

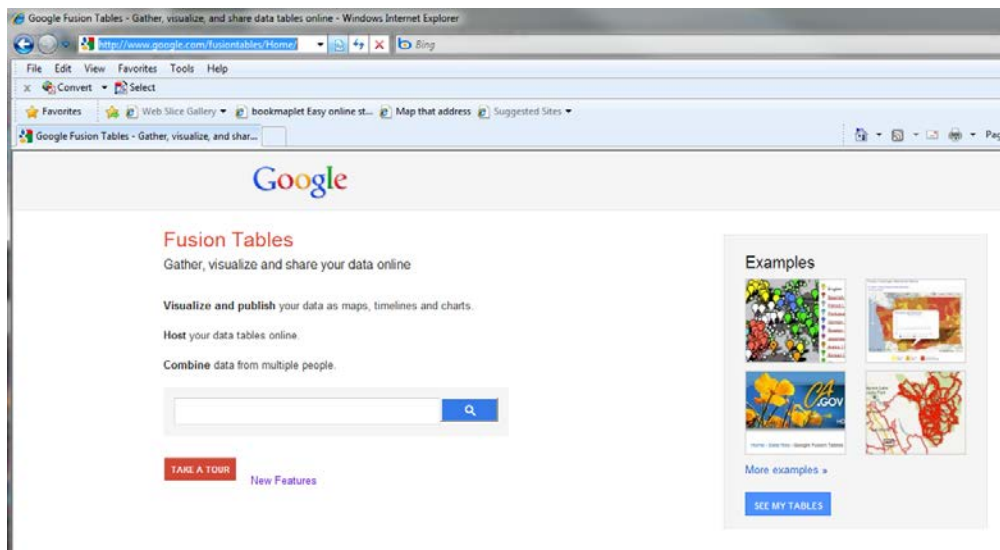
Data to App: Web, Tablet and Smart Phone
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This tutorial is broken into several steps related mostly to the technology applied at each step.

First step:

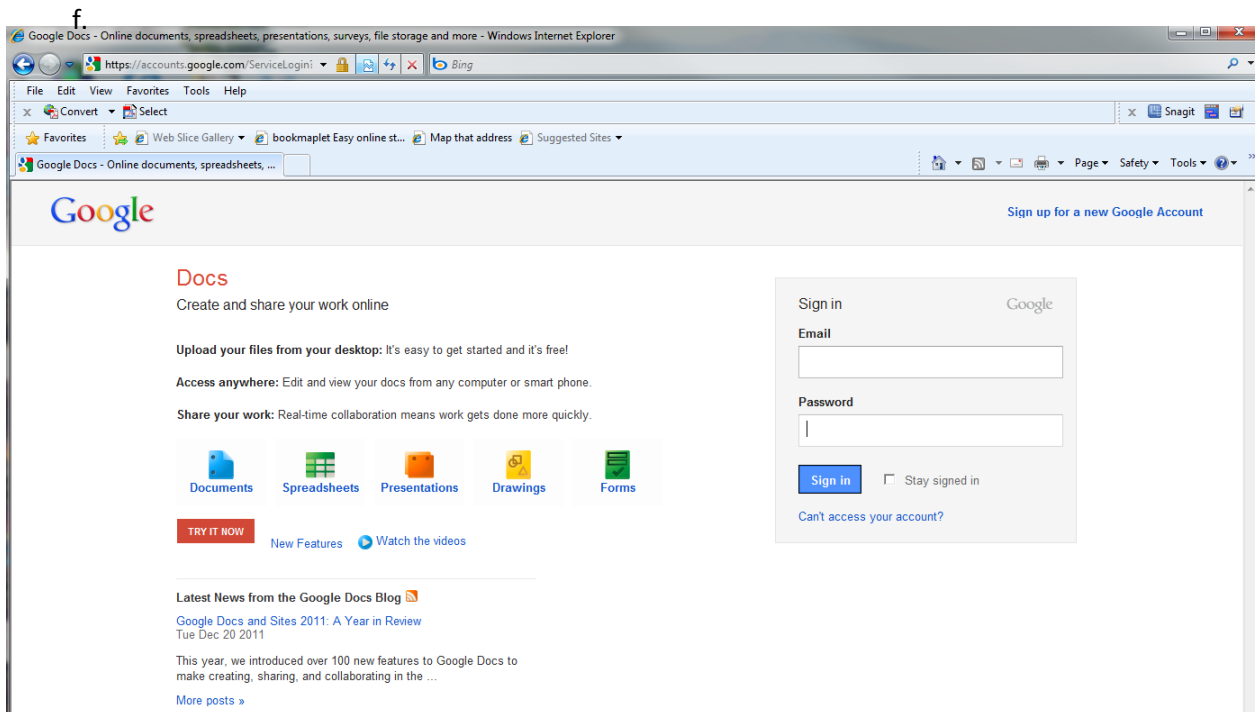
1. Decide on an application that is suitable, where the data is coming from, how much the data/information must be processed, etc. etc.
 - a. See Appendix A for a one page sheet on how to think about which app to develop.
2. Decide on the accuracy (resolution) of your data.
 - a. If pin point data = put at dot on an address (say accurate enough for driving directions), find the Latitude and Longitude of each point (row in a spreadsheet) of your spatial data.
 - i. <http://www.findlatitudeandlongitude.com/>
 - ii. There are several ways to find X,Y coordinate data for
 1. Cities, counties, other types of polygons on a map.
 - b. If County level data, make sure and county and state column are in your data set.
 - c. If it is some other resolution like a city or census tract, you will need to find the X,Y coordinates of each point (row in your spreadsheet).
3. Organize data into a spreadsheet. (See 11 x 17 handouts) or accompanying Excel spreadsheet.
 - a. Put your data into an Excel spreadsheet or a CSV file if more than 400 rows of data.
 - i. Column Headings of your choice
 1. No blank columns, no blank rows (I think)
 - b. Two pages, one for Montana Extension Agent and the other for the Western Extension Farm Management committee. Each is in the same format and actually in the same file.
4. You now have your data ready to load into a Google Fusion Table.
 - a. **If you do not have a Google account, establish one before you proceed. Basically this consists of setting up a gmail account, yourname@gmail.com**
 - b. Use the following link to get to the Fusion tables site at Google. Figure 1.
 - c. <http://www.google.com/fusiontables/Home/>

Figure 1.



- d. Click on the “SEE MY TABLES” button, lower right, Figure 1.
- e. You will be asked to Sign in, sometimes even if you have already signed in to an existing Google account, Figure 2.

Figure 2.





