

MTH 133

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Deer Hunting

ABSTRACT:

The first impression from the data received, was that the number of hunters in the state of Michigan were more than enough to manage the Michigan Deer population. However, when comparing the number of deer population, hunters do not seem to be having much impact. Because of this, a few different models were analyzed. First the percentage of Hunters by type of weapon they used to hunt Deer with, then percentage of harvest by type of weapon. Three control groups were used, number of Michigan Hunters, Michigan deer population between 1975 and 2005 and the number of deer harvest from the same time period. Also analyzed was the correlation between the number of deer harvested and the percentage change in the deer population per year since 1975 – 2005.

INTRODUCTION:

October marks the beginning of the most dangerous time of the year to be driving in Michigan. Not only is the Michigan weather hazardous at this time, but the abundance of deer activity is also a major contributor to many car accidents. Car accidents increase dramatically due to those two factors alone. It has been reported that there were nearly 59,000 car-deer accidents in Michigan in 2005. This would indicate that the deer population in Michigan is thriving.

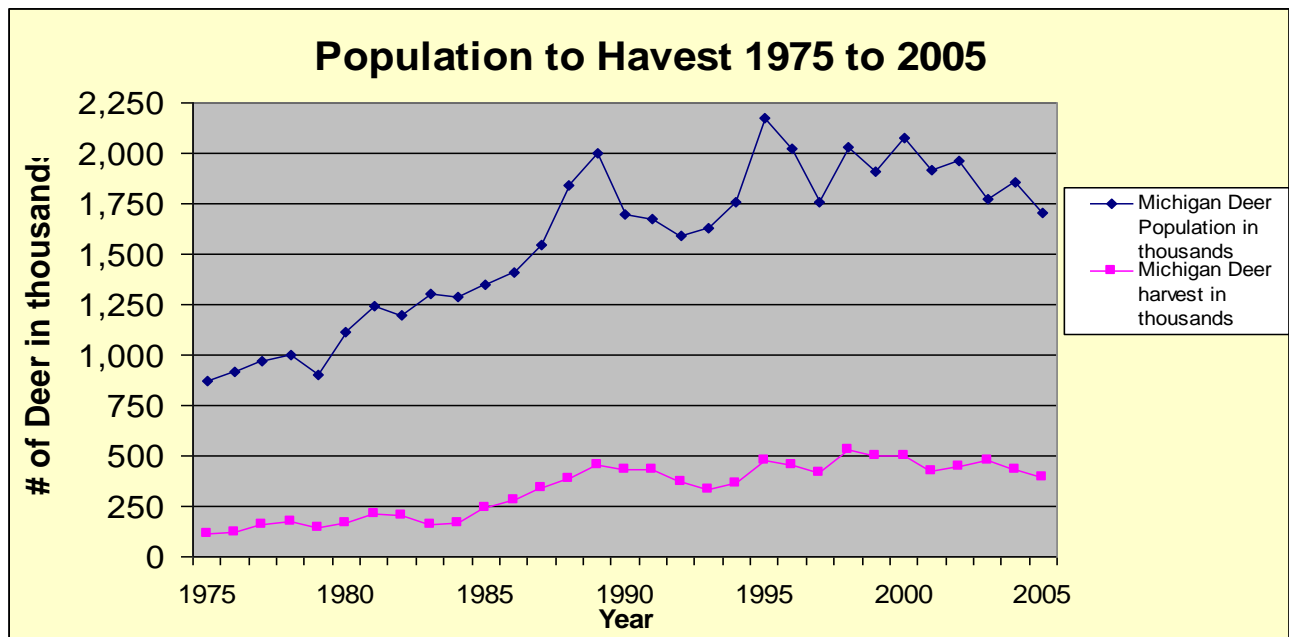
There was at one time however, that the population of Michigan deer was not so abundant, prior to the establishment of the Michigan Sportsman Association and the Michigan Department of Natural Resources the deer population in Michigan was nearly extinct.

Up until 1859 deer hunting was legal all year round. A law was passed to limit the hunting of deer to a seven month period. There was not a limit to the number of deer a person could kill, therefore the population of deer continued to dramatically decrease. Many deer were killed by means that would be considered “un-sportsman like” methods today. Market hunters slaughtered hundreds and thousands of deer each year to ship out of state for financial gain.

In an effort to increase the deer population in Michigan, deer hunting became illegal in the late 1890's through to 1920 in a third of Michigan's counties. Still, the population was not increasing. In the counties that hunting was still legal the harvest limit was again reduced, from five to three, then eventually down to one. Money collected from firearm taxes and licenses were invested into deer census, habitat development, and the employment of full time researchers. The initiatives paid off, by the middle of 1930, the increase in the deer population was visible.

