

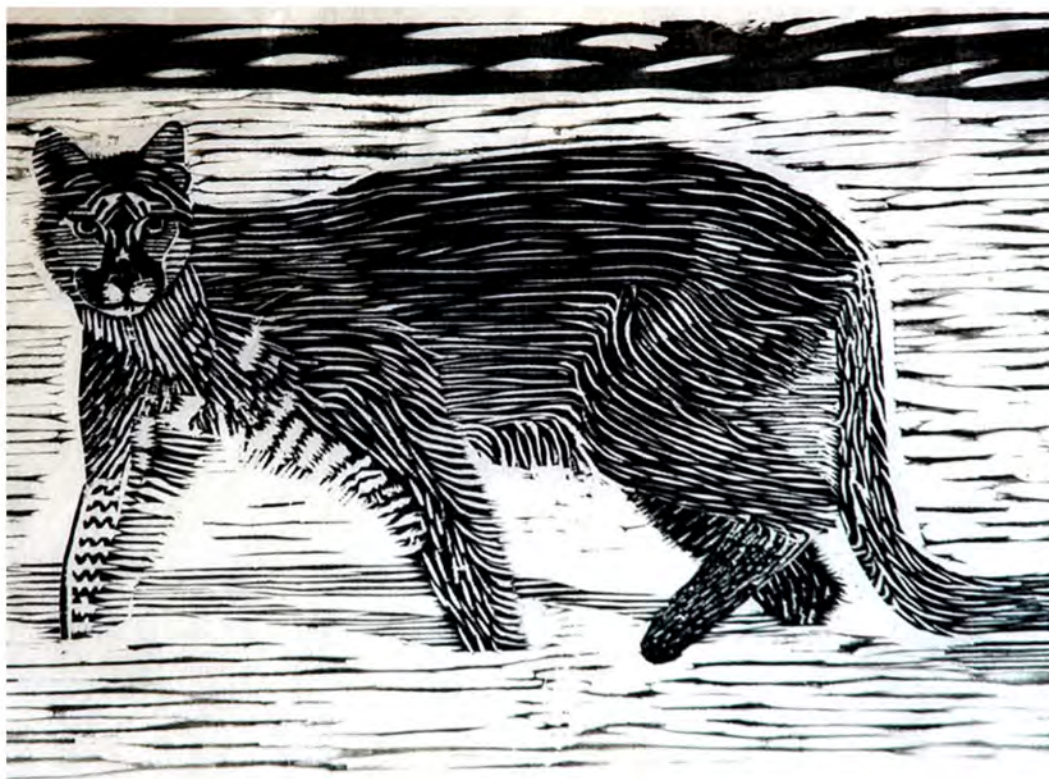


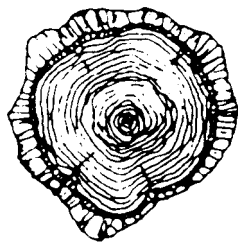
TREE RINGS

THE JOURNAL OF THE YUBA WATERSHED INSTITUTE

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Tree Rings is published from time to time by the Yuba Watershed Institute. We welcome unsolicited articles, art, letters, and notes. Many thanks to the authors and artists who contributed to this issue. — Liese Greensfelder, editor

COVER: WOODBLOCK PRINT BY LOUIS BLUE CLOUD

NOTES FROM THE DIRECTOR BY TANIA CARLONE

FROM the Mediterranean and the Apennine Mountains to the Arctic, the Ozarks and the Sierra Nevada, this spring edition of Tree Rings travels much of the world drawing a thread of continuity across political boundaries, watersheds and bioregions. As Gary Snyder wrote more than a decade ago in a publication for the YWI:

Somewhere in Walden, Thoreau says, "The far side of Walden Pond laps on the banks of the Ganges." The water cycle makes our whole planet one little watershed, sailing in space. This realization gives powerful meaning to the essential idea of interconnectedness ... It gives every person a clear mandate to start right where they are, even while keeping an eye on the global scale.

And so this is echoed in the words and experiences of our diverse group of contributors. They have made their life's work to start where they are -- observing their natural world, learning, teaching, writing and speaking -- sharing their

knowledge with their immediate plant, animal and human communities while in many instances touching communities in nearly every corner of the Earth.

In his essay on Pioneer Forest, Wendell Berry, a native Kentuckian, poses the question: Why should we go to Missouri to look at a program of sustainable forestry? And he answers: "Because, so far as I have discovered, there is no example of such forestry in Kentucky." He continues, "I do not mean to suggest that the sustainable management of the Pioneer foresters can be simply transplanted to any region of Kentucky. The Pioneer method is uniquely suited to its own unique place. But may we not, by the study of such examples, work toward sustainable methods uniquely suited to our own unique places and conditions?"

The Yuba Watershed Institute would respond with a resounding "yes" to this interrogative. It is at the core of our organization's practice to draw knowledge from a broader discussion with local residents, experts, artists and activists from near and far, and to apply adaptive

models, methods and practices to where *we* are.

Whether it is the practice of observation, where we are able to grasp the intelligence and cunning of the Steller's jay; or the pursuit of a model to bring into balance the demand for fire protection with the imperative of fire management; or even still the promotion of land use practices that do not pit ecological health against short term economic gains -- these themes represented herein are a part of this conversation that the Yuba Watershed Institute wishes to inspire in order to seek a better understanding of the Nature of this Place, wherever this place may be.

I'm delighted to be joining in this conversation as the new-ish executive director of the YWI. I would like to acknowledge and thank all of the contributors to this edition. And on behalf of the board of directors, I extend my sincerest gratitude to Liese Greensfelder, guest editor of this edition, for her indefatigable efforts.

Tania Carlone has served as the YWI's executive director since September, 2007.

During the past year, the YWI produced 13 programs, ranging from meadow restoration work-days to an evening presentation on impacts of climate change in the Yuba River region. On December 8, some 125 people scoured the forests and fields of the watershed during our annual Fungus Foray (photo). A mycologist from UC Berkeley helped local experts identify the more than 300 species collected.

photo Robert Erickson



KALAMATA ON FIRE

Last summer southern Greece experienced its worst fire season in five decades. Fueled by three droughts and scorching temperatures, more than 3,000 fires killed 84 people and burned some 2,700 square miles of forests, olive orchards and farmland.

Vassilis Stavropoulos, a professor at the University of Athens in Greece, owns a house and olive groves in Kalamata in the Peloponnese. In an email message written in September to his friend on the San Juan Ridge, YWI co-founder Gary Snyder, Stavropoulos described the efforts his neighbors took to save their village from the flames.

Dearest friend!

We are moved by your concern! Please accept my apologies for not replying promptly! I have just left a message in your answering machine saying that we are safe and our health is good! Thank God!