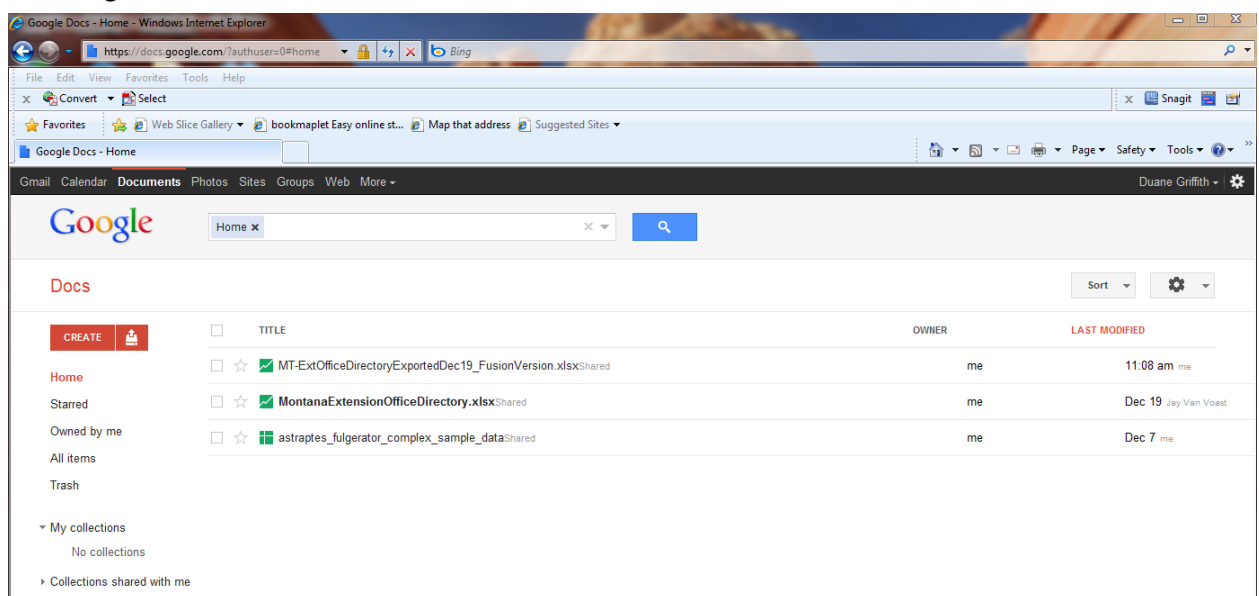
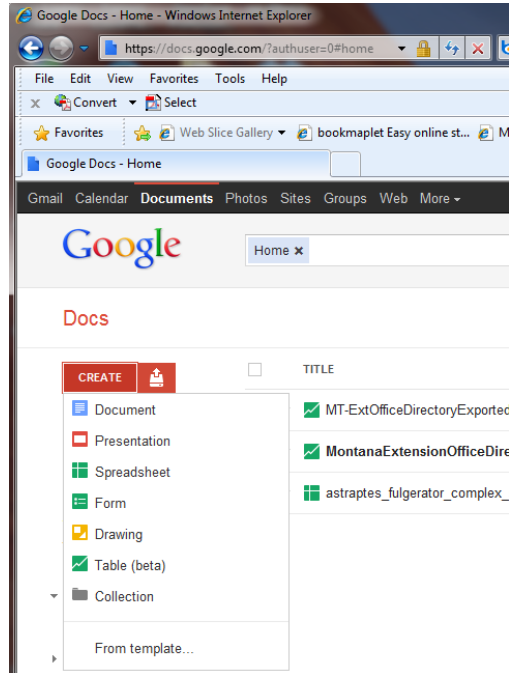
- g. After signing in, you are entered into the Google Doc site. This site lists both your Google Docs (spreadsheets, word docs, etc.) that you have uploaded as a document and your **Google Fusion Tables**. Note the Fusion table icon  is different than the documents icon . Figure 3 shows my Fusion Tables site. Yours will be empty unless you have uploaded a Google Doc.

Figure 3.



- h. Click on the **CREATE** icon on the left edge of the screen. This will bring up a drop down menu, shown in Figure 4. Click on the **Table (beta)** menu item to start the upload process for an Excel spreadsheet, or if you have more than 400 rows of data, upload a file in a Comma Separated Value (CSV) file format. You can save an Excel file to a CSV format.

Figure 4.



- i. Figure 5 shows the first step in uploading a file containing the data. Use the **From this computer** option and Click on the Browse button to navigate to where your file is stored.
- j. Once the file is selected, click on the **Next** button in the lower right corner of the screen, Figure 5. The next screen appears, Figure 6, which is a portion of your spreadsheet. This example is the file used to create the County Agent Map for Montana. Select which row the "Column Names" are in, most always row 1. You can also select columns to exclude by unchecking all columns you do not wish to import, Figure 6. All columns were imported from this table. Click the **Next** button in the lower right corner of Figure 6.

Figure 5.

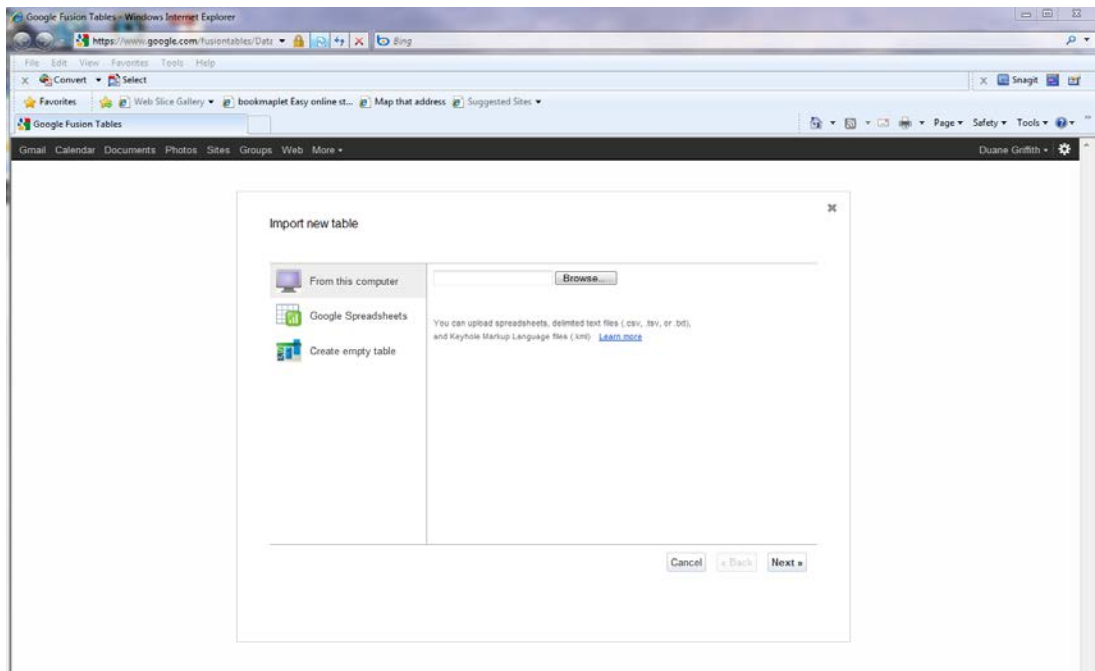


Figure 6.

Import new table

Specify the columns to import.

Column names are in row 1

Import	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	Location	Category	MapMarke	MarkerBuc	CountyCov	Lat	Long	County Short
2	BEAVERHEAD Co.	County	large_red	10	Beaverhead	45.216377	-112.63667	Beaverh
3	BIG HORN Co.	County	large_red	10	Big Horn	45.732483	-107.61136	Big Horn
4	BLAINE Co.	County	large_red	10	Blaine	48.589989	-109.23056	Blaine
5	BROADWATER Co.	County	large_red	10	Broadwater	46.319153	-111.51999	Broadwa

Cancel « Back Next »

- k. Figure 7 shows the last step in the process of uploading data to a Fusion Table. This step allows you to enter meta data, which is data (information) about the data. You can fill this in as necessary or desired.

Figure 7.

Import new table

Table name: MontanaExtensionOfficeDirectoryDec20.xlsx

Allow export: ☒ ?

Attribute data to: ?

Attribution page link:

Description: Imported at Tue Dec 20 17:23:58 PST 2011 from MontanaExtensionOfficeDirectoryDec20.xlsx.

For example, what would you like to remember about this table in a year?

Cancel < Back Finish

- l. Click the **Finish** button in the lower right corner. Figure 8 shows the next screen that appears, which is the “Table view” of the Fusion table. Note the menu

File View Edit Visualize Merge Experiment

under the name of the table in the top left portion of the Figure 8. This menu allows you to finish defining the information in the table before it can be used as a Fusion table.

- m. The next step is to define what each column contains and identify the location information contained in the table. To start this process, click on the word **Edit** in the word menu shown above. A drop down list, shown at right, appears. From this drop down, click on the **Modify columns** option. Another menu selection window appears, Figure 9.

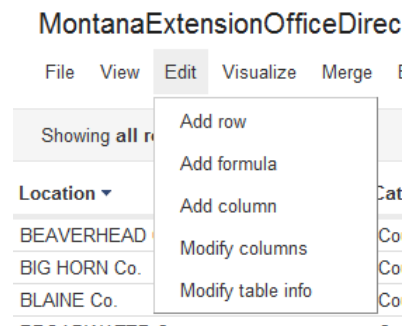


Figure 8.

