



Wiyot Tribe Environmental Department's 2012 Newsletter

Salmon Creek Restoration Project at the Humboldt Bay National Wildlife Refuge (HBNWR)

By Tim Nelson

After a decade of long, tedious work to restore the lower reaches of Salmon Creek, located on the HBNWR, the U.S. Fish and Wildlife Service (USFWS) has completed the restoration project as of October 2011. The problems that had been affecting the Salmon Creek Unit (named so after the USFWS purchased it in 1989) were channelization and ditching caused by previous ranchers/landowners. Also, the creek is affected by activities upstream such as logging, rural development, and livestock grazing which introduced a large amount of sediment that further eroded wildlife habitat. The history surrounding the lower Salmon Creek consisted of ranchers reshaping the environment to increase the amount of land for raising more heads of cattle. For this reason, the channels of Salmon Creek were manipulated to function as natural drains for the land. All around Humboldt Bay, including the lower Salmon Creek Unit, dikes were also 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).

The Salmon Creek Unit of the HBNWR is directly adjacent to Humboldt Bay and acts as a primary inlet for species such as salmon, steelhead, tidewater goby, and many others. The project included the installation of a state of the art tide gate, natural slough channels with the installation of large woody debris, an off channel holding pond, and the restoration of a salt marsh using the excavated material from the slough construction. The project concept and design were developed to allow these species access to headwaters that were once difficult to reach and provide quality habitat in the lower reaches. Further studies relating to fish and wildlife populations are planned for the future which will address the effectiveness of the project and any changes that need to take place. This project is a success story in addressing past problems relating to non-point source pollution (i.e. stormwater runoff, sedimentation, nutrient loading) and hydrological changes that were having a dramatic effect on wildlife and plant species.



For more information on the Salmon Creek restoration project, call or visit the HBNWR or visit www.fws.gov. For more information relating to wildlife or water issues, please call or visit the Environmental Department.

Household Hazardous Waste Disposal & Information

By Stephen Kullmann

We all know that compact fluorescent bulbs, the curly light bulbs known as CFLs, help reduce our energy bills, last longer than regular incandescent bulbs, and reduce our carbon footprint. Yet CFLs contain trace amounts of mercury and should not be thrown in our regular garbage. When mercury is not disposed of properly it can end up in our water supply and in the fish we eat. Mercury can have many harmful effects, including damage to the brain, central nervous system, immune system, kidneys, and heart. Pregnant women and young children are especially vulnerable. So taking care to properly dispose of CFLs is not only the law, but helps protect our future generations.

While CFLs do contain a tiny amount of mercury; generally the electricity they save prevents a much larger amount of mercury from entering the environment through electricity generation.

The Wiyot Tribe Environmental Department will accept used CFLs for disposal. Below is a partial list of places that accept disposal of used CFLs and fluorescent tubes in Humboldt County.

Trinidad: 101 True Value Hardware 400 Patricks Pt. Drive

McKinleyville: ACE Hardware, 2197 Central Avenue

Willow Creek: ACE Hardware, 39168 Hwy 299

Arcata:

Hensel's ACE Hardware, 884 9th St

Sunny Brae ACE Hardware, 86 Sunny Brae Center

Eureka:

Pierson Building Center, 4100 Broadway

Schafer's ACE Hardware, 2760 E St.

Humboldt Waste Management Authority's "Household Hazardous Waste", 1059 W Hawthorne St. (Open first Saturday of the month 9am-2pm)

Redwood Coast Energy Authority, 517 5th St. (Open Mon- Fri 9am-5pm)

Scotia: True Value Hardware, 115 Main St.

Ferndale: Nilsen's, 1593 Market St.

Redway: True Value, 100 Murrish Lane



Broken CFLs



If a CFL breaks, there is no need to panic. You want to do as much as possible to reduce exposure to mercury while cleaning it up. First, have all people and pets leave the room and open a window or door to provide ventilation. Be careful that this does not allow wind to spread the dust, however. Also turn off household heating/air conditioning central air systems. Use a damp paper towel to carefully clean up the bulb and powder, and place everything in a sealable container such as a Ziploc bag or Tupperware. Store the container in an area where it won't be knocked over or disturbed and bring it to a disposal site as soon as possible. Wash your hands thoroughly afterwards.

Batteries (alkaline and rechargeable) are also accepted at the Wiyot Tribe's front office or directly to the Environmental Department. Batteries are also accepted at Humboldt Waste Management Authority's Recycling Facility (1059 W Hawthorne St., Eureka).