The fire actually licked the edge of our village. The men of the village – should I say the braves – stood up facing the front of the fire that was coming, as an old lady told me, “like a ghost!” The village had been evacuated previously and the people with mobility problems had been carried away by the state services. My aunt Georgia (65) denied going anywhere and she was taken away by force by a cousin of mine. However, the Fire Brigade was nowhere in reach. The number of the fires was enormous. Approximately 230 fires per day for two months nationwide!! Furthermore, the land was extremely dry as rain had been scarce for a year. Two days before the fires my father told me that if you put a cigarette lighter next to an olive tree it would blow.

The people of the village used their spraying machinery that they use to spray the trees with pesticides and one or two wheeled platforms carrying water tanks on them. The defense line was by a dry stream. They did their best disobeying the order by the police to abandon their effort. If the fire was to pass this boundary then the village would just be devoured by it!

Suddenly, the wind changed and the fire turned back to the mountain that overlooks our village. Some estates with olive trees were burnt, one of ours also but it is nothing regarding what happened to villages nearby.

For days the people could not breathe easily because of the heavy smoke. It seems that the Patron Saints of the village, saints Theodore Tyron and Theodore the Fighter interceded to save the village and they managed to do it finally. You see they died in flames and the people hoped that they would save from the flames the village that they watch over – which they did! But that is only my version of the outcome.

What gave me some hope for the future of the place was the self-motivated will of the people to fight, in front of the utmost danger. Kalamata, a beautiful

What gave me some hope for the future of the place was the self-motivated will of the people to fight, in front of the utmost danger.

city of 80,000 people was saved at the very last minute with the fire reaching its outskirts and burning down the first houses!! It was a war rather than an emergency.

Of course, so many fires are not an accident. All scenarios for that disaster are open. Almost 200,000 hectares [494,00 acres or 772 square miles] of wild and cultivated land is burnt down only in the Peloponnese.

Apart for the damage to the Wild which is a chapter of vital importance for the land and the people, the damage to farming will only create poor people. Those who made their way with their own poultry, sheep, goats & cows, and those who grew their own vegetables, and who had their own oil – despite their small income – had independence. Now they have to rely on outside help to survive: a drastic change

of their status of life. There is the fear that many will have to leave their villages to come to Athens seeking employment with all the negative results originating from that.

Two days after the fire my father and mother came to Athens. I could see the desolation in their faces as they had to travel for hours amidst burnt land!! One cannot stand it.

My father and mother send their thanks for your interest and wish you well. Niki sends her very best also: her village also was saved. I will try to find you on the phone to tell you the latest, there is a lot!

After the fires I sat in my chair in front of the desk and saw a little piece of paper with a note on it. (Little writings that strike me worthy of consideration.) It was a prophecy by a Greek saint of the 17th century, Kosmas the Aetolian, which I had put there months before the fires and had not paid a lot of attention to. Saint Kosmas had said: “People will be left poor because they will not have love for the trees.” I just shivered.

I would greatly love to see you again. Let us pray it will be soon.

All my very best,

Vassilis.



Bearbaiting in Italy

*An organic farmer in the Po River Valley in northern Italy and editor of the bioregional journal Lato Selvatico [Wild Side], **Giuseppe Moretti** has made several visits to the Yuba River watershed. Here he writes to his friend Gary Snyder about the death of three bears in an Italian national park.*

October 14, 2007

Dear Gary,

Yes, I do remember Vassilis quite well & I followed the dramatic fire event in Greece from the news on tv. I thought about Vassilis a lot but since I know he lives in Athens I thought he wasn't affected.

The same things usually happen every year in Italy, too, especially in south Italy. This past summer hundreds and hundreds of hectares of woodland burned, mostly in Sicily and Calabria.



Louis Blue Cloud

Most of the fires are purposeful, some say: to provide work for the seasonal workers, to change the uses of the area affected by the fire and it could be also that the mafia is involved. One thing is certain and it is the deep contempt toward nature.

Another ecological disaster that I want to tell you about occurred in Italy last week, and it is the death of three bears and a couple of wolves in the Abruzzo National Park. They were poisoned. The suspicion is on a local shepherd who – (most probably) exasperated by the continual loss of sheep and by the difficulties to get compensation from the Park authority – (very badly) decided to poison the animals.

A great loss, especially for the bears (a male, a female and her cub), which total just 50 to

100 individuals. (The wolf is doing better. In fact it is expanding its territory.)

Well, the story looks simple: from one side, the park authority who defend wildlife, to the other, angry citizens who kill animals to defend their livestock.

Franzo Zunino, of the Italian Wilderness Association and a long time bear expert (he worked for years in the Abruzzo National Park and studied the local bear population) thinks differently and said: first of all the Abruzzo people are friends of the bear, otherwise the animals couldn't have survived until now. Second, it may be true that an angry shepherd poisoned the bears & wolves (for the reason above). But, third, the park authority has its own share of responsibility (at least moral). Bears always used to live far from people deep into the wilderness. Recently the park authority adopted a policy of bringing the bears closer and closer to the people to satisfy the appetite of tourism. In fact they set up numerous "carnai" (dead animals), "meleti" (apple orchards) and "caroteti" (carrot fields) not far from the tourist trails. In this way bears lost their fear of human beings and little by little they approached houses, farms and villages and started to eat chickens, sheep, beehives etc. (All the bears that died were well known to the local people. Every night, the male Bernardo, especially, used to walk through the village streets.)

I stand with Zunino. Nowadays the protection of nature in Italy (we have lots of national parks, regional parks, natural reserves and so on) is more an economic act than true ecological awareness. There is a lot of money involved in structures, studies, salaries, tourist interests, museums, etc. I don't blame this at all. If this is the price to save what remains of the Italian wild areas, it's welcome. But we don't have to sell the wild. Species like the bear, the wolf, eagle, chamois, need a situation of wilderness in order to survive. The wilderness does not have to become a zoo. I think we owe this to them as well as to ourselves.

Okay Gary, hope all is well on the San Juan Ridge. Ciao.

Giuseppe

Pioneer Forest



Pioneer Forest photo L-A-D Foundation

WITH my son and David Maehr, a member of the University of Kentucky's Forestry Department, I recently paid a visit to Pioneer Forest located to the south of its headquarters in Salem, Missouri. Pioneer Forest consists of various tracts, totaling about 140,000 acres, purchased by Leo Drey beginning in the early 1950s. Most of the tracts at the time of purchase had been severely degraded by bad logging. From the beginning of Mr. Drey's

tenure, Pioneer has been a commercial forest, which has been continuously logged. At present, there are seven "active timber sales" in various stages of work.

The difference between this and nearly all other commercial forests, and what makes this one worth going to see, is that for the last half century, by Mr. Drey's prescription, Pioneer Forest has been sustainably managed. "Sustainable," like "organic" and "natural," has become an empty word, useful mainly for

Half a century of uneven-age management and careful land stewardship have yielded sustainable timber harvests and rich biodiversity in Missouri's 140,000-acre Pioneer Forest.

misrepresentation in marketing. But I have now looked closely at examples of "sustainable forestry" in Wisconsin, Ohio, Virginia, and Missouri, and those particular examples make "sustainable" again a respectable adjective.

