Sabbatical Leave Report

December 1st 2015 to August 15th 2016

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Narrative

Goal: My sabbatical leave goal was to learn about how extension of forest and fire science is done in France, a country with a similar ecological setting as California but a very different social and institutional organization. I developed this sabbatical goal because my extension program has focused on disseminating the latest science based information on forest management and wildland fire to varied clientele. In addition, my applied research has focused on how multiple agencies and partners can collaborate in forest research and management (Sulak et al 2015) and on how to collaborate in extension activities through development of boundary organizations such as the California Fire Science Consortium (Kocher et al 2012).

Activities: I was able to achieve this overall goal while in France. Specifically, I learned about how forest and fire science is extended by meeting with and interviewing staff at forest and fire research and management organizations and attending workshops, conferences and field trips on these subjects. I spoke very rusty French when I arrived (having been born and lived in France for my first seven years) but my language skills improved greatly after 8 months of language immersion, allowing me to study and learn from local experts while speaking French. Those same colleagues were keen to practice their English with me.

I was hosted by the French Ministry of the Interior, general directorate of civil protection and crisis management. This came about after I met a fire-fighter, Commandant Christophe Frerson at the International Association for Wildland Fire in Boise in April 2015. He is a civil protection advisor and a permanent member of the steering group of international partnerships at the French National Firefighters Federation. Through this connection I was provided office space and introductions to the many players in forest and fire management in southern France.

My office was at the French Department of Interior's crisis response center in Aix en Provence (*l'Etat-major interministériel de zone* - EMIZ). From there I was introduced to staff at the French forest service

(ONF), and the National Institute for Research in Science and Technology for the Environment and Agriculture (IRSTEA) and practitioners who are fire fighters. EMIZ assigned me to the organizing committee of the 2nd International Conference on Forest and WUI Fires https://forestfire.irstea.fr/ held in May 2016 in collaboration with the International Association of Wildland Fire. This conference was very valuable for increasing connections with academics and practitioners in WUI risk management throughout Europe and the world.

I was also able to learn about how forest management extension works in France by meeting and ng interacting with foresters at the Regional Center for Private Forestland owners (CRPF) in nearby Marseille and participating in their workshops to extend forest management information to landowners. Universities are not involved in extension in France, and CRPF, as a public/private partnership, fulfills most of the same functions as cooperative extension in the United States. I also met with the president of the local forest landowner union/syndicate to learn about landowner concerns.

In addition, I travelled to many regions of France to learn more about local forest conditions and special forest products such as cork and chestnut production, and oak plantations to increase truffle production.

Outcomes: I was successful at meeting my overall sabbatical goals. I learned much about how forestry and fire science extension is done in France and the European Union and strengthened ties with international forestry colleagues, including forestry extension agents in Europe. The WUI conference especially allowed us to exchange ideas and best practices on fire science through a special session on fire science exchange at which I and several of my California Fire Science colleagues presented.

One outcome I anticipated was learning about innovative French ideas or approaches that can be implemented here in California. To my surprise, the topic I found most intriguing while in France was the French method for land use planning for wildfire risk reduction. Doing a better job at land use planning to reduce home loss to wildfires in California is a hot topic but few specific methods or blueprints exist to understand how to do it. When I learned from French colleagues that they have a system to do this, I was excited to learn more about it. I focused on this topic for my sabbatical project and developed a manuscript, along with Dr. Van Butsic, land use extension specialist at UC Berkeley. I developed the manuscript with him, titled *"How land use planning is used to reduce fire risk to homes in Mediterranean France and California"*. I submitted it to the International Journal of Wildland Fire where it is currently under review. I've attached the proof of the manuscript (which is not for public dissemination) to this report. I have also translated it into French for distribution to my French colleagues at EMIZ since they requested a final report of my activities as well.

Proposed future activities: In addition to publication of the manuscript, I plan to share results of my sabbatical and of the comparative case study broadly a wide variety of audiences including:

- Presentations at relevant conferences in the US such as the International Association of Wildland Fire and the Association of Natural Resource Extension Professionals and land use professional societies
- Professional foresters through presentations at Society of American Foresters chapters, the El Dorado Amador Forest Forum, and the California Association of Resource Conservation Districts
- UCANR forestry and land use work group members at work group and program team meetings
- The UCANR Green blog (for which I have previously written a number of articles)

- Francophiles through organizations such as the Alliance Française of Sacramento and San Francisco

I am also partnering with forestry extension specialist Dr. Rick Standiford, from UC Berkeley to put together an application to the France Berkeley fund in January 2017. The France Berkeley Fund is a partnership between the government of France and the University of California at Berkeley established in 1993. It promotes scholarly exchange in all disciplines between UC Berkeley and all research centers and public institutions of higher education in France. We plan to develop a proposal to learn more about forest planning by private forest landowners.

