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|  | In order to assess the impact coastal farming is having on the success and distribution of tide pool marine algae, I conducted research over a period of four months at the Fitzgerald Marine Reserve. Nitrates, phosphates, dissolved oxygen, temperaure, ph, and salinity were measured repeatatly at six test sites at the Reserve. Water samples, collected from test sites before and after flowing through agricultural fields, were taken to Cal State Hayward and percisly analysed for pesticides using ion chromatography. Interviews were conducted to investigate changes to the ecosystem observed by naturalists familar with the Marine Reserve. Finally, a laboratory experiment was performed to test the effect nitrate rich fertilizer has on sea lettuce growth.  Test data obtained from the research provides strong evidence to support my hypothesis that coastal farming can have a impact on the success and distribution of tide pool marine algae and in fact, has impacted the ecosystem at Fitzgeral Marine Reserve. A search of the current scientic record has yielded additional evidence to colaborate this claim.  If conditions are ideal then the growth of marine algae, specifically Ulva, can be greatly increased. If there is an abundance of nutrients supplying the Ulva, then excessive growth can be possible. The algae has to have an adequate environment to maintain its growth, importantly the presence of a substrate for the algae's holdfast to attach to. Also it is documented (Beachcomber's guide) that marine algae grows best in waters with a mixture of fresh and salt water. This ideal environment is established at the Fitzgerald Marine Reserve. I have concluded that the excess growth of Ulva at the reserve is resulting because of a number of factors:  1) the algae have adequate substrate to attach to at the Reserve  2) there is a constant, large quantity of nutrients essential for the plants to grow introduced into the environment  3) their reproductive cycle allows for mass reproduction in a short period of time  4) there is adequate sunlight to support the algae  According to Head Naturalist, Bob Breen, the intertidal ecosystem at Fitzgerald Marine Reserve has in previous years supported over twenty species of algae. It has only been in the past few years that these algae have become nonexistent where the creek joins the ocean. The Ulva has completely overtaken approximately 100 feet of the tide pool area to the left of San Vicente Creek and twenty feet into the ocean. This leads to the conclusion that the ecosystem is undergoing a serious change that is potentially harmful. The conditions that make excessive growth of Ulva possible at the Reserve, results in the elimination of the other twenty species of algae that should exist in the tide pool ecosystem.  From my research, I have concluded there is possible eutrophication occurring in the ecosystem at the Reserve. I have observed the following observations to support the possibility of eutrophication:  1) increased primary production  2) changes in plant species composition  3) very dense, often toxic, blooms  These beginnings of eutrophication could lead to decreased oxygen levels and the destruction of the tide pool ecosystem at the Fitzgerald Marine Reserve.  Pollution of the oceans is now on the list of national priorities. Nearly a decade after Rachel Carson�s ominous and prophetic warning in Silent Spring, it became evident that water pollution and the global spread of highly toxic chemicals threatened more than human health - entire aquatic ecosystems were in jeopardy. Congress began to realize that a bandage will not cure this ecological disease. It insisted on no less than complete restoration of the biological integrity of the nation�s waters. The Clean Water Act was passed and the U.S. Environmental Protection Agency (1995) has established a drinking-water standard of 10 milligrams per liter (mg/L) and in natural ground water less than 2mg/L for nitrate. To alleviate problems associated with eutrophication, pesticides, and water management, as required by the Pesticide Use Proposals and Endangered Species Act Section 7, pesticides used on agricultural lands are evaluated every year. The most toxic pesticides are no longer used or their use is restricted.  One way of preventing nitrate pollution is using only as much fertilizer as is needed and by fertilizing only during the growing season so the plants take up the nutrients immediately. This will minimize the runoff of nutrients brought to the oceans. Practical alternatives, to using toxic pesticides to manage agricultural pests, are being researched at DeSoto National Wildlife Refuge. Farmers there have successfully used Integrated Pest Management (IPM) techniques, including crop rotation, mechanical weed control, boicontrols, and very selective pesticide use, to successfully farm on DeSoto and surrounding lands. As a result, agricultural polution is greatly reduced.  The test data suggests that nutrient pollution from agricultural run off is one of the factors contributing to the change in ecosystem at the Fitzgerald Marine Reserve. Data from both the chemtests and ion chromatography proves the presence of high nitrates in both the creek and the ocean surrounding where the creek joins the ocean. Experiments, where different concentrations of fertilizers were added to Ulva, proved that Ulva is able to grow significantly in a short period of time when the right amount of nutrients are added. High level of nitrate in the drinking water at the Reserve may also be a result of added nitrates through soil penetration.  The research conducted strongly suggests costal farming in Half Moon Bay is stimulating the growth of Ulva lactua, adversly impacting other marine algae growth. Although marine pollution can probably never be fully eliminated, steps can be taken to decrease the amount of pollution before the ecosystem at the Fitzgerld Marine Reserve is permanently altered. |

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|  |  | [UPDATES](http://docs.google.com/update.html) |

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

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