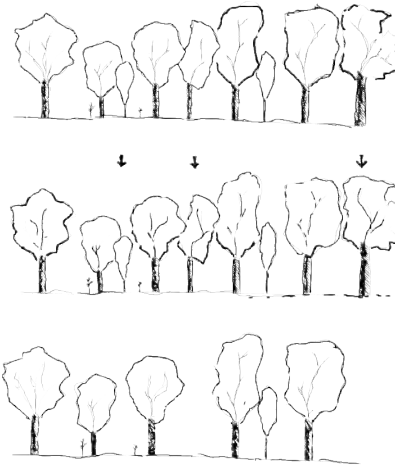
Sustainability, in forestry, rests upon the single principle of keeping the forest ecologically intact. That is to say that, after logging, the forest remains an "uneven-aged stand" of trees in their natural diversity of species and sizes, and the canopy remains unbroken except for scattered small openings that allow for natural regeneration. In practice, this kind of forestry requires logging according to the principle sometimes known as "worst first, single-tree selection." Within the boundary to be logged, which at Pioneer happens every twenty years, every tree is examined, and only those trees are marked which are inferior, fully mature, dead or dying, or obstructing the growth of other trees. The best and healthiest trees are left. Some of the biggest trees will be cut, many of the biggest will be left. There is no exposure of the forest

floor to erosion. The soil stays put. And ever-deepening beneath the trees, the soil does its proper job of retaining, releasing, and filtering the rainfall.

Pioneer's program of sustainable forest management is made possible, in part, by a sustained relationship between staff members and the forest. Pioneer employees typically stay for a long time, some for their entire working lives. These people thus have reason to think of themselves as belonging both to the organization and to the forest. They know the forest intimately, with affection, and in remarkable detail. "We're all family," says forest manager Terry Cunningham. "We don't have to hire pool-hall help." At Pioneer, local knowledge and affection stay local. Staff members belong to the local community, and they work to "give the grandchildren something to stay for," as the logger Ron Harper put it.

And so it matters that Pioneer staff members, not outsiders, mark the trees that are to be cut. The marking guidelines cannot be rigid, Mr. Cunningham says, because the forest can vary significantly within short distances. Markers must consider the standing volume of timber, the qualities of individual trees, species diversity, the nature of the site, and the condition of the canopy. The nature of the forest in any one of its innumerable places is the primary standard of judgment. What will be left after logging is a more demanding concern than what will be taken.

The markers work about a week ahead of the loggers, which gives time to shift the cutting to the least vulnerable spots when wet weather softens the ground. Loggers are required to work from the bottom of the slope to the top, and to allow only marked trees to be scuffed by the skidding



graphic L-A-D Foundation

Within the boundary to be logged, which at Pioneer happens every twenty years, every tree is examined, and only those trees are marked which are inferior, fully mature, dead or dying, or obstructing the growth of other trees. The best and healthiest trees are left.

cables, thus giving maximum protection to the trees that will remain.

Sustainable forestry, practiced in this way, sustains the forest in ecological health. It also sustains, and in the circumstances of Pioneer Forest it improves, the wood-making capacity of the forest. That this is true is shown by the staff's

meticulous measuring and accounting.

From the beginning Pioneer has maintained a scattering of "continuous forest inventory" plots throughout the forest. At present there are 486 of these one-fifth acre plots, and every plot is examined every five years.

These studies, along with an exhaustive scientific analysis by Edward Loewenstein, show results that ought to be far more influential than they so far have been.

In summary, the average volume of standing timber per acre, over the whole forest, and after as many as three loggings in some sections, increased by 184 percent from 1952 to 2002. In the same period diversity and distribution of species had remained stable; shortleaf pine had increased relative to red oak and white oak; and white oak had more than doubled in volume in the preceding twenty years. The forest had produced a respectable economic income, and also, because the worst trees had been removed preferentially, the quality of the standing timber had significantly improved. Damage from pests, diseases, and invasive plants so far seems minimal.

From a logger's point of view, the restricted volume and income per tract is not a problem. Ron Harper, the logger we encountered on our tour, was obviously on good terms with the Pioneer staff. And from his answers to our questions it was clear that he thought of Pioneer's requirements as assuring job security to himself and his crew. Sustainable forestry thus translates into economic

sustainability for the local community.

A long-term local economy resting upon the sustainable use of a local landscape is surely a desirable result. But another result, just as desirable, is the happiness of a forest continuously whole, healthy, beautiful, and everywhere attractive to hikers, lovers of wildlife, and sightseers. Terry Cunningham told us that they had logged tracts right beside Missouri 19, a "scenic highway," and had not received one complaint.

Why should we go to

Missouri to look at an exemplary program of sustainable forestry?

Because, so far as I have

discovered, there is no example of such forestry in Kentucky. Here the customary practices are "high-grading," by which only the most commercially valuable trees are cut, or cutting every marketable tree, or clear-cutting. All of these practices diminish or destroy the ecological integrity and the wood-making capacity of the forest. Any woodland, so logged, will not again produce marketable timber for two or three human generations. When such practices are dominant, academic and governmental forestry is necessarily preoccupied with "Best Management Practices," "Timber Stand Improvement," and the influence of logging on water quality – none of which is an issue at Pioneer Forest, where established commercial practice preserves the good

health of the forest and the watershed.

One must conclude, therefore, that the University of Kentucky's planned study of the "influence of streamside management zone protection on hydrology and water quality in forested headwater catchments of eastern Kentucky" is neither respectably scientific nor necessary. This experiment, which will severely log and put at risk 800 acres of Robinson Forest, is a highly provisional response to the prevalence in Kentucky of unsustainable forestry. More than that, it

assumes that bad forestry and an inadequate wood products economy are permanently the circumstances of Kentucky's

forests. The stated purpose of the proposed experiment, in fact, takes for granted that soil erosion will continue to be a serious problem of Kentucky forestry.

I do not mean to suggest that the sustainable management of the Pioneer foresters can be simply transplanted to any region of Kentucky. The Pioneer method is uniquely suited to its own unique place. But may we not, by the study of such examples, work toward sustainable methods uniquely suited to our own unique places and conditions?

WENDELL BERRY lives in Henry County, Kentucky, where he farms and writes novels, essays and poems.

These studies, along with an exhaustive scientific analysis ... show results that ought to be far more influential than they so far have been.

I was curious to know more about the effects of management practices on Pioneer Forest's animal populations, so I gave a call to Greg Iffrig, chief of recreation and reserves at the forest. He pointed out that while studies conducted by Pioneer have primarily focused on forest composition and production, a number of university researchers have found flourishing insect, bird and salamander populations in the 140,000-acre forest.

"Restoration of this forest has allowed good and lasting benefits to wildlife species," Iffrig told me. "In every case when you take a look at what we've got here in comparison to forests under other management practices, Pioneer is going to be better for everything that's out there."

