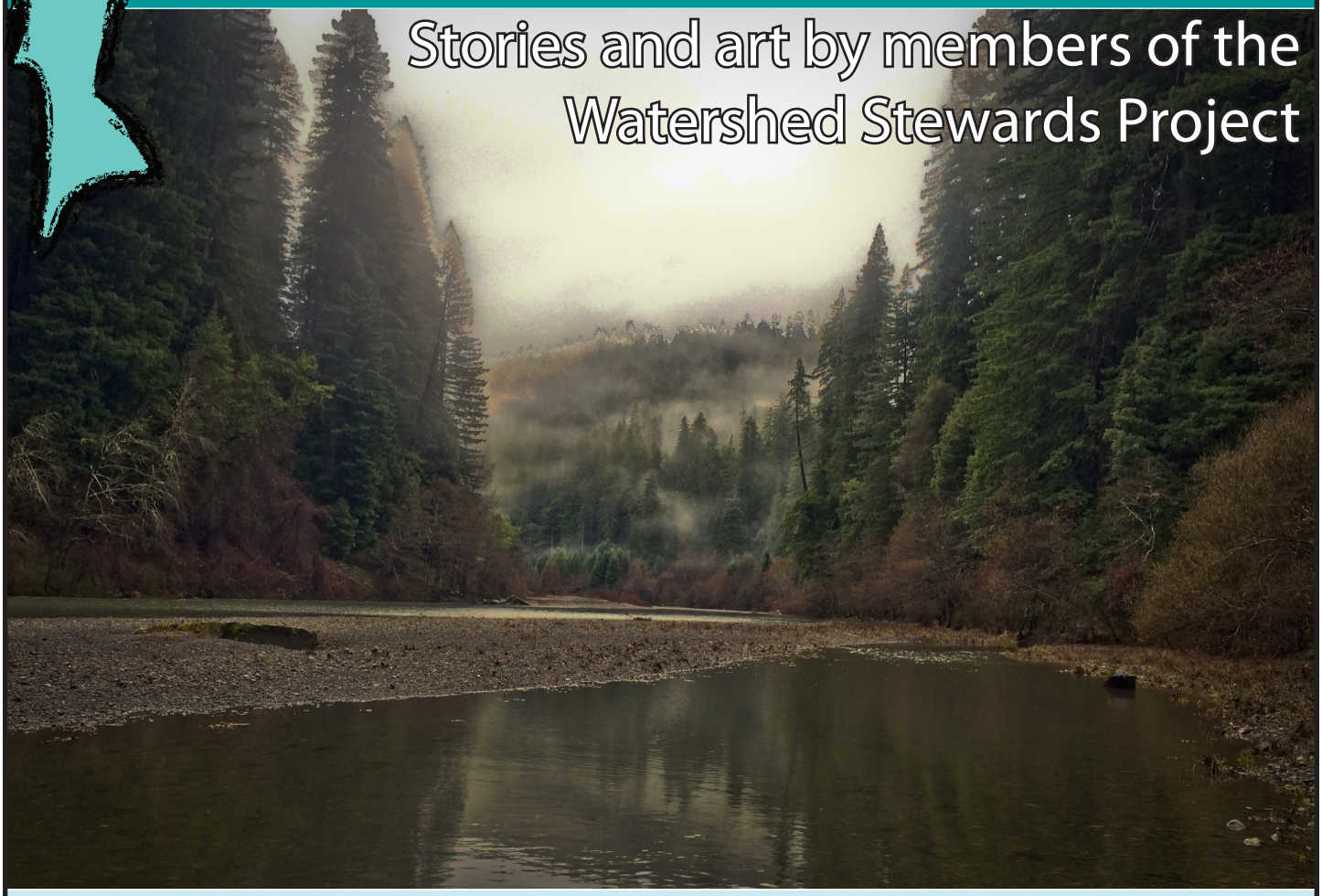
Service Year 20
District B, 2014
Volume 20 Issue 3

Tributary Tribune

Stories and art by members of the Watershed Stewards Project



The Watershed Stewards Project's (WSP) mission is to conserve, restore, and enhance anadromous watersheds for future generations by linking education with high quality scientific practices.

A program of the California Conservation Corps, WSP is one of the most productive programs for future employment in natural resources. WSP is administered by CaliforniaVolunteers and sponsored by the Corporation for National and Community Service.

The Tributary Tribune showcases the adventures, insights, and art of members of the Watershed Stewards Project. For twenty years WSP has been serving communities throughout California's coastal watersheds. This issue features stories and art by members from Region I, District B, which extends from Fortuna to Santa Rosa, CA.

