Attachment 1
Waste Plastics Follow-Up

Waste plastics are reportedly accumulating in the ocean and are more concentrated in a section of the Pacific Ocean between California and Hawaii (due to the Pacific Gyre). Plastics are not biodegradable, but do break down into smaller pieces that become edible by many species of marine taxa. According to the Algalita Marine Research Foundation, waste plastics (including "plastic nurdles" which are pre-production plastic beads used as the material for plastic molds and products) are accumulating in the marine water column to the extent that they can outweigh plankton by a six to one margin in some areas. Toxic chemicals also accumulate on the surface of waste plastics. Staff reviewed the claims made in the Algalita video to determine their validity.

Algalita Marine Research Foundation (AMRF) is a non-profit organization with a well-intentioned stated purpose to communicate scientific research to the general populace. AMRF actually received a ~$500,000 grant from the State Board to work on this goal. It is clear that this organization is not an educational research institution like Scripps, Woods Hole, Moss Landing Marine Lab, etc., but, unlike many non-profits, AMRF does do some research with their company chartered boat (see http://www.algalita.org/links.html), and AMRF and Southern California Coastal Water Research Project have collaborated to publish some of their results in Marine Pollution Bulletin (see http://www.algalita.org/charles_bio.html). Although Marine Pollution Bulletin is not a highly respected journal by some experts in the field, other studies regarding the problem that plastics present in the marine environment have been published such as the following article in the highly respected journal, *Science*:

Lost at Sea: Where Is All the Plastic?
Richard C. Thompson, Ylva Olsen, Richard P. Mitchell, Anthony Davis, Steven J. Rowland, Anthony W. G. John, Daniel McGonigle, and Andrea E. Russell
Science 7 May 2004; 304: 838

The key findings of this article are that microscopic fragments of plastic have accumulated in the oceans and are now common in marine sediments and in the water column. The fragments appear to have formed from mechanical breakdown of larger plastic items. Using archived plankton samples, the team has also shown that the abundance of these fragments has increased significantly over the past 40 years. Laboratory trials have shown that fragments of this size are ingested by marine invertebrates.

The following *National Geographic* article is a good summary of research that appears to validate some of the claims made by the AMRF video:
http://news.nationalgeographic.com/news/2004/05/0506_040506_oceanplastic.html

A study published in *Environmental Science & Technology* shows that PCBs and DDE adsorb onto plastics and can potentially accumulate these endocrine disrupting hydrophobic pollutants up to 1 million times those in the surrounding seawater:
http://www.findarticles.com/p/articles/mi_m1200/is_5_159/ai_71352472

Although not an issue addressed in the AMRF video, another National Geographic article refers to a study in the highly respected journal Nature that suggests invasive species use plastic debris as transport vehicles:

http://news.nationalgeographic.com/news/2002/04/0429_020429_marinedebris.html

Plastics are definitely a problem and need to be addressed. However, we have not been able to find other published results that support the published Marine Pollution Bulletin studies by AMRF regarding the "plastic to plankton" mass ratio. AMRF reported that in the central Pacific there are six pounds of plastic for every pound of plankton near the surface, and in Southern California coastal waters where plankton are more abundant, they reported 2.5 pounds of plastic fragments for every pound of plankton. Every link that staff found came back to studies by Charles Moore of AMRF but we could not find anything in well-respected peer reviewed journals to back up the claims of plastic versus plankton ratios in the oceans.

AMRF's Pacific Ocean Gyre article http://www.mindfully.org/Plastic/Moore-North-Pacific-Central-Gyre.htm was not very convincing. Among other problems, the methods do not allow for an accurate representation of plastic versus plankton in the North Pacific Central Gyre. Much of the plastic in the open ocean reported in their study came from discarded fishing line and shipping traffic. In summary, plastics are a problem that needs to be addressed but we shouldn't rely on the high plastic to plankton ratios expressed in AMRF's two publications.

The solution to the waste plastics problem, as stated in the Algalita video, is to change the way plastics are produced and handled. The source of waste plastic is worldwide, making the problem global in scale. The Regional Board has no legal authority to regulate production and handling of plastics, but can regulate discharges of waste. However, the discharge of waste plastic is so widespread (from littering and illegal dumping) that action by the Regional Board would seemingly be a drop in the bucket and have little physical impact on the issue as it is presented in the Algalita video. For the Regional Board to consider a Basin Plan Amendment or a TMDL (Total Maximum Daily Load) determination, staff would first have to assess the presence and impact of plastics on beneficial uses in terms of water quality objectives.