In 2004, Leo Drey and his wife turned the forest over to the L-A-D Foundation for sustainable management in perpetuity. You can find out more about Pioneer Forest and the biological studies conducted there by going to its Website:

ladfoundation.org/index.php

--Editor

Fire's Impacts on Soils and Streams



photo Robert Erickson

WILDLAND fires do more than burn vegetation: they affect soils and streams in a number of ways. Generally, the greater the intensity and duration of a fire, the greater its effects. While fires can cause much damage to soils and water quality in nearby streams, they can also help vegetation regrow. Indeed, some plant species rely on fire to enable them to resprout or reseed.

Fire and soils

Erosion rates in burned areas generally increase greatly in the first year or two after a fire. This is principally due to the burning off of some or all of the soil's protective coverings: duff (the

Changes in soil chemistry, impermeable soil layers, surges of erosion and renewal of fire-dependent species are just a few of the many impacts fire has on the forest environment.

by Gail Bakker

layer of decaying vegetative matter on the ground) and standing vegetation.

Sometimes a fire will also form a water-repellent layer just below the ground surface. The heat of the fire can release hydrocarbons from the organic matter at or near the ground surface. As the soil cools, the hydrocarbons condense into a waxy, water-repellent coating on soil particles. This layer slows or prevents rainfall from moving downward through the soil, resulting in even more surface runoff and erosion.

Fire also changes soil chemistry by removing some plant nutrients and increasing others. Decaying duff provides nutrients to the soil, such as phosphorus, potassium, nitrogen, magnesium and sulfur. Large woody material, on the other hand, locks up these nutrients in forms that are unavailable to plants. When duff and large woody material burn, the ash that remains on the ground contains these nutrients in forms usable by plants. At the same time, however, some nutrients are lost to the soil when the heat of the fire transforms them to their gas forms and when ash is blown away.

Not only does fire affect vegetation, it also damages the soil biological community residing at or near the soil surface, including fungi, bacteria, and insects. These microorganisms and insects are critical components of the forest ecosystem because they recycle nutrients, create pathways for air and water to penetrate soil, and support plant growth. Because



Soil erosion following fire photo U.S.F.S./B.L.M.

most soils are poor heat conductors, temperatures during fires typically drop sharply with depth. However, even low severity fires can cause soil temperatures to rise high enough to kill some soil microorganisms at shallow depths. Organisms that live deeper in the soil column are more likely to survive a fire. Higher fire intensity and longer fire duration will result in greater damage to soil organisms.

Vigorous regrowth

Several of the effects of fire stimulate regrowth of plants in the burned area. The loss of vegetative cover eliminates competing plants and allows sunlight to warm the soil. Ash from the fire contains nutrients in forms that are available for plant use. Lack of competition, warm soil and availability of nutrients encourage seeds to germinate and grow.

Some plants, including a number of *Ceanothus* species, have seeds that require the heat of fire to trigger germination. Other plants rely on fire to enable them

to resprout from burls, rhizomes and roots, which are generally undamaged by fire. The rhizomes of mountain misery (*Chamaebatia foliolosa*), for example, can reach up to eight feet underground and will sprout vigorously after even high intensity fires. Greenleaf manzanita (*Arctostaphylos patula*) resprouts from burls.

Fire and streams

Fire affects streams by removing plant cover, depositing ash in the water, and increasing sediments in stream channels. Removing cover along the stream banks allows the sun to reach the water surface, increasing water temperature and eliminating places for fish to hide. Removing cover in the watershed

increases erosion and changes streamflow response to rainfall. Ash deposited in the stream increases nutrient levels. Warmer water and increased nutrients encourage the growth of algae, which reduces dissolved oxygen and light levels in the water.

Indirect effects on streams are the surges in erosion and sedimentation created by fires. When fires decrease plant cover, vegetative use of water declines so there is more moisture available to move deeper into the soil or run off the soil surface. In places where fire has created a water repellent layer, more precipitation runs over the ground, washing soil into nearby streams, clouding the stream and depositing sediment in the stream channel. This, in turn, changes stream flow, which then can damage stream banks or result in downstream flooding.

Incised stream channel after a fire and rainstorm photo John A. Moody, U.S.G.S.





Sediment deposition downstream from incised stream channel photo John A. Moody, U.S.G.S.

Fire can also change a stream's response to storms. Live vegetation intercepts rainfall and slows surface runoff. Without the vegetation, most rainfall reaches the ground and moves rapidly downhill. Streams within burned watersheds receive this runoff more quickly so water levels in the streams rise more rapidly and to higher levels than previously. The increased flow moves more sediment downstream, depositing it when the stream reaches flatter areas. This can result in downstream floods and washouts on roads or in communities.

Recovery from fire

Burned areas generally begin recovering within one year, often within a few months. Plants that respond to fire by resprouting from stumps or roots will begin to regrow within weeks. Seeds that survived the fire or that were brought in by wind or animals will be stimulated to germinate by the first rains. If the first few rains are heavy, however, erosion may remove much of the nutrients and many seeds from the burned area, slowing recovery.

Ash and nutrients in runoff typically decline substantially after the first few storms and are insignificant within one or two years.

As vegetation regrows in the first one or two years after a fire, the volume of eroded soil will usually decrease rapidly. The fall of dead needles and leaves from scorched trees also helps provide soil cover that reduces erosion. In burned areas on national forests lands where erosion can cause damage to structures or roads, the U.S. Forest Service will try to reduce erosion by spreading straw mulch, or using other erosion control methods.

Following low- and moderate-severity fires, most soil bacteria and insect communities recover to normal or near-normal conditions within one or two years. However, the fungal community may take many years to recover.

Ash and nutrients in runoff typically decline substantially after the first few storms and are insignificant within one or two years.

Gail Bakker is a hydrologist and geologist with Tahoe National Forest.

Grasses and forbs blanket the ground and oaks are sprouting from roots one year after a fire in Southern California. photo Barbara Barnes



The Inner Fire

by Diane Pendola

In the inner fire
When the years of growth
Have been burned away
And nothing remains
To testify to your achievements

When you are stripped and laid bare
To the elements
Baked by the sun
Rived by rain and
The winds whip you and
You have no garment
With which to clothe yourself
No green thing to cling to

It is just here
Under the pain and the complaint
And the whining voice
Of what is dying and the haunting
Voice of what is dead

Here, rising from your
Emaciated landscape
Just, nothing

No thing

And this unfamiliar openness
Terrifies the lesser parts of you
Hungering for the particular
Growth even now pushing
Into time

While some long encumbered core of you
Breathes

In this moment after fire

Breathes free

January 7, 2001

Walking Through Fire

by Diane Pendola

Smoke hovers over the land,
haunts the burned roots,
black holes of empty space
where tree trunks once buried
their long arms, fingers,
fine tendrilled nutrient seeking veins.