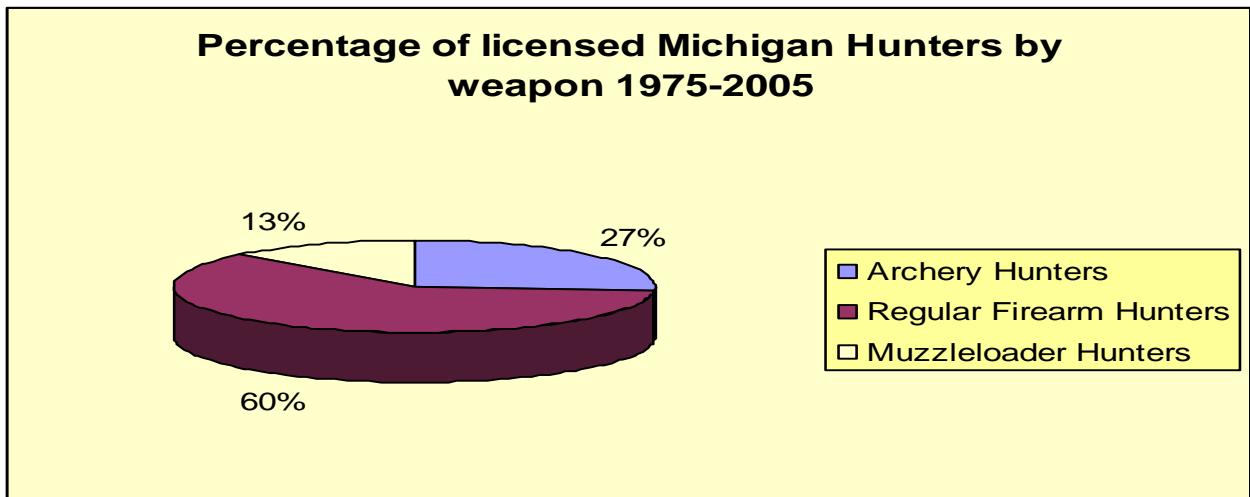
Prior to 1970, it was illegal to harvest a doe. The Department of Natural Resources determined that to escalate the reduction of deer herds in Michigan they would allow hunters to harvest antler-less deer. The first antler-less deer permits became available in 1970. However, the improvement and balance was not visible for ten years.

The chart below shows the population of deer in Michigan between 1975 thru 2005 with the comparison of the deer harvested during the same period of time.



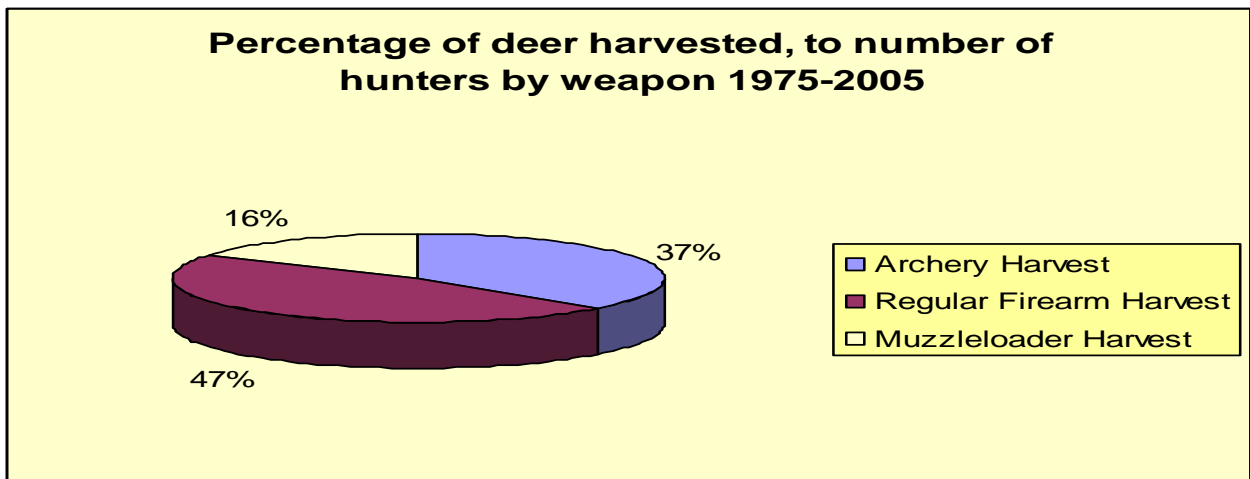
The number of deer harvested has increased by 29% between 1975 and 2005 where-as the population of deer in Michigan has increased by 51%. Therefore the Michigan deer population has recovered at a faster rate than the deer harvested.

