



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dana A. Hawk</b>	<b>Project Number</b> <b>S0607</b>
<b>Project Title</b> <b>Are Two-Stroke Motors Endangering Lakes?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This investigation was designed to determine if two-stroke motors will cause pollution harmful to waterlife in our local lakes. <b>Methods/Materials</b> Ten minnows were put into seven dilutions of lake water which had been exposed to the exhaust products from a two-stroke outboard motor. The dilutions ranged from two-to-one lake water to [exhaust products] to a ratio of sixty four-to-one lake water [exhaust products]. The oxygen levels of each of the seven countainers were measured and recorded periodically. Results show that [exhaust products] in high ratios are harmful to waterlife. <b>Results</b> Results show that higher quantities of exhaust products have harmful effects to waterlife even though fish were not exposed to compromised water for 48 hours after water had first been exposed to the exhaust products. These results have implications for the future protection of our lakes. Some California lakes have already outlawed two stroke motors. This has impact on boaters, fishermen, and other recreational uses. Although the results would have been interesting, the process of testing for MTBE is complicated and expensive and could not be accomplished in this project. MTBE is being replaced with a different and safer additive. Results of two stroke engines being harmful to waterlife are already causing manufactures to stop producing two stroke engines and instead are switching to a cleaner burning engine, the four stroke. <b>Conclusions/Discussion</b> Two stroke outboard motors do cause pollution harmful to waterlife in our local lakes. For further experimentation water could be tested for specific types of contaminates such as MTBE (Methyl Tertiary Butyl Ether). Another conclusion could be formed by determining the number of two stroke motors needed to produce the same deadly ratios in a given lake. Further conclusions could be drawn if the fish were given a much longer period of time, such as 6 months, to be exposed to slow acting chemicals.	
<b>Summary Statement</b> My project was to determine if the exhaust products from a two stroke outboard motor are harmful to waterlife in our local lakes.	
<b>Help Received</b> Mother helped me construct the backboard, Father helped me collect and transport lake water and arranged for the use of a friend`s two stroke motor	