General schedule and activity highlights by month

Following is a general schedule of my activities and contacts during the sabbatical, organized by month.

December 2015 - Wound down California commitments and transitioned to France
January 2016 – Set up life in Aix-en-Provence and settled in at the EMIZ Office
February 2016 – Learned more about Mediterranean forests and ecosystems
March 2016 – Learned about local forests and forestry extension in France
April 2016 - Learned about land use planning in France
May 2016 – WUI and Forest fire conference in Aix en Provence
June 2016 – Local forest and fire management and writing manuscript
July 2016 – Traveling to visit more forests in France
August 2016 – Return to California

December 2015 - Winding down California commitments and transitioning to France.

The first month of my sabbatical I continued to carry out commitments in California and worked on the logistics of moving to France with my family including husband and two teenage children. This included renting my house out and renting a house in France. My activities in December included:

- December 1st and 2nd Hopland, Facilitating breakout sessions at Living with Wildlife event at Hopland REC
- December 3rd and 4th, Sacramento, All staff and advisory committee meetings for the California Fire Science Consortium
- December 9th, Jackson, All staff meeting for UCCE Central Sierra
- December 14th and 15th, Auburn, Western Regional Forestry Extension Meeting

On December 29th, 2015 I flew with my family to Paris and to the high speed train to Aix-en-Provence just north of Marseille, France and moved into a rental house in the nearby village of Luynes. Luynes is about 4 kilometers south of Aix-en-Provence.

Figure 1. Aix en Provence is about a 30 minute drive north of Marseille, which is on the Mediterranean

Figure 2. Rental house in Luynes, France. I was able to walk to the EMIZ office from here

January 2016 – Setting up life in Aix en Provence and settling in at the EMIZ office

In January I focused on managing the logistics of living in France and going to a French office every day. After recovering from jet lag and settling into the house, I learned how to use French public transportation to visit schools and find the best academic situations for my children.

Figure 3. Learning to use French public transportation. The bus stop at our house and at my office.

I enrolled them in French public schools that have international sections, where French children have immersion classes in English and other world languages. There they were able to study French as a foreign language through specialized classes and through immersion in a semester of school taught in French. After learning how to get a French bank account, rental insurance and a phone (no easy task due to the famous French love of bureaucracy), I was able to settle in at the EMIZ office.

Figure 4. College Mignet (a middle school) for my daughter and Lycee' Cezanne (high school) for my son

My office was at EMIZ, a regional interagency response center for crises including wildfire, floods, industrial accidents, terrorism and unrest, and others. It is staffed primarily by fire-fighting officers who allocate regional emergency resources to large crises. All fire-fighters respond to multiple hazards as there is no separate wildland fighting force in France as there is in the United States. EMIZ also houses police, military, and weather prediction services. The office is in the small hamlet of Valabre on the grounds of L'Entente Pour La Foret Mediterraneenne, a collaboration which includes many agencies that are involved in helping protect people and preserving natural spaces in the face of natural and technological risks.

Figure 5. The EMIZ office (up the stairs) at the Entente office in Valabre

Also at the Valabre campus is CESIR, a new state of the art, crisis simulation center, which received a visit by the French Minister of the Interior, Bernard Cazeneuve, in January while I was there. CESIR is used to train responders across regional and national lines. Simulated emergencies are programmed into a computerized system. Responders are assigned to different simulations rooms and must act and communicate with each other to address the risk, in this case a wildfire ignition. Simulated results are used to identify weaknesses and make corrections in response.

Figure 6. Fire fighting officers (Christophe Frerson and Claire Kowalski) in formal uniform to hear the Minister of Interior at the Valabre Crisis Simulation Center (CESIR) on January 29th, 2016.

Figure 7. The crisis simulation center running a mock international border wildfire exercise with a fire fighter from Sweden.

On January 19th I visited again with researchers at the National Research Institute of Science and Technology for Environmental and Agriculture (IRSTEA) located just north of Valabre (I met them in October 2015 on a separate visit to Aix to scope out my sabbatical). I interacted with scientists Eric Maillé, Christophe Bouillon, Anne Ganteaume, Marielle, Jappiot, to help plan the WUI and Forest Fire Conference in May.