So strange to peer in
through the skeletal remains,
like hollowed out bones,
the marrow sucked clean
by the fire's tongue.

Stumps still glow
and flames lick up through
the bellies of oak,
smoke emerging from their tops
like chimneys.

The soil is hard, black, burned;
no fern, no grass, no soft leaf mold,
no green

anywhere.
Cooked earth,

and smoking:
madrone, fir, pine,
smoked sweet smell of
their bodies
standing charred and black
and surrendered
to the fire,

to the power of fire,
to the devastation of fire,
to the transformation of fire.

It is not safe to be walking here.

Broken crowns lie amid cracked
and weakened limbs.
Cardboard thin trunks

hold the weight of ravaged branches.

I look up and around me
and shudder as the wind rises,
clatters through my skull.
The death rattle carried down slope,
across the ridge,
comes back, upon me.

Walking through fire
I am burned through
to the hidden core,
to the open center, where
I curl,
folded into prayer
to await a birth
that is not new.

Pendola Fire, October 1999

photo Robert Erickson



Fire in the Sierra Nevada: Perceptions of Forest Professionals

by Bruce Sturm

Fire in California's Ecosystems, edited by Neil Gugihara, Jan Van Wagtendonk, Kevin Shaffer, Joann Fites-Kaufman and Andrea Thode. University of California Press, 2006. 612 pp., \$75.00.

OUR natural inclination to protect life, property and resources from fire easily leads to an association between “fire” and other threats such as war, crime or disease; we see fire as an evil and combat it with vigor. But in “Fire in California’s Ecosystems”, a major reference text on the subject, the authors try to shift the thinking of professionals and the public toward a broader view of fire as both a natural and a necessary element in our ecosystem. We must manage it, they argue, rather than exclusively suppressing it. Managed fire promotes forest health, encourages species diversity and reduces the threat of future catastrophic fires.

The authors begin with a section on the historical perspective; charcoal analysis shows that extensive fires were common in both coastal and Sierra Nevada regions thousands of years ago. This natural pattern was first modified by Native American settlement and later further altered by European settlement.

The first major section of the book provides an overview of fire ecology. One of the main topics covered here is the influence of global climate elements on fire, including jet stream, oceanic and air current flow, temperature change, precipitation, and plant transpiration. Other topics include the behavior of fire itself and the history of various fire regimes and their effects on plant communities, soils, watershed health, microorganisms, animals and specific plant species.

Applying such a complex topic to the history and ecology of California as a whole requires some simplification. The authors address this by dividing the state into nine different California bioregions, based on climate and geography.

One of the book’s authors, Joann Fites-Kaufman, works as a fire ecologist for the U.S. Forest Service and lives on the San Juan Ridge. Together with Jan W. Van Wagtendonk of the U.S. Geological Survey, she

also co-writes the chapter on the Sierra Nevada Bioregion – the focus of this summary.

Fire patterns and impacts in the Sierra ecological zones

The Sierra Nevada Bioregion stretches from the southern Cascades to the Mojave Desert and ranges from the Central Valley to the Great Basin just east of the Sierra Nevada crest, obviously encompassing a wide range of flora, fauna, geology, hydrology and climates. Granite and volcanic rock form most of the region, and the uplifting which began to form the range millions of years ago is still evident. Glaciation and erosion formed the current landscape, leaving a wide variety of soils. Winter storms drop about twice as much precipitation in the north as in the south, with the area north of Lake Tahoe receiving an average of 79 inches annually.

Vegetation in the region varies primarily with altitude, forming six ecological zones within the larger bioregion: **foothill shrubland and woodland** (to about 1,500 ft.); **lower-montane forest** (oak and mixed conifers, to about 5,500 ft.); **upper-montane forest** (red fir, white pine, Jeffrey pine, ranging from 2,500 ft. to 7,000 ft.); **subalpine forest** (lodgepole pine, hemlock, foxtail pine, whitebark pine and meadows, from 5,500 ft. to over 11,000 ft.); and **eastside forest and woodland** (mixed firs and pines on the east side of the range from 3,500 ft. to 9,500 ft.).

Charcoal analysis and studies of pollen, macrofossils and fire scars show that fire was a regular phenomenon in the Sierra Nevada for over 3,000 years. The same methods, however, show that fire regimes dropped dramatically with settlement by European Americans and somewhat later, formation of the U.S. Forest Service and National Park Service. Recently these agencies have begun to manage fire, but suppression is still the norm, resulting in massive accumulations of fuels.

Plants differ in their responses to fire, and some species thrive on it. In **foothill shrub and woodlands**, for example, fire stimulates sprouting in many grasses and shrubs as well as in blue oaks and live oaks. In

pinos, fire releases seeds. Non-sprouting shrubs, such as some manzanitas and buckbrush (*Ceanothus cuneatus*), have heat-resistant seeds which germinate far more readily after fire. One can see this west of Yosemite, for example, where grasses and shrubs abound in areas that have burned frequently and intensely. Since the foothills are so dry, fires are more frequent in this zone. But suppression leads to denser chaparral and invasion of non-native grasses – phenomena which Native Americans avoided through frequent burning.

In lower-montane forests vegetation types vary depending on altitude and latitude, but most species either resist fire or respond positively to it. For example, mature giant sequoia, ponderosa pine and fir tend to resist fire, while both montane and riparian hardwoods tend to sprout after fire, as do shrubs like poison oak, greenleaf manzanita, hazelnut and willow. Other shrubs, like mountain whitethorn and mountain misery, spread prolifically after fire, particularly fires in spring and fall. Moreover, some plants—mountain whitethorn, California lilac, deerbrush and Scotch broom—also thrive after fire because of heat-stimulated germination of seeds, in some cases seeds which have been in the soil for decades! Similar responses to fire seem to be true of many herbs and

grasses. Studies over the past 40 years or so also indicate that periodic fires are essential to the ecology of sequoias and to some of the mammals living among them; evidence of fire regimes among these trees goes back some 5,000 years.

Historic fire patterns vary in the lower-montane zone, depending on latitude, elevation, and moisture levels, but fire-return intervals are quite short—generally 10 years or less. This is also true for areas dominated by ponderosa pine. Fire patterns are less regular in Douglas-fir and white fir areas, since they resist fire more than pines do. The normal fire regimes tend to result in greater variety in vegetation characteristics – heights, diameters, densities of trees and understory vegetation. Conversely, fire suppression results in more uniformity and density. For example, mid-elevation fire suppression in the central and southern Sierra Nevada has increased the density of white fir and incense cedar, while in the northern range it's resulted in domination of Douglas-fir. Where fuel densities have increased like this in the Sierra Nevada, the landscape is highly fire-prone.

