Wiyot Tribe's Natural Resources Department (NRD) FY14 Newsletter Articles

Natural Resources Department Welcomes New Intern!

By Nicole Woodrow, Natural Resources Intern

Heh-let, en-chish mah! (Greetings, I hope you are well!) My name is Nicole Woodrow, and I am an intern in the Natural Resources Department assisting in the development of the Tribe's community garden, and other various projects. I am currently an undergraduate student at HSU majoring in Environmental Science, Ecological Restoration option. I am also a member of the Wuksachi Indian Tribe and a descendant with Western Mono and Yokut ancestral roots from what is now known as the Sequoia and Kings National Parks in California's Sierra Nevada Mountains. I plan to use my academic and cultural teachings to assist Tribal communities in developing restoration projects for traditional plants, and to increase food sovereignty for healthier and more self-reliant Tribal communities. I am excited and grateful to be able to collaborate with the Wiyot community, and look forward to a flourishing garden. Hoot-theh-wed mah (Thank you)!

California Drought

By Stephen Kullmann, Natural Resources Director

Surely you have noticed the lack of rain this winter. Overall, California has experienced its driest year on record, and 85% of the state has been categorized as in severe drought. Most of the state's reservoirs are well below capacity, according to the CA Department of Water Resources, including Lake Shasta at 37% and Folsom Lake at 19%. The Humboldt County Municipal Water District reports Ruth Lake at 55%. Perhaps even more concerning is the lack of snowpack in the mountains, which is what maintains our rivers through the usually dry summers. According to the National Resources Conservation Service, snowpack in the Sierras is at about 30% of average for this time of year. Rainfall in Eureka since July 1 has been 5.85 inches, only 29% of the normal 19.97.

According to the National Weather Service, the reason for the lack of rain this winter is a "ridiculously resilient ridge" of high pressure causing winds in the east. The zone of high pressure off the West Coast is nearly 4 miles high and 2,000 miles long, blocking Pacific winter storms from coming ashore. This is a similar type of system that caused the areas previous worst drought in 1976-77. While this is being billed as the driest year on record, tree ring analysis going back much

farther in time show some truly frightening "mega-droughts", including one that started in the year 850 and lasted 240 years!

Locally, our municipal water supplies are not in danger. Here on Table Bluff, we are blessed to have two new, high output deep wells that could supply well over our current needs. The rest of the Humboldt Bay area relies on water from the Mad River and Ruth Lake, which while low, are in no danger of running dry this year. For the rivers and our fish, however, the danger is immediate and real. Fisheries experts from the Wiyot Tribe's Natural Resources Department have observed salmon spawning in the lower reaches of the Eel and Mattole Rivers because low flows have blocked them from migrating to preferred spawning areas upstream. As flows continue to drop, water quality and dissolved oxygen levels are impaired, threatening the survival of this year's run. Some biologists have even hypothesized that Mad River steelhead might return to the ocean without spawning as they have been observed to do in drier, southern California rivers, although there is no record of that ever happening here.

Another great concern is the impact of illegal diversions along the tributaries of the Eel River. It is difficult to even estimate how much water is removed from important fish spawning and rearing habitat annually by marijuana grows, but everyone acknowledges the impact can be huge. A simple glance at Google Earth shows thousands of acres cleared for marijuana cultivation, and it has been rare when we have surveyed an Eel River tributary and not found multiple pumps and diversion sites. While water removed from the mainstem may have a relatively minor impact on overall flows, a single pump can severely impact a tributary, destroying multiple generations of juvenile fish. More responsible growers use our typically wet months to fill retention ponds and water tanks to sustain them over the summer, but if the rains do not come soon, there is no telling what may happen this year. Area beekeepers are also concerned about the effects of drought on already declining bee populations, which are essential for pollination for many of our native plants and crops.

Governor Jerry Brown recently declared a statewide drought emergency. While this may be necessary to mandate conservation measures and allow for federal relief funds, there is also concern that the "state of emergency" could allow for less environmental oversight for large agricultural-industrial water users to take more water from other parts of the state. The CA Department of Fish and Wildlife has also instituted a number of low flow fishing closures on local rivers, including the following:

1. The main stem Eel River from the paved junction of Fulmor Road with the Eel River to the South Fork Eel River.
2. The South Fork of the Eel River downstream from Rattlesnake Creek and the Middle Fork Eel River downstream from the Bar Creek.

3. The main stem Van Duzen River from its junction with the Eel River to the end of Golden Gate Drive near Bridgeville.
4. The main stem Mad River from the Hammond Trail Railroad Trestle to Cowan Creek.
5. The main stem of the Mattole River from the mouth to Honeydew Creek.
6. The main stem of Redwood Creek from the mouth to its confluence with Bond Creek.
7. The main stem Smith River from the mouth of Rowdy Creek to the mouth of Patrick Creek (tributary of the Middle Fork Smith River); the South Fork Smith River from the mouth upstream approximately 1,000 feet to the County Road (George Tyron) bridge and Craig's Creek to its confluence with Jones Creek; and the North Fork Smith River from the mouth to its confluence with Stony Creek.

While as stated above, our municipal water supplies appear to be in no present danger, it is never too early to begin water conservation measures. There are many simple things we can all do to conserve water. Some ways to start are:

1. Check and repair leaky faucets, pipes, and toilets.
2. Install water saving faucet aerators and low flow devices shower heads and toilets.
3. Take shorter showers.
4. Don't leave the water running when you brush your teeth or shave.
5. Wait until you have a full load for the dishwasher or washing machine, and/or look for low water use appliances.
6. Let your lawn go brown, or plant drought-resistant plants.
7. Use a broom, not a hose to clean driveways and sidewalks.

And finally, if you are a part of our local agricultural community, please consider the impact to our rivers and fish when planning your crops. There are many resources available for best management practices for marijuana cultivation from local supply shops and the Humboldt Institute for Interdisciplinary Marijuana Research at http://www.humboldt.edu/hiimr/index.html.