The following chart shows the percentage of Michigan deer hunters by choice of weapon they use to hunt with.



Total Michigan hunters 25,058,419			
	Archery	Regular Firearm	Muzzleloader
Number of hunters	6,712,778	15,053,453	3,292,188
Percentage of total	27%	60%	13%

The chart shows that regular firearms are the most popular form of weapon. However we need to take into account that some hunters are captured in all three categories. Each weapon has to have a separate license, or a combo license can be purchase. Combo licenses cover all three weapons in one license, but, the hunter may not necessary use all three weapons.



Total Michigan Deer Harvested 10,297,168			
	Archery	Regular Firearm	Muzzleloader
Number of Hunters	6,712,778	15,053,453	3,292,188
Number of Deer harvested	2,528,189	7,240,230	528,749
Percent of deer harvested	37%	47%	16%

The information provided above reflects the percent of deer harvested, by the hunter's choice of weapon.

Due to the Department of Natural Resources planning and management efforts, the population of deer in Michigan had peaked in the year 2000. Unfortunately, the population has been declining steadily ever since. However, the number of deer harvested in Michigan has also decreased since 2000.

METHODS

The data used in this study was provided The Michigan Department of Natural Resources.

- Deer population (per thousand) of Michigan State.
- Number of hunters is calculated by the number of Michigan Deer hunting licenses sold.
- Deer Harvest calculated by number of reported deer kills, per year.
- The Harvest number does not include car-deer accidents, poachers and traps set by farmers to protect their crops.

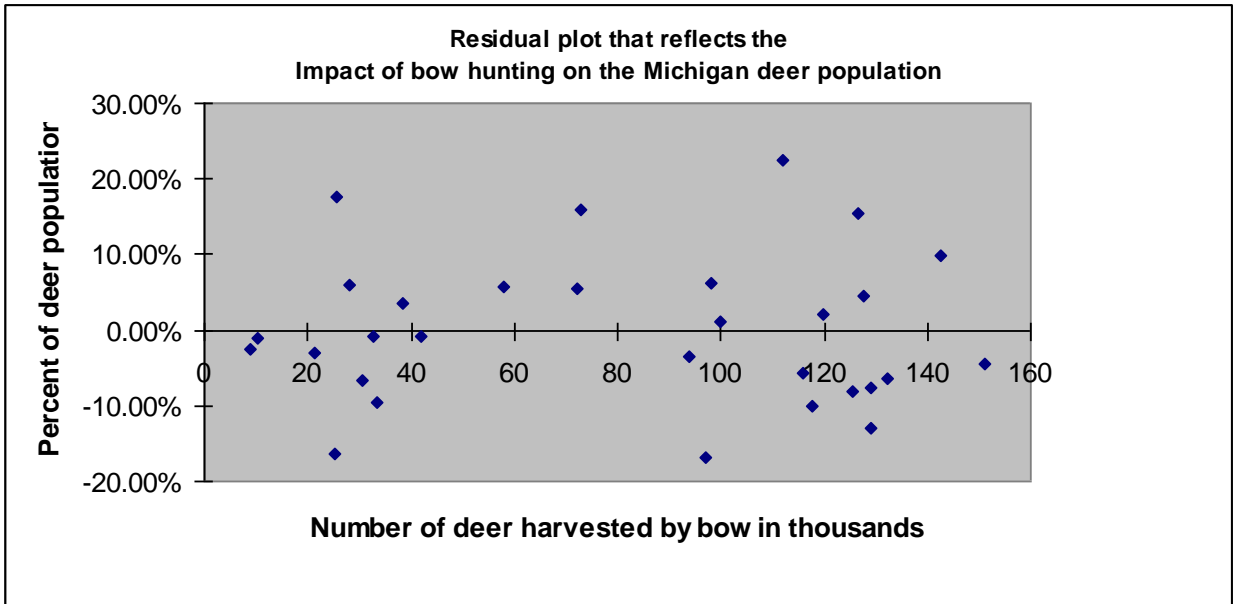
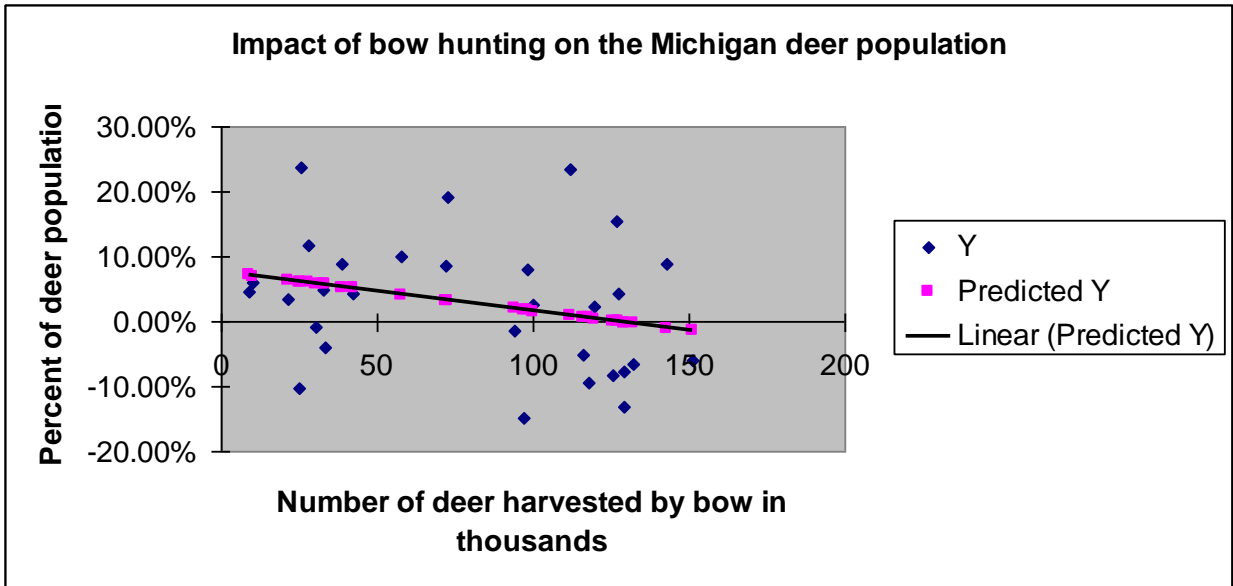
For the purpose of this paper was to discover if there is a strong correlation between the number of deer harvested and the percentage change in the deer population, using a linear regression.