The link below provides a list of substances that are banned from regular trash:

<http://www.calrecycle.ca.gov/HomeHazWaste/Info/>

For more information on solid, household hazardous, electronic waste (e-waste), recycling, and/or composting, call or visit the Environmental Department at 707-733-5055.

E-Waste, Appliance and Tire Disposal Days

The Wiyot Environmental Department is coordinating with Eel River Disposal on an e-waste and appliance disposal days. We will collect old appliances in the Community Center parking lot during normal business hours **March 27-29**.

All appliances are accepted, but refrigerators must be drained of freon or there will be an extra \$30 charge.

E-Waste will be collected **April 10-12** in the Community Center parking lot during normal business hours.

E-waste includes TVs, computers, and anything with a screen or cord.

Please help Tribal staff by not disposing of anything other than e-waste or appliances. Please check with the front desk staff before disposing anything in the trailer.

May 12, 2012

Humboldt Waste Management Authority will be having a Tire Disposal Day. We will be collecting tires the previous week for disposal. Look for additional announcements regarding this event.



Are Japanese Tsunami Debris Hitting our Shores?

By Stephen Kullmann

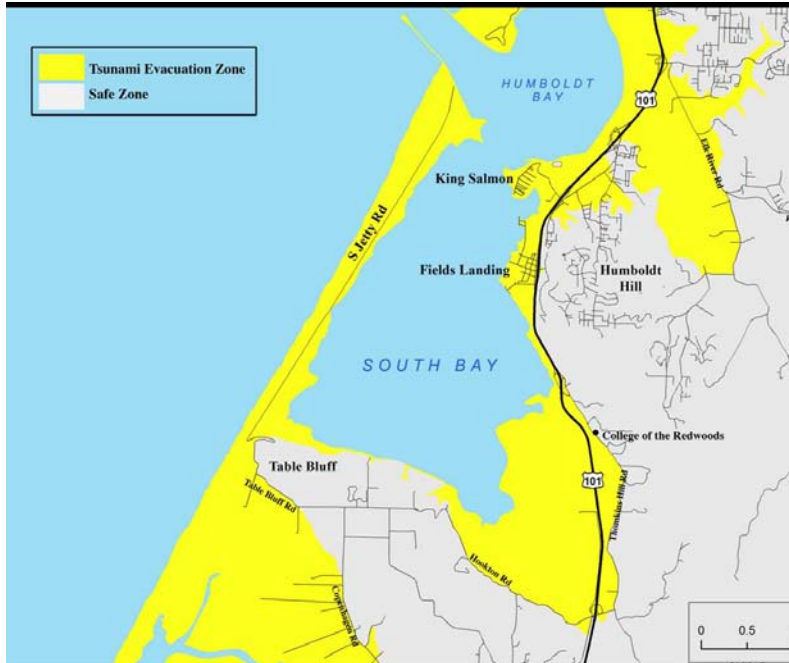
There has been a lot of talk in the news recently about the massive amount of debris predicted to hit California's shores as a result of last year's earthquake and tsunami in Japan. There has also been concern that some of the debris may be radioactive from the nuclear power plant failure following the quake.

Unfortunately, models attempting to predict the path of the debris have high degrees of uncertainty, due to variances in ocean currents, winds, and tides. Unlike sensational reports predicting huge patches of debris hitting our coasts, experts at NOAA, EPA, and Cal EMA believe that most of the debris will be very spread out by the time it potentially reaches our coast, sometime in 2013. Most of it will have sunk, dispersed, broke down, or have been caught up in currents adding to the Great Pacific Garbage Patch. Because the debris was washed out before any radiation was released from Japan's damaged reactors, there is very little chance of it being radioactive.

Nevertheless, there have been many reports of people finding debris along the California Coast that they believe to be from the Japan Tsunami. Debris of all kinds constantly washes up on our shores every day, much of it coming from international shipping, so it is extremely difficult to say with any certainty where any particular garbage originated from.

State and federal agencies are beginning to work with local agencies to implement a plan to deal with any debris that washes up on our shores, and if you find any suspicious garbage washing up you should report it to the local sheriff or other agency. As is the case with many sensational news stories, however, it is unlikely debris from the Japanese tsunami will have the level of impact on our shores predicted in headlines. Like any garbage found in our oceans, however, the long term effects on the health of the marine environment may be long-reaching. The Wiyot Tribe Environmental Department will continue to keep informed on this issue and pass along any information.

There will be a test of Humboldt County's Tsunami Alert System on Wednesday, March 28. This will include sirens and low flying planes with loudspeakers.