Table of Contents

Upcoming WSP Volunteer Events.....Pg. 3
Program Updates.....Pg. 4
Celbrating 20 Years of WSP!.....Pg. 4
Creek Days collage.....Pg. 5
Hatchery Influence in the Russian River Watershed.....Pg. 6
The Ephemerality of my Environmental Experience (So Far).....Pg. 8
Anchors...Past and Present.....Pg. 9
Carrying Kings.....Pg. 10
Requiem for a Coho.....Pg. 12
Making Medicine from a Native Riparian Plant.....Pg. 13
Assorted Photographs.....Pg. 14
Good Governance: An Evaluation of the CWA Section 401 Water Quality Certifications.....Pg. 16
Logic Puzzle.....Pg. 18
Fishy Word Puzzles!.....Pg. 19

Credits

Editor.....Elaine Starks, Region I Team Leader

Layout Designer.....Brittany Koenker, Region II Team Leader

Front Cover Image: Mouth of Redwood Creek in Briceland, CA. Photo by David Lam, WSP member placed at CDFW Fortuna - CWPAP.
Back Cover Image: Trinidad State Beach, home of the 2014 Creek Days event.

Upcoming WSP Volunteer Events

REGION I

June 21
10a.m.-2p.m.
Lowden Ranch Wetland Enhancement Project
Lower Trinity, CA

July 12
9:30a.m.-1:30p.m.
Corte Madera Invasive Smackdown
Kentfield, CA

July 7
9:30a.m.-1:30p.m.
Willows for Salmonids
Petrolia, CA

July 12
9a.m.-1p.m.
Guerneville Russian River Revival
Guerneville, CA

REGION II

June 21
9a.m.-1p.m.
San Geronimo Watershed Restoration
Forest Knolls, CA

July 7
12p.m.-4p.m.
Clean Creeks from Road to River
Santa Barbara, CA

For more information on upcoming volunteer events, visit our Facebook page:
www.facebook.com/AmericorpsWatershedStewardsProject

WSP Program Updates

Funding:

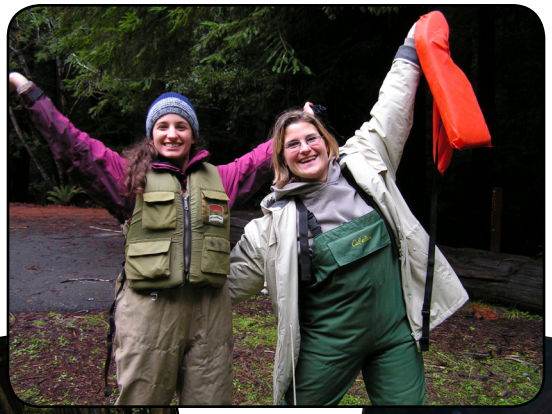
- WSP will once again receive funding from AmeriCorps.
- WSP has also received a grant from the National Fish and Wildlife Foundation.

Year 21 Updates:

- After nine years of service to the program, Carrie Lewis will be leaving us to take a position with California Volunteers in late June.
- Due to the new AmeriCorps funding, there will be no upper age limit for applicants!
- We have changed the name of Individual Service Projects (ISPs) to Watershed Awareness Projects (WAPs) to better describe their intention.

Kerry McNamee, Year 20 member placed with CDFW Yreka, teaches about salmonids and watershed processes at the annual Creek Days event.

Thank you Carrie for your nine years of amazing service to the program! We will miss you!



Creek Days Collage

By Elaine Starks

placed at WSP Fortuna Office

CREEK DAYS!

Hatchery Influence in the Russian River Watershed

By Will Boucher
placed at CA Sea Grant

Over the past decade Coho salmon in the Russian River watershed have seen a drastic decline in numbers. The once abundant population is now hanging on by a thread. Anglers from all over the world once traveled to the banks of the Russian in hopes of hooking up on a silver salmon; those hopes are now gone, or at least for the time being. Some confounding factors contributing to the population decline include stream diversion, overfishing, logging, and agricultural runoff. In an effort to revive the coho, the Army Corps of Engineers established the Coho recovery program at Warm Springs Hatchery in 2001 in Healdsburg. A broodstock was created by collecting fry from the Central California ESU over a three-year period. The principle goal being to re-establish a self-sustaining run of native Coho into the streams of the Russian River Watershed. Though hatcheries can be a quick relief for population decline, little is known about how well hatchery fish will supplement wild stocks because of their inherent differences.

> "Although there seem to be many issues with hatchery fish, you cannot overlook the accomplishments that hatcheries have had in conserving these highly endangerd fish."

Fish born in a hatchery live very different lives than those born in the wild. When fish are spawned in a hatchery they do not have a choice in their breeding partner. The male and female are either chosen at random or at best selected by a breeding matrix such as Warm Springs Hatchery and Big Creek Hatchery, in Santa Cruz, do. Once the fish have been artificially spawned, their fertilized eggs are placed into an incubator. The alevin hatch and live in the incubators for about a month and are then moved to a start tank, which can hold thousands of fish. To thrive in a start tank a fish must feed aggressively at the surface, where their food pellets are thrown. In the wild, a fish actively feeding at the surface is more vulnerable to predation by a kingfisher or merganser. Hatchery fish are fed a fatty, nutritional BioOregon fish food

Start tanks at Warm Springs Hatchery.