First Flush: Monitoring Your Waters

By Tim Nelson, Natural Resources Specialist

This past fall following the first major rains (~1"), the Natural Resource Department continued monitoring the Tribe's water resources by sampling for biological and chemical constituents at the Reservation wetlands. 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 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 rather than infiltrating through the soil or gently spreading along the landscape.

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; Can lead to increased sedimentation in rivers and high turbidity issues which can lead to respiratory complication in fish species of concern
- **Oil, grease, and toxic chemicals from motor vehicles** - health issues to humans/wildlife as both drinking water sources (i.e. wells) and nearby waterways 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 such as *E. coli* that can harm and/or kill 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** – health issues to humans/wildlife as both drinking water sources (i.e. wells) and nearby waterways may be affected
- **Thermal pollution from dark impervious surfaces such as streets and rooftops (also called the "Heat Island Effect")** – can raise water temperatures affecting cold water dependent fish species (i.e. salmonids) 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 (i.e. Table Bluff Reservation Hazardous Waste Facility)
- 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

Threats to Our Local Ecosystem

By Eddie Koch, Natural Resources Technician

Logging was the dominant industry on the north coast for almost a century. By the 1970s it became clear that unregulated logging practices were responsible for unprecedented damage to local ecosystems. Most notably the sedimentation of streams from landslides due to clear cutting practices and failing legacy logging roads has resulted in the destruction of vital salmonid spawning and rearing habitat. As a result, forest practice rules were implemented that established standards for forest practices such as timber harvest, pre-commercial trimming, road construction, fertilization, and forest chemical application.

Streams situated within our steep unstable coast range mountains collect large quantities of sediment naturally, to which salmonids have evolved to spawn, hatch, and thrive. Though occurring naturally in the environment, there are concentration limits for sediment within a given time interval. When this limit is surpassed streams become chocked and are considered polluted. In the early 1970s, accelerated erosion far beyond natural rates occurred due to unregulated and mismanaged road building performed by commercial and private logging operations. Soil, gravel, and rocks erode downhill from these operations during rainstorms covering spawning habitat or suffocating incubating eggs.

The past few decades have seen an awareness and sense of stewardship in the local community. Logging practices have changed and ecological damage has, to some degree, been mitigated through either natural processes or from direct human intervention. However, our local ecosystem faces a new threat with consequences rivaling the most indiscriminant logging technique. This threat comes in the form of another botanical species that holds extreme market value and is cultivated, grown, and harvested by many rather than single corporations with large logging equipment. The plant is marijuana and in Humboldt, Mendocino, Trinity, and Del Norte counties, plays integral part of the local culture.

Environmental impacts from unregulated weed grows are compounded when compared to those from logging. To put this into perspective; a comparison of Google Earth images of the southern portion of Humboldt County from 2010 to 2013 show an exponential increase in pot farms. Moreover, what used to be considered common cultivation practices consisted of clandestine operations that disturbed top soil to a far less degree than today's uninhibited operations. Roads are being pushed through to desirable locations by individuals either unlicensed or with zero to little experience using heavy equipment. Rodenticides and other poisons designed to kill/deter mammals (i.e. mice/deer) that are targeting the nutritious plant buds, bioaccumulate in the individuals and are then passed on to larger predator species (i.e. spotted owls/mountain lions).

In some cases, poisons have been found in hot dogs or other food sources in order to control larger wildlife species (i.e. fishers). Again, these poisons are then transported up the food chain where they can affect even scavenger or omnivorous species (i.e. vultures, bears).

Our local rivers are experiencing an onslaught of threats. Unregulated water diversions, introduction of high levels of fertilizers and poisons, and unnatural amounts of sediments. All this coupled with the present drought add up to disaster. Shaving off the tops of mountains to grow weed introduces excess sediment into streams to levels comparable to unregulated logging practices. Furthermore, tremendous amounts of fertilizers are being used to produce the maximum yield possible. The dumping of used soils containing fertilizers introduces excess amounts of nutrients into streams which cause algal blooms that disrupt the diurnal oxygen cycle. High nutrient content also creates blue-green algae blooms that translate to health risks for humans as well as animals that come into physical contact with the water.

The Wiyot Tribe Natural Resources Department conducted surveys on about 40 streams during the summers of 2012 and 2013. We saw very few Eel River tributaries that carried sufficient flows to allow for the production of native fishes such as Coho and Chinook salmon as well as Pacific lamprey ("eels"). Algal blooms, probably as a result from large inputs of nutrients to the system upstream, were found in some of these tributaries where one would not expect to see them. Along with conducting fisheries surveys, the Department also conducted water quality monitoring and saw very depressed dissolved oxygen numbers (<30% or 2 mg/L) sufficient enough to result in fish kills. More often than not, if fish were not stranded in a pool, these sites did not contain either salmonids or lamprey (both Pacific and Western brook). On one occasion we were confronted by a grower who informed us, using threatening language, that we should leave the area because of our close proximity to marijuana grows.

We are hoping over the next few seasons, that there is a communal shift in perspective to stewardship and caring for our local mountains and streams. The attraction of free for all growing in Humboldt, and surrounding counties, has resulted in an influx of non-local seasonal residents who have a primary goal of making money then getting out, only to come back and repeat the process the next year. These people seem to have very little consideration for what damage they are causing to our local environment. That is not to say that local farmers are exempt from the temptations that high yield growing offers. It may be that we are entering an era in which regulations curb illegal water diversions and set in place best management practices for marijuana cultivation (see Best Management Practices: Northern California Farmers Guide @ http://s3.documentcloud.org/documents/691078/bestpracticesguide.pdf). What the future holds in these regards may be unknown but one thing is certain, that awareness to the problem at hand and caring for our community is needed from everyone in order to create a real change.

For more information and to view a YouTube clip containing a compilation of screenshots of Google Earth grow site images go to:
http://www.thenation.com/article/176955/pot-growing-bad-environment?page=0,1

Gou'daw, the Journey Continues

By Eddie Koch, Natural Resources Technician

By now, most of you are aware of the Natural Resources Department's (NRD) involvement in numerous fisheries related projects. Completion of a two year project focusing on assessment of Pacific lamprey (aka "eels" or in Wiyot language, *gou'daw*) passage barriers was a tremendous accomplishment and added invaluable data to continue the effort to increase Eel River lamprey populations and restore their natural habitat. While the aforementioned project focused on assessment of passage barriers within tributaries throughout the entire Eel River basin, our latest project is focusing on population distribution and spawning and rearing habitat within ancestral Wiyot territory.

