



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> Anthony A. Stenzel	<b>Project Number</b>  34697
<b>Project Title</b> <b>Does <i>Bacillus thuringiensis israelensis</i> (Bti) Affect Non-Target Aquatic Invertebrates of the Madrona Marsh?</b>	
<b>Objectives/Goals</b> To determine whether Bti (a biologically-active mosquito larvicide) is responsible for the recent decrease in Dragonfly populations at the Madrona Marsh. <b>Abstract</b> <b>Methods/Materials</b> 1) Maintain a live culture of Dragonfly Nymphs (Odonata). 2) Prepare the samples of <i>Bacillus thuringiensis israelensis</i> (Bti) solutions. 3) The Bti solutions were used to fill the aquaria in which the dragonfly nymphs would live. Prepare a test tube with 10 mL of the test solution. 4) Subjects were monitored for lethality daily over a period of two weeks. Also observed for activity level: active or lethargic. <b>Results</b> Having discovered that low levels of Bti did not have a lethal effect on the dragonfly nymph population tested. I increased the ITU levels of exposure in my follow-on trials. The amounts were 50, 100 and 150 ITUs of Bti. Of course, I ran a control group as well that had no Bti added to its habitat. I observed that all experimental groups suffered die-off. The most rapid rate of die-off was found in the tanks containing the lower level ITUs. The newly designed habitats worked in that there were now no deaths-by-decapitation. However, these results prove that there is not a direct link to the presence of Bti in the water and the life expectancy of the dragonfly nymphs. <b>Conclusions/Discussion</b> The results show that simple Bti exposure does not kill the dragonfly nymphs within 4-24 hours as it does with the mosquito larvae. The dragonfly gut, therefore, must not be an alkaline environment with enzymes that release the pro-toxins produced by Bti. Thus the results do not support my initial hypothesis that dragonfly nymphs will be lethally affected by Bti. However, there is still another untested hypothesis supporting a detrimental effect of Bti on the dragonfly populations. While the gut of the dragonfly nymph may not produce the deadly conditions that the gut of the mosquito larvae does in the presence of Bti, that same toxin is being ingested by the dragonfly nymph when it feeds on the larvicide-exposed mosquito larvae as a food source. A further study is indicated before I can completely abandon that there is no relationship between the decline of the dragonfly presence at Madrona Marsh and the recent dosing of Bti.	
<b>Summary Statement</b> Determining whether Bti (a mosquito larvicide) is responsible for the recent decrease in Dragonfly populations at the Madrona Marsh.	
<b>Help Received</b> My father, Bob Carr and Tracy Drake spoke with me about my project but I did all the research, came up with the ideas and performed the experiment on my own. My father never touched any part of my actual experiment.	