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|  | EXPERIMENT #1  In experiment #1, seven tests were repeated on six different test sites at Moss Beach over a period of four months.     |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | CONTROL: Test site #1 From creek: 250 feet to right and 125 feet straight out west | | | | | | | | | Date | Temp. | D.O. | Phos. | Nit. | pH | Salinity | High Nit. | | Nov 6 | 15 C | 7 | o.1 | 3 | 6 | 34 |  | | Dec 3 |  |  |  |  |  |  |  | | Lots of Rain! | | | | | | | | | Jan 6 | 8 C | 9 | 0.1 | 0.1 | 7 | 34 | 0 | | Jan 27 | 9 C | 9 | 0 | 0 | 8.3 | 32 | 0 | | Sunny but heavy rains for the last week. | | | | | | | | | Feb 27 | 16 C | 10 | 0.1 | 0.1 | 7 | 30 | 0 | | Average | 11.6 C | 7.6 | 0.06 | 0.12 | 7.06 | 32.8 | 0 | | Test site #1, the control, was 250 feet south of San Vicente Creek and 150 feet straight out into the ocean. This site provided fresh sea water not contaminated by any other substance. These findings are constant with normal standards for that area and ocean water in general. | | | | | | | | | San Vicente Creek: Test site #2 | | | | | | | | | Date | Temp | D.O. (ppm) | Phos (ppm) | Nit. (ppm) | pH | Salinity | High Nit. (ppm) | | Nov 6 | 11 C | 9 | 6 | 0.1 | 6 | 0 |  | | Dec 3 | 10 C | 9 | 0.3 | 0.3 | 6 | 0 |  | | Lots of rain! | | | | | | | | | Jan 6 | 6 C | 7 | 0.1 | 0.1 | 7 | 0 | 0 | | Jan 27 | 8 C | 9 | 0 | 0.6 | 7 | 0 | 4.4 | | Sunny but heavy rains for the last week. | | | | | | | | | Feb 27 | 11 C | 10 | 0.1 | 1.0 | 5 | 2 | 17.6 | | Very fast moving water , many channelss and lots of water | | | | | | | | | Average | 9.2 C | 8.8 | 0.22 | 0.42 | 6.2 | 0.2 | 7.33 | | Test site #2, San Vicente Creek, runs through agricultural fields before it flows into the ocean. From my results pesticides and fertilizers are joining with the creek before it reaches the ocean. The temperature at an average of is slightly cooler than ocean water. This is consistent with the results of the dissolved oxygen. As temperature increases, the amount of oxygen dissolved in water decreases. San Vicente Creek has a lower temperature than the ocean water but a higher dissolved oxygen rate. Phosphate and nitrate findings suggest the presence of fertilizers in the water. The average phosphate was 0.22ppm and the average nitrate was 0.42ppm, much higher than the control. Fresh water in rivers, streams, and rainwater typically has very low salinity as is the case with a 0.4 reading of salinity at San Vicente Creek. Lastly the high nitrate reading proved scary amounts of nitrates in the creek. In Analysis of San Vicente Creek, I found the data to be very typical of fresh water with contaminates of fertilizers. | | | | | | | | | Seagrass Site #1: Test site #3 20 feet west of the creek | | | | | | | | | Date | Temp. | D.O. (ppm) | Phos. (ppm) | Nit. (ppm) | pH | Salinity | High Nit. (ppm) | | Nov 6 | 11 C | 9 | 0.2 | 0.3 | 6 | 30 |  | | Dec 3 | 9 C | 11 | 0.2 | 0.1 | 7 | 0 |  | | Lots of rain! | | | | | | | | | Jan 6 | 8 C | 7 | 0.1 | 0.2 | 7 | 30 | 0 | | Jan 27 | 9 C | 12 | 0 | 0.2 | 8.4 | 20 | 4.4 | | Sunny but heavy rains for the last week. | | | | | | | | | Feb 27 | 12 C | 9 | 0 | 0.6 | 7 | 0 | 13.2 | | Flood signs on the road, sunny, warm, many people at reserve, LOW tide today | | | | | | | | | Average | 9.8 C | 9.6 | 0.1 | 0.28 | 8.85 | 16 | 5.87 | | In test site #3, Seagrass Site #1, the nitrate level is in between the ocean and San Vicente Creek suggesting dilution from the ocean water or absorption of the nitrates from the Ulva. On Feb. 27th the amount of nitrates was highest because of the high levels of rain fall in the last week. This is common because as rain falls, the amount of runoff from the fields increases. It is also significant to notice the amount of salinity. It falls in between the levels at the San Vicente Creek and the control, showing the effect the creek is having on the salinity of the shallow tide pool environment. | | | | | | | | | Seagrass Site #2: Test site #4 50 feet west of the creek | | | | | | | | | Date | Temp | D.O. (ppm) | Phos. (ppm) | Nit. (ppm) | pH | Salinity | High Nit. (ppm) | | Nov 6 | 11 C | 9 | 0.1 | 0.1 | 7 | 33 |  | | Dec 3 | 10 C | 4 | 0.2 | 0.2 | 6 | 21 |  | | Lots of rain! | | | | | | | | | Jan 6 | 7 C | 9 | 0.1 | 0.1 | 6 | 34 | 0 | | Jan 27 | 8 C | 12 | 0.2 | 0.1 | 8.4 | 30 | 0 | | Sunny but heavy rains for the last week. | | | | | | | | | Feb 27 | 12 C | 10 | 0.2 | 0.6 | 6 | 0 | 4.4 | | Creek so high it hit this site today | | | | | | | | | Average | 9.6 C | 8.8 | 0.22 | 0.22 | 6.68 | 23.6 | 0.88 | | From the evidence test site #4 is slightly affected by the creek water but not in the extreme that test site #3 is. It is important to note that the salinity on Feb. 27 is zero because the creek was so large it continued to flow 50 feet into the ocean to test site #4. This was very unusual and affected the averages for this site. | | | | | | | | | Sunshine Valley Creek: Test site #5 | | | | | | | | | Date | Temp. | D.O. (ppm) | Phos. (ppm) | Nit. (ppm) | pH | Salinity | High Nit. (ppm) | | Nov 6 | 12 C | 7 | 0.4 | 1 | 7 | 0 |  | | Dec 3 | 9 C | 5 | 1 | 3 | 6 | 0 |  | | Lots of rain! | | | | | | | | | Jan 6 | 8 C | 7 | 0.1 | 0.3 | 8 | 2 |  | | Jan 27 | 9 C | 11 | 0.6 | 5 | 7.7 | 0 | 44.4 | | Feb 27 | 16 C | 11 | 0.6 | 1.5 | 6 | 0 | 13.2 | | Lots of water, fastt flowing. | | | | | | | | | Average | 10.8 C | 8.2 | 0.54 | 2.16 | 6.94 | .04 | 28.8 | | This data was insignificant to my research because although high amounts of nitrates and phosphates appeared in the creek there was no substantial tide pool environment  to support the growth of algae where the waters joined. | | | | | | | | | Drinking Fountain: Test site #6 (well water) | | | | | | | | | Date | Temp | D.O. (ppm) | Phos. (ppm) | Nit. (ppm) | pH | Salinity | High Nit. (ppm) | | Nov 6 | 11 C | 6 | 0 | 4 | 6 | 0 |  | | Lots of rain! | | | | | | | | | Dec 3 | 10 C | 2 | 0 | 4 | 6 | 0 |  | | Jan 6 | 8 C | Less than 1 | 0.1 | 1.5 | 7 | 0 |  | | Jan 27 | 9 C | 2 | 0.1 | 1 | 7 | 0 |  | | Feb 27 | 15 C | 3 | 0.1 | 2 | 7 | 0 | 24.0 | | Lots of water, fast flowing. | | | | | | | | | Average | 10.6 C | 2.8 | 0.06 | 2.5 | 6.6 | 0 | 24.0 |   EXPERIMENT #2: ION CHROMATOGRAPHY  From the charts below you can see the exact amounts of ions in the test samples. Autocal1,2 and 3 are run first to get the calibration standards for the other tests. In the San Vicente Creek and Sunshine Valley Creek the nitrate levels are high for fresh water providing strong evidence that runoff from the fields is contaminating the creek. Also the level of nitrates in the drinking water is remarkably high but this is actually typical of well water.     |  |  |  |  |  | | --- | --- | --- | --- | --- | | Sample Name:AutoCal1 | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret. Time | Component Name | Concentration | Height | | 1 | 0.73 |  | 0 | 7779 | | 2 | 1.62 |  | 0 | 15174 | | 3 | 2.16 | Fluorid | 3.0 | 121430 | | 4 | 2.83 | Chloride | 5.0 | 117927 | | 5 | 3.26 | Nitrite | 3.0 | 29421 | | 6 | 4.47 | Nitrate | 3.0 | 18603 | | 7 | 5.17 | Phosphate | 3.0 | 5758 | | 8 | 5.75 | Sulfate | 20.0 | 123956 | |  |  | Totals | 148.0 | 1855813 | | Sample Name: AutoCal2 | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret. Time | Component Name | Concentration | Height | | 1 | 1.61 |  | 0 | 13274 | | 2 | 2.15 | Fluoride | 6.0 | 244770 | | 3 | 2.81 | Chloride | 10.0 | 256854 | | 4 | 3.23 | Nitrite | 6.0 | 62445 | | 5 | 4.41 | Nitrate | 6.0 | 38958 | | 6 | 5.17 | Phosphate | 6.0 | 11807 | | 7 | 5.75 | Sulfate | 40.0 | 272881 | |  |  | Total | 74.0 | 900989 | | Sample Name: AutoCal3 | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | |  |  |  |  |  | | 1 | 1.61 |  | 0 | 10027 | | 2 | 1.94 |  | 0 | 2736 | | 3 | 2.16 | Fluoride | 12.0 | 458162 | | 4 | 2.60 |  | 0 | 6871 | | 5 | 2.81 | Chloride | 20.0 | 544996 | | 6 | 3.04 |  | 0 | 9516 | | 7 | 3.22 | Nitrite | 12.0 | 118495 | | 8 | 4.37 | Nitrate | 12.0 | 83004 | | 9 | 5.15 | Phosphate | 12.0 | 24724 | | 10 | 5.71 | Sulfate | 80.0 | 597282 | |  |  | Total | 148.0 | 1855813 | | Sample Name: Control | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 0.47 |  | 0 | 1037 | | 2 | 1.62 |  | 0 | 41518 | | 3 | 2.12 | Fluoride | 1.612 | 23607 | | 4 | 2.83 | Chloride | 0.369 | 4552 | | 5 | 3.65 |  | 0 | 6496 | | 6 | 4.44 | Nitrate | 0.990 | 6995 | | 7 | 5.08 | Phophate | 126680252 | 11745321 | |  |  | Total | 126710223 | 11829526 | |  | | | | | | Sample Name: San Vicente Creek | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 1.61 |  | 0 | 10608 | | 2 | 2.14 | Fluoride | 0.254 | 11334 | | 3 | 2.85 | Chloride | 61.744 | 1508491 | | 4 | 4.39 | Nitrate | 6.519 | 43562 | | 5 | 5.77 | Sulfate | 17.337 | 125502 | |  |  | Total | 850855 | 1699497 | |  | | | | | | Sample Name: Seagrass Site #1 | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 1.62 |  | 0 | 26973 | | 2 | 2.12 | Fluoride | 1.014 | 22746 | | 3 | 2.32 |  | 0 | 10404 | | 4 | 2.80 | Chloride | 0.326 | 3658 | | 5 | 3.82 |  | 0 | 4182 | | 6 | 4.43 | Nitrate | 2.203 | 155264 | | 7 | 5.20 | Phophate | 9243.971 | 9450108 | |  |  | Total | 9247.514 | 9533334 | |  | | | | | | Sample Name: Seagrass Site #2 | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 1.62 |  | 0 | 38274 | | 2 | 2.12 | Fluoride | 1.509 | 23677 | | 3 | 2.80 | Chloride | 0.520 | 4673 | | 4 | 3.85 |  | 0 | 3627 | | 5 | 4.41 | Nitrate | 0.973 | 6790 | | 6 | 5.10 | Phophate | 11515.200 | 10979747 | |  |  | Total |  | 11518.202 | |  | | | | | | Sample Name: Sunshine Valley Creek | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 1.65 |  | 0 | 1277 | | 2 | 2.13 | Fluoride | 0.196 | 7441 | | 3 | 2.39 |  | 0 | 1512 | | 4 | 2.93 | Chloride | 183.028 | 337091 | | 5 | 4.35 | Nitrate | 30.303 | 212401 | | 6 | 5.75 | Sulfate | 65.663 | 484720 | |  |  | Total | 279.190 | 4044442 | |  | | | | | | Sample Name: Drinking Fountain | | | | | | Report Date: 2/2/99 | | | | | | Pk. Number | Ret Time | Component Name | Concentration | Height | | 1 | 1.62 |  | 0 | 4302 | | 2 | 2.14 | Fluoride | 0.449 | 19654 | | 3 | 2.55 |  | 0 | 1327 | | 4 | 2.90 | Chloride | 114.425 | 2556164 | | 5 | 4.34 | Nitrate | 31.650 | 228820 | | 6 | 5.76 | Sulfate | 58.960 | 444457 | |  |  | Total | 205.484 | 3254724 | |  | | | | |   EXPERIMENT #3: SEA LETTUCE LABORATORY  In experiment #3, Sea lettuce, harvested from the Marine Reserve, was transplanted into fish bowls and tested for the effects of fertilizer its growth.  