A brief refresher on Pacific lamprey life history; Much like the anadromous salmonid species endemic to our local streams, Pacific lamprey spend a majority of their adult life in the marine environment then return to freshwater streams to spawn. Soon after spawning they die, decompose, and return to the system as valuable marine derived nutrients. After spawning takes place, eggs incubate in nests that the adults build on strategic locations, usually at the edge of pool tailouts, just before riffle crests on numerous tributaries. These nests, called redds, are one of the main focal points of our current project.

Figure 1. Lamprey pair spawning on redd (Coquille River, OR).

The Wiyot Tribe's NRD conducts "intensive" spawning surveys on a weekly basis in order to observe and catalogue the number and placement of lamprey redds on two streams; Bull Creek and Lawrence Creek. These creeks were chosen as suitable index reaches for ongoing monitoring of Pacific lamprey spawning numbers as a result of the Tribe's proposed Pacific Lamprey

Management Plan. Bull Creek is a large Eel River tributary which flows around Grasshopper Mountain and enters the South Fork Eel River approximately 1.5 miles upstream from the South Fork and Eel River confluence. Lawrence Creek is a large tributary to Yager Creek, a very large and important tributary to the Van Duzen River. Lawrence enters Yager approximately 6 miles upstream from the confluence of Yager Creek and the Van Duzen River, which occurs near the town of Carlotta.

At the moment, once a week, the Tribe's NRD has been conducting spawning surveys alternating between Lawrence Creek or Bull Creek. Two reaches equaling approximately 3 miles on each stream are surveyed. In the near future during the peak Pacific lamprey spawning period (May-June), the Tribe expand surveys to focus on large river systems as well as small streams of interest including Van Duzen, South Fork and mainstem Eel River, and Price Creek. To date we have recorded a number of redds on both steams. The adult lamprey that are constructing these redds are typically not this year's inmigrating fish but rather are last year's fish that have been holding instream since their return to the river. The eels that are being caught at the mouth of the Eel River this year will transition into an approximately year long instream holding cycle in which they will not feed, lose some of their size, then spawn around this time next year.

Aside from the focus of our current project goals, quantifying lamprey population as well as spawning and rearing habitat, the NRD is very interested in learning what past or current threats exist that are detrimental to Eel River lamprey populations. The US Fish and Wildlife Service have determined that, on a broad scale, passage barriers are the prime threat. While this holds true for the entire Pacific lamprey population which utilize and inhabit streams along the entire West Coast we can make other assumptions about limiting factors based on both historical as well as data gathered by the Tribe. Large flood events such as the 1964 flood in conjunction with land management practices centered around logging, agriculture, and dairy farming have caused a decline in ammocoete (larval lamprey) rearing and adult spawning habitat. Current water use as well as marijuana cultivation practices combined with drought conditions have caused a major decline in water quantity as well as quality. It is our hope that the data collected will help to implement management plans that will be instrumental in restoring a critically important tribal trust species.

Environmental Education Program – Summer 2014

By Tim Nelson

This summer, the Natural Resources Department will once again team up with the Youth Activities Program to put on environmental education activities for the Wiyot youth. The Department understands that today's Wiyot youth are tomorrow's environmental stewards. That being said, it is the overall goal of the Department's environmental education program to incorporate both traditional environmental and institutional-based knowledge into a curriculum in order to ensure that the Wiyot youth have a strong desire to care for their environment. Some of the activities include a River and Ocean Days, wetlands exploration and tree planting, Community Garden Days, and much more. We will be posting more information on the Tribe's website (www.wiyot.us) as summer approaches and schedules are finalized so please check online, call the Tribal office @ 707-733-5055, or "Friend" the Wiyot Tribe on Facebook for updates on recent events/news.

Helpful Garden Tips for the North Coast

By Tim Nelson

Below you'll find some helpful tips on gardening on the North Coast. For tribal members outside Humboldt/Del Norte/Mendocino Counties, check with a local nursery for more information on planting schedules for your specific climate zone.

Planting Schedule

- April is the month to directly seed carrots, parsley, celery, and sunflowers while sowing starts for plants such as bok choy, artichoke, zucchini, squash (winter/summer), cucumber, and melons.
- May is the month to directly seed beans, edamame, snap beans (pole or bean), sweet/grain corn, sorghum, and millet.
- June is the month to plant early spring seedlings such as bok choy, artichoke, zucchini, squash (winter/summer), cucumber, and melons, parsley, celery, and sunflowers, cilantro, dill, fennel, lettuce, broccoli, cabbage, cauliflower, kale, Brussels sprouts, spinach, chard, beets, peas, onions, green onions, leeks, potatoes, tomatoes, peppers, and tomatillos.

If sowing seeds, use flats with 3-5" of potting soil, use a finger to make holes to desired seed depth, place seed(s) in, cover with a thin layer of soil, pat gently and **keep moist** but allow to dry a little between watering. Remember, it is not late to plant early spring seedlings such as bok choy, artichoke, zucchini, squash (winter/summer), cucumber, and melons, parsley, celery, and sunflowers, cilantro, dill, fennel, lettuce, broccoli, cabbage, cauliflower, kale, Brussels sprouts,

spinach, chard, beets, peas, onions, green onions, leeks, potatoes, tomatoes, peppers, and tomatillos.