Tsunami Hazard Map

The yellow area shows where tsunami waters may reach.

Note that Table Bluff Reservation is **not** in the Tsunami Evacuation Zone, but much of the surrounding area is. In case of a potential tsunami, it is safest to stay put on high ground than risk travelling on low lying roads.

For more maps and information on Tsunami preparedness, visit the Redwood Coast Tsunami Work Group webpage at <http://www.humboldt.edu/rctwg/>

Free Water Resources Technician Training Program

By Stephen Kullmann

There is an excellent opportunity for a FREE WATER RESOURCES TECHNICIAN TRAINING PROGRAM from BIA. Please read the information below and contact the Administrative Staff if interested.

Students successfully completing the training program will receive 1-year voucher, for full-time temporary employment, with their tribal government as an entry level Water Resources Technician. Government employees (Federal, State, or Tribal), if selected, will not receive the voucher from the BIA, since they already have a job.

The Tentative Date for the Bureau of Indian Affairs' (BIA) Water Resources Technician Training Program is **July 8 through August 3, 2012** (4 weeks), at University of Arizona, Tucson, Arizona. Applications are now being accepted. DEADLINE FOR APPLICATIONS is **April 20, 2012**.

Candidates must meet the following requirements to be considered for the training program:

1. Endorsement letter from her/his federally-recognized tribal government, preferably the Chairman, Governor, or Head of Nations;
2. Copy of High School Diploma or GED;
3. Have plans for future higher education or career development;
4. A brief, one-page statement reasons for wanting to join the program;



5. Provide general information using the old Standard Form 171 or is available at BIA's Branch of Water Resources, Washington, D.C., (202) 208-4004. This old SF-171 will be used for general information only, and is NOT an offer, intent, or consideration for Federal employment;
6. Provide a copy of Certification of Membership in a federally-recognized tribe, signed by a tribal government official (Do not send an original certificate);
7. Submit your application for the training program on or before April 20, 2012;
8. A signed pledge stating that the participant will remain alcohol and substance free during the program. A violation of the pledge will result in immediate dismissal from the program;
9. The students are expected to complete all classroom and homework assignments in a professional manner. Daily attendance and active classroom participation are required to graduate.

All selected students will be staying in the dormitory. Commuting to and from the training center is not allowed. Sorry, but no room and board is available at the training center for family members, friends, or pets.

Dioxin Found on PG&E Power Poles in San Francisco Bay

By Tim Nelson

An environmental group has filed a law suit against Pacific Gas and Electric (PG&E) Company alleging that power poles installed in and around San Francisco Bay are "bleeding" dioxin into the waters. The group claims that the discharge of this pollutant violates the Clean Water Act (CWA) and the Resource Conservation and Recovery Act. In Northern California alone, it is estimated that over one million power poles have been treated with the toxic chemical.

Dioxin is a member of the penta- family and poses a significant environmental and human/animal risk. Dioxins can be found in many sources but some examples include: herbicides, pesticides, wood preservatives, fungicides, by-products from burning, etc. Before industrialization, dioxin existed naturally in low levels but has since been found in alarming amounts. The Environmental Protection Agency (EPA) has stated that most dioxin generated comes from the following sources:

- Combustion sources (e.g. municipal waste or medical waste incinerators and private backyard barrel burning)
- Metal smelting
- Refining and process sources
- Chemical manufacturing sources



- Natural sources
- Environmental reservoirs

Dioxin affects your health as a small amount of the chemical can target your reproductive, nervous, and immune systems. Dioxins are primarily absorbed through your diet as the chemical is fat soluble (attaches to fat molecules). It's no surprise that animals containing higher amounts of fat (i.e. beef) may contain a higher amount of dioxin which is then passed onto the next consumer (i.e. humans). In nature, dioxin is transported into a body primarily through inhalation or ingestion. In the water, dioxin has an affinity to attach to sediments (sediment bound) and more study needs to be done to confirm that un-bound dioxin exists in the water column. At the bottom of the food chain, dioxin is picked up through filter feeders, who are ingested by primary consumers (i.e. fish), who are eaten by larger predators (secondary consumers), who may be eaten by even larger predators (tertiary consumers). This "bioaccumulation" of dioxin poses the most risk to those at the top of the food chain (i.e. humans) as we are ingesting all the dioxin that has accumulated from the lower trophic levels.

