Wildfires in California

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Introduction

The concern with wildfires and their consequences are increasing each year. Every year millions of dollars are spent to prevent, reduce, and combat wildfires. From that, the GIS can be useful to study the wildfire phenomenon, and behavior. Thinking in this use, we decided to map all the wildfires incidents that occurred in California, between January 1st and October 31st 2014 through the ArcMap software. All these occurrences were based in a data collected on Incident Information System (InciWeb), a website from National Wildfire Coordinating Group. From that, we can have a better notion about the wildfire behavior, seasonality, intensity, distribution, and study measures to mitigate them.

Methods

The following steps were taken to do this project:

1. Set up and project folder structure;
2. Acquire the data, from the website, Incident Information System (InciWeb);
3. Project the data to North American Datum 83 (NAD 83) Tale Albers, that will be more appropriate for analysis in the state of California;
4. Add the XY data, that contains all the coordinates of the wildfires;
5. Create a shapefile from the XY data added;
6. Define the Geographic Coordinate System of the shapefile XY data, that will be World Geodetic System 1984 (WGS 1984);

7. Project the shapefile XY data with the points of wildfire to NAD83 Tale Albers;
8. Do the buffer for all the wildfires points using the values of radios;
9. Observe with some of the buffer intersect;
10. The wildfire points were numbered according to their ID;
11. The distance between a specific incident to others wildfires points were measured;

Results

Following are the tables, and the maps showing the outbreaks of wildfire and then the radius of each fire. The table 1 contains a summary of the main information necessary to do a quick analysis about the incidents. The table 2 shows incidents selected randomly to observe the distances between the wildfires outbreak, and possible interconnection.

The image 1 shows all the points were a wildfire happened, and in the figure 2 we zoom on the wildfires to see the radius of each one. The purpose of the buffer was to see if the fire's radius will be intercepted. As we can see come fire's radius are so small that even appears on the map, just a few ones are bigger enough to see from this scale. Finally, the image 3 shows us the wildfires incidents, and counties with their respectively identification.

Number	County	Latitude	Longitude	Cause	Fuels involved
1	Siskiyou	41,796	-123,374	Lightning	Timber
2	Riverside	33,779	-116,566	Unknown	NA
3	Mariposa	37,687	-119,742	Unknown	Chaparral
4	El Dorado	38,782	-120,604	Arson	Timber
5	Trinity	41,145	-122,81	Unknown	NA
6	Siskiyou	41,682	-122,127	Lightning	Timber
7	Siskiyou	41,268	-123,002	Unknown	Timber
8	Siskiyou	41,93	-122,869	Lightning	Timber
9	Mariposa	37,675	-119,783	Unknown	Chaparral
10	Mariposa	37,712	-119,509	Lightning	Timber
11	Alpine	38,59	-120,028	Lightning	NA
12	Orange	33,748	-117,601	Unknown	Chaparral
13	Kern	35,726	-118,479	Unknown	Grass, Oak, Brush
14	Siskiyou	41,523	-123,164	Lightning	Timber
15	Shasta	40,72	-121,562	Unknown	Timber
16	Los Angeles	34,233	-117,750	Unknown	Brush
17	Los Angeles	34,267	-117,867	Unknown	Chaparral
18	Madera	37,275	-119,337	Human	Timber
19	Modoc	41,507	-121,266	Lightning	Grass, Brush
20	Shasta	40,901	-121,368	Lightning	Brush
21	Tulare	36,214	-118,532	Unknown	Timber
22	Kern	35,703	-118,620	Unknown	Manzanita, Oak
23	Fresno	36,824	-118,579	Human	Mixed-conifer forest
24	Kern	35,642	-118,148	Unknown	Timber
25	Plumas	39,868	-120,200	Unknown	Grass, Brush
26	Kern	35,717	-118,550	Unknown	Timber
27	Modoc	41,888	-120,790	Lightning	Grass, Brush
28	Modoc	41,467	-120,93	Unknown	Grass, Brush
29	Trinity	40,408	-123,239	Unknown	Unknown
30	San Bernadino	34,176	-117,538	Illegal Campfire	Grass, Chaparral
32	Siskiyou	41,182	-122,354	Unknown	Brush
33	San Diego	32,814	-116,493	Unknown	Brush
35	Los Angeles	34,159	-117,843	Campfire	Low fuel moisture
36	Tehama	40,066	-121,764	Unknown	Timber

Table 1. The main information about the incidents, including the county, geographical position, cause, and fuels.

Siskiyou County		
Wildfire ID	Distance	meters
7	1	66.305,75
	6	86.391,09
	8	74.260,60
	14	31.373,48
	32	55.210,32

Modoc County		
Wildfire ID	Distance	meters
19	27	57.965,805
	28	28.441,97

Modoc County		
Wildfire ID	Distance	meters
15	20	25.920,29

Kern County		
Wildfire ID	Distance	meters
13	22	12.996,81
	24	31.347,71
	26	6.493,63

Table 2. Comparative between a specific incident, and distances to others incidents around it.

