Distribution of Mule Deer Habitat in Humboldt County

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17 NOVEMBER 2014

Abstract

Deer hunting in Humboldt County, California, is restricted to the B Zone, as designated by the Department of Fish and Wildlife. However, desirable habitat for mule deer within the various subcategories of the B zone is limited. GIS data analysis was used in order to determine the location and area of desirable mule deer habitat in Humboldt County. Desirable mule deer habitat was determined by areas within 500 meters of water and important mule deer vegetation including Ceanothus, manzanita, and oak. These areas had to be on lands designated as "public" in order to be considered huntable lands. The resulting analysis determined that there is a total of 334km2 of desirable mule deer habitat within Humboldt County that can be hunted on. The majority of this land is in the B1 zone. This zone also has the highest chance of success in comparison to the other two B zones in the county, the B2 and B4 zone. The B2 zone has the lowest total area of suitable hunting are, but has the second highest success rate for the county. Comparing suitable hunting area to current deer blind locations, it can be seen that the blinds do not fall within the desirable habitat generated by the analysis, but are very close, indicating a possibility of success if one were to use these blinds.

Introduction

Deer Hunting in California can be quite a challenge depending where you are. Cesar and Bobby went hunting in the B zone during the fall of 2014(Figure 1). They only saw three deer, none of which were legal to take. This presented a problem. They wanted to shoot a buck, but were not able to find one. This was a problem that could be solved through the use of GIS and data analysis to find optimal deer habitat within each of the hunting zones in Humboldt County

There are multiple areas within California that you are able to hunt Deer which are divided into zones (Figure 1). The zones that include hunting in Humboldt County are the B1, B2, and B4 zones, shown in (Figure 2).

