Wiyot Tribe Environmental Department's Newsletter Articles (Oct. - Dec. 2012)

Japanese Marine Debris Reaches West Coast

By Stephen Kullmann

Japanese floating dock that washed ashore in Washington in December 2012. AP Photo/Washington Dept. of Fish & Wildlife

A large floating dock that washed ashore in Washington's Olympic Nation Park last December has been confirmed to be from the March 2011 Japanese tsunami. On January 15, a fisherman retrieved a 24-foot boat that was also suspected of being washed away during the tsunami. Other smaller debris have recently washed up along the shores of Hawaii and the West Coast. The Japanese government estimated that approximately 5 million tons of wreckage was washed to sea after the tsunami, but about 70% of it sunk offshore. Many people have expressed concern about potential radioactive contamination from the Fukushima power plant, but experts agree that this is highly unlikely for two reasons: 1) The debris came from a long stretch of shoreline, mostly many miles away from the power plant; and 2) no radiation was released from the plant until several days after the tsunami and the debris was washed away. Scientists are actually much more concerned with potential invasive plant and animal species that may be attached to floating items.

The National Oceanic and Atmospheric Administration (NOAA) has been tackling the difficult task of trying to track and model where debris will end up. Predicting where debris will drift to is complicated by ever-changing ocean currents and weather and the wide variety of types of debris. Currently, the models predict that we will continue to see more debris on the West Coast in 2013, with much of it remaining off-shore and circling back to Hawaii in 2014 to 2016. Much of it will also likely get caught up in the Great Pacific Garbage Patch. Because of the amount of garbage and debris that is generally in our oceans, it is difficult to positively confirm that debris originated from the tsunami and not from some other source.

The concern of the Japanese Marine Debris highlights another, more lingering problem--marine debris and garbage in general. Plastic garbage in the Pacific Ocean, much of it from single use drinking bottles and bags, has formed the Great Pacific Garbage Patch. The plastic breaks down in smaller polymers that can end up harming bird and sea creatures when ingested. Some of it has been washing ashore on the beaches of Hawaii; at some places accumulating up to three feet deep into the sand. While there is not much we can do to prevent debris from a natural disaster such as a tsunami, there is a lot we can do to address the concern of garbage in the ocean. Recycling, reusable shopping bags and water bottles, and properly disposing of trash into tightly sealed receptacles are all a start to reducing the amount of waste that ends up in our oceans. Help protect our waters and make even a small effort to reduce the amount of waste you generate. The Wiyot Tribe Environmental Department, in conjunction with the Humboldt Bay Harbor District and Humboldt Baykeeper, has also applied for NOAA funding to begin cleaning up some of the larger marine debris in *Wigi*, Humboldt Bay.

At Kamilo Point on the Big Island of Hawaii, plastic fragments penetrate up to three feet into the sand.

If you do encounter any suspected Tsunami debris along our coastline, make note of the exact location and nature of the debris and contact NOAA at DisaterDebris@noaa.gov, or the Wiyot Tribe Environmental Department at 707-733-5055. An interagency Japanese Tsunami Marine Debris website is available at: http://disasterdebris.wordpress.com/. There is also a mobile App for iPhone and Android: *Marine Debris Tracker,* available in Google Play or iTunes.

The Recycling Debate

By Tim Nelson

For many of us, recycling is a normal part of our daily routine. We were taught that by recycling materials, we can remanufacture a similar bottle, can, glass, etc. Metals like aluminum can be crushed, glass can be broken and melted, and paper can be pulped and reshaped to form another functional container/box for our everyday use. The processes involved may be easier said than done and the long lasting debate has been whether or not the costs of the process outweigh the benefits for society. Everything from jobs, energy, pollution discharge, and inevitably money are involved. The great debate: Is recycling economically efficient?

