



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

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Project Title Catching Rays: Reflections on Portable Desalination Devices	
Abstract Objectives/Goals Objective: Increase Portable Desalination Device (PDD) effectiveness using a flexible reflector (FR) to focus sunlight. The manipulated variable is whether a FR is part of the PDD. Responding variables are the salinity and volume of produced water, and the temperature inside PDDs. Controlled variables are the PDDs, conductivity meter, thermometers and seawater. Prediction: A FR will focus the sun to increase PDD effectiveness because reflecting sunlight from mirrors raises the temperature inside a container, increasing the water evaporation rate. Evaporation leaves salt behind in the original container. Cooled water vapor then condenses into liquid that can be collected and tested for salinity.	
Methods/Materials Materials: 6 each: Large water bottles, Small water bottles, Small plastic cups, Flex straws, Quarters, Rubber bands, and Liters of seawater. Plastic wrap, Aluminum foil, Wire, 7 Thermometers (C), Conductivity/Total Dissolved Solids Meter, Metric measuring cup, Knife, Wire cutters, Scissors, Data Sheets, Pencil, Computer, Sun. Methods: Construct 6 PDDs, 3 with and 3 without foil reflectors. Measure seawater conductivity. Pour 750 ml of seawater into each PDD. Record water temperature in PDDs. Place PDDs outside in sunlight, in random order, and record the time. Record PDD water temperatures, ambient air temperature and wind conditions at least hourly. At sunset, record the water volume and conductivity produced by each PDD. Repeat the trial. Enter data into Excel, obtain means and standard errors, and make graphs.	
Results Weather during trials was cold and windy. PDDs reduced the seawater conductivity from 41,259 uS/cm (SE=108) to as low as 22 uS/cm (SE=12). The data did not clearly demonstrate that adding a reflector to the PDD resulted in higher water production, water with lower salinity, or higher water temperatures within the PDDs compared with the experimental controls without a reflector.	
Conclusions/Discussion I want to be an inventor using solar energy to reduce dependence on other energy sources. I developed a PDD that can be built from household items and used in an emergency to produce drinking water from seawater. PDDs did not make as much water as I expected, but they produced very high quality water with lower salinity than even tap or bottled water. Conducting additional warm weather trials should increase temperatures within PDDs and therefore the water volume produced.	
Summary Statement This research has demonstrated that a Portable Desalination Device, which provides pure drinkable water, can be constructed from recycled materials.	
Help Received Aunt Becky bought materials, cut the bottles, and took pictures while I did the experiment.	