Hatchery coho smolt (top) and wild steelhead smolt (bottom).

on a strict schedule to maximize growth, as opposed to the inconsistent availability of food for wild fish.

When hatchery fish are released into the wild, you would think that they would have the immediate advantage over a wild fish. Why wouldn't a hatchery fish that is bigger and stronger have a higher survival rate than that of a wild fish who has been living in the low summer flows with limited food? In reality, those hatchery fish have no idea what it takes to survive in the wild. They have no stream smarts to identify predators, to look for food, and to know when to begin migration. Wild fish are much more in tune with their surroundings. For example, during smolt trapping this spring in the Russian River we have witnessed a majority of the wild smolts migrating much earlier than the hatchery smolts, when flows were higher and the river mouth was still open. During extreme drought years such as this, some of the hatchery smolts may never make it to the ocean, let alone have what it takes to survive in the ocean.

Raceway full of coho smolts at Big Springs Hatchery, Santa Cruz.

These differences mentioned above are things that I have observed while working with hatchery fish. Although there seem to be many issues with hatchery fish, you cannot overlook the accomplishments that hatcheries have had in conserving these highly endangered fish. If it weren't for the captive broodstock program at Warm Springs Hatchery, the Coho would be extinct in the Russian River Watershed. Some hatcheries have begun using innovative practices such as gravel bottom incubators and curved start tanks to help bridge the gap between hatchery and wild fish. The offspring of hatchery fish born in the wild are now thought of as being wild fish. Ideally, if we continue to bridge the gap between hatchery and wild fish, hatchery survival rates will increase population numbers enough to reach a self-sustaining level.

Coho smolts at Warm Springs Hatchery.

The Ephemerality of my Environmental Experience (So Far)

By Nicholas Ryu
placed at North Coast Regional Water Quality Control Board

"For where your treasure is, there will your heart be also".
-Matthew Ch. 6:21

As a recent college graduate, the Watershed Stewards Project has been my first real job and my first home since college. As an environmentalist, I was very confused as to what subfield or concentration would become my specialization. There were so many options ranging from climate change to sustainable agriculture, to renewable energy or sustainable planning. Yet, I found myself in the field of water quality.

Before I started my first day of work, I felt as if I was in a surreal vortex of time just as Leonardo DiCaprio was in the movie Inception. I didn't think I had a grasp on reality after leaving college and my family, undergoing WSP orientation, and calling a barnhouse in Sebastopol surrounded by farm animals my new home. Yet, WSP and my surroundings became my new home.

I remember being unsure of what my time in WSP at the Regional Water Board would manifest into that first day of work this past October. But so far, the experience has been extremely gratifying. The fact that I am no longer in college does not mean there are no longer chances to learn, as I've been blessed with the chance to learn about Total Maximum Daily Load programs and bioassessment protocol (TMDLs for short) from water board academy classes and by taking part in auxiliary roles for various projects. I've had multiple opportunities to work for and alongside numerous professionals in a friendly and fulfilling work environment. Whether it be taking pictures for a visual monitoring program on Lugwigia macrophyte populations and flooding in the Laguna de Santa Rosa, or analyzing and evaluating CWA 401 Water Quality Certifications, I think of every day of work as my way of saving and maintaining water quality across Northern California and ultimately the environment at large. It's a funny thought that even though the office staff thank me for my help, I am actually thanking them for providing me with fulfilling work and showing me through their positive attitude that if you do choose a job you love you'll never have to work a day in your life. Yet, I know there is a different job waiting for me in the future.

Here I am with less than four months until the term is done, and I am wondering about the next plan in store for me. I am not fully convinced that I will be in the water quality field, but I am convinced that the environment will still be my main profession. So far, I've appreciated the natural environment because of my living situation with animals, spike trips, recreational activities, and the beautiful landscape that has developed since I started work last October. When I have my own family and hopefully reach my newfound goal to become an environmental professor, WSP will be an experience of the past. Yet, I will always remember how WSP was an environmental experience I will never forget.