Linear regression is used to find the linear correlation coefficient which is the measure of the strength of linear relation between two quantitative variables.

RESULTS

The results in the first part of this study showed that there is a negative impact by hunting on the Michigan deer population, from all of the weapons used. However, the Regression value indicates that there is not a very strong correlation. The summary of regression analysis using the Michigan deer population as the dependent variable and number of deer harvested by bow hunters between 1975 through 2005 as the predictor is shown below, followed by the variable line and residual plots that show the linear relationship.

<i>Regression Statistics</i>				
Multiple R	-0.27530418			
R Square	0.07579239			
Adjusted R Sq	0.04278498			
Standard Error	0.09956786			
Observations	30			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.07607422	0.0369447	2.05914	0.048891
X Variable 1	-0.00060501	0.00039926	-1.5153	0.140898

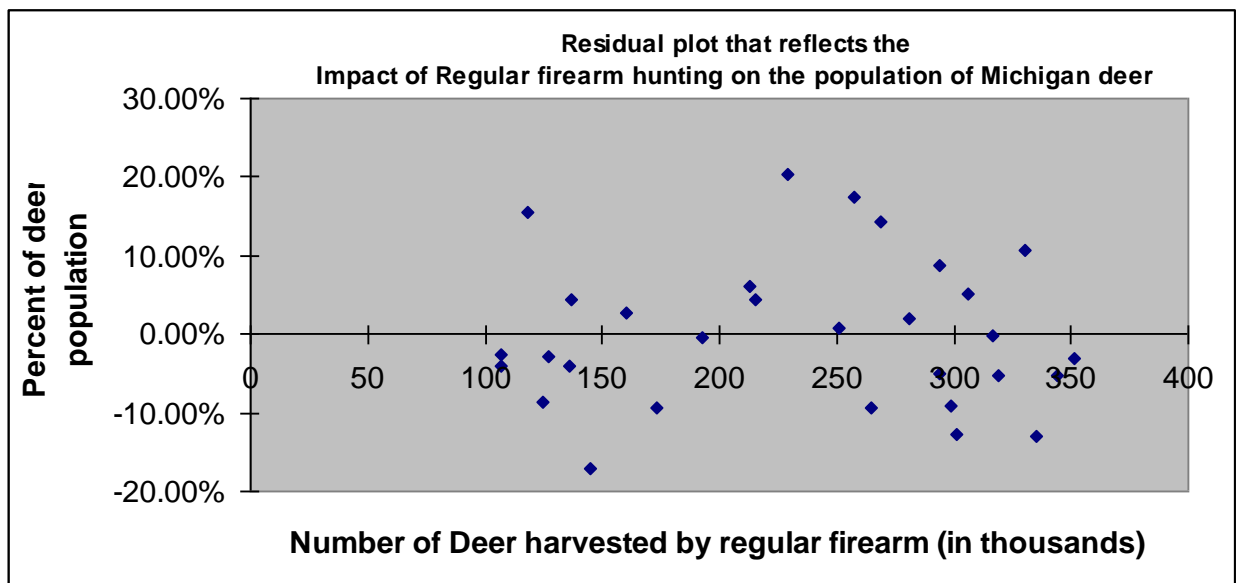
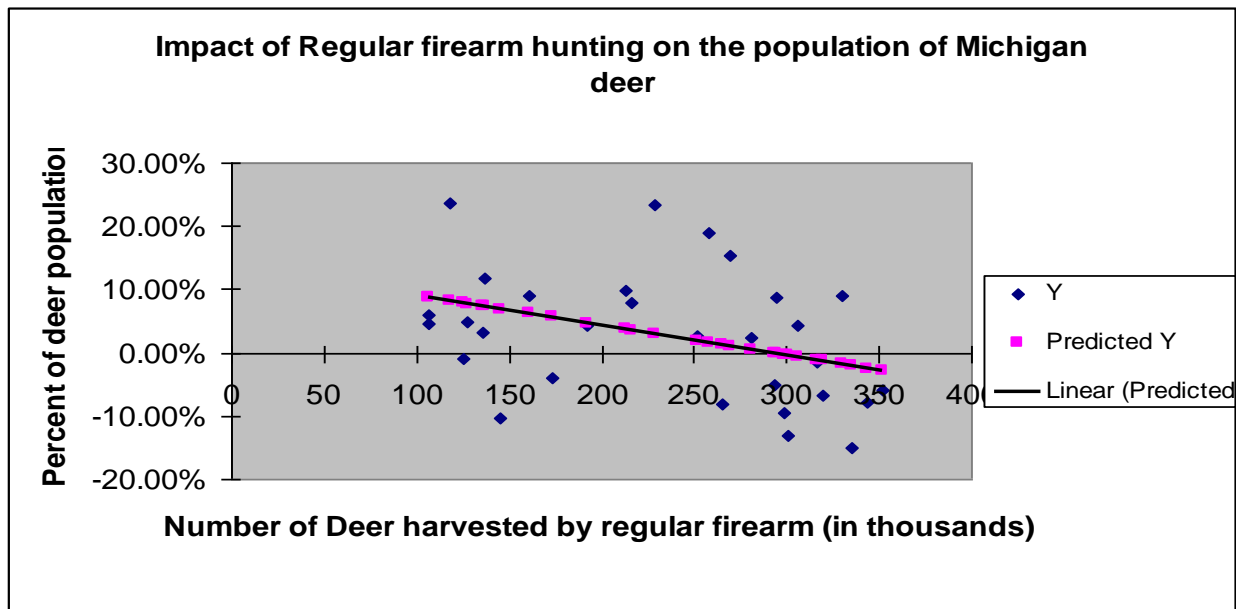


The residual plot of the impact of bow hunting on the Michigan deer population reflects a scattered pattern that indicates that there is a linear correlation. The strength of this correlation is measured by the “R” value, which in this instance is a negative $R = -0.275304$. Therefore, the relationship between the bow harvest and the deer population is not very strong. This could be because the bow season is the first hunting season of the year. Bow season generally runs between, Oct 1st through Jan 1st. Although this season is the longest of all of the hunting seasons, more skill and accuracy is needed to harvest a deer by bow.

The summary of regression analysis using the Michigan deer population as the dependent variable and number of deer harvested by regular firearm hunters between 1975 through 2005 as the predictor is shown below, followed by the variable line and residual plots that show the linear relationship.