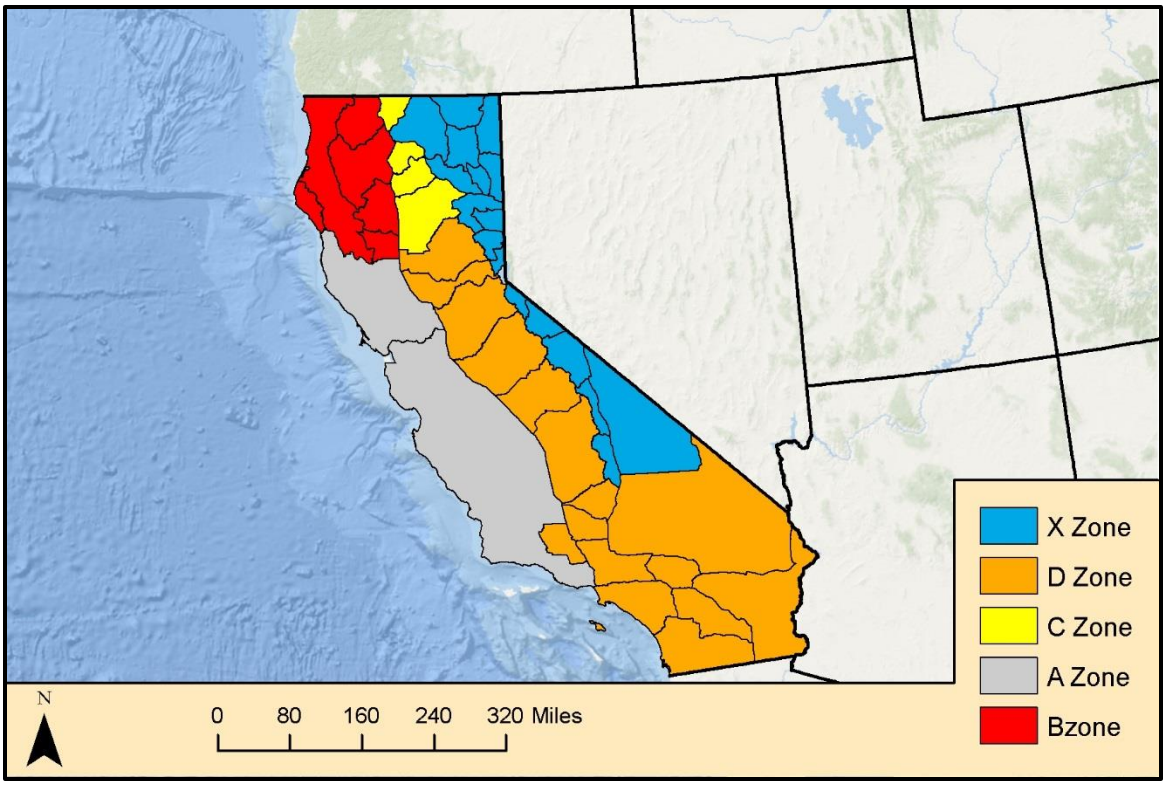

Figure 1. The Deer Hunting Zones of California

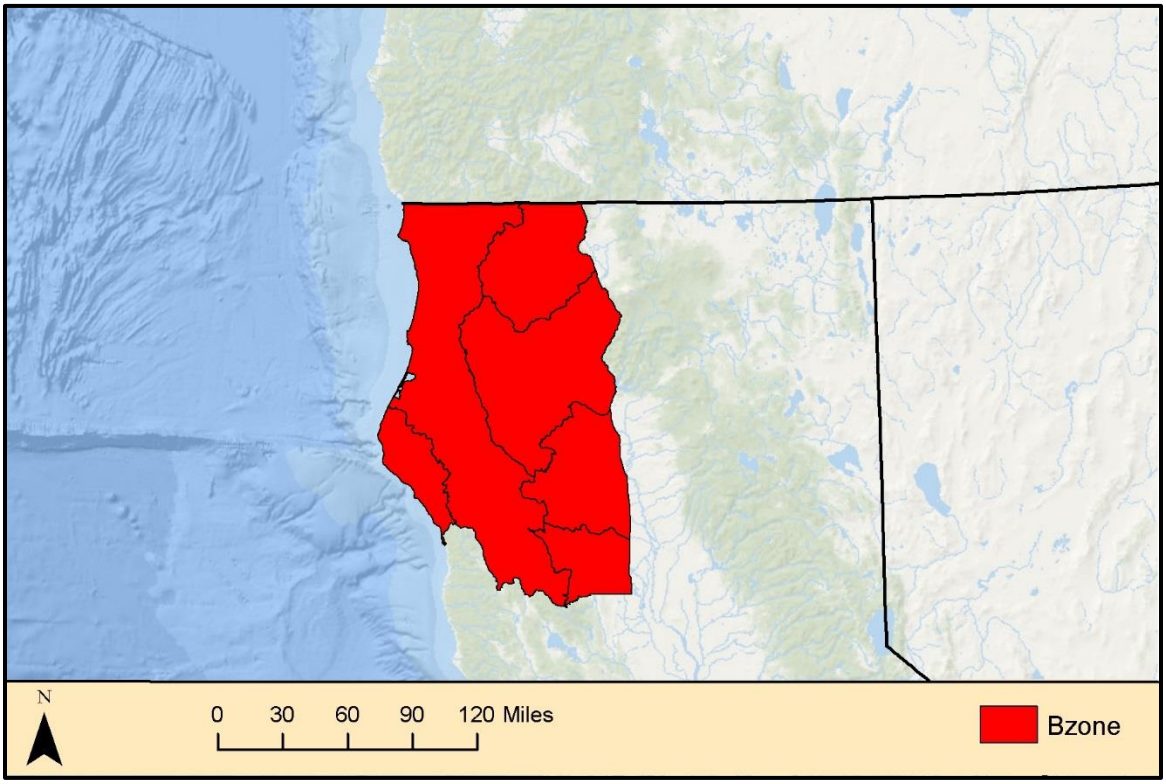

Figure 2. The deer hunting B Zone of Northwestern California.

The B zone is all inclusive, meaning if you have a tag in any of the B zones (B1-B6) you can hunt in any B zone. There are more tags available for this area than anywhere else in California. Those combined factors might seem like instant success until you look at the success statistics for the 2013 Hunting Season (Table 1).What are all of the success rates measuring? What is the difference in reported and estimated kills? I would just include “total tags” “tags per zone” “kills per zone” “success rate by zone”

Table 1. Kills within each B Zone for 2013.

Zone	Kills reported in 2013	% of B zone kills	% Chance of success
B1	1070	33.1%	3.06%
B2	938	29.0%	2.68%
B3	305	9.42%	0.87%
B4	152	4.70%	0.03%
B5	307	9.48%	0.88%
B6	463	14.3%	1.32%
Total	3235	100%	9%
Total tags Issued	34997		
Total Success Rate	9%		

Of all the tags issued by the Department of Fish and Wildlife, only 9% were filled. The following pie chart shows the tags filled (mule deer killed) in each of the six B zones.