The Ongoing Cleanup of Humboldt Bay

By Tim Nelson, Natural Resources Specialist

Just recently, the Wiyot Tribe's Natural Resources Department completed the environmental contamination cleanup on Indian Island in Humboldt Bay. It all started with a conversation at an annual U.S. EPA Conference when Natural Resources Director, Stephen Kullmann approached a member of the U.S. EPA's Task Force of the Superfund Division to speak with him about the Indian Island project. After a few phone calls and a site visit, plans were made to begin work on capping and filling the 1.5 acres of contaminated soil, the last phase that would ultimately allow the Tribe to hold the World Renewal Ceremony once more on Indian Island. While cleaning up the site, the Department was approached by the Humboldt Bay Harbor, Recreation, and Conservation District (HBHRCD) to see if the U.S. EPA would talk to them concerning the newly acquired pulp mill. At the site, 3 million gallons of caustic liquors used in the pulping process are housed in giant tanks that are seismically unstable and are at risk of overflowing from the collection of rain water over the years. Due to the potential disastrous situation at the site, the U.S. EPA deemed the site an emergency and began the process to remove the liquors from the site. Currently, the cleanup is underway and completion is scheduled for summer 2014. Who knows, but if not for the effort of the Department to seek assistance from the U.S. EPA with the final cleanup of Indian Island, the pulp mill on Humboldt Bay may still be housing dangerous contaminants on the brink of a major catastrophe. For more on this story visit: http://www.northcoastjournal.com/humboldt/liquor-run/Content?oid=2521608

Figure 2. Indian Island after completion of final contamination cleanup project. Pilings in foreground are slated for removal summer 2014.

So how bad are the liquors present at the pulp mill site situated on Humboldt Bay and what effects can we see from a massive spill? Humboldt Bay is a very large oyster producer (~50-70% of oysters sold in CA) and the companies involved employ hundreds of people for our local economy. A massive spill of chemicals similar in size and acidic properties to those housed at the pulp mill can have devastating impacts not only to our environment but to the local economy as well. The chemicals present at the site have properties that can lead to the erosion of carbonate, a common component of seashells, and lead to increased ocean acidification. 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 hydrogen (H^+) and hydroxide (OH^-) 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!" Water has a pH score of ~7, neutral on the pH scale that runs from 0-14. Any range lower than 7 is more acidic (i.e. coffee is ~pH 5) while any score over 7 is more basic (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. The main causes for the increase in ocean acidity are 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. 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 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.

Beginning this summer, the Tribe's Natural Resources Department, in conjunction with the HBHRCD and Humboldt Baykeeper, will begin the bulk of work for a recently acquired Marine Debris Cleanup grant awarded to the Tribe by the National Oceanic and Atmospheric Administration (NOAA). Some of this work will focus on the removal of solid waste on Indian Island and old, dilapidated pilings and metal wayrunners just offshore. Similarly, the grant will also focus on the removal of other marine debris (i.e. old pilings and floating docks) around Humboldt Bay that pose an environmental and health risk as well as a safety risk for nautical/navigational purposes.

For more information on the Natural Resources Department's efforts to clean up Humboldt Bay, please call or visit the Department.

2014 Eel River Green Sturgeon Survey

By Stephen Kullmann, Natural Resources Director

As part of a National Marine Fisheries/NOAA funded Tribal Species Recovery Grant, members of the Wiyot Tribe's Natural Resources Department (NRD) took part in an epic 120-mile Eel River journey from Dos Rios to the ocean looking for migrating *ba'm*, green sturgeon. Anecdotally, we know that green sturgeons are using the Eel River, but NMFS and other agencies have no data on numbers or timing. Our plan was to use a specialized Didson sonar camera on a custom built mounting system to survey all of the deep holes (typically greater than 15 ft.) on the river that might potentially hold migrating sturgeon.

Figure 3. The NRD Cataraft, nicknamed the Blue Ba'mmer for the Wiyot word for sturgeon, starts off on its 120 mile, week long journey from Dos Rios to the ocean.

We used an 18 ft. cataraft, powered by oars or a 20-hp outboard, and which carried an estimated 2000 lbs of scientific equipment, gear, food, and supplies. After scrambling to outfit all of the gear and complete the building of the Didson mount, the team departed in the evening of Tuesday, March 8 for Dos Rios and put in on Wednesday morning. NRD Technician, Vincent DiMarzo joined Stillwater Sciences biologists Dr. Joshua Strange and Ethan Mora for the first leg of the survey from Dos Rios to Fort Seward, passing through some class 3 rapids and surveying the deepest hole on the trip at 47 ft. NRD Director, Stephen Kullmann relieved Vincent at Fort Seward Friday evening and continued the trip through the weekend until reaching the mouth on the afternoon of Tuesday, March 15.

The team had limited success in locating sturgeon, however. A total of 95 holes over 15 ft. deep were recorded, and we had five positive identifications, although all downstream of Rio Dell. Our hypothesis is that sturgeons were just entering the river so we were a little early for the main run. We had selected our timing based on the river flows and timings on other river systems, which may or may not be correlated to water levels. We plan on returning to a few of the deeper holes this summer to investigate and hopefully capture and tag some fish. We are just at the beginning of a three-year project, so hopefully we will have a lot more knowledge soon and continue to be able to increase the Wiyot Tribal capacity to manage and steward all species within ancestral waters.

Low Impact Development (LID), Key to a Greener Future

By Tim Nelson, Natural Resources Specialist

According to the U.S. EPA, LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible; it employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and

Figure 4. Stormwater retention basin on TBR treats contaminated stormwater runoff from roads/sidewalks

appealing site drainage that treat stormwater as a resource rather than a waste product. LID practices mimic pre-development drainage patterns and hydrologic processes by encouraging the principles of "Slow It, Spread It, and Sink It." This includes structural and non-structural strategies such as retention and detention areas, reduction of impervious surfaces, and the lengthening of flow paths and runoff times. There are many practices that have been used to adhere to these principles and can include, but are not limited to, permeable pavement, bioretention cells, swales, rain gardens, etc. Other strategies include the preservation/protection of environmentally sensitive site features such as riparian buffers, wetlands, steep slopes, mature trees, and highly permeable soils. As a result, there is an increased rate of water retention, detention, infiltration, and evapotranspiration and thus stormwater can be more easily treated at its source.