<u>Regression Statistics</u>				
Multiple R	-0.37681879			
R Square	0.1419924			
Adjusted R Sq	0.11134928			
Standard Error	0.09593564			
Observations	30			

	<u>Coefficients</u>	<u>Standard Error</u>	<u>t Stat</u>	<u>P-value</u>
Intercept	0.136929990	0.053840392	2.54326	0.016791
X Variable 1	-0.00046971	0.0002182	-2.1526	0.040113



The residual plot of the impact of Regular firearm hunting on the Michigan deer population reflects a scattered pattern that indicates that there is a linear correlation. The strength of this correlation is measured by the “R” value, which in this instance is a negative $R = -0.376819$

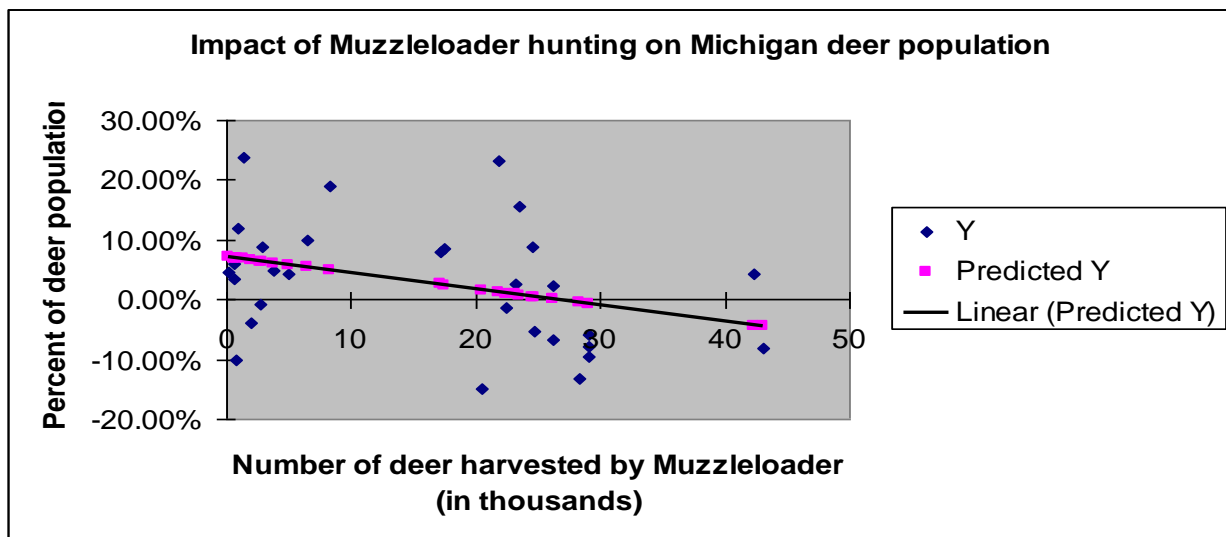
Therefore, the relationship between the Regular firearm harvest and the deer population is not as strong as other two weapons used to hunt.

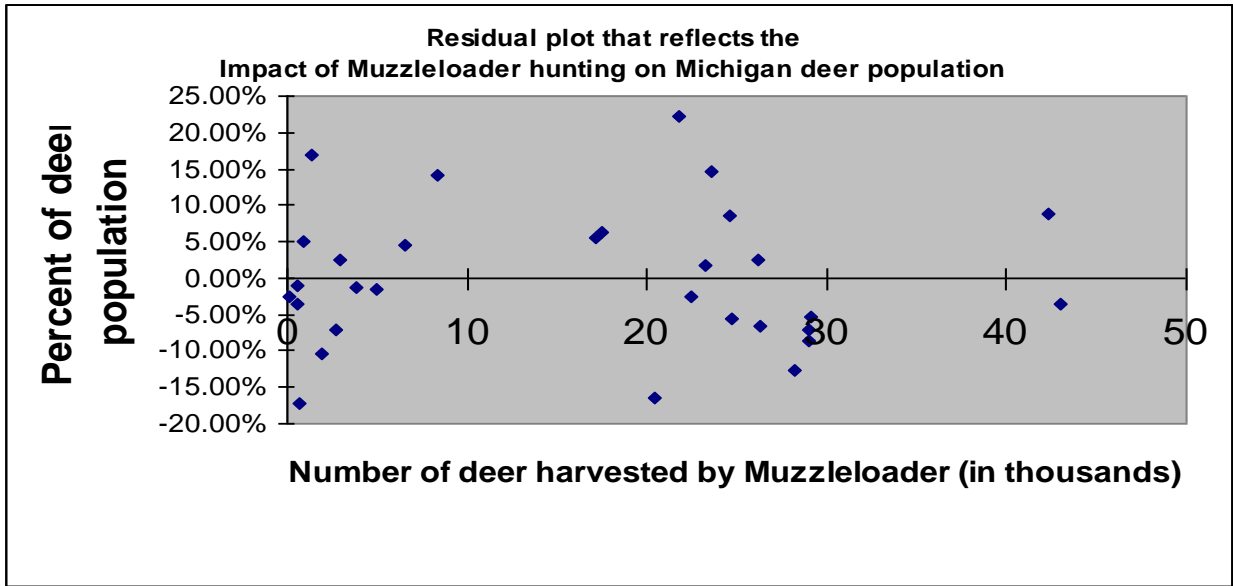
Regular firearms are only used for two weeks in November, then again for two weeks at the end of December through the 1st of January along with Muzzleloaders. The stronger relationship value could be the result of higher numbers of Regular firearm hunters and the time of the year they get to hunt.