Location	Category	MapMarker	Marker	CountyCoverage	Lat	Long
BEAVERHEAD Co.	County	large_red	10	Beaverhead	45.216377	-112.63667
BIG HORN Co.	County	large_red	10	Big Horn	45.732483	-107.61136
BLAINE Co.	County	large_red	10	Blaine	48.589989	-109.23056
BROADWATER Co.	County	large_red	10	Broadwater	46.319153	-111.51999
CARBON Co.	County	large_red	10	Carbon	45.485268	-108.96971
CARTER Co.	County	large_red	10	Fallon-Carter	46.366936	-104.28415
CASCADE Co.	County	large_red	10	Cascade	47.5	-111.3
CHOUTEAU Co.	County	large_red	10	Chouteau	47.819984	-110.67221
CUSTER Co.	County	large_red	10	Custer	46.408325	-105.83998
DANIELS Co.	County	large_red	10	Daniels	48.792496	-105.42027
DAWSON Co.	County	large_red	10	Dawson	47.105263	-104.71193
DEER LODGE Co.	County	large_red	10	Deer Lodge	46.128593	-112.94136
FALLON Co.	County	large_red	10	Fallon-Carter	46.366936	-104.28415
FERGUS Co.	County	large_red	10	Fergus	47.062485	-109.42746
FLATHEAD Co.	County	large_red	10	Flathead	48.195816	-114.31192
GALLATIN Co.	County	large_red	10	Gallatin	45.776093	-111.1761

Figure 9.

Location

Category

MapMarker

MarkerBucket

CountyCoverage

Lat

Long

County-Short

Text

Text

Number

Location

Location

Number

Location

Column name:

Location

Type:

Text

Format:

None

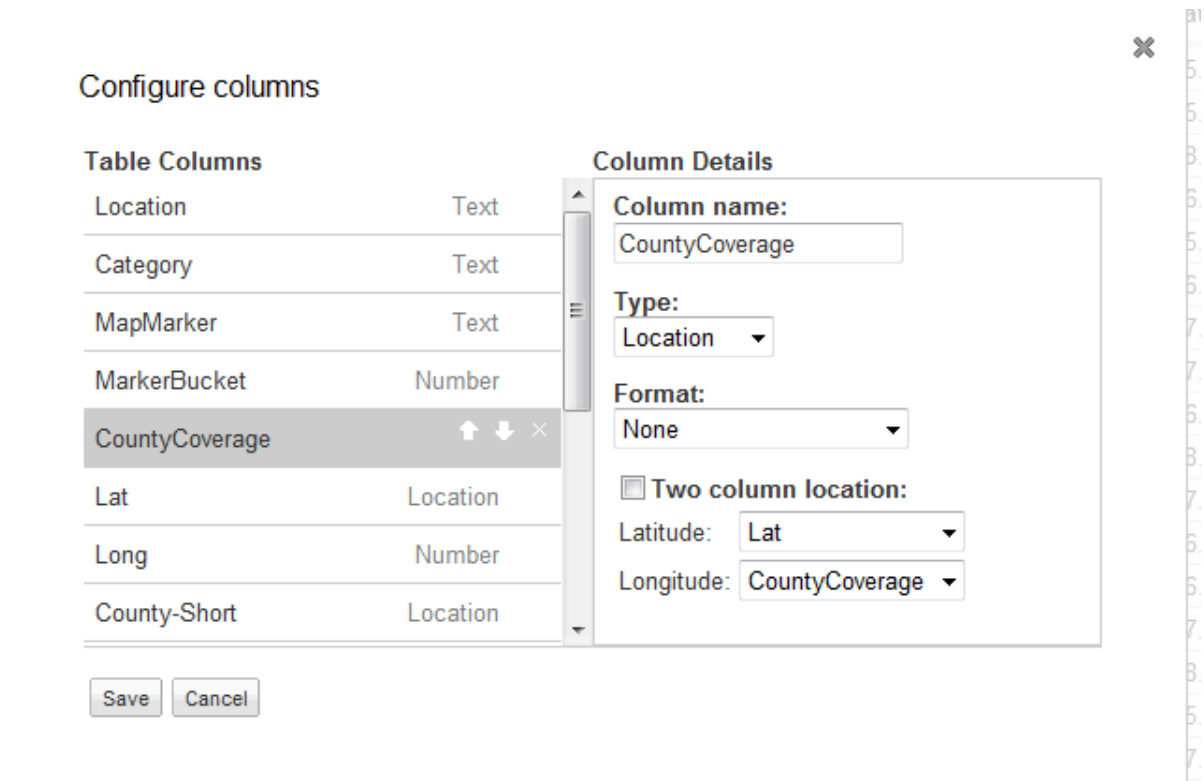
Save

Cancel

- n. During the conversion to a Fusion table, Google takes its best guess as to what type of information is stored in each column. Figure 9 show how you identify the type of information you want to assign to each column rather than using Google's best guess. The name of the first column is "Location" and you can see that column is highlighted in Figure 9. Google thinks the "Type" of data is Text and the Format is None. In this

instance, it is correct. The column headings of Category, MapMarker and MarkerBucket are also correctly identified. The column labeled CountyCoverage is identified as “Location” information. If we click on the CountyCoverage column label to highlight it, we get a slightly different view of the type of information Google thinks this column contains on the right hand side of this pop up window, Figure 10.

Figure 10.



- o. Figure 10 shows Google thinks this column contains Location information, and it does. It contains the names of counties in Montana. Google recognizes many common location references such as state, county and city names, latitude and longitude (and X,Y) pair, physical street addresses such as 1324 North Sixth Street, or 2730 South 19th, etc. Street addresses are a special case because Google will geocode a list of street addresses for you if you do not know the Lat and Long for each row of data. The physical street address should be accompanied by a state and city name in the same row to help Google find the information. More on geocoding later.
- p. We want to change the information listed in the “Type” box from Location to Text. Click the drop down arrow next to the “Location” identifier and select Text from the list. Click on the next column label on the list which, left side, which is “Lat.” Figure 11 shows the results.

Figure 11.

Table Columns	Type
Location	Text
Category	Text
MapMarker	Text
MarkerBucket	Number
CountyCoverage	Text
Lat	Text
Long	Number
County-Short	Location

Column Details

Column name:

Type:

Format:

☒ Two column location:

Latitude:

Longitude:

Save Cancel

- q. When the Lat column label is highlighted, Google thinks it is also location information and in this instance it is also correct. When using latitude and longitude for X,Y coordinates, the columns must be together, but they do not have to have any particular names. It is just easier to identify and work with the columns if they are named something like Lat and Long. Figure 11 shows the Type as Location, the format is None which is OK. The last item on the right edge is "Two column location:" and it lists the name of the two columns starting with the one highlighted. The box in front of "Two column location:" is checked. If not check it. If you upload data and Google does not automatically recognize the Lat Long data, this is where you tell Google to use the columns that contain that data. These two columns containing the location information do not have to be adjacent. If you have geocoding your data, you do not have Lat Long numbers, you can select the columns you wish to use here, which may not be adjacent in your data file.
- r. Save your table definitions by clicking on the **Save** Icon, lower left corner of Figure 11, when you are finished. You return to the Table View.
- s. When you get the Lat Long columns identified as your location information columns, the rest of the columns can be set to Text values. How you intend to use this information across platforms "may" determine how the rest of the columns should be specified, i.e. phone number is a number field rather than a text field, etc. We are still exploring this as of Dec. 21, 2011.
 - i. Possible platforms used by the intended audience may include:
 1. Just the web
 - a. Can limit interactivity but delivers information
 2. Tablets and smart phones
 - a. Can access the web site, but can not utilize some of the capabilities of these platforms, such as dial a phone number, send an email.
 - i. Note with these platforms, a producer could take a picture of a bug with his smart phone and send to his local County Agent, or directly to a diagnostic lab.

