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| |  | | --- | | [See the temperature of this years El Niño compared to the last one.](http://docs.google.com/images/hot.jpg) | |  | |  | | [See the happenings under the surface...they reason for it all.](http://docs.google.com/images/nana.jpg) | |  | |  | | [See When El Niños occured and how long they lasted.](http://docs.google.com/images/time.jpg) | |  | |  | |  | |  | | [See Where the storms start, and where the move to.](http://docs.google.com/images/Howto.jpg) | |  | | [Don't Understand the words? Check the glossary for your weather word.](http://docs.google.com/gloss.html) | |  | | **So, what is this El Niño thing that everybody�s talking about?**  El Niño is shorthand for a phenomenon that the meteorological community calls an "El Niño-Southern Oscillation (ENSO). The name "El Niño" originated from Spanish fishermen off the coast of Peru, who noticed that the ocean current that they were in was much warmer than they had noticed earlier. They named it such because the warm current showed up around Christmas, and El Niño is Spanish for �boy child�, in reference to the boy Jesus. The actual El Niño event that takes place is just a small part of what people consider to be El Niño to be. The scientific explanation of an El Niño is fairly simple, but the normal weather patterns much first be understood.  During an ordinary year, there is a large amount of warm water in the western Pacific. This pool is held there by eastern trade winds, which move across the ocean, bringing warm water from the tropics west towards Indonesia. This heavy wind and large mass of warm water displace the thermocline. This means that cold water is pushed downwards in the western part of the ocean while the cool water in the eastern Pacific rises closer to the surface. This cold water stays in a pool because of the barriers on either side of it; the warm water mass, and the western coast of the Americas.  An El Niño begins when there is a variation in the force or direction of the trade winds. Approximately every two to seven years, the trade winds die down and move eastward, and the force that is put onto the ocean is lessened. When this occurs, The pools of warm and cool water change location. The warmer pool is not confined, and spreads across the surface of the Pacific. The cooler thermocline rises in the west and falls in the east, thus causing a balance in the ocean temperatures. The warm water simply moves east, sloshes against the coast, and begins to spread north and south. The cool water occupies the areas in the west and a balance is reached. The western part of the ocean is cooler than it had previously been, and the eastern part is warmer. This warm water along the coast is what many people limit their thoughts of El Niño to, but the incident is much more complicated, and is effects much larger.  Tropical storms are some of the most recognized effects of an El Niño. Tropical storms are fueled by hot and moist ocean air; the warmer the air, the more intense the storm tends to be. As the warm water pushes it�s way east, it pulls along large storms with it. The coast of California can get hit especially hard by these storms, causing floods, while the northern United States finds itself in uncommonly mild winters, without the usual amount of rain and snow. The storms mentioned above cause a few problems of their own. A large storm can send warm air and moisture more that 40,000ft into the air, adding a great deal of energy to the high-altitude jet stream. Changes in the jet stream can be detected as distant as Africa.  An El Niño�s conditions also have a large impact in ecological and biological areas. During normal conditions, the thermocline is very close to the surface in the eastern Pacific. Passing wind mixes the thermocline, which is full of nutrients, with the warmer surface water. The combination of this mixture and sunlight allow for the production of phytoplankton, which in turn allows for the production of zooplankton, and so on down through the food chain. While an El Niño is taking place, the layer of warm water in the east is much deeper, and the nutrients in the thermocline are unable to support phytoplankton due to their distance from light, thus disrupting the underwater community. Tropical fish must migrate towards the poles in search of food, as must many sea birds that feed on lower members of the food chain as well.  Ecological systems on land can be effected as well. With an unusually large amount of rain, many dry desert lands can become fertile grasslands, creating a new habitat for many species. Smaller populations of organisms move in first, such as grasshoppers. These creatures bring larger animals, such as birds and frogs, and so on down the line. An extreme amount of rainfall can also help increase or begin some fish populations on land. Fish that migrate up streams during flood periods get trapped in temporary lakes as the storms slow down. In some cities along the coast, populations of shrimp increased exponentially, creating new industry. In other areas, populations of mosquitoes increased in the same manner, bringing in new waves of malaria.  The natural problems that an El Niño brings can be devastating as well. Past El Niños have caused severe draught in several parts of South America. Niño delayed the usual monsoons that normally put out natural forest fires. Large fires in China, Russia, Australia, and Africa were also caused by the event. The rain that Niño brings can cause damage besides flooding. With an abundance of water rushing through the land, large amounts of pollutants can accumulate in streams and rivers, eventually leading to the ocean. Elements like nitrogen and phosphorous, as well as chemical fertilizers and pesticides are washed away, causing fish to die and algae to grow, thus hindering the food chain. Even pollution that was not noticed before, such as the oil and residue left on streets and highways, can cause problems, because it could be washed away in such large amounts.  I chose to conduct an experiment to test whether or not the 1997/98 El Niño�s effects would alter the Bay Area�s weather pattern as significantly as suggested, as well as observe whether or not any effects that did come about were helpful or devastating to the local population and environment. The significance of weather changes can be very extreme, especially in the case of the agricultural industry. I chose to use California and the West Coast as the test area for my experiment for a variety of reasons. California is one of the largest agricultural states in the country, and any changes in weather there would have some affect on part of the world�s food supply. This makes the area very important for study. The Bay Area was chosen in part for the ease of testing, as it is the area of the country that I reside in. It is because of this that I was able to collect data that accurately represents what effects have gone on in the area. If any of the effects mentioned above are to happen in the area, they should be easily noticed, despite whether or not they have a positive or negative effect.  This project consists of a number of parts. There were two separate data collections; one showing the predicted weather patterns of a normal year compared to an El Niño year, and the results of the comparison, as well as data collected during and after the El Niño had brought its wrath. The two sets of data are then compared to see how the predicted data compared to what actually happened.  The goal of this project is to discover two separate things. The first is to see if El Niño does effect the environment of the San Francisco bay area, and how much or little that effect is, if it exists. The second will be to see if simulation can accurately predict what will happen to our environment, before any actual events occur. The information in these pages should provide a good representation of these two items, as well as an understanding of the El Niño weather pattern. |

*This Web Site is Best viewed with 256 or more colors.*

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