Anchors...Past and Present

By Kalyn Bocast

placed at ERWIG/CCC Fortuna

Anchors...Past and Present

Importance of Large Woody Debris (LWD):

- Provides refuge for salmonids, decreasing the probability of predation
- Creates low velocity habitat conditions
- Increases hydraulic complexity
- Creates resting pools that reduce temperature extremes, and decrease temperature, that allows an increase in oxygen holding in the water
- As decomposition of LWD takes place, it provides food sources for macroinvertebrates and releases much needed nutrients into the stream
- Aids in bank stabilization, reducing the rate of erosion

Old Method vs. New Method:

- Increased efficiency
- Materials decrease
- Lower cost
- Decreased hazard to trees, wildlife, humans, and the environment
- Improved aesthetics, creating a more natural appearance

Carrying Kings

By Toni Longley

PLACED AT CDFW FORTUNA - NCWIC

On March 25, 2014 the California Department of Fish and Wildlife (CDFW), United States Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) began their efforts to truck over 30 million Chinook salmon smolts, from five inland hatcheries, to the Sacramento-San Joaquin Delta to aid in their journey to the Pacific Ocean. In normal water years, CDFW, USFWS, and NMFS truck about 15 million smolts down to the lower Sacramento River or further into San Pablo Bay. Many people involved in salmonid conservation biology and fisheries management are concerned that without the physical hauling of these smolts to the ocean, outmigrant survival will be extremely low thereby resulting in low adult numbers. There is great concern that this would lead to cancellation of the commercial and/or recreational Chinook salmon fishing season in 2016 off of the California coast. Many people want to avoid what happened in 2008 and 2009 when there was a full shut down of recreational and commercial Chinook salmon fishing off the of California coast due to extremely low population numbers. By trucking the smolts and creating favorable conditions for the 2016 fall run, it is estimated that 23,000 jobs will be saved. The entire salmon industry in California is valued at $1.4 billion dollars, while the price tag of trucking the fish is about $800,000. The drought is creating poor conditions for juvenile salmonid survival by decreasing flows, increasing water temperatures and creating clear water conditions that increase their predation.

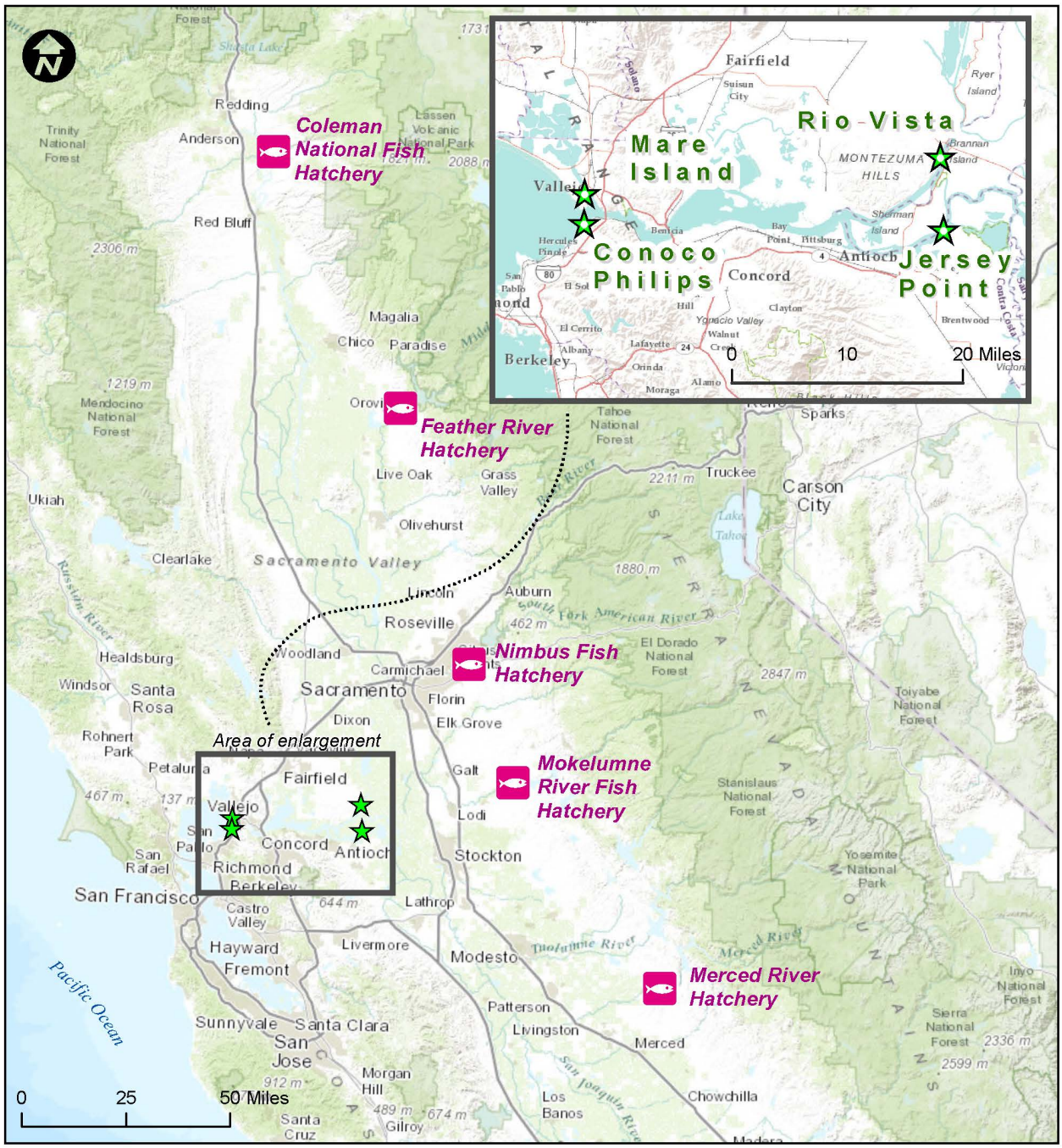
"The drought is creating poor conditions for juvenile salmonid survival by decreasing flows, increasing water temperatures and creating clear water conditions that increase their predation."