Remaining Steps:

5. You are ready to view the mapped data. In the table view, click on **Visualize** and then **Map** and Google will display your mapped data. Figure 12.
 - a. Explore the map. Zoom in and out, pan in all directions, click on the red dots to see the automatic popup window Google Fusion Tables creates. **This will be helpful in understand the next few steps.**

MontanaExtensionOfficeDirectoryDec20.xlsx

File View Edit Visualize Merge Experiment

Showing all rows

Location

BEAVERHEAD Co.

BIG HORN Co.

BLAINE Co.

BROADWATER Co.

CARBON Co.

CARTER Co.

CASCADE Co.

Table

Map

Intensity map

Line

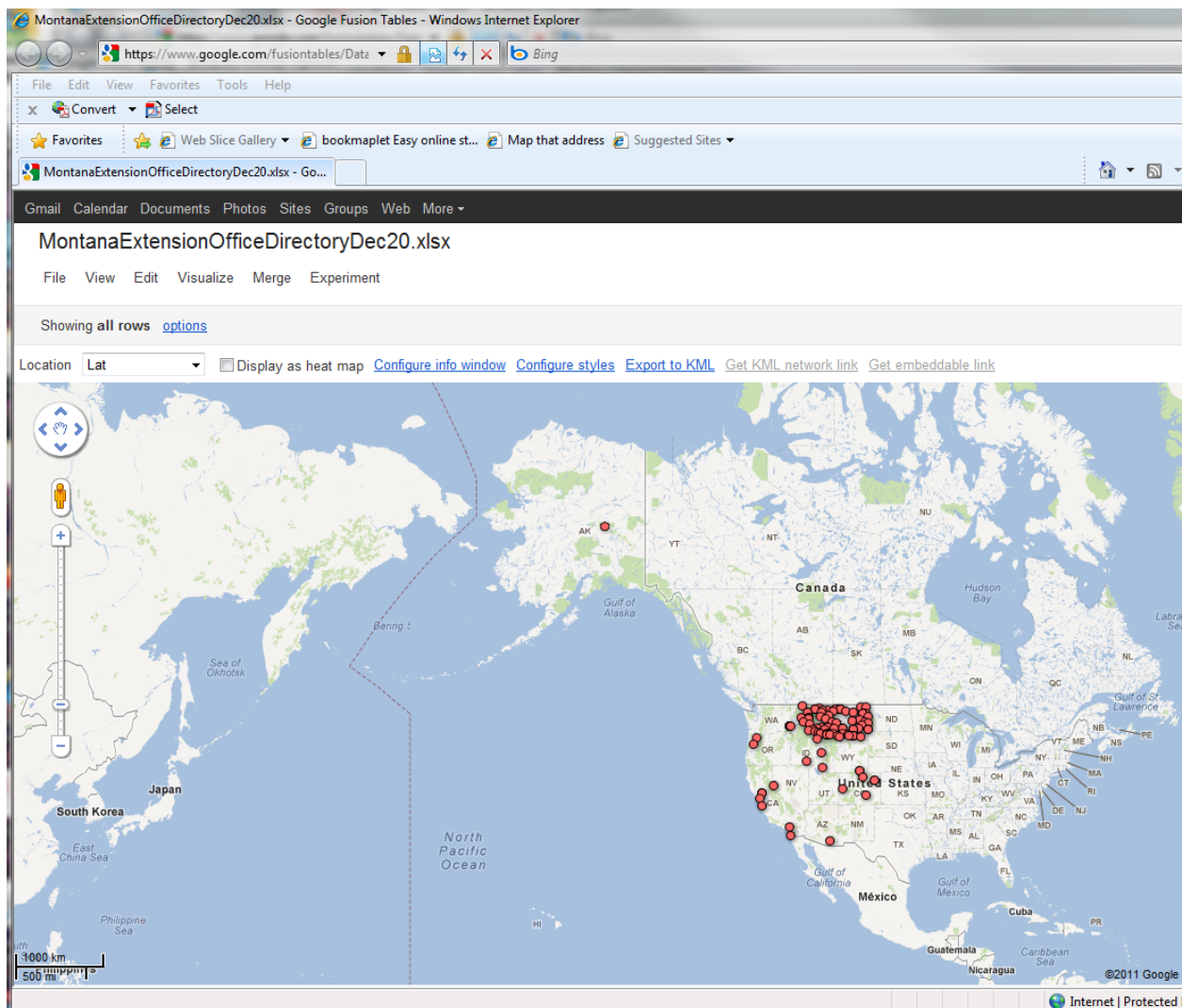
Bar

Pie

Scatter

Timeline (date, number)

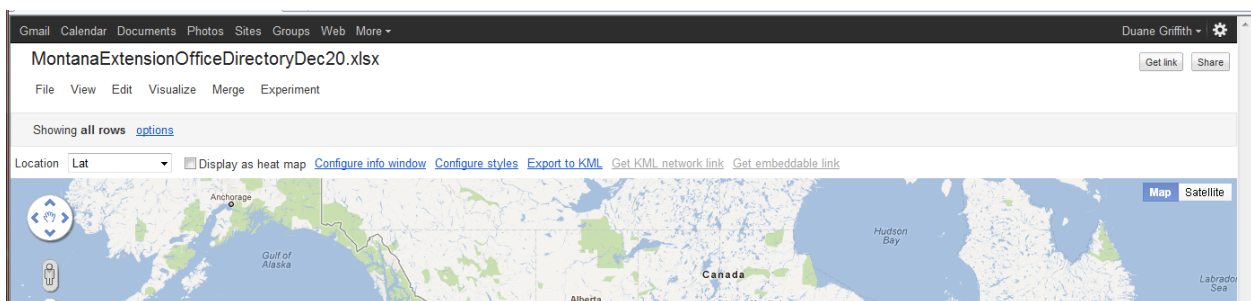
Figure 12. Contains the Montana Agent List and the Farm Management specialists from the 13 Western states, as per the last circulated mailing list.



6. Customizing your map:

- a. Now that the map has been created, you can change some of the display characteristics and what information is actually displayed from the table you uploaded.
- b. Reasons to customize your map display:
 - i. The final destination may require features that are not supported completely using just Google Fusion tables and the web.
 1. Activate data included in tables such as phone numbers and email address so the user can access these via Tablets and smart phones.
 2. Scaling on devices may require some custom programming to display correctly on tablets and smart phones
 3. Gives control to use custom icons rather than Google's built in list of Icons. <http://www.google.com/fusiontables/DataSource?snapid=99003>
 - a. This link puts you within the Fusion table's development screen so you may need to have a Google account and be signed for this to work.
 - b. Going from Fusion Tables defaults to the Google API provides tremendous flexibility in the look and feel of your "application."
 - i. May create additional display problems if the data in the table is intended strictly for the web.
 - ii. Need Java Script and HTML programming capabilities
 - iii. Buy your IT support/programmer lunch.
 - c. To customize your map display, there is an additional set of menu options available when the map is actually displayed. These items are directly above the map. Note that some are active and some are greyed out. Figure 13.
 - i. Active are [Configure info window](#); [Configure styles](#); [Export to KML](#)
 - ii. The greyed out options will only become available when you **make your Fusion table Public instead of private**. The default is private.
 - iii. To share your work, click on the **Share** Icon, upper right corner, Figure 13.

Figure 13.



- iv. Clicking on the Share Icon allows you to specify how the data is shared, and who has access to edit the Fusion table data. Figure 14. Figure 14 shows this popup after I have specified who else can have access to edit this table and how it is to be shared, in this instance as Unlisted.
- v. When you have set these parameters to your needs, click on the X in the upper right corner to close this Share setup screen.
- vi. The links that were previous greyed out are now active. Figure 15.

Figure 14.