LID can be separated into two categories, Green Infrastructure and Green Building. Green infrastructure uses natural hydrologic features to manage water and provide environmental and community benefits**.** It usually refers to development that involves land-use planning decisions and how to create communities that function with nature. Some examples of Green Infrastructure techniques that are used in local communities include:

- **Better Street Design/Layout**
  Create neighborhoods where vehicle traffic speeds are reduced, walking/biking is encouraged, conserve open space, and reduce impermeable surface area
- **Retain/Plant Native Vegetation**
  Retaining existing permeable surfaces and planting native vegetation helps to absorb stormwater runoff thus holding potential contaminants on site
- **Use Permeable Surfaces**
  When laying new surfaces for roads, sidewalks, and/or parking lots use permeable pavement surfaces such as permeable asphalt/concrete, pavers, or other substrates (i.e., gravel, sand)
- **Conserve Sensitive Areas**
  Sensitive areas such as wetlands already exist as nature's own filter system. Plant species adapted for wet environments have associated bacteria that help to capture and bioremediate stormwater runoff
- **Bioswales/Vegetated Buffer Strips**
  Bioswales and/or vegetated buffer strips help to slow down stormwater runoff, capture any potential pollutants (i.e., sediment, hydrocarbons), and allow for water to be reabsorb rather than diverted to a storm drain
- **Bioretention Cells**
  Bioretention cells can refer to retention and/or detention facilities where stormwater runoff is held for absorption and/or treatment. Bioretention cells can be stormwater retention basins, curb extensions, or parking lot catch basins

Green Building is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition. Some examples of Green Building techniques that are used locally include:

- **Rain Gardens**
  Rain gardens are located near buildings where runoff from roofs (from downspouts) or nearby impermeable surfaces can collect and be treated. They are named as gardens because these retention cells contain plants that utilize the stormwater, collect contaminates, and provide an aesthetically pleasing environment.
- **Waste Reduction Plan**
  Construction material is a massive contributor to landfill waste when a large portion can be recycled or reused in other projects. A Waste Reduction Plan helps plan whether construction debris should be recycled, reused, or thrown away
- **Green Materials**
  Purchasing "green" materials refers to environmental preferable products that are made from recycled, renewable sources that contain zero to low VOC/PVC levels
- **Water & Energy Conservation Practices**
  Install products that conserve both water and energy; Some examples of water conservation practices include installing low flow fixtures, dual flush toilets, rain barrels/cisterns, and following xeriscaping planting techniques; Some examples of energy conservation practices include installing Energy Star® rated appliances, proper R-value rated insulation, low energy windows, using skylights for natural light in lieu of light fixtures, and much more.

Currently, the Tribe's NRD is generating a LID Policy for any future development, redevelopment, and/or enhancement project on Table Bluff Reservation. The Tribe has many reasons to be concerned with stormwater runoff as large storm systems can generate significant flows that deposit large amounts of sediment downstream and can degrade valuable fisheries habitat. As a coastal Tribe that utilizes marine and riverine based resources (i.e., Pacific lamprey, salmonids, bivalves, etc.), the cultural and health impacts from stormwater runoff are equally, if not more, devastating to the Wiyot community. Nearby cultural gathering grounds located on Humboldt Bay and the Eel River are the closest waterways to the stormwater runoff occurring on TBR. Protection from these contaminants during the pre- (LID planning), mid- (installation of BMP measures), and post-construction (maintenance of LID facilities) phase ensures that the Tribe is playing an active role in safeguarding their resources now and for future generations.

For more information on non-point source pollution, LID techniques for homeowners, or water quality information, please call or visit the Tribe's NRD.

TBR Community Garden

By Nicole Woodrow

The TBR Community Garden is up and growing fast! There are many varieties of produce planted in the garden (Table 1), and this year's harvest is going to be a successful one.

This past March, the Garden received $500 from the 2014 ScottsMiracle-Gro GRO1000 Grassroots Grant to build raised beds from MiracleGro. With these funds, the NRD created four, two-feet high 4'x 8' raised beds out of cedar to be placed in the southwest portion of the garden. The purpose of the raised beds is to encourage individuals with limited mobility to participate in garden activities. In May, the North Coast Community Garden Collaborative (NCCGC) approved the TBR Garden for a $250 gift certificate to Pearson's for garden supplies. They NCCGC also donated various plant starts such as broccoli, cauliflower, tomatoes, and more.

Image: 1. Happy Romaine lettuce seeded by Vincent DiMarzo. 2) Cedar raised beds. 3) Mammoth sunflowers.

On Wednesday, July 23rd, several Wiyot youth spent the morning harvesting 30 heads of lettuce! Varieties are: Buttercrunch (Boston Bibb) (right), Freckles (Image 5), Red Oak Leaf, Baby Lollo Rosso, Red Romaine, and Green Leaf lettuces. Together, we thoroughly washed and separated the lettuce. They were combined and served it for the afternoon elder's and youth lunch with tamale pie. Yum!

Many questions were asked about the varieties of lettuce harvested, specifically Freckles lettuce (Image 5). The interesting name is a description of the unique red splashes of color on a green background. Freckles is a type of romaine lettuce, also called Flashy Troutback, and are believed to retrieve the interesting markings due to sun exposure.

Image 5. Freckles lettuce and 6. Broccolli.

Table 1. Other produce that have taken off in the garden include the following:

❖ Purple Viking, Modoc, and Yukon potatoes ❖ Pole and Bush beans ❖ Broccoli, Cauliflower, Brussel Sprouts, Purple Cabbage, Cabbage, Kale ❖ Artichokes ❖ Cucumber, Lemon Cucumber, summer and winter Squash, Pumpkins	❖ Various melons ❖ Buttercrunch, Red Oak Leaf, Freckles, Red Leaf, Romaine, Red Romaine, Baby Lollo Rosso lettuce ❖ Tomatillos, various Peppers ❖ Celery ❖ Sunflowers ❖ Herbs: basil ❖ Sweet onion ❖ Various tomatoes

Image 7. Purple cabbage

Kids' Corner Garden : The Beginning

Image 8. Kid's Corner

On June 20th, Wiyot Youth prepared the northern most corner of the garden as the Kid's Corner. They planted pumpkins, sunflowers, tomatoes, lettuce, and bush beans.