One of the numerous challenges that will face the returning spawners in 2016 is that they won't have imprinted the location of their home stream. This may lead to straying fish that do not make it back to spawn in their hatchery of origin. There is a high rate of straying in salmon that are trucked. This may increase the chances of the returning fish spawning with wild fish and having negative effects on the genetics of the wild fish. Some of the Chinook smolts will never make it to the ocean despite being transported most of the way. Many get stuck in inland deltas and never make it out. Another challenge facing the trucked fish is acclimatization from the fresh river water to the brackish lower delta and bay waters. The shock of acclimatizing is traumatic and lethal for many salmonids. Keeping the fish in holding tanks in the brackish water has been beneficial to the survival of the fish.

The effort will take about 250 truckloads traveling distances of between 180 and 270 miles depending on which of the five hatcheries the fish are coming from. The five hatcheries taking part in this effort are the Coleman National Fish Hatchery in Anderson, Feather River Hatchery in Oroville, Mokelumne River Fish Hatchery in Clements, Nimbus Hatchery in Gold River, and Merced River Fish Hatchery in Snelling. Of the 30 million fish, one quarter will receive small electronic tags that record their hatchery and river of origin and their release method. These will hopefully be collected in 3-4 years when the fish return to the hatcheries to spawn to add the growing body of Pacific salmonid data.

U. S. Fish & Wildlife Service / California Department of Fish and Wildlife

Chinook Salmon Hatcheries and Main Release Site Locations



Data Sources: USFWS; ESRI World Topo Basemap; Open Street Map Basemap

Produced by: US Fish and Wildlife Service, Pacific Southwest Region

Projection: California Teale Albers

Date: 3/21/2014

Chinook Salmon Release Site

Chinook Salmon Fish Hatchery Location

Requiem for a Coho

By Tim Ryan

PLACED AT CA SEA GRANT

Oh zombie coho
You swim here covered in fungus
But it is not the fungus of failure
It is the fungus of victory
For you, sweet, sweet zombie coho
You have defied the odds
You swam upstream against both currents and drought
You found yourself the beautiful lady coho of your dreams
And though soon you shall feel the icy embrace of death
You go to fishy Valhalla with the knowledge that your bitter end was also your greatest success
You leave behind a brave new world
A new generation of coho
Unless of course the redd dries up due to the extreme climate conditions California has recently been struggling with
But I digress
Oh brave zombie coho!
While your flesh rots away, your spirit never will

Making Medicine from a Native Riparian Plant

By Christina Malatesta
placed at Mattole River Alliance

In addition to smelling insanely good, cottonwood buds contain natural anti-inflammatory, antimicrobial, and analgesic agents. Every year I make a batch of cottonwood bud salve to use on minor cuts, bumps, and aches. Since field work can sometimes leave us a tad beat up (bushwhacking through blackberries?), I thought I'd share how to make this salve.

What you'll need:
Cottonwood buds
Olive oil
Beeswax
Mason jar, or any glass jar + a rubber band
Cheesecloth, or any clean handkerchief or rag
Small containers to fill with salve

• Fill a jar halfway with cottonwood buds. Buds are best collected in late winter, when they are oozing with their sticky resin. What's most ideal is to wait for a heavy wind or rain storm, when older cottonwoods often lose branches full of buds that will no longer fulfill their destiny of becoming leaves.
• Pour olive oil over the buds, leaving an inch or two of space at the top of the jar. The buds will expand, so leaving that room helps prevent spillover

• Cover the jar with a cloth and use the mason jar screw band to secure it (or a rubber band on any regular jar)
• Set the jar someplace warm to encourage infusion of resin into the oil, like near a woodstove or on a windowsill. If you're using the sun's warmth, be sure your cloth is covering the entire jar, as uv rays can cause degradation of molecules
• Stir the mixture every couple of days, making sure the buds are always covered by oil; they can mold if they're sticking out
• After at least six weeks, strain the buds from the oil
• Warm the beeswax on very low heat until it's melted
• Stir in the cottonwood bud oil for a ratio of about 1:1, erring on the side of more oil than wax
• Pour the wax and oil mixture into containers and allow to cool at room temperature Sometimes I buy little empty salve tins at an apothecary or herb shop, but often I just reuse small tins or jars I collect from my kitchen or from thrift stores

Assorted Photographs

By David Lam

PLACED AT CDFW FORTUNA - CWPAP

So far during this term with WSP at the CDFW Fortuna – CWPAP placement site, we have primarily conducted spawner surveys. We survey as far north as Bull Creek in Humboldt Redwoods State Park and as far south as Laytonville. These pictures reveal a snapshot of what we see during the course of a day, but couldn't possibly capture the entirety the spawner survey season. Hope you enjoy these photos!