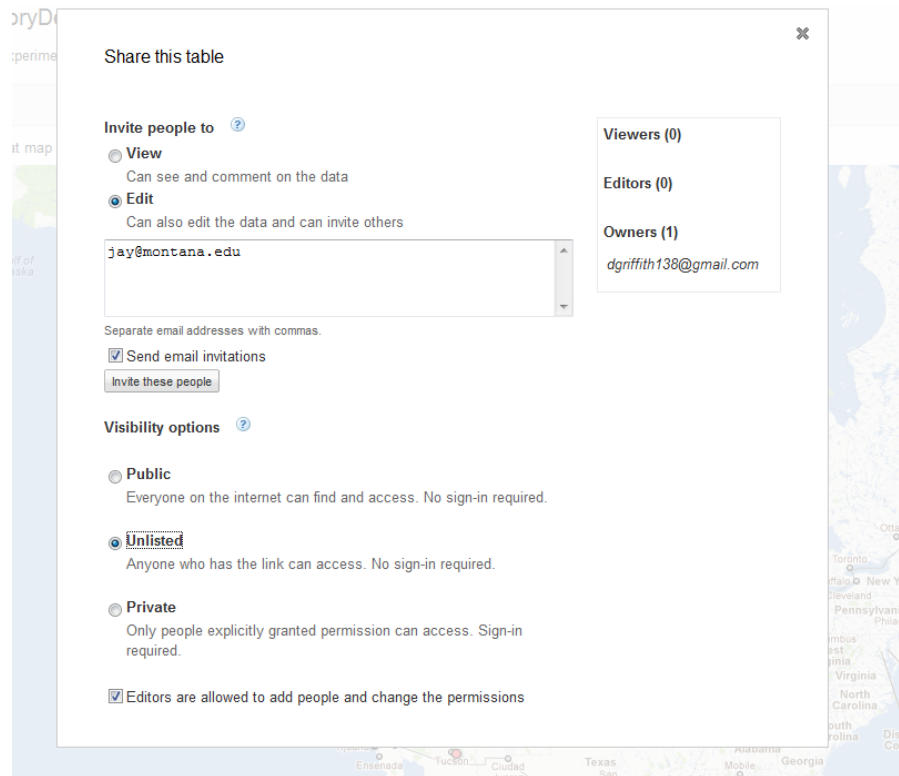
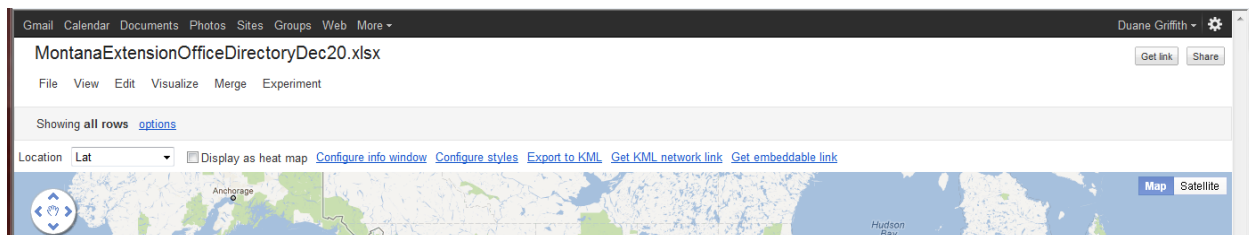
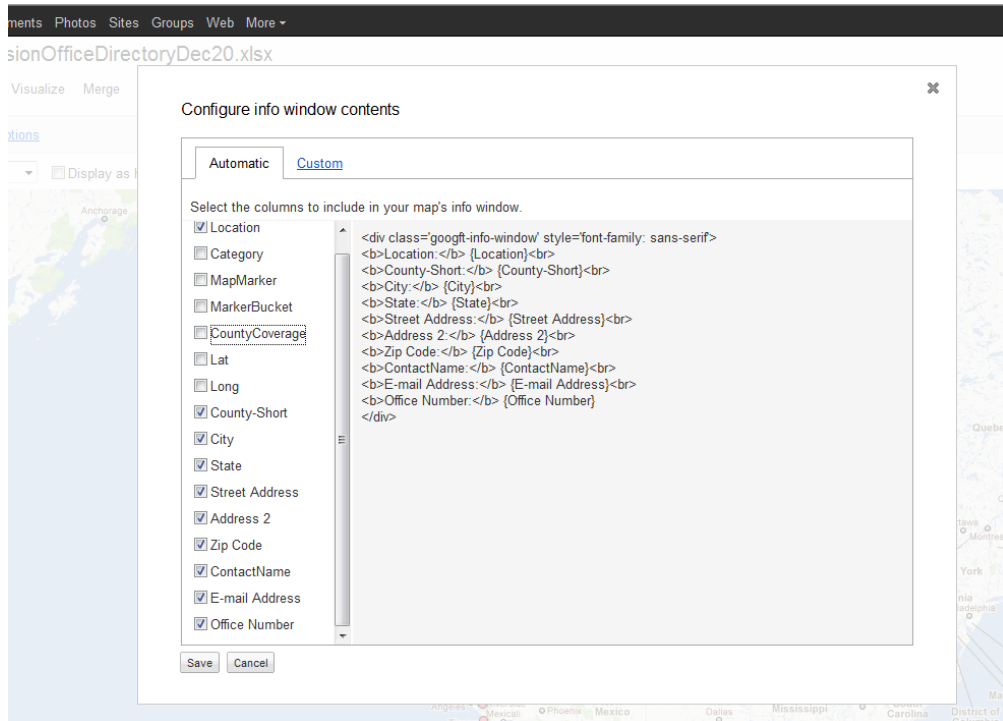


Figure 15.



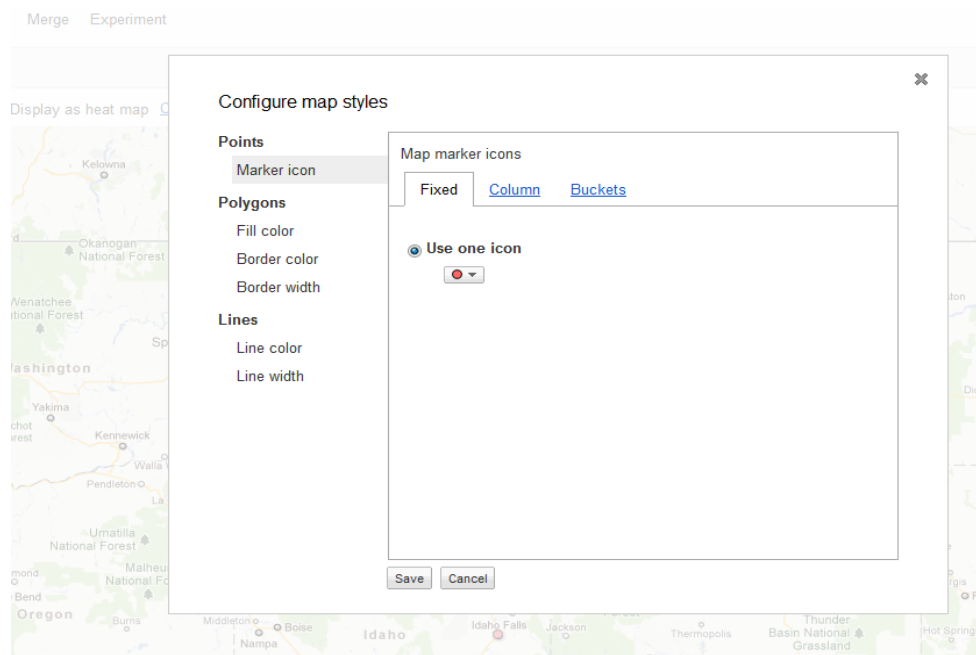
- vii. To start customizing your map display, to the extent that Google Fusions tables allows, click on the [Configure info window](#) link shown in Figure 15. This allows you to select the columns that are displayed in the popup window when you click on one of the red dots. Selecting the information included is a simple click to activate or deactivate information in a column. Figure 16. Click **Save** to exit.
1. Note that the popup window is configure by html code shown on the right hand edge of the screen, which means you can have a great deal of control over how the popup looks if you move from Google Fusion tables to the Google API.

Figure 16.