Announcements:

- **There will be an upcoming Garden Party and CalFresh outreach event by the Redwood Community Action Agency and the Natural Resources Department to be held at the garden in the month of September. Date and time TBA.**
- **Please remember that anyone and everyone is welcome, so please come out to water, pick weeds, or plant and harvest your own produce!**
- **If you are interested, or know someone who is interested in having produce brought to them, please contact us* (below) and we can have that arranged for you.**

To learn more about produce interesting facts, nutrition, geography, history, recipes, and more, there is the Specialty Produce app available for iPhones and Android. Or go to SpecialtyProduce.com

If you have any questions regarding the garden, please feel free to contact Vincent DiMarzo or Nicole Woodrow at the Natural Resources Department. We would be happy to assist you as best we can.

Blue-green Algae in Local Waters

Written by Patty Torres

What is blue-green algae, and where is it found?

Cyanobacteria, also known as blue-green algae, are single celled organisms that live in fresh or salt waters. Blue-green algae occur naturally, and only a small amount of species could be harmful when blooms occur. Blooms of cyanobacteria are known as visible colonies of these microscopic plants, which can look like scum or foam, and most often are blue, green, white or red. These colonies have been observed to happen in nutrient-rich water such as ponds, lakes and rivers. It is believed that fertilizer runoff and septic tank overflows exacerbate the growth of cyanobacteria, which use the nutrients found in fertilizer, such as phosphorous and nitrogen, as food for growth and reproduction.

Recently, a warning was issued by Humboldt Health Alert informing Humboldt county residents of blue green algae blooms that have been observed in Big Lagoon and Eel River. As a safety precaution, the California Department of Public Health recommends that people, pets, and livestock stay away from water that shows signs of a cyanobacteria bloom. Special precautions should be taken with children and pets, as they are especially vulnerable.

Figure 5. Photo credit: Eel River Recovery Project

In past twelve years, as many as eleven dogs have perished in what veterinarians believe may have been cyanobacteria toxicity. When it comes to children, doctors believe their smaller body weight puts them at a higher risk for toxicity.

How does blue-green algae affect people and animals?

According to the Center for Disease Control, toxins produced from cyanobacteria can affect people and animals by different forms of ingestion. When water containing cyanobacteria-related toxins comes into contact with skin, a rash or hives may form. If contaminated water is swallowed, symptoms include vomiting, diarrhea, and possibly liver damage if medical attention is not sought right away. Cyanobacteria toxicity is also possible by inhaling water droplets produced from activities such as jet skiing or boating. Finally, the ingestion of harmful cyanobacteria can cause

neurotoxicity. Symptoms include numbness, tingling fingers, and spells of dizziness. These symptoms are far more severe in dogs, which can experience seizures and difficulty breathing.

Preventing the harmful effects of blue-green algae

Different precautions should be taken to ensure the safety of people and animals during a blue-green algae bloom. As aforementioned, contact with water that appears to be experiencing a bloom should be avoided. If your pet swims in water that appears to have scum or foam, rinse him off as soon as possible, and try prevent your pet from licking his fur. Also, avoid watering plants or lawns with water originating from a source that may have a blue-green algal bloom. If you consume fish that were caught in a water body with an observed bloom, remove the internal organs. According to the California Department of Public Health, the internal organs of fish are more likely to contain a higher concentration of the algae.

Cyanobacteria is not all bad!

Although blue-green algae may have a bad reputation, these organisms are an incredibly important part of aquatic environments. Cyanobacteria have been around for billions of years, and they help generate oxygen which supports all life forms. That's a pretty big deal! Even more interesting, scientists believe that all plants on earth actually originated from cyanobacteria. These tiny organisms were some of the first to use carbon dioxide and water to make their own food, a process known as photosynthesis. In recent years, health experts have been researching the possible nutritional benefits of a particular species of cyanobacteria, known as Spirulina. This food supplement is rich in protein, antioxidants, vitamins and minerals. Many believe that consuming Spirulina can help with various kinds of health ailments. Cyanobacteria are amongst the most diverse organisms on earth, although they can be toxic, their benefits far outnumber their risks!

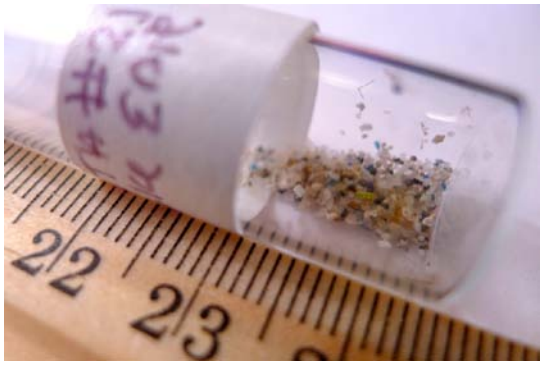
More information:

To learn more about blue-green algae blooms visit:

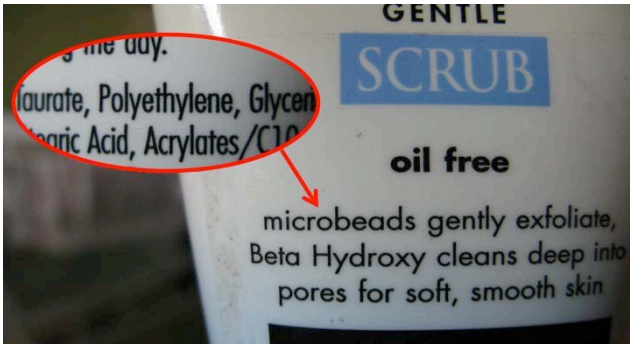
- Center for Disease Control: http://www.cdc.gov/hab/cyanobacteria/pdfs/facts.pdf
- California Department of Public Health: http://www.cdph.ca.gov/healthinfo/environhealth/water/pages/bluegreenalgae.aspx
- State Water Resources Control Board: http://www.waterboards.ca.gov/water_issues/programs/bluegreen_algae/

ACTION ALERT: What are microbeads and why should they be avoided

by Stephen Kullmann, Natural Resources Director



Many personal care products, including facial scrubs, shampoos, and even toothpastes, contain tiny pieces of plastic that are so small they not only wash down the drain but also pass through most water treatment and filtration systems. We have known for a while that plastic garbage in the ocean is an increasing problem, posing health hazards to marine life and those that eat it. Plastics have been shown to act like a sponge, absorbing environmental contaminants such as DDT, PCBs, flame retardants, and other industrial chemicals. The beads, which can closely resemble fish eggs, are often consumed by various fish. As fish are eaten by larger predators, the toxins can bio-accumulate, or multiply up the food chain. These toxins can then appear on our dinner plates as we enjoy an otherwise healthy fish dinner.