Frog found at Indian Creek near Piercy during a spawner survey.

Brian (WSP Member and site partner) and Ben (CCC Vet) during a spawner survey in Hollowtree Creek, in Northern Mendocino County.

Fog rolling through the redwoods on a drive on the 101 to a creek.

Brian (WSP Member and site partner) in an inflatable kayak during a floating survey on the South Fork Eel River.

Coyote spotted at Yager Creek near Fortuna.

Alex (CDFW) on a spawner survey in Huckleberry Creek, a tributary to Hollowtree Creek.

Go od Governance: An Evaluation of the CWA Section 401 Water Quality Certifications

By Nicholas Ryu
placed at North Coast REgional Water Quality Control Board

"Tell me and I forget, teach me and I may remember, involve me and I learn."
-Ben Franklin

Since I've started working at the Region 1 Water Board, I've had the opportunity to work on various projects; from cross-sectional surveys in the Garcia River, to data analysis on dissolved oxygen on the Shasta River. However, the most direct role and the longest project I've been involved in so far during my time in the Watershed Stewards Project has been evaluating 401 Water Quality Certifications.

Every one of the nine regional water boards in California has its own unique basin plan that is a "master water quality control planning document that designates beneficial uses and water quality objectives (hereafter called WQO) of the state" (1). Furthermore, the basin plan provides the basis for protecting water quality within the respective region, and which also serves "as an educational and reference document for dischargers and members of the public" (1).

Within the multifaceted basin plan are various projects designated towards specific policies, like the aquatic ecosystem restoration policy (AERP). The California Environmental Quality Act (also known as CEQA) scoping document defines one of the WQOs of the AERP as to "identify the surveillance and monitoring actions to be implemented to determine if the goals of the Basin Plan are being met" (2). In addition, the basin plan explains that the Region 1 Water Board currently "supports restoration through grant funding, permitting, monitoring, and technical and regulatory assistance" (2). Every three or four years, the Basin Plan undergoes a process known as Triennial Review, which means that under the federal Clean Water Act, the basin plan is reviewed at least once every three year period to "keep pace with changes in regulation, new technologies, policies, and physical changes within the region" (3). After understanding this policy background, let me explain the relevance of this information to my assignment.

I was assigned to review and evaluate the office's 401 Water Quality certifications (401s from this point onward) by one of environmental planners this past January. The purpose of my assignment was to evaluate whether or not 401s thoroughly complied with various permit standards and policies outlined in the 401s (such as monitoring plans and permit goal achievements). If not, then there would be a strong need to redevelop an updated AERP that complies with the Basin Plan before the next triennial review (which is currently taking place this year of 2014). Previously, a similar pilot study was completed reviewing 401s from 1991-2002 by a professional team of environmental professors and specialists that sought to "evaluate the compliance and wetland condition of compensatory wetland mitigation projects" (4). Due to the extensive data and methodologies used by the more qualified research team, I interpreted the document to my best ability and benchmarked the overarching ideas into my own personal report.

When I first started my assignment, I researched the definition of a 401 and saw that it was defined by the Environmental Protection Agency as a "federal license or permit to conduct any activity including…the construction or operations of facilities, which may result in any discharge into the navigable waters of the U.S.A" (5). After acquiring the current list of 401s, I started to dissect and analyze the listed permits and codify the factual information into a holistic evaluation template.

While every permit contains variable information, a 401 permit generally is divided up into two sections. The first section usually contains between 8 and 15 subsections

identifying the permit timeline, specific goal of the permit, legal and mitigation requirements, and relevant permits and rulings that have been acquired or reviewed. This was followed by the quantitative and affected conditions of the permitted project (such as the acreage filled or excavated, receiving waters, and filled volumes).The second half of the permit usually contained the mandatory compliance conditions in order for the 401 to be considered legal, explained between 10 and 20 subsections. These parameters usually involved but were not limited to the expiration date, monitoring plan requirements, and the legalistic authority of the Regional Water Board.