Figure 8. IRSTEA researchers Eric Maille' and Christophe Buillon

I also started to visit local forests to learn more about forest growth and use. Though there is no industrial timber production in the south of France, growing and harvesting special forest products are an active sector of the economy. I made a visit to the Massif de Maures, just north and inland of Nice, to see how European chestnuts and cork trees are managed.

Figure 9. Artisanal chestnut management and production in Collobriere, a village in the Massif de Maures, January 31st, 2016.

February 2016 – Learning more about Mediterranean forests and ecosystems

Figure 10. Palais SARDE where the brokerage event was held.

In February I focused on learning more about the local forest in Mediterranean France and how wildfire and risk management is done there. On February 1st, I attended a European Union brokerage event for risk reduction grant proposals in Nice. My goal was to better understand how science is disseminated to agencies and practitioners in France and Europe. The event was put on by the Ministry of Interior of France, the French Network for Secure Societies, the Security Research Network (SEREN3), and the University of Nice Sophia Antipolis (UNS). The goal was to connect European networks of practitioners in the field of security leading to better cooperation on EU funded projects. I learned that European organizations are very active at creating networks of practitioners and private companies to tackle issues, though universities seemed to be a much smaller part of the scene than in the US.

On February 4th I visited the Eco-museum of the Mediterranean forest in Valabre to learn more about the ecology and fire history of the local forest, and especially learn the French vocabulary needed to communicate about forests in the south of France. It is widely used by school groups to help teach youth about forests, fire and history in the area.

Figure 11. The Eco-museum of the Mediterranean forest is within walking distance from Valabre

February 5th I travelled to Marseille to meet foresters at the Regional Center for Private Forests (*Le Centre Régional de la Propriété Forestière* - CRPF). I met with Haïmad BAUDRILLER, Camille LOUDUN and Nicolas JOLY, forest engineers to discuss how they do outreach to forest landowners. CRPF is a public private partnership that fills the same role as Cooperative Extension in the US though they are not explicitly connected to any universities. They face very similar issues as we do on giving advice to landowners. They invited me to several extension workshops in the coming year.

Figure 12. Advertising flyer for a CRPF workshop on developing wood products from private forests.

On February 23rd, I met with Guillame Roux from the SAFE Cluster. The primary activity of SAFE Cluster (Security and Aerospace actors for the Future of Earth) is to build innovative solutions for security of people and the environment. The cluster brings together 600 affiliates, including companies, training and research organizations related to security, environmental protection and aerospace sectors; insurance companies, banks, and customers such as civil and cities security services to develop new business opportunities. Universities seemed to be a minor part of the mix.

Figure 13. Banner for the SAFE cluster


Figure 14. Vincent Pastor, of SDIS 13.

On February 24th, I met with Vincent Pastor of the Bouches de Rhones fire department (*Service Departmental d'Incendie et de Secours des Bouches de Rhones* - SDIS13). He is a forester assigned to fire departments as a technical expert to help with fire-fighting strategies. That day and over the rest of my time in Aix, he explained to me how land use planning for wildfire risk reduction works in France. He was my most important collaborator for completing my sabbatical project.

On February 26th, EMIZ held a retirement celebration for Colonel Jacques Vandebeulque, the Director of EMIZ who was the official who signed off on my stay at EMIZ. It was an outing to a ski resort in Haute Provence. I used the opportunity to snowshoe through the European larch zone.


Figure 15. EMIZ office trip to ski resort in the Haute Provence for Colonel Vandebeulque (on right in third photo from left)

March 2016 – Learned about local forests and forestry management in France

In March I focused on exploring local forests and forest management including the Massif de Montaiguet, a 20 square kilometer long forested ridge/range where I lived and walked through to get to work. Massifs are defined forested areas with mixed public and private land ownership that are managed cohesively.

Figure 16. The ridges around Valabre are each defined as part of a 'massif'. There are 23 in the Bouche de Rhone Department – each one has its own regulations and management plan. Vegetation includes Aleppo pine and green and pubescent oaks.

The primary tree species in the area are Allepo pine (*Pinus halepensis*), pubescent oak (*Quercus pubescens*), and green oak (*Quercus ilex* – not pictured). All are fire adapted species. Allepo pine is serotinous meaning it seeds in well after wildfire. Many agricultural lands were abandoned after World Wars I and II and grew back to this very flammable vegetation type. Most of the local forest is about 60 years with mortality due to crowding starting to accelerate.