The upper-montane zone has weaker soils and long periods of snowpack, and is dominated by California red fir, western white pine and an understory with



Burning Brush

Marsha Stone

manzanita and California lilac. Some areas also have Jeffrey pine, aspen, western white pine and junipers. In this zone the ages of conifers affect bark thickness and, consequently, their fire resistance, but most species here also survive fire through sprouting and seeding. This zone has more lightning strikes but fewer and less intense fires, and the fire-return rate is longer. Fire here tends to promote growth of California red fir, whereas Jeffrey pine and juniper are less resilient.

Lying just below alpine meadows is the **subalpine forest**, where summers are cool, winters are very cold and soils are weak. On the west slope, lodgepole pine dominates, whereas the steeper eastern slope has a narrower band of limber pine and whitebark pine. The higher altitude, of course, means more numerous lightning strikes, but the snow-free period is short, so fewer fires result and they rarely cover wide swaths. These fires can kill saplings, but the older trees tend to survive, particularly lodgepoles, which seed profusely following fire. Fire-return rates here can measure in the hundreds of years and much longer in the eastside groves of whitebark or limber pines. The alpine meadows and shrublands have little fuel and very few fires.

The **eastside forest and woodland** narrows from a width of about 20 miles in the north to half a mile in the high peaks of the south. This zone experiences frequent lightning strikes. It typically has a patchwork – or mosaic – of open woodlands and shrub or grasslands. Common trees are Jeffrey and ponderosa pines, white fir, aspen and pinyon pine with some large meadows and riparian plant communities. The Jeffrey pines here are fire-resistant. The pinyons are not, but they grow in areas with little fuel. The ponderosa and lodgepole pines here have seeds that can withstand high heat, while shrubs and chaparral plants vary in their fire response. Fire histories need more research in this zone. But we do see that they vary with vegetation types, and there is evidence that some fires in white fir result in conversion to chaparral.

Applying the research

The authors then discuss what this information means to residents and policy-makers in the Sierra Nevada.

Rapid population growth and fire suppression in the montane and eastern areas have changed forest regrowth patterns, expanded the amount of land covered by chaparral and increased fuel densities. The more remote regions of the Sierra lend themselves to fire management, while in developed areas residents demand protection rather than fire management. But as the authors point out, such demands must be accompanied by individuals and communities taking responsibility for fuels management: for example,

through removal of understory trees and shrubs and prescribed burning. They place especially strong emphasis on research that shows that thinning forests without subsequently removing or reducing slash and other surface fuels can result in fires that are more intense and severe than if the area had been left untreated.

Forest and fuels management, including the use of managed fire, are also essential to protect animal habitat and species that evolved in natural fire regimes, some of which are now endangered. Managing fire may also require exemption from air quality restrictions or alteration of the standards currently in place.

While this text is replete with references to research, the authors also point out that far more extensive studies are needed, particularly on the long-term ecological effects of moderate fires and the effects of fire on other ecological elements such as insect and fungi. Finally, they make a case that we could learn much from remeasurement of fire surveys done one or two hundred years ago, and from research into fire's effects on snags, woody debris, fungi and bacteria.

***Bruce Sturm** has recently completed a term on the board of the North San Juan Fire District and remains actively involved in local fire preparedness issues.*



White alder in bloom

photo Robert Erickson

A Couple of Steller's Jay Observations

by Kurt Lorenz
photos by Walt Carnahan



NANCY and I live on the south side of the Cruzon Grade/Backbone Ridge, at 4,000 feet elevation, above the Spring Creek drainage. From our house we can look over sections of the Inimin Forest and adjacent U.S. Forest Service parcels.

As casual bird watchers, we have enjoyed everything from the tame nature of a nesting pair of spotted owls on our property, to the flash of raptor light as a Cooper's hawk bores a hole through the understory on its way down hill. We have always been blessed with resident pileated woodpeckers, but there are more common and less dramatic avian miracles, and one source of interest over the years has been the antics of Steller's jays.

They repeated their actions over and over again around the two sides of the house over the deck, and as I watched I realized that the two birds were taking turns.

First described in 1741 by Georg Wilhelm Steller, a German botanist and zoologist, who was the naturalist on Vitus Bering's second Kamchatka Expedition, the Steller's Jay, *Cyanocitta stelleri*, is a West Coast member of the corvid family which includes jays, crows, ravens and magpies in North America. A number of corvids are some of the most social, most anthropomorphic, and most intelligent birds known. Their status as characters in First Nation

legends is indicative of their interest to humans.

The entry on Corvidae in Wikipedia notes:

Based on the brain-to-body ratio of animals over 1 kilogram, corvid brains are among the largest in birds, equal to that of great apes and cetaceans, and only slightly lower than a human.

It has been perhaps 10 years now since the summer in which Nancy and I observed two particularly striking demonstrations of intelligence and cooperation among Steller's jays.

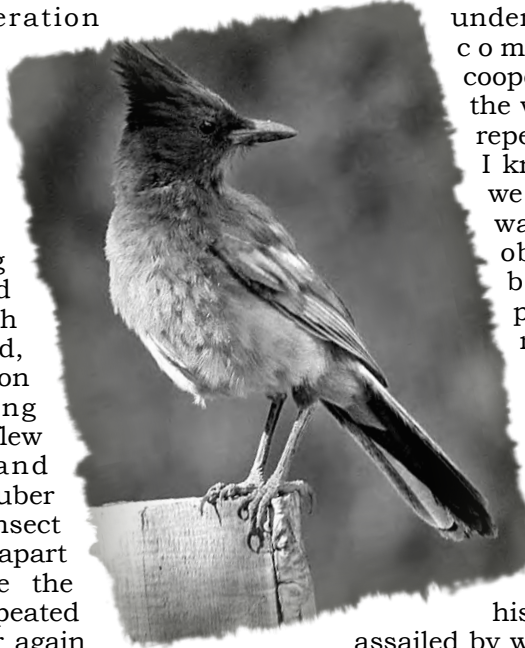
On a warm summer day at our house I noticed an odd rustling sound accompanied by occasional small thumps. It seemed to be coming from the deck outside, and peering out of the French doors I watched fascinated, as two Steller's jays sat on the deck intently gazing upward. Suddenly one flew up under the eaves and knocked down a mud dauber wasp nest. Its partner in insect crime then quickly picked apart the broken nest and ate the larvae within. They repeated their actions over and over again around the two sides of the house over the deck, and as I watched I realized that the two birds were taking turns.

The second tale is more dramatic and was at least as exciting as the behavior was clever. We used to have a handsome sugar pine some distance below our deck, and one fall afternoon Nancy and I happened to be outside and noticed an occasional flutter of sugar pine seeds breaking free from their huge cones and spiraling down in the blustery wind.

As we watched, a Steller's jay flew by and grabbed a seed out of the air. Soon another bird joined the first, and one of the birds seemed to understand the connection between the wind-induced motion and the availability of the seeds. All of a sudden, first one and then both birds wheeled about and started bumping the ripe hanging cones, causing a cascade of seeds to spill out. In less than five minutes there were perhaps a dozen jays swirling about and hitting the cones while others dove and roiled below them collecting the seeds. It was impossible

to follow individuals in the general free-for-all, but it seemed to us that there was a circulation of harvesters and consumers. The technique was to "shoulder" the cones with a wing, like throwing a block in football, and the result was literally a cloud of pine seeds cascading down and blowing about.