Economic analysis of recycling include decreased air pollution and greenhouse gases from incineration, reduced hazardous waste leaching from landfills, reduced energy consumption, and reduced waste and resource consumption which leads to a reduction in environmentally damaging mining and timber activity. Proponents for recycling will argue that recycling saves energy, reduces pollutant discharges caused by production of new material, reduces landfill accumulation, lowers incidences of hazardous waste spills, and creates jobs. Opponents to recycling argue that the amount of money saved depends on how the recycling facility functions and the size of a community in relation to landfill fees. Also, they argue that timber companies plant more trees post-harvest than the amount that existed pre-harvest, thus saving trees. Lastly, opponents will argue that the amount of energy being saved depends on the material that is being recycled.

Though opponents provide some interesting counters to the benefits of recycling, much data can be found to support the idea that recycling is very economically efficient. In terms of energy savings, recycling an aluminum can has a 95% energy savings, glass (5-30%), paper (40%), cardboard (24%), plastics (70%), and steel (60%). In terms of air pollution savings, recycling an aluminum can has a 95% air pollution savings, glass (20%), and paper (73%). In terms of landfill accumulation and emissions leading to global warming, the Environmental Protection Agency stated that in 2005 the U.S. efforts of recycling reduced CO_2 emissions by 49 metric tons while the United Kingdom's recycling efforts successfully reduce CO_2 emissions by 10-15 metric tons/year! Due to the removal of hazardous substances from our landfills, pollution of groundwater near landfill sites has been reduced dramatically thus saving on expensive pollution remediation efforts, cleanups, or drinking water treatment.

All in all, the debate between the economic efficiency of recycling will continue as scientific data becomes more available. So far, data shows that recycling proves to be worth the effort

for an economy in many different aspects whether they are economical, health, or environmental issues. Do your part and please recycle!

For more information on recycling, hazardous waste, or non-point source pollution, please call or visit the Environmental department.

Chemical and Biological Assessment of the Tribe's Wetlands

By Tim Nelson

In October 2012, the Environmental department assessed the Tribe's water resources for chemical and biological constituents during the annual "First Flush" event. During the spring/summer months, the amount of pollution generated will most often collect on our streets and roadways. It isn't until a heavy rain storm (usually over 1") transports this pollution off our streets, down roads and/or storm drains, and eventually into one of our waterways nearby. Similarly, the department conducted biological surveys (plant and avian) to assess the basic habitat of the Tribe's wetlands. Birds and plants can be important metrics to study habitat quality as the presence or absence of specific genera and/or species can be an indicator to the overall health of the wetland.

Assessment from the annual First Flush event showed results within acceptable ranges for all parameters that were measured. Total coliform levels were elevated with fecal coliform present but not at high levels. Since the wetland wells are not a source of drinking water, the presence of coliforms is not a concern and the levels at which they were detected are to be expected in a natural system. Fecal coliform most often originates from the waste of warm-blooded animals (i.e. mammals) and a main concern for human health is the presence of *E. coli* which can lead to severe gastrointestinal problems and can be fatal to the young and elderly. Nitrite, ammonia, and total Kjeldahl nitrogen were undetected during the monitoring period but nitrate and phosphorus were detected in low levels. The concern of elevated nutrient (i.e. nitrogen and phosphorus) levels in the wetland has to do with algal growth. As algae utilize the excess nutrient loads, they deplete the oxygen levels in the wetland leading to anoxic (low oxygen) environments. This is turn can have an effect on the vegetation present and lead to significant changes in biodiversity in the wetland. By having native wetland vegetation such as willows and alders, the plants can survive in these environments and act as buffers by filtering out pollutants and nutrients. In drinking water, the presence of nitrite and nitrate levels in excess limits can lead to a respiratory illness in infants called "blue-baby syndrome." Testing for metals was conducted and chromium, zinc, nickel, and copper were found to present. The presence of chromium was expected since it is naturally occurring in the soil while the elevated levels of zinc, copper, and nickel were within normal limits. The presence of elevated metals can affect the following systems:

- Dermis (skin)
    - *Arsenic*: Skin damage
    - *Chromium*: Allergic dermatitis
    - *Selenium*: Hair or fingernail loss