The summary of regression analysis using the Michigan deer population as the dependent variable and number of deer harvested by Muzzleloader hunters between 1975 through 2005 as the predictor is shown below, followed by the variable line and residual plots that show the linear relationship.

<i>Regression Statistics</i>	
Multiple R	-0.350852377
R Square	0.12309739
Adjusted R Sq	0.09177944
Standard Error	0.096986231
Observations	30

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.071134273	0.028312	2.512513314	0.018025022
X Variable 1	-0.002714678	0.0013693	-1.98256647	0.057305601



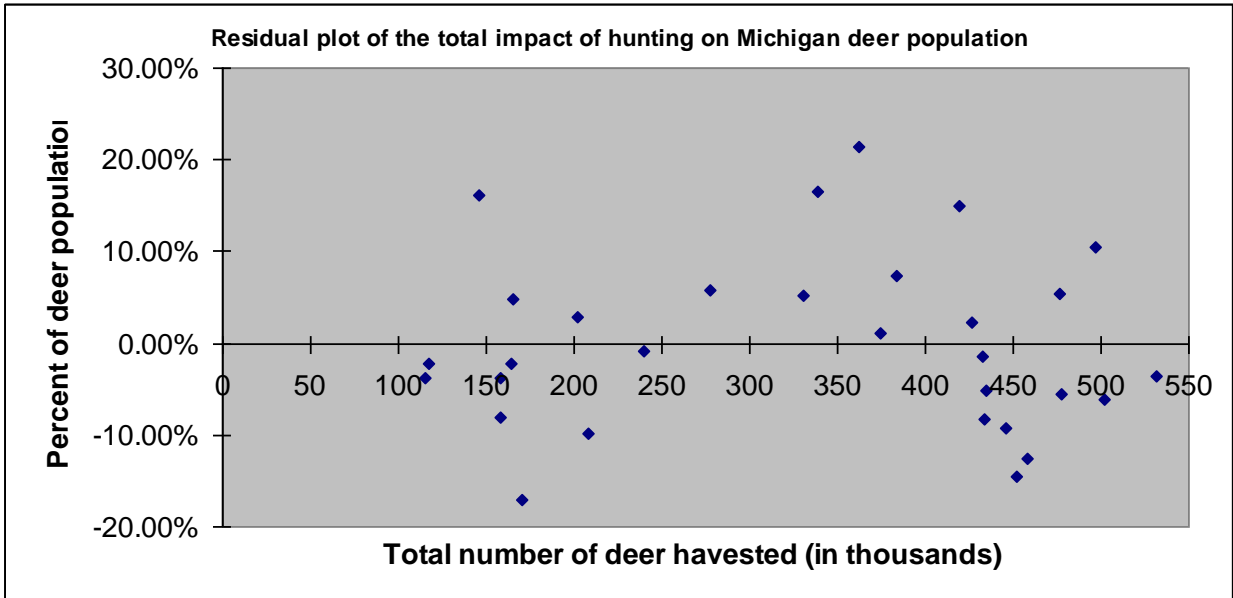
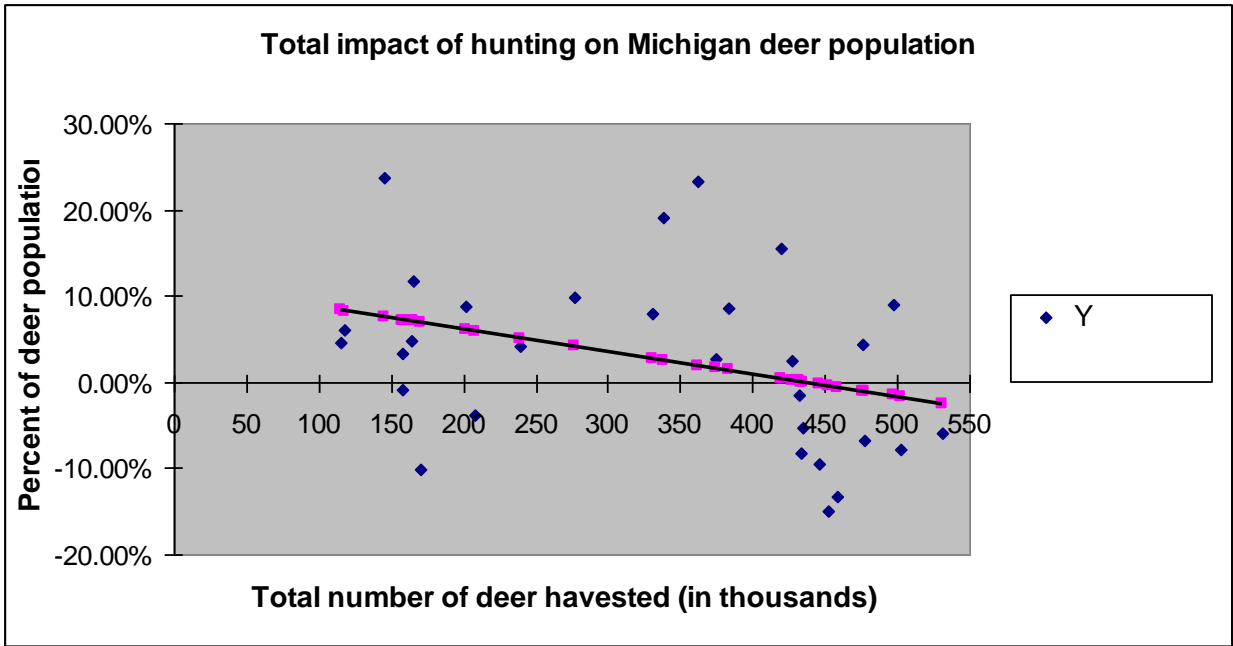