Many manufacturers have agreed to phase-out micro-beads over time and the state of Illinois became the first to enact a ban on the tiny pollutants. In the meantime, you can take immediate action by refusing to purchase products containing microbeads and stopping the use of those that you may already have. A group has developed a handy app to help identify which product should be avoided, available on the App Store, Google Play, Windows Phone Store, and at: http://get.beatthemicrobead.org/

There are many natural alternatives to tiny plastic pieces in your beauty products, and many manufacturers are listening to public pressure to switch over. Please take a few minutes to check the products on your shelf and when you make your purchases. And if you don't want those plastic beads coming back laced with toxins in your salmon dinner, stop washing them down the drain.

photos from 5gyres.org

Spartina on Indian Island

by Patty Torres, Natural Resources Administrative Assistant

The invasive cordgrass, *Spartina densiflora* has inhabited Humboldt Bay for decades, altering the ecosystem for native plants and wildlife. Adverse effects associated with the presence of *Spartina* have been studied extensively by scientists, and many agree that the eradication of this cordgrass is necessary for the health of local salt marsh, a very rare and delicate ecosystem. Restoring salt marsh to its native conditions is no small feat, and doing so requires the participation of many federal, state, and local agencies. After years of efforts, U.S Fish and Wildlife Service (USFWS) has effectively restored about 75% of what makes up the Humboldt Bay National Wildlife Refuge. Recently, the Wiyot Tribe has joined the ongoing efforts to remove *Spartina* from our bays. The Natural Resources Department (NRD) of the Wiyot Tribe was awarded a competitive grant from the Bureau of Indian Affairs (BIA) to eradicate *Spartina* on Indian Island. Committed to restoring Indian Island, the department is optimistic about starting this important work early next year.

Spartina is native to South America, from the coasts of Argentina and Brazil. It is believed that *Spartina* arrived in Humboldt Bay in the middle of the 19th century, as a result of ships traveling to and from South America during the lumber trade. It wasn't until the early 1980's that *Spartina* was recognized as an invasive species, upon which intensive research began in order to understand its effects on coastal ecosystems.

After years of monitoring, researchers from USFWS found that invasive *Spartina* not only spreads rapidly, but it outcompetes the native salt marsh plant known as pickleweed (*Salicornia virginica*). Other sensitive plant species found in our bays are also threatened by the invasion of *Spartina*, such as Humboldt Bay owl's clover (*Castilleja ambigua* var. *humboldtiensi*) and Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), both of which can also be found on Indian Island. Invertebrates also suffer from this shift in the ecosystem, as studies have found that many species of insects and arachnids are far less diverse in invaded habitat. Small effects like the aforementioned ultimately disrupt the natural balance of food chains. *Spartina* has the ability to spread to various types of habitat such as salt marsh, brackish marsh, mudflats, as well as rocky and sandy substrates in dunes. To make matters worse, researchers also found that *Spartina* produces seedbanks that can last up to three years, meaning that various treatments may be necessary to fully eradicate this noxious cordgrass.

As proud stewards of the environment, the NRD will continue to serve the Tribe by beginning this eradication endeavor early next year. A combination of mechanical and manual methods will be used to remove *Spartina* (no herbicides or other chemicals will be used). Native plants have been

shown to recover quickly after an eradication treatment takes place, so the NRD is optimistic that differences in the vegetation on Indian Island will be notable throughout the upcoming year.

Much controversy remains as to what the best management practices are for dealing with *Spartina* infestations. Treatments for eradication are extremely costly and labor intensive, and many question the necessity of these measures. Due to the nature of this species, failing to keep up with treatment regimes could lead to re-infestation. Nevertheless, the Wiyot Tribe's NRD believes in the importance of restoring Indian Island to its native state. Prior to English settlement, the north coast of California boasted 9,000 acres of salt marsh. Today, that number is 900, much of which remains invaded with *Spartina*. What little is left of salt marsh deserves to be protected and restored, for the benefit of the entire ecosystem as well as its cultural importance.

Figure 6. Volunteers removing Spartina in Humboldt Bay (photo credit: U.S. Fish and Wildlife Service)

U.S. EPA's 22nd Annual Region 9 Tribal Conference

By Stephen Kullmann, Natural Resources Director

On October 15-17, Natural Resources Director Stephen Kullmann and Administrative Assistant Patricia Torres attended the US EPA's 22nd Annual Region 9 Tribal EPA Conference in Sacramento, CA. This conference brings together representatives from federally recognized Tribes in the U.S. EPA's Region 9, which includes California, Nevada, Arizona, and the Pacific Islands. This annual conference is a great opportunity for the Wiyot Tribe's Natural Resources Department to stay up-to-date on new EPA guidelines, get area-specific trainings, and interact with agency officials and colleagues from other Tribes. It is especially useful to learn from the successes and challenges other Tribal Environmental Departments have faced in protecting their Natural Resources.

The theme of this year's conference was *Helping Hands Will Green Our World*, emphasizing the important role Tribes have in reversing some of the past environmental injustices that have occurred. This conference is also important because the Wiyot Natural Resources Department receives approximately $250,000 in annual funding from the US EPA, of which approximately $70,000 goes into the Tribe's General Fund through the Indirect Rate.

Workshop topics included everything from permaculture gardening, Tribal Emergency Management, brownfields remediation, environmental education, climate change, and more. The brownfields sessions highlighted the Wiyot Tribe's Tuluwat Restoration Project as a success story.

