



A Comparative Analysis of the EIoT and Conventional Methods of Data Collection in Managing Wild Pigs

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Introduction

A major problem plaguing the state of California is the presence of exotic and invasive species. From fish, to plants and insects, invasive species present a great danger to the ecosystems of California. One large-bodied invasive species that is a threat not only to California, but throughout much of the continental United States is the wild pig, or *Sus scrofa*. Pigs have a major impact on wildlife habitats in California, and account for millions of dollars in agricultural damage, as well as loss of biodiversity (Melstrom, 2014). Because they are opportunistic omnivores, wild pigs root up fields and consume mast, which is a conservation concern (Wilcox, Van Vuren 2009). All of this makes the management of wild pigs a major concern, not only for wildlife managers, but for the people of California. Left unchecked, the pig population will increase, the problems will also increase. Therefore, management of the pig population is an ongoing and pressing concern.

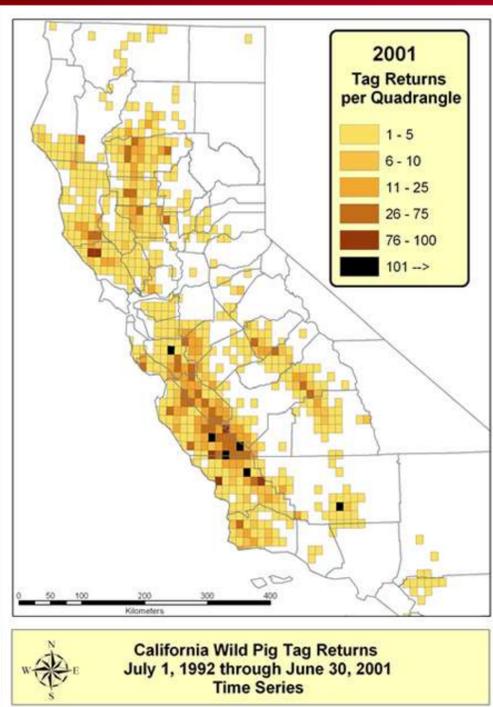


Figure 1 (above): A map of tag returns in California in 2001. Provided by California Dept. of Fish and Wildlife

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Research Question

The question is as follows: Could the Environmental Internet of Things (or EIoT) be used to gather more data of a higher quality on wild pigs? By using this method of gathering data, the hope is that better judgements can be made on the management techniques of wild pigs, such as the price of wild pig tags for hunters and whether or not the pigs are on depreciation or not.

Background and Literature Review

Collecting data on these wild pigs is vital to managing them. Population size, birth rate, death rate, migration patterns, all must be tracked. By using the Environmental Internet of Things (EIoT), we can gather data to manage these animals much more effectively than with conventional methods. The Internet of Things (IoT) as a whole has been applied to the ecology of many species already (Songtao, et al. 2015). Further, Li et al. (2015) found recent advances with the IoT have made the methods and technology better for protecting and conserving nature reserves. They compared the conventional methods used in wildlife conservation and those of the EIoT used by scientists around the world to see which methods are more effective in gathering data to effectively manage wild pigs. By using the best possible methods, the delicate balance of California's biodiversity will be better preserved.



Figure 2 (above): An example of a wild pig in California. Provided by the California Dept. of Fish and Wildlife.

Methods

The method that is to be used in this study will be to compare data collected by the use of conventional methods and the EIoT and come to a conclusion based on the results. The elements in this study, therefore, will be the data studied, as well as professionals who have worked in the field. These professionals may be interviewed to give their viewpoint on which form of data collection is more efficient. Based on research done so far, current methods don't seem to be as effective as they could be. For example, in the case of trail cameras, Clifford Rice, in a test of the effectiveness of these devices that is analyzed by Reginald Barrett and Thomas Kucera, says, "Despite extensive experimentation with event recording delay and unit position, I could not obtain satisfactory results with trail monitors. Several units were vandalized and I subsequently suspended their use..." (Rice, Kucera, Barrett, 1995) Based on this observation, it is clear that conventional methods such as trail cameras are not as effective in data collection due not only to their technical problems (i.e. recording delays), but also due to the fact that they can be vandalized by people. GIS systems have also been used to try and find the range of pigs, but these often over- or underestimate the range of wild pigs (Waithman et al., 1999) Due to the methods of data collection being somewhat inaccurate, it would be beneficial to wildlife managers to get better data for these wild pigs.

With regards to this particular project, there are a few ways that a test of this hypothesis could occur. While it is possible that field testing could be performed, the time and resources at hand would be too limited to perform such a study, and thus this option is not being considered. It is expected that preliminary analysis of archival data will take place, followed by a comparative analysis. Once this analysis has been done, conclusions will be drawn. This may be done with several sets of data if possible. Once all conclusions have been compiled, a final conclusion will be drawn.

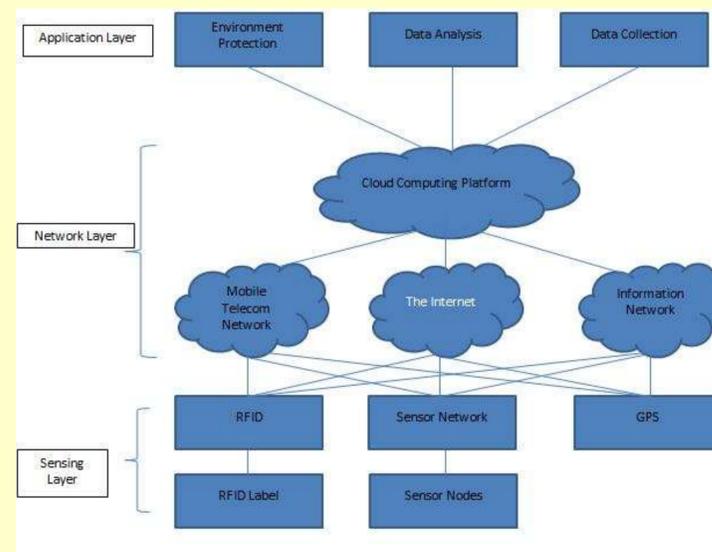


Figure 3 (above): a diagram of what the EIoT looks like conceptually [Diagram translated from Hwang, Fox, and Dongarra 2012]

Expected Results

It is expected to be found that the EIoT is found to be the superior method of data collection, though as with all scientific analysis, one must be ready to be proven wrong. Based on the findings, conclusions on the best form of data collection will be drawn. Following this, these methods will be suggested for managing wild pigs.

This research will hopefully contribute to bettering the methods of wildlife management, such that it could be applied to all of California as well as to other states plagued by wild pigs. This research, if applied, will be of benefit to the biodiversity of California and to the preservation of her natural beauty.

Significance

This research could be used to better manage the wild pig problem that is currently plaguing the state of California, and would give the Department of Fish and Game better data to set guidelines on hunting with. With the pigs managed well, California's native wildlife would be given a much better chance to survive in the wild, allowing for the conservation of these animals.

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Acknowledgments

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