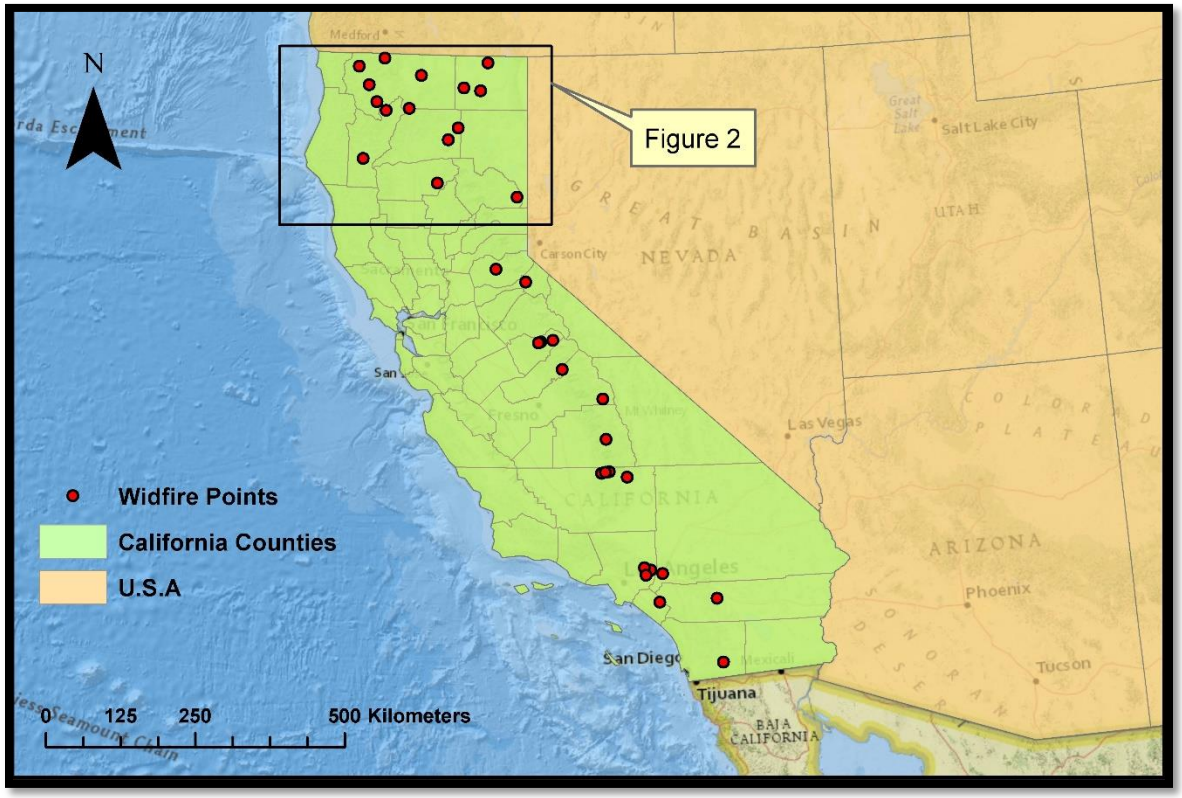

Figure 1. Distribution's map of fire in the state of California. (Source: Incident Information System; NAD 83 Tale Albers.)