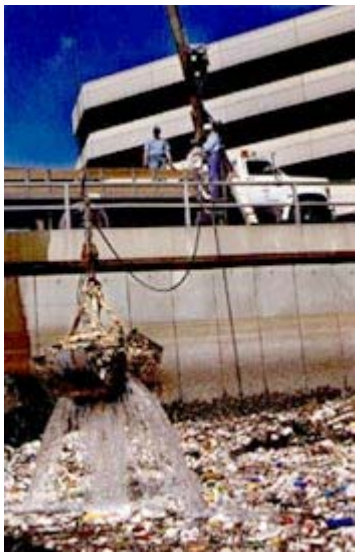
Trash is a broader issue that includes waste plastics. At this time, CCAMP staff (Central Coast Ambient Monitoring Program) are noting the presence of trash during their field work, and their impression is that the amount of trash observed thus far is relatively minor. However, staff has noted increases in amounts of trash in some long term monitoring stations. Other than that, no formal investigation or monitoring program for trash or plastic exists in our Region. Staff has not implemented trash assessments because we assume the problem is not as important as other issues in our relatively rural Region. We have not observed or been made aware of large-scale problems with this issue (such as the problems that exist in the L.A. Region, see below).

The pros and cons of a TMDL or Basin Plan amendment for trash are unknown at this time. There are many outstanding legal issues, as noted below. The Los Angeles Regional Board adopted a TMDL for trash in September 2001. The Los Angeles River was listed as impaired for trash due to exceedance of the following narrative objectives that apply to trash (Water Quality Control Plan, Los Angeles Region, p. 3-9):

• "Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses."

• "Waters shall not contain suspended or settable material in concentrations that cause nuisance or adversely affect beneficial uses."

January 2001



February 2000

Trash in the Long Beach Harbor, which is the mouth of the Los Angeles River
(Photos were copied from the Los Angeles Regional Board's website)

The Los Angeles Regional Board found that trash was impairing recreational uses of the Los Angeles River and harming wildlife via ingestion, physical entanglement, and from the degradation of spawning and nesting areas. Municipal storm drains are the primary conveyors of trash to the Los Angeles River. The TMDL establishes a schedule for progressively reducing the amount of trash that may be discharged to the river by 10 percent per year, with the final waste load allocation to be set at zero. The TMDL will be implemented through the National Pollutant Discharge Elimination System storm water permits.

This TMDL has been very controversial and several lawsuits have been filed on various issues including authority of USEPA and the Los Angeles Regional Water Quality Control Board to establish TMDLs, costs to be incurred by the municipalities, methods of compliance recommended, and challenges to procedures followed under California Environmental Quality Act. Some of these suits have been resolved in favor of USEPA and the Regional Board but others are still pending.

Municipalities could use screens or grates on storm water inlets as a direct method to control the discharge of plastics into the environment. The screens trap debris, and the debris then traps smaller particles such as plastic nodules. Municipalities would have to remove the accumulated trash in front of the screens. Staff will encourage the use of these screens in the Central Coast Region (the Board and its staff cannot specify which BMPs will be used by the discharger).

The solution to the waste plastics issue will likely come from legislation that requires fundamental change in the plastics industry. There are many groups that could propose such legislation, such as the Ocean Conservancy. Staff spoke with a representative of the Ocean Conservancy who expressed interest in pursuing legislation on the issue. Regional Board member Bruce Daniels also forwarded an article on proposed legislation directly related to this issue (the Marine Debris Research and Reduction Act). The article can be found at:

https://secure2.convio.net/toc/site/Advocacy?pagename=hompage&page=SplashPage&id=144&JServSessionIdr001=sgg9ri9bl1.app5b

The article states:

"Marine debris is one of the most pervasive and yet solvable pollution problems plaguing the world's oceans and waterways. It poses a significant threat to ocean life.

Ships can introduce marine debris into the ocean and waterways through intentional disposal by discharging wastes overboard and by not retrieving excess fishing gear. Fishing activities can also result in unintentional loss of gear when it wears out and is lost while deployed. Research shows that marine debris poses a serious risk to marine wildlife such as whales, turtles, seals, sharks and sea birds as well as sensitive habitats including coral reefs.

Successful management of the marine debris issue requires a comprehensive understanding of the nature of this pollution. Strategies for identifying the types, sources, amounts, and impacts of marine debris form the foundation of this pollution prevention initiative. The Marine Debris Research and Reduction Act will make it possible for the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard (USCG), in coordination with other Federal and non-Federal entities, to significantly expand domestic efforts to reduce and prevent pollution."

The article encourages readers to contact their Senators and offer support for the Bill (and provides a link to a form letter). Staff will continue to follow the waste plastics issue and report to the Board as information develops. We will also ensure that our storm water management efforts are optimizing plastics reduction through municipalities' education of citizens to not litter, and through physical BMPs to prevent discarded plastics (and other trash) from leaving the municipal storm system and entering our waters.

More information on the regulation of plastics can be found at the California Integrated Waste Management Board website:
http://www.ciwmb.ca.gov/BuyRecycled/TrashBags/LegReport/