  - *Thallium*: Hair loss
- Blood
  - *Antimony*: Increase in blood cholesterol/decrease in blood sugar
  - *Arsenic*: Circulatory problems
  - *Barium*: Increase in blood pressure
  - *Copper*: Liver problems (long-term exposure)
  - *Lead*: High blood pressure in adults
  - *Selenium*: Circulatory problems
  - *Thallium*: Changes in blood; liver problems
- Digestive
  - *Asbestos*: Intestinal polyps
  - *Beryllium*: Intestinal lesions
  - *Copper*: Gastrointestinal distress (short-term exposure)
  - *Thallium*: Intestinal problems
- Excretory
  - *Cadmium*: Kidney damage
  - *Copper*: Kidney problems (long-term exposure)
  - *Lead*: Kidney problems in adults
  - *Mercury*: Kidney damage
  - *Thallium*: Kidney problems
- Nervous
  - *Cyanide*: Nerve damage or thyroid problems
  - *Lead*: Delays in physical or mental development in kids
  - *Selenium*: Numbness in fingers and toes

Since 2007, biological assessments of the Tribe's wetland have shown a more favorable biodiversity of native plants and avian species utilizing the habitat. For botanical species, the proportional abundance of the three most common species occurring in the Tribe's wetland has stayed consistent since 2008 as coast willow (*Salix hookeriana*), water parsley (*Oenothera sarmentosa*), and buttercup (*Ranunculus repens*) were the most noted. Native species were recorded at an occurrence rate of 54-65% with perennial species comprising 81-91% of those recorded. For avian surveys, there has been an increase in the amount of birds recorded in each sequential year. To date, more than 3,250 individual birds of 75 known species have been recorded and characterized according to metrics used to assess wetland habitat health.

For more information on water quality issues or the Tribe's water resources, please call or visit the Environmental department.

The Importance of Riparian Zones

By Eddie Koch

Riparian zones are the areas that surround bodies of water and are composed of moist soil, water loving plant species, and the ecosystems that are associated with them. Riparian zones can be found around lakes, streams, estuaries, and rivers and consist of complex interactions between water, soil, microorganisms, plants, and animals. Our focus will be on the interaction between fish (primarily salmonids) and plants with an emphasis on a local example, the Salmon Creek Unit on the Humboldt Bay National Wildlife Refuge (HBNWR).

Scientists have long recognized the value that riparian areas provide for fish and wildlife. Unfortunately, a number of riparian areas in California have been in a constant state of degradation since the arrival of settlers. Lack of proper vegetation in riparian areas leads to inadequate shade cover that is essential to salmonid rearing habitat and allows excess sediment to build up which, in turn, profoundly affects the productivity of a salmon or trout stream. All around Humboldt Bay, including the lower Salmon Creek Unit, dikes were constructed to keep the incoming tides from flooding the land. As a result, 90% of the salt marshes of Humboldt Bay have been eradicated (9000 acres to our current amount of 900 acres) and riparian zones were essentially depleted as a result of denuded vegetation from increased agricultural practices.

The effects of sedimentation on salmonids are high stress or fatality, especially in the early egg and alevin stage. Survival of eggs is dependent on a continuous supply of well oxygenated water through the streambed gravels. Suspended sediment can cause reduced water flow as well as smother eggs, alevins, or emergent fry. In later life stages, fish secrete mucous to clean their gills which help in winter months when flows are high and sediment concentrations naturally increase. As sediment begins to accumulate in the gill filaments, fish excessively open and close their gills to expunge the silt. Protective mucous secretions are inadequate during the summer months, when natural sediment levels are low in a stream system. Consequently, sediment introduction at this time may increase the vulnerability of fish to stress and disease. Lack of natural vegetation in riparian zones can lead to high nutrient loads resulting in increased algae growth depleting much needed oxygen. When waste from cattle and agricultural runoff enter a stream, the associated nitrogen and phosphorus changes pH as well as increases algae growth. In turn, these changes deplete oxygen during respiration which creates a high stress environment that allows for numerous diseases to occur within fish populations. Willows and other riparian vegetation act as natural filters, removing and storing nutrients and toxins. Riparian vegetation also provides shade helping to maintain water temperatures desirable to salmonid productivity.