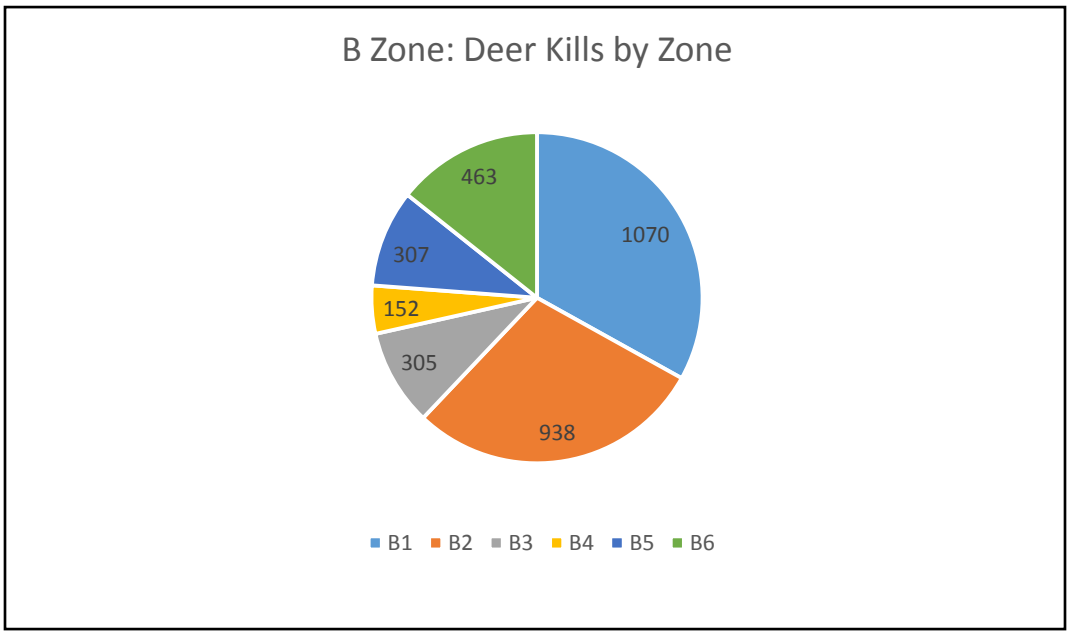

Figure 3. Number of tags filled by zone.

Luckily for us, the deer zones with the most bucks harvested occur through Humboldt County, as well as the zone with the least. These zones are represented in Humboldt County in Figure 4.

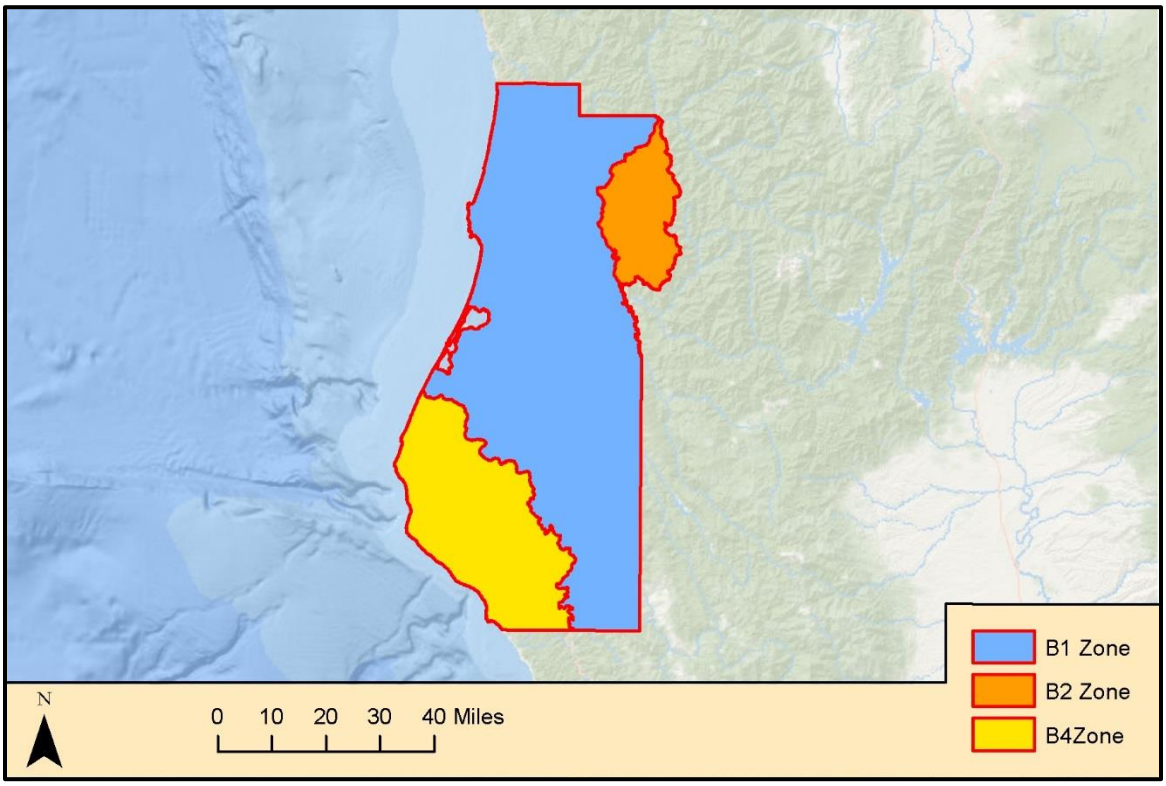

Figure 4. Deer zones within Humboldt County.