After compiling the extracted information into an evaluation template, I codified my findings into 18 separate sections. The first 6 sections highlighted basic information such as the project title, project location, and contact information for the various involved parties (with the internal party always being a representative of the Region 1 Water Board). The next six sections usually were copied from the specific permit on project details such as the permit types involved (401 certifications or Army Corps of Engineer nationwide permits), area impacted, potential funding sources, and the implemented monitoring plans. The last 6 sections entailed the project significance, current status of the projects, where to obtain particular environmental reports, and the next steps needed for potential permit reviews and renewals.

From reviewing the evaluation template, I was able to explain the following to my superior. The 777 reviewed 401 permits dated from March of 2005 up until the present year of 2014 (6). Of the 777 reviewed 401 permits, only around 125 permits were relevant cases that related to AERP. The other 401 certifications were not geared towards aquatic restoration or enhancement activities but were usually permitted towards urban or anthropocentric projects such as culvert replacements, construction of office complexes, or the development of new housing. Every permit (as detailed before) contained two sections and a total of 18 to 35 subsections. While the Region 1 Water Board was always involved with the 401s, the various permit-holders and interested parties ranged from individual farmers and landowners to private environmental firms to public and federal entities (listed but not limited to the Sonoma County Water Agency, the California Department of Fish and Wildlife, and various city governments and resource conservation districts).

Overall, we concluded that the 401 certifications did provide a strong basis towards needing an updated AERP in the basin plan as the 401s did not fully provide sufficient information as to whether or not overall permit goals were being met. This notice will hopefully provide a strong conviction towards requiring a thorough quality assurance plan for the future development of 401 certifications relating towards the AERP. Being able to have a role (albeit an auxiliary role) that set the platform for how to evaluate the performance criteria and redefinition of goals for 401s has been an awesome experience. I've appreciated my work and time spent on this project as I was able to witness firsthand how a public agency upholds the idea of good governance and how I was able to learn so much about restoration policy by being actively involved in a meaningful project.

Bibliography:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/
1

http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/111003_aer/111003_ceqa_RestorationPolicy.pdf
2

http://www.swrcb.ca.gov/northcoast/water_issues/programs/basin_plan/triennial_review.shtml
3

http://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/wetlandmitstudy_rpt.pdf
4

http://water.epa.gov/lawsregs/guidance/wetlands/sec401.cfm
5

http://water100.waterboards.ca.gov/rb1/water_quality_certifications/search_results.asp
6

Logic Puzzle

By Adam Zwick

placed at North Coast Regional Water Quality Control Board

While taking a hike along the Klamath River you come upon quite the scene. There are five brightly colored tanker trucks from hatcheries that are used for transporting fish to stock the Klamath river. Each has been backed up side by side and looks to be ready to release their payload of fish. Alongside the trucks is a little bit of commotion as the Department of Fish and Wildlife has taken the drivers aside to question them. As you approach a distressed DFW member explains the situation to you:

There are 5 unmarked colored tanker trucks in a row – each a different color driven by different people from different locations carrying different species of fish to stock the Klamath River. There has been an anonymous tip that one of the trucks is full of lampreys – a malicious attack from someone who wants to see the other species perish.

The following are **known facts** that have been taken before the group of drivers started babbling wildly and incoherently against each other's claims.

The 5 truck drivers each brought their favorite drink for the drive – each driver does not drink the same type of drink.

Vincent Vega is the owner the red truck

Jules Winnfield has brought the *Lost River Suckers*

Butch Coolidge is drinking Tea

The green truck is to the left of the white truck

The owner of the green truck drinks coffee

The suspect that came from Mad River brought *Steelhead*

The owner of the yellow truck came from Iron Gate

The suspect that parked their truck in the middle drinks milk

Buddy Holly parked his truck to the far left

The suspect from Mount Shasta is parked next to the truck that is carrying *Coho*

The suspect is carrying *Chinook* parked next to the suspect who is from Iron Gate

The suspect from Trinity River drinks beer

Captain Koons is from Crystal Lake

Buddy Holly is parked next to the blue truck

The suspect that is from Mount Shasta is parked next to the suspect that drinks water.

Which Suspect brought the Lampreys?

Fishy Word Puzzles!

By Brian Starks

Placed at CDFW Fortuna - CWPAP

Word Search – Words can be forward, backwards, diagonal, upside down, any way at all!

E	C	J	S	Z	F	A	O	W	G	R	A	Y	P	D
S	K	T	S	H	A	W	Y	T	S	C	H	A	I	D
U	Q	I	P	L	Q	A	C	D	O	G	H	L	D	E
H	C	J	S	A	Y	A	S	L	P	L	Y	O	T	R
C	D	B	G	U	Y	C	L	A	R	K	I	D	P	B
N	E	D	B	J	T	Y	J	O	J	Y	X	T	S	B
Y	H	N	Y	Y	R	C	N	I	V	E	L	A	H	L
H	S	V	O	O	N	K	H	L	C	E	I	I	Q	O
R	R	A	C	E	A	C	C	I	R	O	L	Y	P	K
O	E	B	G	Z	E	N	Q	J	W	E	B	P	P	V
C	T	O	E	Y	V	W	I	L	E	V	A	R	G	D
N	A	H	H	G	Q	G	O	N	G	B	D	S	C	W
O	W	M	I	G	R	A	T	I	O	N	Y	X	I	J
H	M	X	W	S	U	O	M	O	R	D	A	N	A	F
P	M	Y	K	I	S	S	M	O	L	T	H	O	S	N

