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With an increase in rainfall and standing pools of water this past year, Davis saw an increase in the mosquito population. Any standing pool of water, regardless of the size, is the perfect breeding spot for mosquitoes. An increase in mosquitoes is bothersome to people, but more importantly it raises the risk of diseases spread around the Davis area (Ternus-Bellamy). After careful examination and research for different solutions, we propose two solutions: insecticide-spraying drones and genetically-modified mosquitoes. Drones provide a quick response with immediate results in mitigating the mosquito population, thus lowering the risk of diseases. The drone we are interested in is the DJI AGRAS MG-1 model ("AGRAS MG-1") that covers approximately seven to ten acres per hour. Genetically modifying mosquitoes is a longer process that yields desired and thorough results to the problem. In researching about modifying a mosquito's DNA, we found research tests and trials already completed in different areas of the world, proven to be successful (Gabriel). Modifying mosquitoes entails either spreading a DNA strand to prevent female production or modifying mosquitoes so that their offspring will not reach adulthood.

To effectively compare the two options and select the one most-suited for this situation, we devised the following three criteria to base our comparison on: time, cost, and effectiveness. It is important to address it as soon as possible and see results in real time. We researched and calculated different aspects of both options, including modifications, shipping, and completion. The current solution to mitigating the mosquito population is not cheap, and neither will the proposed solutions. Calculations made help compare the costs, see how they reflect in the budget, and decide which cost is best over time. Mirroring results from previous researched trial instances of the two solutions is key in determining just how effective each solution is. Seeing results in real time is important and can weigh heavily as a decision-maker. Drones work immediately and leave minimal effects on the environment. While Davis already has a program that uses airplanes to spray chemicals over the land, drones provide a more localized way to spot control mosquitoes, being efficient through following a path of already-known mosquito breeding locations. On the other hand, genetically-modified mosquitoes take around at least six months for the entire process ("Wild Mosquito Problem"). While these mosquito farms already exist, the additional time needed for this solution includes shipment and releasing the mosquitoes into the desired areas every few weeks.

Staying in the budget and being appropriately cautious with money is also a big factor. Purchasing the initial drones tallies up to around $310,000, which includes the necessary 20 drones and batteries to

cover around the 6330 acres in Davis (United States Census Bureau). In addition, approximately $37,300 is needed to cover Naled insecticide costs for one round of spraying. The costs for drones in one year total to around $888,700 and $610,000 each year after that. Genetically-modified mosquitoes have an initial high cost of $1.9 million but is much less in yearly maintenance fees, $384,000, than the drones. However, over a longer period of time, the modified mosquitoes will have a lower cost than the drones, with the potential of being even lower from advancements in technology.

Most importantly, we want to see lasting results in the mosquito population. Spraying insecticides provide immediate results, but noted by different sources of having an effectiveness from 10% to 90%. According to Oxitec, a company that develops genetically-modified mosquitoes, spraying insecticides have an effectiveness of around 50%. Genetically-modified mosquitoes, however, prove to have both consistent and effective results, with a statistic of 90% effectiveness from different sources using the same methods (“Wild Mosquito Problem”). After our research, calculations, and analysis of the problem, we recommend the implementation of the genetically-modified mosquitoes. Although drones provide a convenient way to spray insecticides and show immediate results, genetically-modified mosquitoes are a more thorough and effective solution in the long-run. Modified mosquitoes, with the promise of successful statistics, will help Davis in eliminating the pestering insects that bite its citizens for protein and most importantly decrease the risk tremendously for the threat and spread of deadly diseases like the West Niles and Zika viruses.