Apparently, both events I've described here were adventitious discoveries of the moment, immediately understood and supported by companions, and then cooperatively pursued. Of course the whole show could have been repeated daily, in season, for all I knew. We see only the things we happen to see. I have no way of knowing if what I observed was common jay behavior or a unique performance, but I have never seen either behavior again, and there have been plenty of chances to observe our resident jays.



Sadly, both corvids and sugar pines are under attack at this time. The sugar pine, depleted by historic over-logging, is being assailed by white pine blister rust and is in trouble in parts of its range. The corvid family of birds is particularly susceptible to West Nile virus, carried by the Culex mosquito. In fact, the top four avian victims of the disease are American crows, western scrub-jays, yellow-billed magpies and Steller's jays, which is likely why we see many fewer Steller's jays here than we used to. It's not yet known how much resistance the birds will develop to this scourge. Time will tell.

The sugar pine in this story was topped by a storm a year later, and a year or two after that succumbed to bark beetles. But here and there on the slope nearby are sugar pine pups which may owe their existence to the harvest techniques of a long gone flock of Steller's jays.

Kurt Lorenz, a retired teacher and former planning commissioner, takes time to admire his avian neighbors on the San Juan Ridge.

A Huge Black Tale



A mountain lion drags a black-tail deer into the forest below the author's house.

by Kuddie

It was around 4 o'clock in the afternoon on January 30 and I had just lain down for a little "cat" nap. As I drifted off, I heard what at first I thought was a distant dog bark. However, it was too high-pitched and very urgent.

I got up and looked out the window. At first I couldn't figure out what I was looking at. But then I realized that there, about 30 yards away in the recently fallen snow, was a mountain lion setting back on its hind quarters on the ground grasping a full-grown doe by the throat. The doe was looking straight into the sky and her body was twisted to the side with her flank on the ground. At first she struggled and kicked at the lion. But her attacker didn't budge.

Soon she lay still. Yet the lion sat there holding on, occasionally adjusting its hold. This whole ordeal took about 20 minutes.

Finally, the lion stood up and surveyed the surroundings. That's when I first realized how large this kitty was.

**photos by Kuddie
woodblock print by Louis Blue Cloud**

It appeared to be about six feet in length from nose to rump, dark brown, with a huge black tail and cute little rounded black ears.

Without any waste of time or effort, it grabbed the doe by the throat and effortlessly dragged her down the hill and out of sight.



I'd been standing watching this from the window and when the struggle was still going on after about five minutes I thought of my camera. I ran to get it and was able to take several photos. Unfortunately, I was shooting through ancient, wavy glass, so all but one of the shots are fairly blurry.

I walked outside about 15 minutes after the cat left and saw that there was very little blood at the kill site. I could see by the tracks and marks in the snow where the lion had hit the deer and I measured about 12 yards between that point and the kill site. The lion's tracks were four-and-a-half to five inches in diameter.

Here is an odd thing. I walked around the entire scene many times and could not find lion tracks coming to the site. I speculate that the lion may have hidden in the big oak nearby while the snow fell overnight – then it laid in wait for its prey all day. Odder yet is the fact that I'd walked around that tree earlier in the day.

Watching this procedure reminded me, once again, how fragile life is, and how natural the passing.

Kuddie is a singer, songwriter and observer of wildlife who lives on the San Juan Ridge. The scene he describes unfolded at his house near Bald Mountain on the north rim of the South Yuba River canyon.



The lion's print next to the author's boot

SEEN ANY TURTLES?

In 1998, a YWI survey of western pond turtles on six 'Inimim Forest ponds showed that we had 16 adults and no juveniles. This can indicate a problem in reproduction that may be threatening our local turtle population. (There is speculation among amateur biologists that either the turtles are not reproducing or the baby turtles are not surviving due to predation, possibly from the non-native bullfrog.)

Please let the YWI know if you find any turtles. A shell measurement would also provide valuable information: juveniles are defined as having a carapace (shell) of less than 4.5 inches from front to back.

Call or email Bob Erickson with your sightings: When. Where. Shell size.
(530) 292-3777 bob@ericksonwoodworking.com

WOLVERINES IN



OUR MIDST

By now, most everyone has heard about the Oregon State University graduate student who captured a wolverine on film in the Tahoe National Forest on February 28. Her photo was the first ever taken of a wolverine in the Sierra Nevada -- and according to forest service research ecologist Bill Zielinski, the first confirmed physical evidence of the animal's existence in California since the 1920s. Since February, an intensive search has snagged more photos (above), scat and hair from the animal.

Katie Moriarty's shot was taken at Sagehen Experimental Forest just over the crest of the Sierra Nevada from the Yuba River. Given the range of these largest members of the weasel family, we're giddy with the thought that our watershed is hosting the elusive animal, at least part of the time.

In Scandinavia, where I lived for four years in the 1970s, wolverines are not as rare. Populations in both Sweden and Norway hover between 300 and 400 individuals.

Unfortunately, this meat and carrion eater raises the ire of sheep farmers and reindeer herders when it preys on their livestock. Sweden protects its wolverines, but Norway issues a few hunting licenses annually to keep numbers from growing.

In 1999, Louis Blue Cloud traveled to Sweden where he observed wolverines in a wildlife sanctuary and heard first-hand accounts of them from Sami reindeer herders in Mitådalen in the central part of the country. On the following page is an email he wrote when he heard about the Sierra discovery. --editor

Blue Cloud grew up between the Middle and South Yuba rivers on the San Juan Ridge. A professional artist and accomplished wildlife tracker, he now lives in Portland, Oregon.

Photos courtesy of the USDA Forest Service Pacific Southwest Research Station and Oregon State University

Wolverine Tales From the North

I was told by the Sami that wolverines could occasionally be a major pain in the ass. Apparently, if a wolverine came upon reindeer in an enclosure, it would leap onto their backs and bite through the long tendons of their necks. This caused the reindeer's heads to drop and hang limp, immobilizing – but not killing – them.

The wolverine would do this to as many reindeer as it could, stockpiling, as it were. That allowed it to later kill and eat its prey as needed. The thinking was that because calories are scarce in the far north, wolverines made the most of every opportunity

and, while they may have been overdoing it (overkill!), they didn't have any experience in their evolutionary past with animals that were penned up; thus they didn't know when to stop. Fortunately, the Sami only corralled their reindeer for a brief time each year, and were very vigilant when they did, so this was a rare occurrence.

But maybe the Sami who told me this were just pulling my leg. Yet next to each Sami house was a second little house perched atop a single pole. I was told that these were for *järv**-proof food storage.

I didn't hear whether they ever shot wolverines.