At first glance, the risk of chemicals on a power pole may not seem like something to address but upon further investigation of the chemical, it appears very toxic to our health and the environment. In Humboldt County, we should be concerned as our bay is the second largest in CA and supplies roughly 50-70% of the oysters sold in this state. Pollution of our waterways from both point and non-point sources doesn't just affect the aesthetic value of our environment but it can be present in the food you eat today, thus affecting your own life.

For more information on water quality issues, non-point source pollution, or for general solid/hazardous waste information, please call or visit the Environmental department.

The March of the Lone Wolf, OR7

By Tim Nelson

For the first time since 1924, a lone, 2 ½ year old male gray wolf (*Canis lupus*) from a pack in northeastern Oregon began the new year by crossing into the state of California. On December 29, 2011, wolf OR7, or "Journey," was tracked via GPS (installed in February 2011) to a remote area of Siskiyou County, north of Mount Shasta. By crossing state boundaries, the wolf officially became protected under the Federal Endangered Species Act (ESA), administered by U.S. Fish and Wildlife Service. To biologists, the finding came as no surprise as the northern reaches of California such as Lassen, the Marbled Mountains, Trinity Alps, and Shasta contain vast amounts of wilderness area which, in addition to the Oregon Cascades, biologists say can



support hundreds of wolves. Though this is exciting news for wolf populations it is mired in a past filled with myth and fiction concerning the “big, bad wolf.”



In the early 1900’s, gray wolf populations were almost hunted to extinction due in part to misguided human perceptions. At the time, the wolf was seen as an evil, ferocious killer and was killed more for sport and fur than out of necessity. Modern societal views of the wolf are still showing the wolf as a calculated killer in cartoons such as “The Three Little Pigs” and as a man-eater in older children stories such as “Little Red Riding Hood” and in more recent movies such as “The Gray.” In fact, wolves

are intelligent creatures that hunt in packs for survival and most often are timid to the point that they will run and/or abandon a kill to an encroaching human. In this day, wolves are pushed back into the spotlight by ranchers and dairy farmers upset about wolf predation on their livestock. For this reason, states such as Idaho, Minnesota, Montana, Wyoming, and others, have or are considering the allowance of hunting wolves. Unfortunately, societal views combined with encroachment of humans into wolf territory and the raising of livestock (easy game for wolves) has cast a dark shadow on the importance of wolves in nature.

Biodiversity is usually viewed as beneficial to a community as each species may help to keep the other in check. For example, Yellowstone National Park reintroduced gray wolves back into the park due to the complete eradication of the species by humans in the early 1900’s. The reintroduction served as a method to decrease the enormous elk, deer, and moose populations that were decimating their own environment and literally eating themselves to death. By doing so, the wolves helped to decrease the ungulate numbers through predation which, in turn, provided the necessary time for willow, aspen, and cottonwood stands (major food source for ungulates) to regenerate. This form of “checks and balances” in the wildlife community also helped the local beaver population as their once, long-absent food source, willows, now returned. This new reestablishment by the beaver affected other species as their dams provide habitat for muskrats, otters, and fish and encourage new plant growth (shrubs, succulent vegetation) in the pools behind the structure, thus providing habitat for songbirds, warblers, rodents, and insects. Also, water quality improved as loads of sediment that were sent adrift from the absence of vegetation along stream banks were now stabilized, thus decreasing in quantity. As you can see, the loss of one main predator, such as the gray wolf, from a community can have a domino effect on the water quality and biodiversity within an ecosystem.



For more information on OR7 (his path through CA and current status), visit California Department of Fish and Game's website at: <http://www.dfg.ca.gov/wildlife/nongame/wolf/>. For more information on water quality issues in relation to plants and animals, feel free to call or drop by the Environmental Department for some useful information.

First Flush: Monitoring Your Waters

By Tim Nelson

Very soon fall weather will set in and our once sunny, but most often gloomy, summer will turn to dark clouds, high winds, and large amounts of precipitation. 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. In the near Eureka area, it isn't hard to imagine how easy it would be for non-point source pollutants such as motor oil or gasoline/diesel oil to eventually end up in Humboldt Bay. At times, U.S. Highway 101 is a mere ten feet from north Humboldt Bay. You may initially believe that the proximity of a waterway to a transportation route would contain higher amounts NPS pollution but you may be shocked to learn that a large amount of NPS pollution comes from far away sources.