Figure 17. Allepo pine and pubescent oak seedlings. Dead pines now form fuels on the forest floor, which is often terraced (as shown in the third photo. Some agricultural terraces have been maintained but transition into forest (fourth photo).

On March 3rd and again on June 7th, I met with Yvon Duche', responsible for wildfire response for the French Forest Service in the southern region (*l'Office National des Forêts* - ONF) to learn about how they interact with private landowners to address the wildfire threat. They manage both the lands owned by the government and communal forests, owned by local government, based on local preferences.

Figure 18. Regulations for the Massifs, including fire hazard level. Photo of Yvon Duche'

On March 5th I returned to the SAFE cluster at the Massif de l'Arbois to watch defensible space clearing (*debrousillament*) done. Defensible space is required by law around houses and roads – but fuels reduction work is not done much within the forest itself.

Figure 19. Roadside brush crew working, mowing wild rosemary. Wild thyme and lavender grows throughout the area as well.

French housing must be built according to building codes. In areas of fire hazard, the building codes are even stronger. The housing is generally built more durably than ours, mostly of tile, block, and stucco. I watched this house being built on the walk between my home and office.

Figure 20. New homes being built in Luynes. Only the roof joists are flammable.

On March 7th I met with Luc Langeron, fire prevention director at L'Entente, to learn about the fire prevention outreach approach and defensible space requirements in France. Agencies have very active outreach programs in the summer as well as large volunteer patrol groups. Landowners within 200 meters of a forested massif must do fuels clearing.

I met twice with the President of the Forest Landowners Syndicate in the Department of the Var, Frédéric-Georges ROUX. We discussed the outlook and goals of private forestland owners in southern France and how the system of syndicates (forest landowner unions) works for their forest management goals.

Figure 21. Frédéric-Georges ROUX, Le President de la Syndicat des Propriétaires Forestiers Sylviculteurs du Var

On March 23rd I attended a CRPF event in Aups, in the nearby Department of the Var, for private forest land owners on developing simple forest plans. These are required for landowners with more than 25 hectares of forestland, though compliance is not very high. This workshop was very similar to workshops

we hold in California. French landowners had the same kind of concerns and asked similar questions. I ate lunch with the foresters after the workshop.

Figure 22. Landowner meeting hosted by CRPF on how to develop a forest management plan. Forest around Aups.

April 2016 – Focusing on land use planning to reduce wildfire risk in France

In April I focused down on a sabbatical project that I thought was feasible to complete during my time in France. I decided to compare land use planning for wildfire risk reduction in France and California. I recruited Van Butsic, land use cooperative extension specialist in land use planning to help develop a manuscript for publication. With my French language skills improving, I was able to read and translate French fire risk prevention plans, interview experts and visit communities to see planning results.

Figure 23. I visit the community of Auriol near Aix on April 17th as a community to examine because it has a local fire risk prevention plan to reduce the risk of wildfire in the WUI.

On April 21st, I interviewed the new head of EMIZ, Jean Jacques BOZABALIAN, about land use planning and wildfire risk reduction. I also wanted to know about the role of fire agencies in thinning and forest management on private land. The role is very limited as they do not provide any subsidies to private landowners to thin as we do in California. Instead they focus on brush clearance around roads and massive attack for fire suppression.

Figure 24. Jean Jacques responding to media questions about big fires around Aix en Provence in August 2016.

On April 29 I attended a CRPF oak management field trip in the community of St. Marc Jaumegarde, near Aix en Provence. The goal was to show how green oak woodland could be managed for production of firewood. Not much management has been done in most woodlands since World War II when these areas were heavily used for firewood (using coppicing) and grazing. CRPF recommends clear-cutting for production of firewood on a 40 year rotation.

Figure 25. CRPF field trip to view green oak management for firewood on April 29th, 2016. Bottom photo shows immediate post clear cutting for firewood production

May 2016 – WUI and Forest fire conference in Aix en Provence

In May I took part in the WUI conference and attended the Festival of Transhumance in Saint Rémy de Provence. The end of May was historically the beginning of the 10 day long journey towards the high mountain pastures with thousands of sheep. Herds are now transported by truck after the festival. Activities included a parade of about 3,000 sheep through town and sheep dog demonstrations.

Figure 26. Parade in Saint Rémy. Women wearing their traditional costumes, with donkeys and sheep behind. The sheep are then penned up at the Plaine de Crau before transport to high elevation pastures.