The residual plot of the impact of Muzzleloader hunting on the Michigan deer population reflects a scattered pattern which indicates that there is a linear correlation. The strength of this correlation is measured by the “R” value, which in this instance is a negative $R = -0.350852$

Therefore, the relationship between the Muzzleloader harvest and the deer population is not very strong. The relationship between the Muzzleloader harvest and the deer population is not as strong as the bow hunting harvest, However it is a little higher than the regular firearm harvest. The Muzzleloader season is the shortest hunting season. However the season coincides with the period of time that the deer are herding together.

<i>Regression Statistics</i>	
Multiple R	-0.350115994
R Square	0.122581209
Adjusted R Sq	0.091244824
Standard Error	0.097014772
Observations	30

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.112876293	0.0467358	2.415202341	0.022503907
X Variable 1	-0.000259202	0.0001311	-1.97782335	0.057866361



The residual plot of the impact of total hunting on the Michigan deer population also reflects a scattered pattern which indicates that there is a linear correlation. The strength of this correlation is measured by the “R” value, which in this instance is a negative $R = -0.350115$

Therefore, the relationship between the total number of deer harvested and the deer population is not very strong. These results would indicate that there are other lurking variables that impact the Michigan deer population.

CONCLUSION

There has been an average of 1,075,116 hunters and an average of 332,166 deer harvested in Michigan between 1975 and 2005. The average population of deer in Michigan between 1975 and 2005 has been 1, 563,612 with a standard deviation of 395,000.

One conclusion that can be identified from the data used is that when the Deer population is high, the harvest numbers will be high also. There have not been many years were the population was low and the harvest is high.

All three choices of weapons used have a negative impact on the population. The correlation strengths derived from the data indicate that there are other variables that are impacting the deer population. It is also worth considering that the data does not provide the number of deer born.

Hunting needs to be encouraged in the state of Michigan to help manage the deer population. The more deer killed by the hunter may decrease the number of car deer accidents, reduce damage to farmers crops, and reduce the spread of disease.

THANKS

Thanks to the Michigan DNR for providing the data. Thanks to the class instructor, for providing guidance as to what data to use, and how to compile the information and helping me complete this assignment. Thanks to my husband for whining about the number of deer I have hit with the car, compared to the number he has harvested with a bow. I am winning. The internet was also a very useful for gathering information in reference to deer management. Lurking variables that should also be taken into consideration are disease, car deer accidents, and poachers.

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