Surface water runoff can happen in both the rural and urban environments but the latter is much more affected than the other. In urban environments such as the largest, New York City and Los Angeles, a city block composed of impervious surfaces (i.e. concrete, asphalt) can generate up to 9 times more runoff than a woodland area of equal size. Impervious surfaces do not allow for water to infiltrate through the ground where biological buffers (i.e. plants, microbes, bacteria) can "treat" potential pollutants. The pollution issue in the urban setting is a real concern as there is only a 15% infiltration rate and a **55%** runoff rate. On the other hand, in the rural setting, there is a 50% infiltration rate and only a **10%** runoff rate. This runoff from urban areas collects pollutants along the way and is quickly channeled into storm drains where it is deposited directly into the nearest waterway (creeks, rivers, and/or ocean). Like a garden hose, this increased volume and constricted, pressurized flow of water then destroys the downstream habitat as water is heavily deposited from the storm pipe.

Though urban areas generate the majority of non-point source pollution that lead to impaired waterways, rural environments can be responsible for similar effects on water quality as well. Some of the potential pollutants that can affect water quality in both the urban and rural environments are:

- *Sediment* – increase in water temperature and algae/bacteria growth in waterways



- *Oil, grease, and toxic chemicals from motor vehicles* - health issues to humans/wildlife as drinking water sources (i.e. wells) may be affected
- *Pesticides and nutrients from lawns and gardens* – health issues to humans/wildlife and increase nutrients that can lead to toxic algae blooms and eutrophication
- *Viruses, bacteria, and nutrients from pet waste and failing septic systems* – carry diseases that can harm humans/wildlife
- *Road salts* – increase in salinity which affects fish species in nearby freshwater sources
- *Heavy metals from roof shingles, motor vehicles, and other sources* – can lead to health issues for humans and wildlife
- *Thermal pollution from dark impervious surfaces such as streets and rooftops (also called the “Heat Island Effect”)* – can raise water temperatures affecting fish species in nearby waterways

But we have the ability to intervene and help preserve our natural waterways for humans and our local flora and fauna. Changes both large and small can make a huge difference in how your local waterways can improve in water quality. Some changes that you can make to ensure that you are not contributing to the non-point source pollution problem are:

- Plant native plants and mulch to reduce impervious surfaces or high maintenance lawns
- Use fertilizer sparingly or not at all; Use compost collected from your own food scraps and yard waste
- Sweep sidewalks and driveways instead of wasting water and washing sediment down storm drains
- Do not use pesticides but use Integrated Pest Management techniques instead (i.e. use marigolds or neme oil in your garden to deter pests)
- Pick up pet waste so that harmful bacteria do not wash down storm drains
- Maintain your car to limit leaks and recycle motor oil and antifreeze at proper locations
- Use car wash facilities or wash your car on your lawn to limit soap and grime from washing down storm drains
- If you have a septic tank, have it professionally maintained once every 3-5 years

For more information on water quality issues and non-point source pollution, please call or visit the Environmental Department.



Coastal Cleanup Day

By Tim Nelson

In September, the Environmental Department participated in the annual Coastal Cleanup Day. Volunteers worked from the South Spit near Table Bluff Reservation and headed south cleaning up ~2-3 miles of the coastline. On this day, ~500,000 people around the world help to clean up 9,184,428 pounds of trash from 20,776 miles of shoreline. Locally in Humboldt County, 844 volunteers helped to clean up 13,000 pounds of trash and 400 pounds of recyclables from nearby waterways. Due to geographical location and currents, Humboldt County beaches should be the first to receive debris generated from the Japanese tsunami. Local agencies have kept a watchful eye on our beaches and the public has been asked to call 707-822-6918 to report any potential tsunami debris.

Hydraulic Fracturing: The Impacts to Water Quantity and Quality

By Tim Nelson

In the world of energy production, specifically oil and gas, the term hydraulic fracturing is usually referred to as “fracking.” Fracking is the practice of injecting water, chemicals, and a proppant at high pressure into an existing oil or gas well in order to fracture or re-fracture rocks for further gas and oil production (Figure 1). The proppant consists of small particles of sand, or man-made materials such as coated sand or ceramic materials which hold open the fractures created by fracking treatments. These treatments may be beneficial in regards to oil and gas production but scientists argue that the costs far exceed the benefits.