May was also the month of the Forest and Wildfire Conference held May 25-27 in Aix en Provence https://forestfire.irstea.fr/. I was an official member of the organizing committee, gave an oral presentation and hosted French and American colleagues at a networking party at my house. I also assisted Jean Jacques to open the conference by writing his speech in English.

On May 24th I traveled with Dr. Hugh Safford, Regional Ecologist for the Region 5 of the US Forest Service who arrived for the conference, to Montpelier. We met with Dr. James Aronson at the Center for Functional and Evolutionary Ecology (*Centre d'Ecologie Fonctionnelle et Evolutive* – CNRS). He is a prominent restoration ecologist.

Figure 27. Lunch with Dr. James Aaronson and Dr. Hugh Safford

May 25th, the first day of the conference, had a special session on fire science dissemination. It included two colleagues from the California Fire Science Consortium, including Dr. Hugh Safford and Dr. Chris Dicus, forest and fire science professor at California Polytechnic University. I gave a talk in the session titled: *Science collaboration leads to shared understanding between natural resource management agencies, scientists and stakeholders* based on my work on the Sierra Nevada Adaptive Management Project.

Figure 28. Colleagues Christophe Frerson and Jean Jacques Bozabalian of EMIZ, and Hugh Safford from the California Fire Science Network and Barb Satink-Wolfson from the SW Fire Science Exchange. The conference was held in French and English. The third photo shows the translation booth. Translators spoke into headsets available to attendees.

On May 26th I hosted a networking event/party at my house for French, American, Australian and Spanish colleagues attending the conference and for our friends, and neighbors. It was my biggest social achievement while on sabbatical. Fun was had by all!

Figure 29. Conference goers socializing at my house in Aix, May 26th, 2016.

On May 27th, conference goers had a field trip to the CESIR simulation center and training centers for the fire department in the region (SDIS13). We also visited a fire/shrub/vineyard area which had a wildfire the year before to understand better how fire suppression and recovery is handled in France.

Figure 30. Firefighters at SDIS 13 train by dousing natural gas fires expelled by the bronze trees on the left. They have fairly high tech mobile mapping vans and drones used in suppression. Vegetation 1 year after fire is shown on the right.

June 2016 Local forest and fire management and writing manuscript

On June 1st, I gave a talk on wildfire in California to fire-fighting officer trainees at the French Academy for Fire, Rescue and Civil Protection (*Ecole Nationale Supérieure des Officiers de Sapeurs-Pompiers* – ENSOSP). I was invited by Commandant Mohammed KHARRAZ from SDIS 72 who is an instructor at the school. I gave the talk mostly in French, which was a surprise to me. I arrived thinking I was giving it in English. It went well considering.

Figure 31. Christophe and Mohammed at ENSOSP, a recruiting poster for female fighters, ENSOSP regalia and a view of the center.

June 9th to 13th I traveled with my family to London, which is outside the EU passport control zone (the Schengen zone) in order to renew my French visa through August.

On June 14th I had a day in the field with Dr. Bernard Prevosto, a researcher in the Aix-en-Provence office at the National Research Institute of Science and Technology for Environment and Agriculture (IRSTEA), who focuses on Mediterannean ecosystems and risks. He is the academic expert on management of Aleppo pine and is doing some of the fundamental research on how to manage it through quantifying the effects of stand density on understory growth and regeneration. Most foresters consider the species not to be commercially viable because it is often slow growing and twisted but there is evidence that proper silviculture can produce much more straight growth on higher site ground. Bernard is doing some of the research to understand what kind of silviculture can produce better value in this species.