Methods

Data for analysis was first obtained by digital download from a variety of sources including The US Forest Service, US Geological Survey, The Humboldt County GIS data hub, and the California Department of Fish and Wildlife website. Data quality was verified, and any alterations were made in ArcMap version 10.1 (Esri, inc.). The first step was to project all of the data into the same spatial reference. All data was projected into the North American Datum 1983, Universal Transverse Mercator Zone 10 North (NAD83 UTM Zone 10 North).

Lands designated as “Public” were first selected from a land use layer for Humboldt County. A new layer was then created from this selection, and called “Public Land”. Layers for the B1, B2, and B4 hunting zones were loaded in, and then clipped with a Humboldt County outline layer. This produced a new layer of the area covered by the three B zones in Humboldt County. This new B zone layer was then intersected with the previously created “Public Lands” layer to produce a new layer which displayed the public lands within the three B zones, and was called “PublicLands_BZone”.

A streams and waterways layer for Humboldt County was loaded next. Streams equal to or greater than 1.5Km were selected from the attributes table, and a new layer containing only these streams was created. This selection was made to exclude seasonal streams from our analysis. The new

streams layer was then buffered to 500 meters on either side of the streams. This was done because deer will generally remain near a water source. The new layer was called "Streams_500mBuffer". This layer was then clipped with the "PublicLands_BZone" layer to produce a layer that contained the buffered waterways within the "PublicLand_BZone" area. This layer was titled "Streams_BZone".

The next step was to include preferable vegetation to further narrow our search criteria. Deer prefer oak woodland habitat, and Ceanothus and Manzanita habitat. This is because these areas provide suitable food, and are relatively open allowing the deer to better access to shade intolerant shrubs for browsing. Two vegetation layers were loaded into ArcMap. Both of these layers combined covered the extent of Humboldt County. They were first clipped with the Humboldt County outline then both layers were narrowed down by selecting from their attributes tables only those areas with a dominant vegetation classification of "Ceanothus", "Manzanita", "Oak Woodland", and several other variations of these. Selection layers were created from this. The first vegetation selection layer was buffered to 500 meters. This was done to include the surrounding areas to the dominant vegetation areas. The buffers were then dissolved to create a single shapefile with all of the area designated as a single attribute. The "Erase" tool was then used to eliminate the areas of overlap between the newly buffered vegetation layer and the second vegetation selection layer. Once the overlapped areas were eliminated, the same process of buffering and dissolving was performed on the second vegetation selection layer. After this the two buffered layers were then merged and dissolved to produce a single layer representative of the area and surrounding area in Humboldt County with vegetation suitable for deer.

The final analysis step was to combine the vegetation layer and the "Streams_BZone" layer. The intersect tool was used to show only the areas occupied by both of these layers. These would be the optimal deer hunting grounds in Humboldt County. Total hunting area per zone was calculated, and the results are displayed in Table 2.

Results

As a quality check, four collected points of deer blinds in the B1 Zone were overlaid on the final hunting grounds layer. These points represent the areas found suitable for hunting prior to terrain analysis in ArcMap. While previous assumptions regarding the success statistics put us in the 2nd best area of Humboldt County, it is apparent that none of the constructed deer blinds fall directly into the prime deer habitat. That's not to say they weren't close, though. (Figure 5)