**wolverine*

In southern Sweden I visited an animal sanctuary with world-class enclosures (very large, outdoor and natural). They had a pair of *järv* there that I spent quite a while watching. The pair would gallop around the perimeter of the enclosure and stop to sniff me every time they passed (I held my hand out). Around and around and around. I've heard that they run everywhere and cover great distances. I was struck by the heaviness of the thumps their feet made when they hit the ground.

Various researchers and other observers have described wolverine behavior that confirms most details told to Blue Cloud. A Swedish Wikipedia entry on wolverines -- an excerpt translated below -- jibes with the scientific literature. And little houses on one or more poles (*njalla*), have been used by Sami for centuries to protect food from animals large and small. --Editor

The wolverine kills its prey with a strong bite to the neck. It attacks larger animals under extreme snow conditions by jumping up on the prey's back and then attempting to bite its neck. But often the size of the prey animal becomes a problem and it doesn't die right away.

The wolverine's advantage in the winter is that it does not sink down into the snow but can easily make its way, in contrast to the larger prey, for example reindeer.



YWI Initiates Corridor Study

In March, the YWI board of directors took the first step in initiating a collaborative effort with the U.S. Forest Service, the Bureau of Land Management and California State Parks to study and create a plan to connect key habitat on the San Juan Ridge. Board president Bob Erickson reports that the agencies have responded with enthusiasm and a meeting has been set up for April to discuss the issue.

The science of conservation biology is maturing as a key tool to study and preserve biodiversity in our world of fragmented habitat. Mammalogist James Halpenny states it well in his book "Yellowstone Bears in the Wild":

Linkage is the wave of the future and one of our best hopes, not only for bears but also for all wildlife and habitat in the West.

Corridor Study (cont.)

UC Berkeley Conservation biologist Adina Merenlender, co-author of "Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation," will share her expertise about corridors with the YWI in a meeting in May. She will also hold a public presentation in conjunction with the meeting. (See Calendar listing on cover.) It's our hope that private landowners will play a key role in efforts to preserve ecosystems in the Yuba watershed.

Join YWI Today!

The YWI welcomes new members and volunteers. We need your support and involvement. Members receive Tree Rings and timely announcements of Institute events and activities. While donations of any size are welcome, annual dues are:

\$100.00 Forest Steward/ Small Business membership

\$50.00 Family membership

\$35.00 Individuals

\$20.00 Low income

Send your check, name, address and phone number to the Yuba Watershed Institute, P.O. Box 2198, Nevada City, CA 95959. Dues and other donations are tax deductible.

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Tania Carlone

GARY SNYDER/TOM KILLION BROADSIDE

The YWI is offering a limited edition broadside for sale. Poet Gary Snyder and printmaker Tom Killion collaborated to produce this stunning work, color printed on cotton fiber paper.

Originally published in conjunction with a reading by Snyder in November 2007 to benefit the YWI, a few of the 108 limited edition prints are still available. To purchase, contact Tania Carlone at (530) 265-4459 or taniacarlone@sbcglobal.net.

Details: \$75 plus shipping and handling. MasterCard and Visa accepted.

Dimensions: 10" x 15"

Poem: *No Shadow*, originally published in "Danger on Peaks," 2007

Print: *Vicente Canyon*, Tom Killion, copyright 2007

The poem is letterpress-printed by Full Circle Press.

The woodcut print is giclée-printed by Shannon Perry.

Broadsides are signed, dated and numbered by Gary Snyder.

No Shadow

My friend Deane took me into the Yuba Goldfields. That's at the lower Yuba River outflow where it enters the Sacramento valley flatlands, a mile-wide stretch between grass and blue oak meadows. It goes on for ten miles. Here's where the mining tailings got dropped off by the wandering riverbed of the 1870s — forty miles downstream from where the giant hoses washed them off Sierra slopes.

We were walking on blue lupine-covered rounded hundred-foot gravel hills til we stood over the springtime rush of water. Watched a female osprey hunting along the main river channel. Her flight shot up, down, all sides, suddenly fell feet first into the river and emerged with a fish. Maybe fooling the fish by zigzagging, so — no hawk shadow. Carole said later, that's like trying to do zazen without your self entering into it.

Standing on a gravel hill by the lower Yuba
can see down west a giant airforce cargo plane from Beale
hang-gliding down to land
strangely slow over the tumbled dredged out goldfields
— practice run
shadow of a cargo jet — soon gone

no-shadow of an osprey

still here

— Gary Snyder

Gary Snyder



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YWI Spring 2008 Calendar

Cleaning up Mercury on the South Yuba River: An Experiment

Thurs., April 24, 7:00 p.m.

A team of scientists from the B.L.M. and U.S.G.S. will describe their strategy for removing mercury from the South Yuba River at Humbug Creek and discuss potential environmental impacts.

The Odd Fellows Hall
212 Spring St., Nevada City
\$5.00 suggested donation

An Evening with Jerry Franklin and Norm Johnson

Tues., April 29, 7 p.m.

Come hear two of the country's leading thinkers on forest issues discuss their thoughts and ideas for forest management changes in the Sierra Nevada: Jerry Franklin, forest ecologist at University of Washington and Norm Johnson, forest policy expert at Oregon State University.

Madelyn Helling Library, Nevada City
\$5.00 suggested donation

Habitat Fragmentation and Corridor Ecology

Weds., May 7, 7 p.m.

UC Berkeley Conservation biologist Adina Merenlender will explore the science behind common assumptions about the utility of corridors to link plants and animals among fragmented habitats. Merenlender will highlight large-scale planning efforts to maintain and restore connectivity.

The Odd Fellows Hall
212 Spring St., Nevada City
\$5.00 suggested donation

Walk in the 'Inimim: Spring Creek

Sat., May 17, 10 a.m.

Join YWI board members Bob Erickson and Gary Parsons for a walk and lively discussions on geology, natural history and forestry in the 'Inimim Forest.

Call the YWI for details after May 1.

Laws Field Guide to the Sierra Nevada w/ author Jack Laws

Fri., June 27, 7-9 p.m. Slide show and book signing

Sat., June 28, 10 a.m - 3 p.m. Nature illustration workshop

Jack Laws' extraordinary field guide to the Sierra Nevada met with rave reviews from the national press when it was published in the fall of 2007. To see why, go to www.johnmuirlaws.com

Friday evening: Madelyn Helling Library, Nevada City
\$5.00 suggested donation

Saturday illustration workshop: \$30 general, \$25 YWI members
North Columbia Schoolhouse Cultural Center

17894 Tyler-Foote Rd. on the San Juan Ridge

Class limited to 20 participants. Pre-registration recommended.

For more information on upcoming events, contact Tania Carlone: (530) 265-4459 or taniacarlone@sbcglobal.net.

Writers and artists: If you have a proposal for an article or illustration you think would be appropriate for Tree Rings, please contact Tania Carlone to discuss your idea. Thank you!



TREE RINGS

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