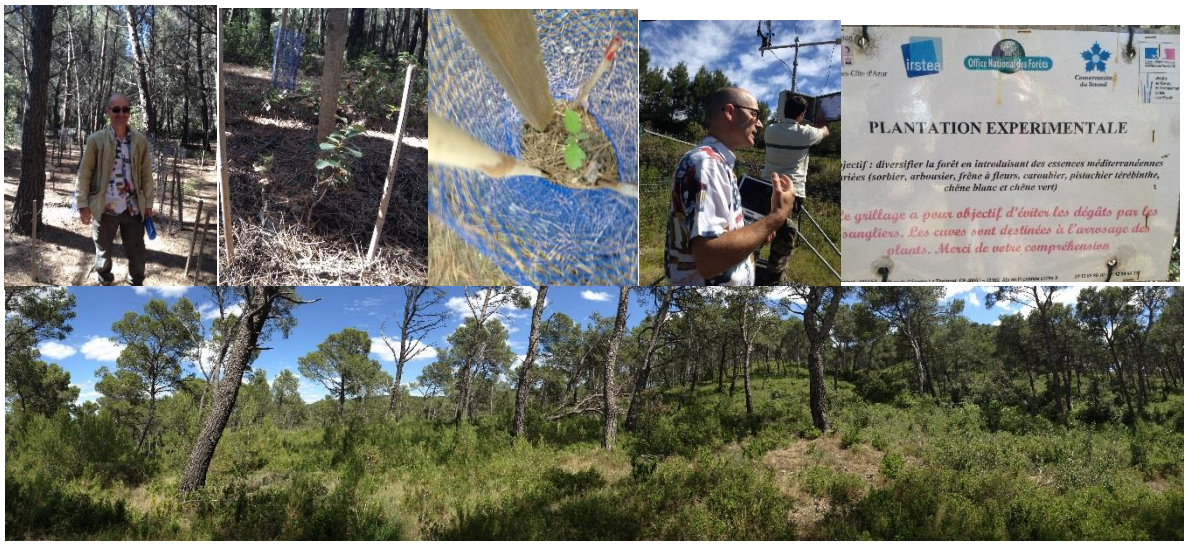

Figure 32. Dr. Prevosto and his experimental plots to determine the effect of stand density on understory planting and regeneration. He inter-planted pine and oak saplings after thinning to different densities and is measuring subsequent growth in trees and shrubs. He also maintains weather stations to quantify the effects of moisture on stand dynamics.

July 2016 – Traveling to visit more forests in France

In July, I finished writing my land use planning manuscript and translating it into French, which was requested by my French colleagues to serve as my final report to them. I also traveled away from Aix to look at forests in nearby regions. On July 7th I visited the forest at Sainte Baume, which is one of the only 'old growth' forests in France. It has been maintained by the Catholic church as a sacred space, where St. Mary Magdalene is said to have spent her final years. It never has been harvested except for during the time of unrest during the French revolution when church lands were seized by the government. The species and biomass accumulation there are unique in southern France, but certainly inform the capability of the landscape to grow vegetation without on-going harvesting and disturbance.

Figure 33. The forest at Sainte Baume, said to be the final home of Saint Mary Magdalene.

I also visited chestnut forests in the Ardeche Department. Chestnuts have historically been an important special forest product in France and all of the Mediterranean. At the chestnut museum (*Musée de la Chataigneraie*) that I visited in the town Joyeuse on July 29th, I learned about current and historical

chestnut cultivation and harvesting and processing technology. France currently cultivates over 35,000 hectares of chestnuts, producing about 9,000 tons per year. Chestnut producers have organized themselves and now have a system of regional appellation control, similar to that in place to brand wines, to increase the value of their products.

Figure 34. Historical chestnut processing equipment and modern production and regional appellation brands at the chestnut museum.

Cork is another special forest product in southern France and Corsica. It takes a skilled harvester to remove the bark without harming the tree. Cork oak bark can be harvested about 10 feet up the stem of a tree every ten years without harming it.

Figure 35. Cork oak growing with chestnuts. Bark has been removed on the stem on a tree growing in a communal forest.

I also visited a land owner in nearby Vaison-la-Romaine to learn more about truffle cultivation. Pierre Brun is a farmer of olive trees and vines. As a way to supplement his income he has also set up a campground on the farm for agricultural tourism (*camping a la ferme*) which was made legal about 20 years ago. Most recently he has installed a field of green and white oak saplings to grow high value truffles. The trees are inoculated with truffle spores and are expected to produce within 8 years.

Figure 36. Farm property of Pierre Brun. His family welcomes campers, sells them wine and olive oil, and has installed a new field of oak saplings to cultivate truffles. They already have trained dogs to locate truffles.

I traveled to the “Giant of Provence”, Mount Ventoux, which at 1900 meters is the highest peak in the department. It was systematically deforested starting in the 12th century for shipbuilding but has been aggressively reforested since the 1860s. It is now a UNESCO Biosphere Reserve of more than 200,000 acres. The north side of the mountain is mostly conifers which are now experiencing an outbreak processionary caterpillars that are toxic to the touch. The south side has a lot of oaks mixed in and is being thinned along the road to reduce fire hazard. This illustrates the long term issues inherent in choosing the right species and densities for reforestation.

Figure 37. Forests on Mount Ventoux with dying pines on the north side and aggressive thinning by feller-buncher along the road on the south side.

August 2016 Return to California

In August I made preparations to return to the US by clearing out my rental house and traveling to Paris and then home to South Lake Tahoe on August 15th to resume my regular duties.