Fish tank #1     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Date | Height Small Rock (in.) | Height Large Rock (in.) | Appearance | Nitrate (ppm) |  | | Wed Mar 3 | 1 | 1 1/8 | Very healthy, green clear water | 0.1 | new water | | Tues Mar 9 | 1 1/8 | 1 1/4 | no great growth, water murky, not as healthy looking | 0.1  0.1 | old water  new water | | Tues Mar 9 | 1 1/2 | 1 1/2 | light green, transparent, looks healthy, water a little murky, soft to touch | 0.1 | new water |   Fish Tank #2 2 cups 1 tablespoon fertilizer/1 gallon sea water   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Date | Height Small Rock (in.) | Height Large Rock (in.) | Appearance | Nitrate test (ppl) |  | | Wed Mar 3 | 1 | 1 1/4 | Very healthy, green, pink water | 5 plus | new water | | Tues Mar 9 | 1 1/2 | 2 | clear with some coloring, new shoots, very brittle | 5 plus  5 plus | old water  new water | | Mon Mar 15 | 1 1/4 | 1 3/4 | pink color water, not healthy looking, many shoot, not full leaves, white parts, looks as if dead, very brittle | 5 plus  5 plus | new water  old water |   Fish tank #3 2 cups 1/2 tablespoon fertilizer/1 gallon sea water     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Date | Height Small Rock (in.) | Height Large Rock (in.) | Appearance | Nitrate test (ppm) |  | | Wed Mar 3 | 2 | 1 1/2 | Very healthy, green, light pink water | 5.0 | new water | | Tues Mar 9 | 2 | 1 3/4 | clear water, very long shoots, visible pink barely there | 5.0  5.0 | old water  new water | | Mon Mar 15 | 1 3/4 | 3 | slight pink tint in water, long transparent shoots, doesn't look so good, murkywater, brittle | 5.0  5.0 | old water  new water |   Fish tank #3 2 cups 1/2 tablespoon fertilizer/1 gallon sea water     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Date | Height Small Rock (in.) | Height Large Rock (in.) | Appearance | Nitrate test (ppm) |  | | Wed Mar 3 | 2 | 1 1/2 | Very healthy, green, light pink water | 5.0 | new water | | Tues Mar 9 | 2 | 1 3/4 | clear water, very long shoots, visible pink barely there | 5.0  5.0 | old water  new water | | Mon Mar 15 | 1 3/4 | 3 | slight pink tint in water, long transparent shoots, doesn't look so good, murkywater, brittle | 5.0  5.0 | old water  new water |   From experiment #3, I concluded that fertilizer can be used to increase the growth of sea lettuce when the concentration is not to high. In fish tank two and three the fertilizer was to strong of a concentration and burnt the Ulva causing a reverse in growth. This could be very disastrous to an ecosystem. Fish tank number four showed the most growth and almost tripled in size in the two week period. The Ulva was able to withstand this concentration of fertilizer and increase its growth rate. |

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

*For More Information about Creekwatch, please contact Eric Thiel at* [*ethiel@pleasanton.k12.ca.us*](mailto:ethiel@pleasanton.k12.ca.us)