ONCORHYNCHUS
TSHAWYTSCHA
MYKISS
KISUTCH
CLARKI
ANADROMOUS
OTOLITH
PYLORICCAECA
SMOLT
MIGRATION
WATERSHED
GRAVEL
REDD
ALEVIN

Jumble – Unscramble each word on the left, then use the circled letters to figure out the fishy phrase at the bottom. The circled letters won't go into the phrase in order, though!

COOH

TERHEADSW

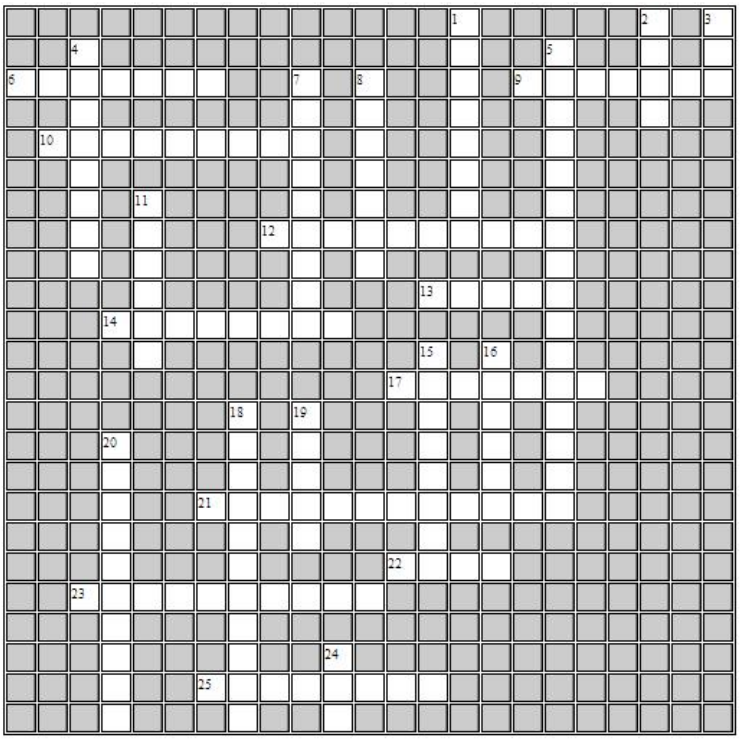
HESRIESFI

RIEVR

DARWESOTNM

L P G !

Crossword Puzzle – It's a crossword puzzle!



Across

6. Oncorhynchus tshawytscha.
9. Eel like anadromous fish.
10. Gravel pile on a redd.
12. Largest river in California.
13. "Sharp" variety of fern.
14. Third largest watershed in California.
17. Evergreen tree.
21. Coast redwood, Sequoia _____.
22. Good juvenile salmon habitat.
23. Cute terrestrial mollusc.
25. Naturalist and explorer in the 16th and 17th centuries. NorCal celebrity.

Down

1. Connection between caudal fin and body.
2. _____ marks on juvenile salmon.
3. Young salmon.
4. Vegetated zone along a creek.
5. In-stream structure, good juvenile salmon habitat.
7. Piscivorous bird.
8. Brackish rearing environment.
11. Bottom feeding freshwater fish.
15. Blood sucker.
16. Swift moving shallow section of creek.
18. Trait of only reproducing once in a lifetime.
19. Nickname for pink salmon.
20. Source of a river.
24. Deep part of a redd.

Cryptrogram – Deduce which numbers stand for which letters and use the key to figure out what the Watershed Guy said.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
22																			12						

A T T ___ ___ ___ T ___ ___ A ___ ' ___ ___ ___ ___ ___ ,
22 12 12 11 10 10 9 8 3 1 12 11 10 8 22 7 15 6 3 4 25

___ ___ ___ ___ A ___ ___ T ___ A ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ,
7 3 23 11 22 24 10 12 3 22 15 25 7 3 23 4 15 10 20 1

" ___ ___ T ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ T A ___ ___ ___ T ? "
8 3 12 11 10 1 21 15 11 23 9 8 10 4 15 12 22 9 8 21 12

From Scott Downie, the Watershed Guy

Watershed Stewards Project
1455-C Prairie Ct.
Fortuna, CA 95540
707.725.8601
www.ccc.ca.gov/go/wsp

Carrie Lewis - Project Director
Jody Weseman - Project Manager
Emily Afriat-Hyman - Member Coordinator
Zia Schatz - Office Manager