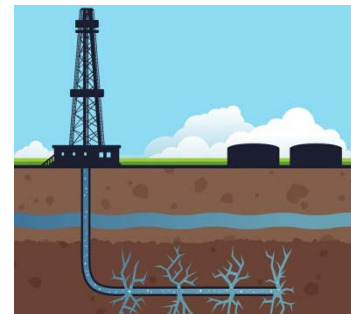


Figure 1. Fracking operation



Figure 2. Contaminated water from fracking operations

There are three main concerns to the fracking process: 1) Depletion of water resources used during treatment, 2) Spills and leaks of fracking chemicals and fluids, and 3) Mismanagement of wastes generated during treatment. The process of fracking utilizes large volumes of water which have come from nearby sources. Community water supplies, irrigation schedules, and water availability for aquatic species can be affected due to large water usage during fracking. In addition to water quantity, hundreds of billions of gallons of “produced water” (are generated by the oil & gas industry every year and may contain hydrocarbons, heavy metals, salts, and



naturally occurring radioactive material (NORM), in addition to the chemicals injected into the well during fracking. This fluid is then stored in large tanks or open pits on the surface where it is then treated at the surface, transported either by truck or pipeline for treatment, or re-injected into another well or underground (Figure 2). The opportunities for surface and groundwater contamination are numerous as open pits are susceptible to spills and leaks; tanks are susceptible to leaks from tank damage or aging; and underground injections are susceptible to earthquakes that may shift geologic formations for direct connection to underground aquifers.

When it comes to fracking, “out of sight, out of mind” is an appropriate saying as the majority of damage being done is happening below the surface. Risks associated with well construction and well integrity, neighboring gas and oil wells, and natural fracturing can affect the quality of water being stored in large aquifers. The addition of man-made fractures to naturally occurring fractures in the rock creates a network or pathway for oil, gas, and/or fracking fluid to eventually creep its way into a usable water source. If contamination



Figure 3. Methane from fracking operations has made this drinking source non-potable

occurs, the water to be used must be heavily treated as the contents of oil, gas, and/or fracking fluids are extremely toxic. Most residents who live near fracking sites where the chemicals can more likely enter their water source have complained of headaches, nosebleeds, disorientation, and sick animals. As an example, a resident in Pennsylvania discovered methane in her water source after she had leased land to an energy company to conduct fracking operations. Following treatment, her drinking water was far from potable and, in fact, was flammable (Figure 3)!

As humans, we need to strive for energy sources that are not only environmentally friendly but are also sustainable for years as the current projection for eventual fossil fuel consumption is near 2050. If you consider the environmental side effects that accompany fossil fuel exploration and use (i.e. decreased water quality, wildlife deaths, climate change, etc.), it makes sense that we begin to shift focus to stop relying only on this energy source. Until there is a unified local change it will be difficult to push for a global change as larger economies and societies still rely on non-renewable sources of energy. For a greener, cleaner tomorrow we should all be pushing for renewable energy sources in order to clean up our land, our air, and our water.

For more information on water quality and energy issues, please feel free to call or email the Environmental Department.



Lamprey at Van Arsdale

By Vincent DiMarzo

On Friday, June 8th, I had the opportunity to travel with U.S. Fish Wildlife Service (USFWS) fisheries biologist Damon Goodman to Van Arsdale Reservoir. While there we met with California Department of Fish and Game (CDFG) fisheries biologist Scott Harris to discuss lamprey passage at the dam and how we can help the lamprey to negotiate the existing barrier.



Figure 1. Van Arsdale Dam with fish ladder (box structure on right)

Cape Horn Dam was constructed in 1908. At Van Arsdale there is a fish ladder in place to help with fish passage but it had previously been in operation only in the fall and shut down in the beginning of May, right about the time lamprey would be arriving. Also, the ladder is designed with salmon and steelhead in mind with no consideration to what lamprey would need to successfully migrate. To lamprey the dam meant an almost complete barrier to any spawning grounds above the dam. Since that time our eels have been forced to spawn below the structure and though some can manage to climb the dam and make it to their

traditional spawning ground, the majority cannot.

Around the end of May, a large amount of water was released from the reservoir for the first time ever in an effort to encourage young salmon to start their seaward migration. As a byproduct of the release there was a discovery made. When the flows peaked it triggered the lamprey holding below the dam to attempt to climb the fish ladder where more than five hundred trapped eels were captured in one night. These individuals were then transported by trash can to the top of the dam and released so that they could complete their upstream migration. This event was an eye opener of sorts to the needs of the lamprey at the fish ladder as CDFG set up a meeting with USFWS regional lamprey specialist Damon Goodman to discuss possible solutions. I was offered to go along to give tribal perspective and learn about passage criteria.