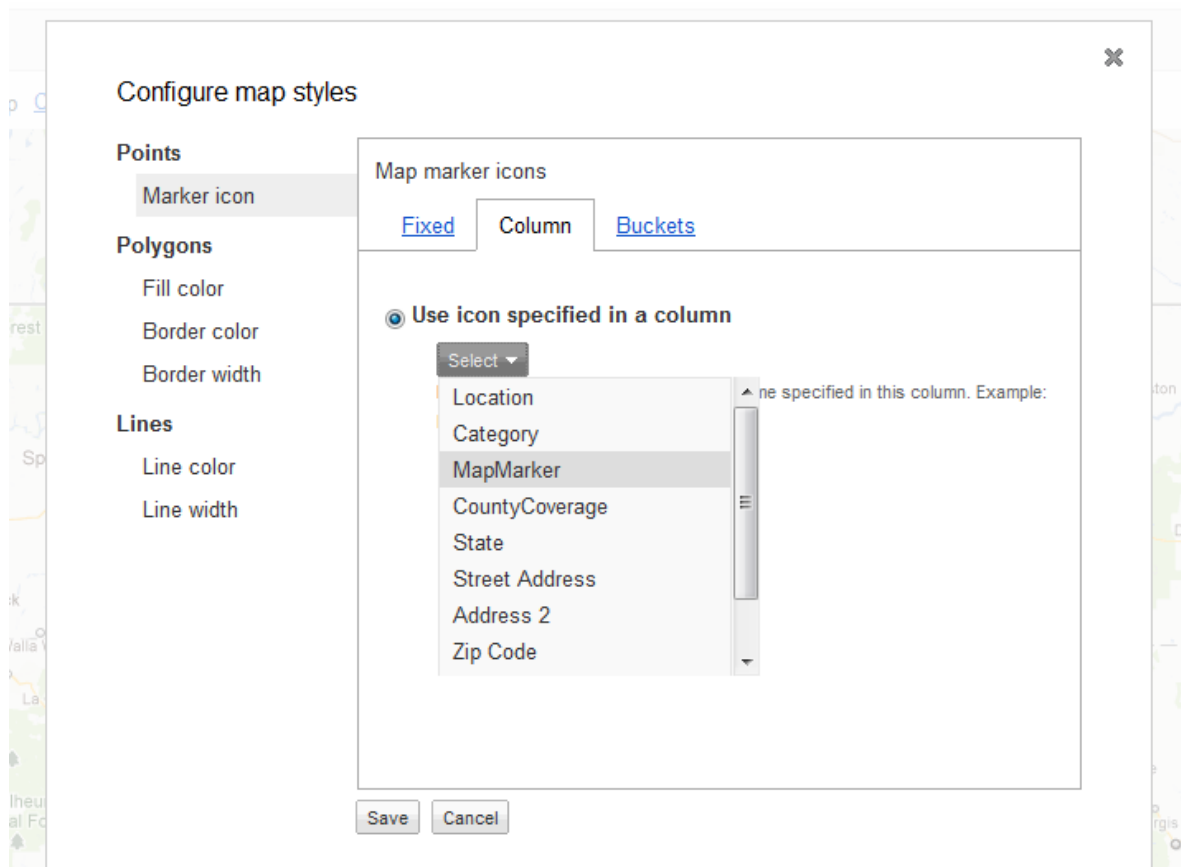
- viii. When the info window is configure, click on [Configure styles](#). This popup window allows you to change the “markers” placed on the map, which defaults to little red dots, Figure 17.

Figure 17.



- ix. The popup shown in Figure 17 contains both a menu of things to change on the left hand edge and a set of “styles” tabs to change how each menu item is displayed. This document deals only with the marker styles. If a one size fits all display fits your needs, you can leave the display as is, or you can at least change the type of marker displayed on the map. Click on the drop down arrow next to the small red dot.
- 1. The marker display chosen may depend on the intended final destination of this web site/app. In our initial efforts, we found that the small red dots were not sensitive enough to be used effectively on a smart phone screen. We switched to a set of bigger markers.**
- x. The second tab allows you to select a column within your Fusion Table that will change the map marker based on a label entered in this column. See Figure 8, the column labeled MapMarker. Also refer to the handout or Excel spreadsheet containing the original data. Click on MapMarker to specify the column, Figure 18.

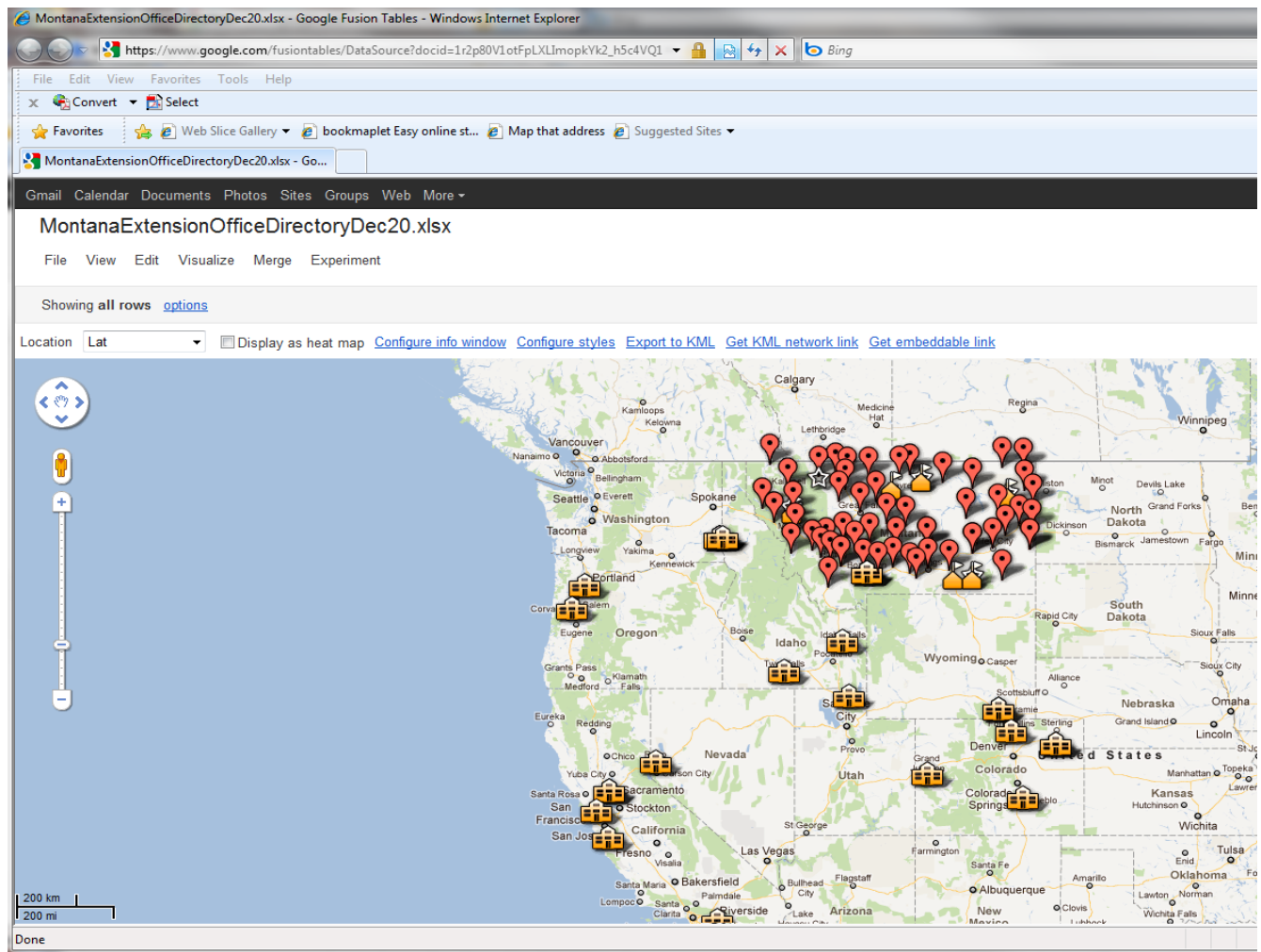
Figure 18.