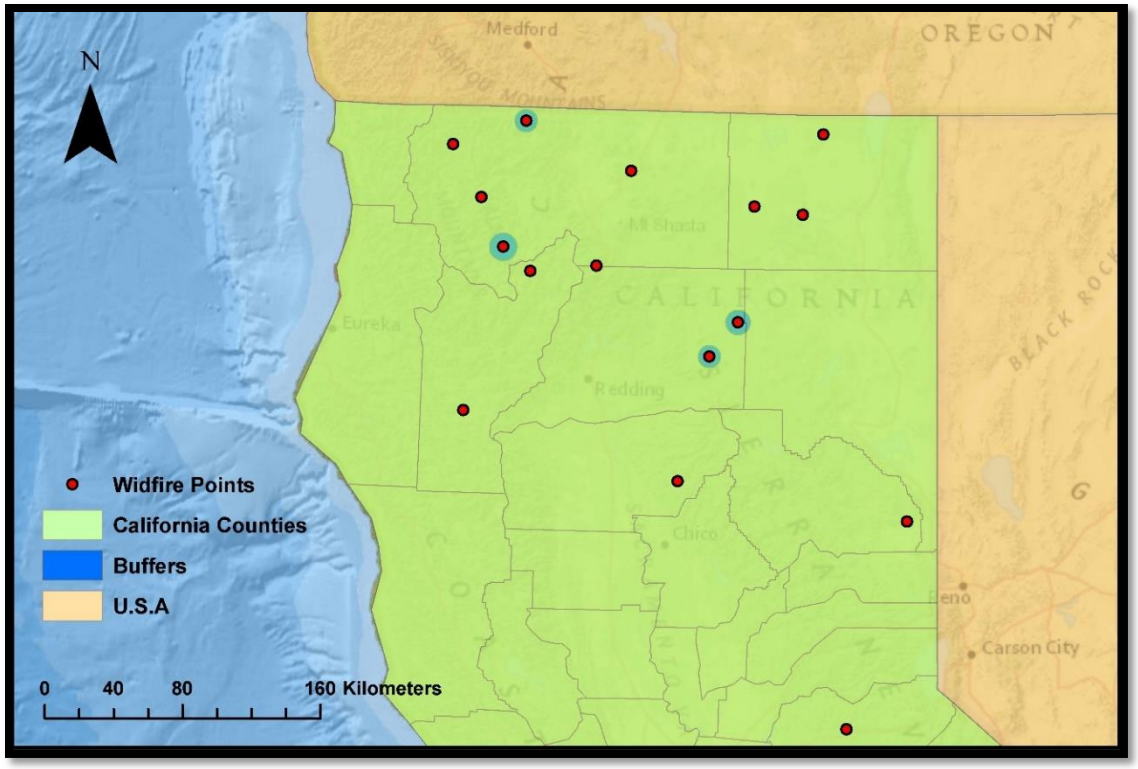

Figure 2. Map showing the buffer of the wildfires. (Source: Incident Information System; NAD 83 Tale Albers.)

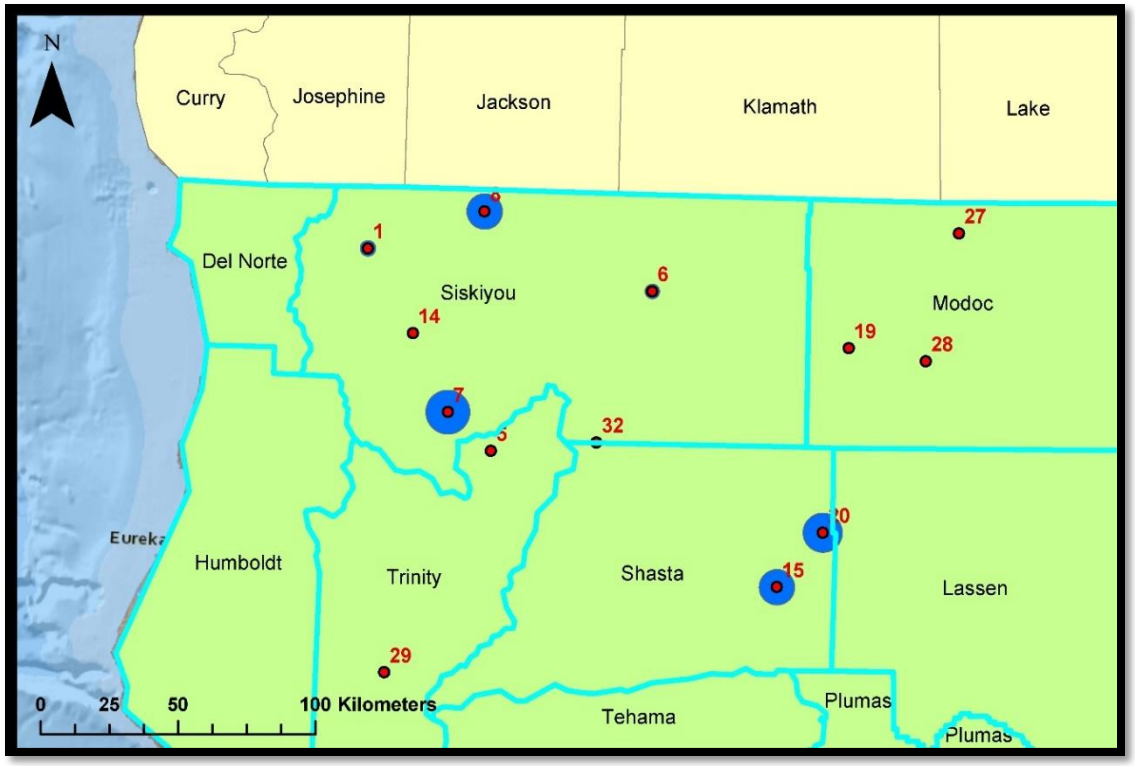

Figure 3. Map showing the wildfires ID (Source: Incident Information System; NAD 83 Tale Albers.)

Conclusion

Based in the data collected from the InciWeb, it is possible to conclude some facts. The incidents involving wildfires in the state of California are concentrated in majority in the inner, far from the ocean. It is explained, by the fact that are areas with rain cycle more irregular, and dry seasons. Furthermore, it is possible to notice that the northern region of California has a great concentration of incidents. It happens, because, the forestry industry activities provide a considerable amount of debris that are a good source of fuels. Finally, some cases came from human activities or are under investigation.

One more time, the GIS and the ArcMap software were useful to analyze, and understand the wildfire behavior in the California. Because, in the InciWeb site, it is possible to visualize just one occurrence at a time. Here, we gather all the relevant information at the same place, and we could study in a quick way the wildfires.

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