Within moments of being at the fish ladder, we observed the first of several lampreys struggling to climb the barrier. A lot of pictures and a short video were taken to document their struggle. After watching for several minutes we captured a few, took measurements, and then transported them to the top of the dam for further upstream migration. Afterwards, we talked about how we could improve the ladder by making some small adjustments. Some good ideas were shared and some potential solutions were discussed in depth. As we finished our meeting, Mr. Harris seemed very excited about fixing this



Figure 2. Lamprey attempting to maneuver a barrier at Van Arsdale Dam



problem. He stated that this has been going on for a long time and that, as soon as we were gone, he would purchase supplies from the hardware store to fix the barrier immediately. I felt he genuinely meant all he said and that he would be inviting us back to see the ladder functioning properly when completed. Hopefully this can be a good starting point for the Wiyot Tribe to have more input over what happens on our river and the beginning of a healthy collaboration between CDFG and the Wiyot Tribe.

Acidification and the Health of the Pacific Ocean

By Tim Nelson

Ocean acidification is a scientific term that is used to describe a lowering of pH in the Earth's oceans. Water, H_2O , when separated into the binding molecules H^+ (hydrogen ions) and OH^- (hydroxide ions) can determine the acidic or basic properties of a water source. More OH^- in the water source, the more basic the environment while more H^+ in the water source defines a more acidic environment. The term pH stands for the "power of H (H standing for hydrogen)!" Water has a pH score of 7, neutral on the pH scale that runs from 0-14. Any range lower than 7 is more basic (i.e. coffee is pH 5) while any score over 7 is more acidic (ocean water is pH 8). Subtle changes in the pH levels of an environment can spell certain doom for organisms adapted to live in a specific pH range.

Throughout time, organisms have adapted to live in very acidic, neutral, or extremely basic pH environments. For example, the blood coursing through your veins and arteries requires a specific pH level (~7.4) and the slightest variation either way can cause your cells to stop functioning. We are lucky to have pH buffers that regulate our body's pH but unregulated changes, like acidification of an organisms' environment, can destroy fragile ecosystems. For example, in Washington, ocean acidification of the Pacific Ocean is the leading suspect in the ongoing crash of Pacific oyster populations. The main cause for the increase in ocean acidity is attributed to carbon deposition from cars, factories, and power plants. This carbon dissolves in the oceans and creates the same carbonic acid that gives soda pop its tang. Carbonic acid turns oceans acidic and dissolves carbonate, a common component to seashells. An increased amount of carbonic acid destroys shelled organisms such as oysters, marine snails, marine plankton, coral reefs, etc. which has a devastating effect on the food chain as larger organisms (i.e. whales) thrive on the smallest of creatures (i.e. plankton).

Ongoing research in the Pacific Ocean suggests that the ocean is headed toward a more acidic future. In the past 15 years, the top 300 feet of the ocean has lowered by a pH of 0.026, a 6% jump in acidity. Similarly, ice cores in Antarctica have shown that ocean pH is higher now than it was 800,000 years ago. In just in recent history, our oceans have become 25-30% more acidic



since the Industrial Revolution, when businesses began to use carbon burning machines to produce mass goods.

So what can we do to stop the increasing acidity of our oceans? We can limit the amount of carbon that we personally deposit into our atmosphere. Also, we can help to push for renewable sources of energy and move away from fuels that require the burning of carbon (i.e. fossil fuels). We can also hope that factories and power plants move to cleaner sources to create products or harvest energy thus lowering the amount of carbon expelled from smokestacks.

For more information on water quality issues, please call or visit the Environmental Department for some handouts and links to websites for important water quality standards.

Renewable Energy Comes to Table Bluff Reservation

By Stephen Kullmann

Thanks to an Energy Efficiency and Conservation Block Grant (EECBG) from the US Department



1500 Watt wind turbine on a 45 foot tower, and 2100 Watt solar array mounted on the Community Center roof

of Energy, Table Bluff Reservation has its first renewable energy generating capability.

At the end of summer 2011, a 2.1 kW solar photovoltaic array was installed on the roof of the Community Center and in March 2012, a 1.5 kW wind turbine was erected on the lawn near the Community Center and the Environmental Department buildings. Both units provide free, renewable energy to the three administration buildings in a "grid-connected"

system. Grid-connected systems are the most common method of using renewable energy where an electric grid is present. The energy is fed directly into the PG&E power grid, offsetting the energy used by the buildings. For example, when the sun is shining and the wind is blowing, we are generating more power than we are using, so the electric meter actually runs backwards. At times when we are using more power than we are producing, the electric meter returns to running forward. This eliminates the need for expensive and high maintenance batteries, because we are basically using PG&E as our battery.



Electrical ABC's

A Watt (W) is a unit of power. 1000 Watts are a kilowatt (kW). One kW used for one hour is a kilowatt hour (kWh), and costs about \$0.12 from PG&E.