- xi. To learn more about map marker options and procedures use this link.
<http://support.google.com/fusiontables/bin/answer.py?hl=en&answer=185991>
This link is also available within Fusion tables. After you click on the MapMarker column, Figure 18, the display will change and there will be a [Learn more](#) link on the screen just below the box that displays MapMarker as the column selected.

- xii. The last tab on the Configure styles popup is labeled Buckets. This tab allows you to select a color scheme for the map markers using a column in the spreadsheet. See Figure 8 and Figure 9. The column labeled MarkerBucket, not completely displayed in Figure 8, is a set of numbers assigned to a particular category of data. You can categorize the data however you wish. In this example, Montana Agents were all assigned the number 10 in the Fusion table before it was uploaded. Reservations were assigned the number 25 and Tribal Community Colleges were assigned the number 35. The Western Extension Committee members were assigned the number 45. **Note that the Bucket marker style was not used in this map**, but an allowance was made in the data by adding a column of numbers that could be used. You can specify how many categories your data has and select a marker for each category = Bucket.
- xiii. Your map display should now look like Figure 19.

Figure 19.

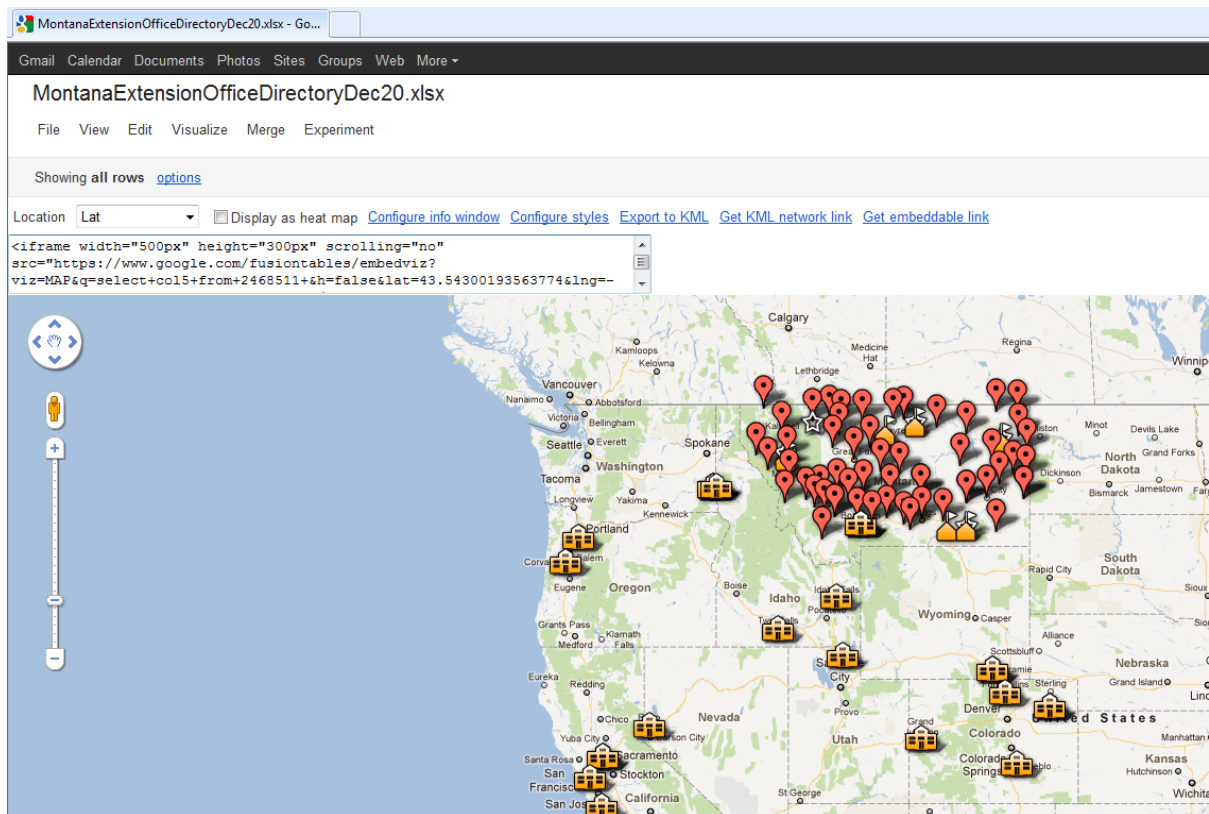


7. KML options listed in the Visualize>Map mode as shown in Figure 19.
 - a. There are two KML options listed that allows the user to generate a “packaged code” that can be distributed in a single file with a KML extension, [Export to KML](#) or listed on a network, [Get KML network link](#). These allow the distribution of this information in Google maps and Google Earth. An individual file, [Export to KML](#), can be shared with users via email, web link etc. and the user then loads the KML file, into Google Earth for example, and the original Fusion table data is displayed in Google Earth, or Google Maps as the user wishes.
8. The [Get embeddable link](#) option produces a snippet of code that can be cut and pasted into an existing web page. If you click on this link, the display changes to show the link source code, Figure 20. The source code shown in Figure 20 is also is shown directly below. When you embed this code into an existing page, you can change the size of the display from the default of 500 x 300 to as large as you wish. The code snippet below generates a window within a web site.
Important Note: Google uses the image as displayed on the screen before you use the [Get embeddable link](#) option as a reference point, for how it displays your map. You should “center up” and scale the display on your computer to look like what you want the end user to see when the map is loaded for them the first time.

Source Code snippet:

```
<iframe width="500px" height="300px" scrolling="no"
src="https://www.google.com/fusiontables/embedviz?viz=MAP&q=select+col5+from+2468511+&h=false&lat=43.54300193563774&lng=-110.19879064999998&z=5&t=1&l=col5"></iframe>
```

Figure 20.



9. Another option to get a shareable link is to use the **Get Link** button in the upper right corner. This button provides a different http address than the [Get embeddable link](#) menu item and the display utilizes the entire browsers window space, which you may or may not like. Figure 21 and Figure 22.

Figure 21.

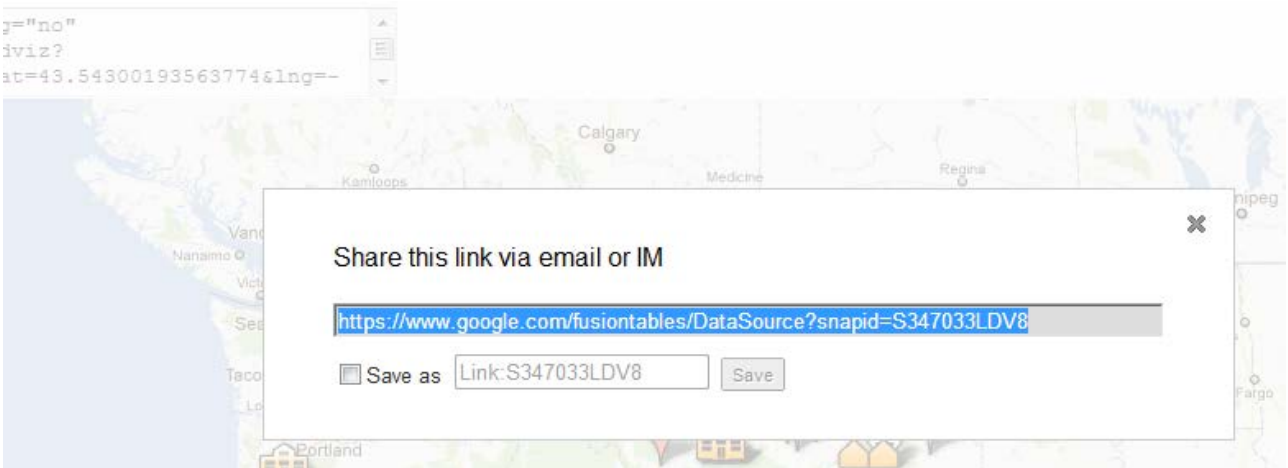


Figure 22. Using the **Get Link** button and pasting the link into a browser. Note that this link puts you back in the Fusion tables menu. This may only work for people who you have Shared this table with.