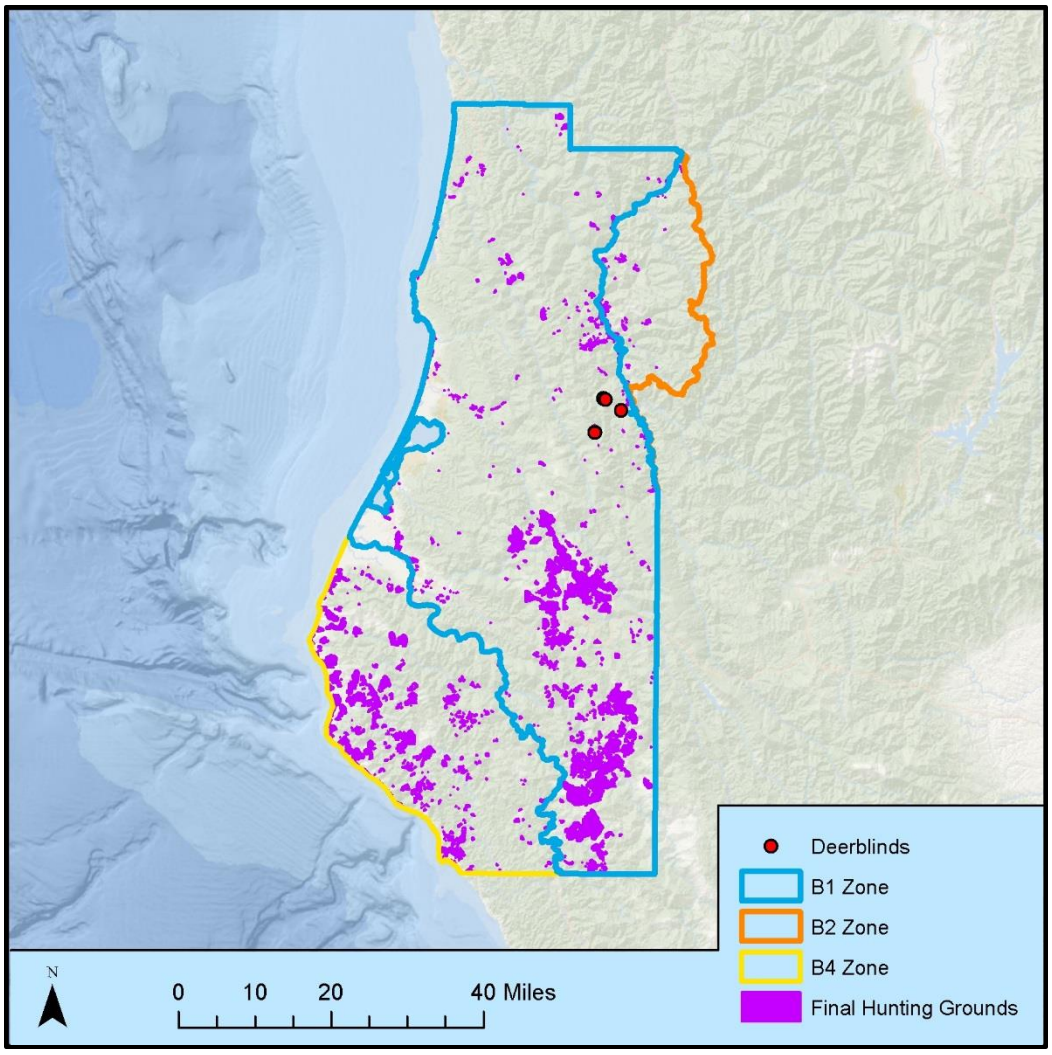

Figure 5. Previous Hunting Blinds in comparison to ideal mule deer habitat in the B Zones within Humboldt County.

Table 2. Summation of desirable Mule Deer hunting area in Humboldt County by Zone.

Zone	Area (Km^2)	Hunting Area (Km^2)
B1	6389	227
B2	790	5
B4	2098	102
Total	9277	334

Conclusion

The locations that were previously chosen for suitable hunting were just outside ideal Mule Deer hunting habitat. This was fortunate seeing as how sparse these areas are in the Eastern B1 zone, or the B2 zone in its entirety for that matter. Surprisingly though the B4 zone had much more suitable habitat (Table 2), but with a markedly inferior success rate. Unfortunately there was not enough data to distinguish how many of those successful harvests occurred within Humboldt County, and how many occurred in adjacent counties that shared the same zones. The relatively close location of the existing deer blinds to the ideal hunting area determined through the analysis suggests a level of confidence in the accuracy of the determined locations. Since the points representing deer blinds with confirmed kills are close to areas determined to be suitable deer hunting sites, it can be inferred that remaining area determined by GIS is also suitable hunting area.

Acknowledgements

Data for this study were provided by the Humboldt County GIS Department, Natural Earth, and the National Atlas. Funding, computer access and other facilities were provided by Humboldt State University. Thanks to Topoquest.com for properly georeferencing all digital graphic rasters. Special thanks to Microsoft PowerPoint 2010 and Microsoft Excel 2010 for all calculations used, as well as all graphs and charts done by the Microsoft software. Credit to ESRI for providing the software to create base maps. Thank you to the California Department of Fish and Wildlife for providing the Zone Success Rate for deer hunting in California.

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