An added benefit to the system is that we will be able to measure the performance of both types of renewable energy side-by-side to help decide which has more "bang for the



The wind turbine tilts to protect itself in high winds, but is still producing power

buck." While the solar array is a little larger in its power rating (2.1kW to the wind's 1.5 kW) both units cost approximately the same amount to purchase and install. This way we will hopefully be able to make more informed decisions on how to best spend money to install more renewable energy.

Furthermore, having both wind and solar helps round out our energy production. While the solar may perform better in summer, the wind will do better during our winter and spring months. Also, solar can only produce electricity during the daytime while wind can operate 24 hours a day This units will just provide a small percentage of our electrical use, however. Historically, the electrical use for the administration buildings has been around 80kWh/day.

As of August 6, 2012, in 139 days of operation, the 1.5 kW wind Turbine has produced 222 kWh of energy, or about 1.6 kWh/day. The 2.1 kW solar array has produced 2,683 kWh of energy in 345 days of operation, or about 7.8 kWh/day. Since both units were about the same installed cost, so far we are averaging about 4.5 times the energy production from the solar than the wind, in terms of cost. In terms of energy production per rated capacity, the solar outperforms the wind by a factor of 3. The data for the last three months are shown in the attached chart. We will need at least a full year of data to accurately rate the two systems, and we expect the wind output to improve and solar to decline over the winter months.

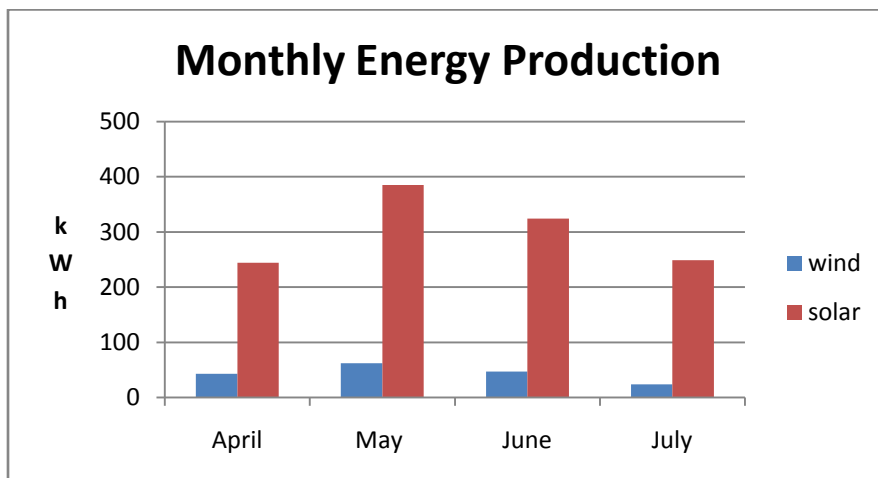




Table Bluff Community Garden Update for August 2012

By Vincent DiMarzo



Greetings my fellow Wiyot Tribal Members! The community garden has gotten off to a good start this year. We began the planting season with an amazing “garden party” that got the ball rolling. Many different organizations, including UIHS Potawot, Redwood Community Action Agency, University of California Cooperative extension, HSU Social Services Department and Earthly Edibles, brought donations to help our garden. Without their kind donations it would have been difficult to purchase all the seeds and starts we now have growing. Also in attendance were some of the Tribe’s youth who had an opportunity to get their hands dirty and apply their green thumbs. Thanks to all who participated!!!

With the year quickly winding down, the first harvests have begun to take place. Thus far we have already harvested over sixty-seven heads of lettuce, several heads of broccoli, a few heads of cauliflower, several zucchini and summer squash with a total weight of seventeen pounds, over six pounds of snap peas and a variety of others including tomatoes, strawberries, Swiss chard, kale, with much more to come. The corn, potatoes, pole beans and onions are nearing completion and will be harvested sometime over the next month. Once harvested, the produce will be divided equally and disbursed to community members, with an emphasis on elders and those with special dietary needs. The rest will be used at the Wiyot Day feast, which the Tribe hopes will be largely attended by members and the surrounding community.



Figure 4. TBR Community Garden harvest

Also worth mentioning, we recently received a small garden grant that will pay for a dozen apple trees and some blackberry starts to begin a community orchard and berry patch. Thank you to the Redwood Community Action Agency for that opportunity.

Lastly, I would like to invite you to come and visit the community garden and get your hands dirty any time you like. To get a hold of me to arrange a visit, call Vincent at the tribal office, 733-5055, ext. 106.