Attendance at these conferences and trainings helps the Wiyot Natural Resources staff to continue to serve the Tribe and protect and enhance Wiyot ancestral Natural Resources by identifying new funding sources and developing new programs. New projects under development include enhanced environmental education opportunities, an indoor air quality program, waste reduction for Tribal operations, and an Environmental Needs Assessment.

Pacific Lamprey Ammocoete Surveys

By Eddie Koch, Natural Resources Technician

The Wiyot Tribes Natural Resources Department (NRD) has been busy conducting ammocoete (larval lamprey) surveys on several streams within and just on the outskirts of Wiyot ancestral territory. Our last newsletter article entitled "Gou'dow the Journey Continues," shed light on the adult life cycle of the Pacific lamprey (*Entosphenus tridentatus*), traditionally known as "eels". We discussed the spawning surveys and how important they are as a first step in determining how many eels are returning as well as what their distribution is locally.

Next, we have conducted ammocoete surveys to determine in what streams Pacific lamprey are present. After constructing redds (nests), adult lampreys die and become valuable biomass that returns ocean derived nutrients back into the riverine system. Soon after, eggs are deposited in redds where they hatch into tiny ammocoetes that measure the length of a long eyelash. Rather than actively swim, these tiny eels passively drift until settling out into areas in which large amounts of fine sediments have been deposited. What most people find amazing is that Pacific lamprey ammocoetes spend the first 5 to 7 years of their lives nestled into the sediment, filter feeding, until transforming into adult stage fish that migrate out to sea.

Some very interesting facts about Pacific lamprey ammocoetes: They have no eyes but instead, they have a layer of skin called the buccal hood covering the area where the eyes later form. Unlike their adult counterparts, they have a very small mouth with no teeth and lack kidneys. As most of us know, Pacific lamprey are parasitic and predatory, seeking out fish to latch onto then sucking blood as a means of feeding. When juvenile ammocoetes undergo metamorphosis before transforming into adult fish they form eyes, their mouth becomes more substantial, they grow teeth, and kidneys form. The color of these fish change from a solid brown or grey to silver on the ventral (bottom) side and black on the dorsal (top) side. This color scheme is called counter shading and is a natural means to avoid predation; they are less likely to be seen from predators looking from above as well as below.

It is during the ammocoete stage of their life that we take advantage of their lack of movement and conduct electrofishing surveys to determine their presence, or lack thereof. The e-fisher is an extremely useful tool in fisheries data collection and is used for just about every kind of freshwater fish (the e-fisher will not work in the marine environment due to high ionic content). The concept is simple; run a small amount of electricity through the water to disrupt behavior or stun the fish in order to capture. Using this method we have determined the presence of Pacific lamprey in 5 of the 17 streams sampled. One thing became very clear this summer; water quality and quantity played a huge role in whether or not fish utilized a particular stream.

For now let's focus on water quantity. Obviously if there is no water present in a stream then fish will also not be present. This was the case in a number of streams we surveyed including main tributaries like Bull Creek, which we were surprised to find in an intermittent state in late summer. The continuing drought coupled with numerous water diversions creates very undesirable conditions that we would not expect to see during a normal year. Numerous tributaries to the Eel as well as the Van Duzen ceased running this summer. We have found that it is hard to guess which streams offer good refuge for lamprey while providing good ammocoete rearing habitat mainly because there are a lot of variables in the equation. The purpose of the NRD projects is to gather baseline data to determine presence/absence in selected streams and to put together a plan to bring back lamprey populations in the Eel River.

Department Receives Wetlands Program Development Grant

By Tim Nelson, Natural Resources Specialist

Recently, the Natural Resources Department received a United States Environmental Protection Agency (U.S. EPA) Clean Water Act (CWA) 104 (b)(3) grant, more commonly known as a Wetlands Program Development Grant (WPDG). Some of the objectives of the grant include: 1) bolster training capacity for the Department, including wetlands delineation and California Rapid Assessment Method (CRAM) training, 2) monitor and assess of all the Tribe's wetland resources not only on Table Bluff Reservation but also on Indian Island in Humboldt Bay, and Cock Robin Island in the Eel River estuary, 3) develop a Wetland Program Plan, and 4) conduct education and outreach to the Wiyot community, especially Tribal youth. It is the overall objective of the grant that, once upon completion, the Department will have a full understanding of the extent of the Tribe's wetland resources and will develop a plan that will work to conserve or restore these resources while also achieving goals set forth by the U.S. EPA's Strategic Plan to improve the quality and quantity of wetlands, especially coastal wetlands.

The Department will increase our capacity to plan and manage any current and/or future wetland projects by attending both wetland delineation and CRAM trainings. Once completed, the Department will begin monitoring and assessing the Tribe's wetlands by first creating a wetlands inventory by utilizing GIS software and wetland delineation techniques to accurately map existing boundaries. In order to stay compliant with the Tribe's current Quality Assurance Program Plan (QAPP), the Department will generate quality control documents detailing study design criteria and any metrics used for assessment purposes. Some of the monitoring that will take place include: botanical surveys, passive wildlife monitoring using hide cameras as well as avian surveys, CRAM assessments, and macroinvertebrate sampling. Following completion of all the field work, the Department will generate an overall report detailing the findings. A Field Operations Manual will also be generated to create a step by step approach to methodically collect scientifically valid

data. Next, working with local NGO's, neighboring Tribes, and state/federal agencies, the Department will develop a Wetland Program Plan that will focus on four core elements to increase the quality and quantity of the Tribe's wetlands. These core elements include: Monitoring and Assessment, Regulation, Voluntary Restoration and Protection, and Water Quality Standards for Wetlands. Lastly, the Department will continue outreach with both the Wiyot community and the general public through a multitude of resources. Some of these examples include: quarterly newsletter articles, wetland youth activities, a wetlands field guide, and presenting field results/WPP at a regularly scheduled Tribal Business Council meeting, in a local media outlet such as KHUM's Coastal Currents, and at a meeting with other natural resources managers (i.e., Eel River Forum).

The Department will continue to update the Wiyot community on the progress of our CWA 104(b)(3) grant via newsletter articles and on the Tribe's website @ www.wiyot.us, but if you would like more information, please call or visit the Natural Resources Department.