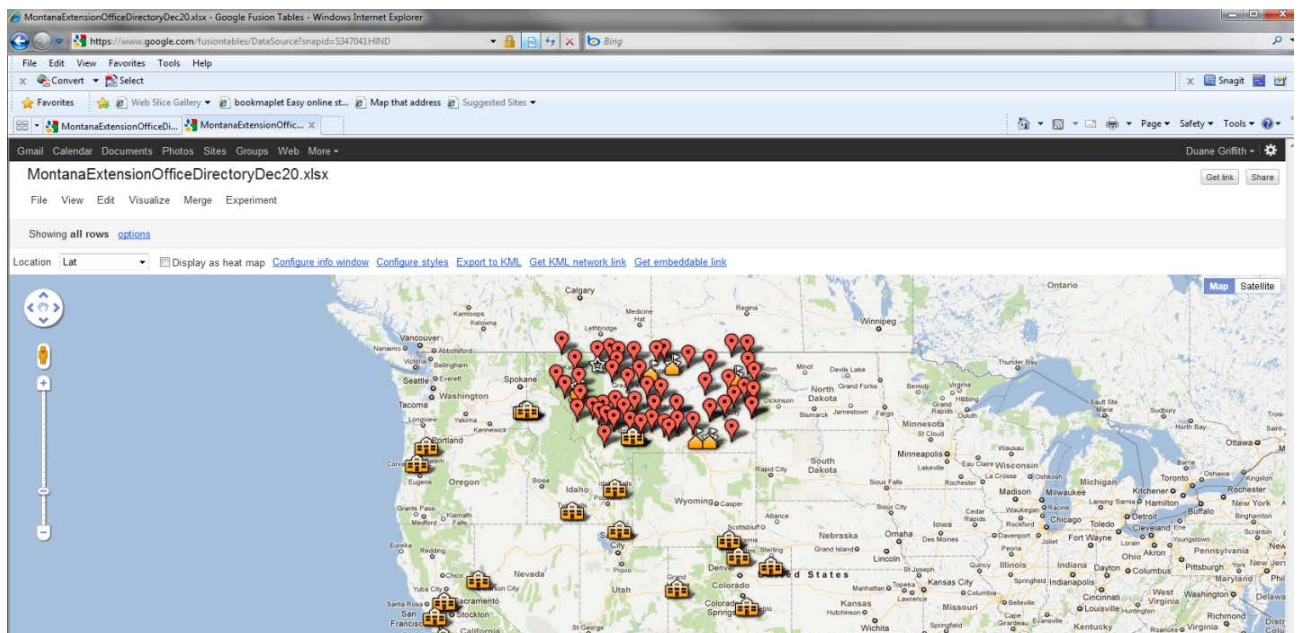
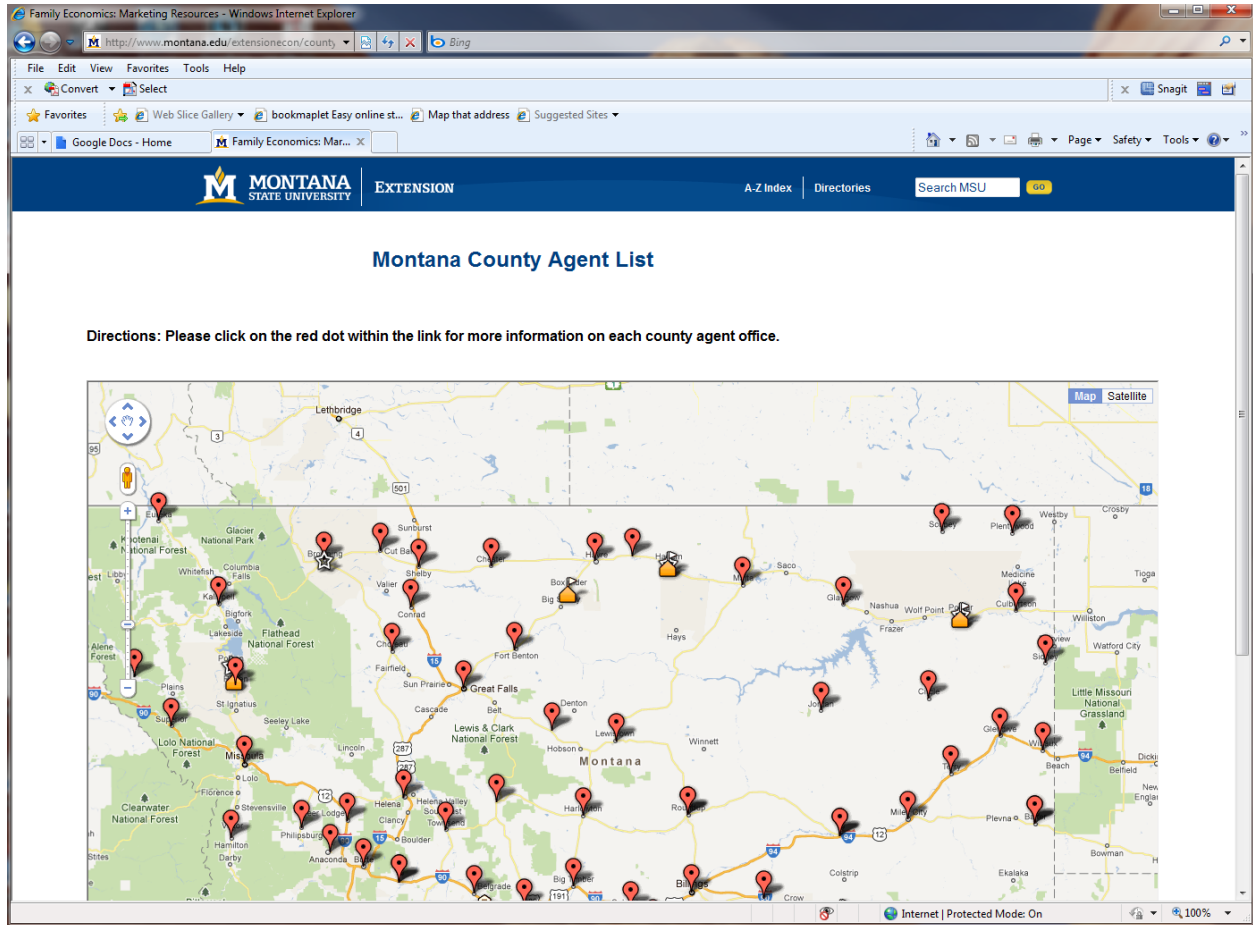


Figure 23. Used the snippet code and changed the scale to 1000 x 800. Link to this site is <http://www.montana.edu/extensionecon/countyagentlist.html>



10. What happens if **you do not have Lat and Long numbers** for each row/point.
 - a. As mentioned previously, Google Fusion tables recognizes several types of location information. For example, Google recognizes and will use State, County and City names as well as Physical street Address, as "Location" information. If these are contained in separate columns when you upload a file, you can identify the columns with this information as Location type columns. After you have set up your table using the process just described in 4a through 4s, save these settings and you will be taken back to the "Table View."
 - b. The next step is to use the Visualize>Map menu sequence and Google will automatically geocode all of your with the information your provided, to the best of its ability.
 - c. **OR**, use the geocoding site <http://www.findlatitudeandlongitude.com/>

I always sign out of my Google Account when done. Click on your name, displayed in the black bar, right hand edge, Figure 22, and then click Sign Out.

Appendix A:

Software and/or Tablet and Smart Phone Apps Development Outline

A) Description of App and/or “problem/market need” it addresses:

Target Audience:

Potential applicability (geographic area of distribution):

Estimated audience size, your (_____) Lowest and (_____) Highest:

B) Data Source(s):

Describe data	Agency, organization, contact person, etc.	Data is Static ¹ or Dynamic ²
¹ Updated infrequently: weekly, monthly, annually, periodically ² Updated, real time, daily, weekly...		

C) Analytics: Describe what is to be done with the data/information:

D) Describe results:

E) Recommended technology:

F) Possible partner agencies and organizations:

G) Required resources: