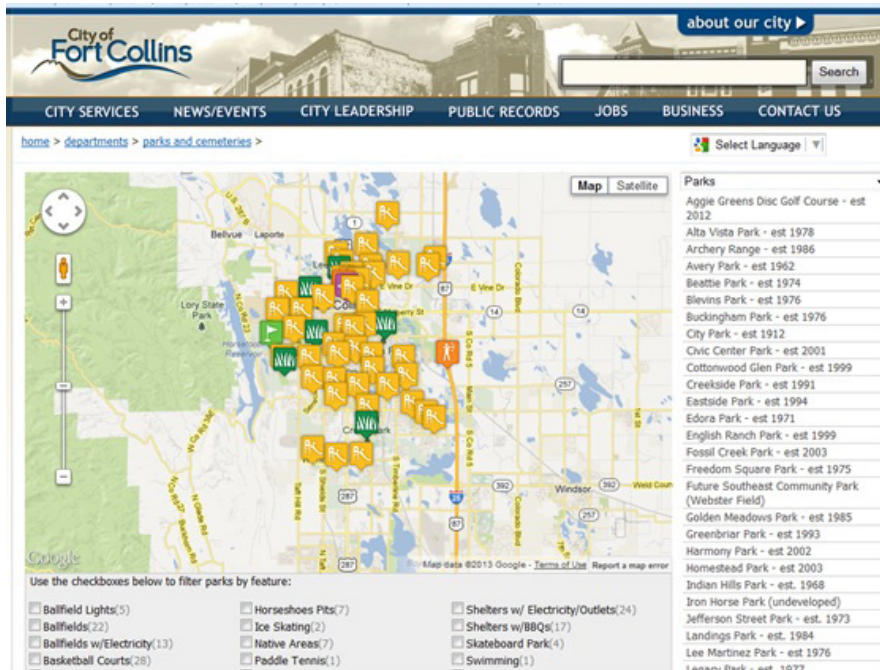| Program	Website	Description	Cost
Microsoft Excel	http://office.microsoft.com/en-us/excel/	Microsoft Office Spreadsheet Product	Already Acquired
Notepad	None	Text editor	Free comes per installed on most computer systems
Notepad++	http://notepad-plus-plus.org/	Source code editor	Free
ExtendOffice -Kutools	http://www.extendoffice.com/product/kutools-for-excel.html	Extended tools for Excel	Free 30 Days Trail
Firebug	http://getfirebug.com/		Free Open Source
iMacros	https://addons.mozilla.org/en-us/firefox/addon/imacros-for-firefox/		Free
Google Fusion Tables	https://www.google.com/fusiontables/DataSource?dsrcid=implicit&redirectPath=data&usp=a pps_start&hl=en&pli=1	"Experimental data visualization web application to gather, visualize, and share larger data tables" (Google, 2013)	Free
Google Maps	https://developers.google.com/maps/	Google Maps	Free
Searchable Fusion Table Map Template	http://derekeder.com/searchable_map_template/	Search Map Template	Free
DreamHost	http://dreamhost.com/	Hosting	Already Acquired Plans start as low as 8.95 a month
WinSCP	http://winscp.net/eng/index.php	FTP Client	Free

Appendix C Examples Park and Recreation Sites
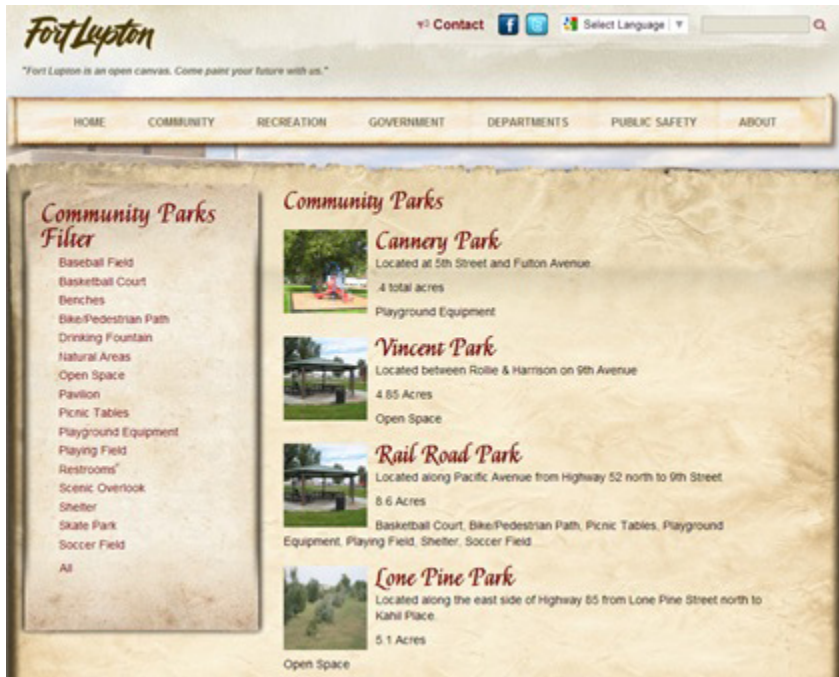
Denver Find a Park Interactive Map
http://www.denvergov.org/dpr/ParksandRecreation/Parks/FindaPark/tabid/443592/Default.aspx
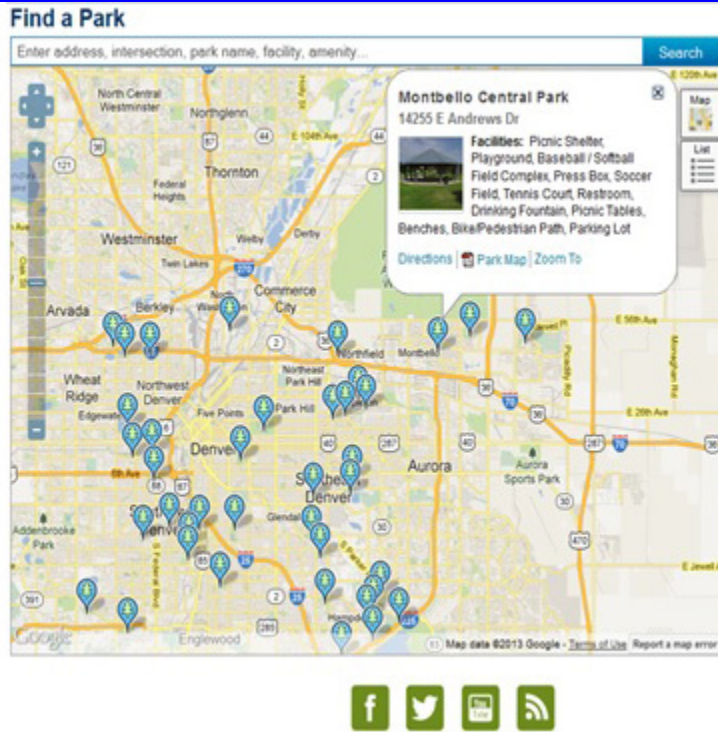
City of Fort Collins Park Map   http://www.fcgov.com/parks/map/

Fort Lupton http://www.fortlupton.org/community-parks

City of Arvada Park Map
http://maps.arvada.org/opendata/pdf/Parks_and_Open_Space.pdf