BURNING QUESTIONS WITH A FORESTRY EXPERT

Interview with Dr. Brandon Collins

BY GRACE GUAN, ALLISUN WILTSHIRE, AND ANANYA KRISHNAPURA

***Brandon Collins, PhD**, is an adjunct professor in the Department of Environmental Science, Policy, and Management at the University of California, Berkeley. Dr. Collins is also a research scientist in a partnership with the U.S. Forest Service, Pacific Southwest Research Station, and UC Berkeley Center for Fire Research and Outreach. Additionally, he is an Associate Editor with the* Journal of Forestry. *In this interview, we discuss Dr. Collins' research on the history and trajectory of fire management strategies in California as well as factors driving forest change.*

BSJ: What sparked your interest in forestry and fire science?

BC: I did not have an "Aha!" moment where I knew that was exactly what I wanted to do, but an influential moment was back in 1991 when I was in middle school and we had the Oakland Hills fire. Although I was not anywhere near the fire—at the time, I was living in Alameda, about 10 miles or so from it—it was still something that hit close to home for me. I remember being on a football field to pick up my brother from practice and ash was visibly falling. From then on, I was really interested in fire and forestry. My dad had an undergraduate degree in forestry from the University of Alberta, so my dad's explanation of the fire coupled with my first-hand experience is probably what got me into it.

BSJ: How does your work as a research scientist at UC Berkeley differ from your work with the U.S. Forest Service?

BC: Currently, I am a partnering scientist with the Forest Service, although I used to be full-time. The hybrid-type position that I am now in allows me to also teach ESPM 134, an upper-division class on the importance of fire, insects, and disease as agents of forest disturbance, as well as at the Forestry Field Camp for UC Berkeley. Overall, though, from a work standpoint there has not been a considerable change. The transition has been relatively seamless. There are several scientists in different research stations at the Forest Service that have affiliations with universities, so it can be a fluid thing to go back and forth between these institutions. It is really a neat partnership and something I wish there was more of.

BSJ: What should the Bay Area expect in terms of the frequency and severity of wildfires in the coming years?

BC: Unfortunately, I cannot offer a great prediction on that. The one thing we have learned, especially in the last four or five years, is that fire is a lot more likely than perhaps it was in the past. We used to have these one-off events like the Oakland Hills fire in the 90s that I mentioned earlier; before that, I think the last big fire in the Berkeley Hills was back in the 20s. Now, I think these kinds of topics are constantly on people's minds because there always seems to be either a fire near us or smoke from something much further away which reinforces this idea of the inevitability of fire. For a long time, people had no direct experience with fire or smoke, so they would not even think about or plan for it. Now, however, I think it is something we can plan for. We cannot say for sure that next year we will have a terrible fire in the Oakland Hills again; there are random components to these events, and sometimes, getting an ignition that we cannot get crews to quickly enough is almost all it takes. My take-home would be that people ought to be thinking about that inevitability—not that fire will happen tomorrow or next year, but

that it is more likely than not in our lifetime.

BSJ: What are the different fire management strategies California has employed in the last few centuries?

BC: In pre-Euro-American settlement times, there is plenty of evidence that Native Americans lit fires intentionally to manipulate the forest for different characteristics that were beneficial for them. Some early California settlers also adopted these strategies, particularly for the purposes of improved grazing. There are even some accounts of private foresters who owned timberland and saw a benefit to prescribed burning. At the time, the norm for foresters was to say that fire, in general, was not good. They believed it was hurting regeneration. The majority of foresters did not want fires at all, but there was this small contingent that recognized that if they kept putting fires out, they would eventually have this problem of fuel buildup and overly dense forests. By the 1930s to 1940s, we had pretty much adopted a policy, both in-state and nationally, of full suppression. Any of those contingent foresters that were using fire were either displaced or had their programs completely shut down. We suppressed fire for many decades, and we were very successful at it up until about the 1980s to 1990s. More recently, we are starting to see some of the consequences attached to putting fires out for so many decades.

However, we are simplifying it when we say that we went into full suppression as soon as Euro-Americans came; there is a little more nuance to the story. For instance, around the late 1960s and early 1970s, there were a couple of areas in California's national parks where they started to use naturally ignited fire. When lightning started fires, they let them burn and resume their natural ecological role in these forests. Today, while we still practice fire suppression, there is much more recognition of the need for fire. The key issue that we struggle with is how to reimplement this process, especially when we have taken fire out for so long. The forests are not in a condition where we can just flip a switch and automatically decide to let fires burn. Ultimately, while we have a broad agreement that fire is ecologically important, we have not made the leap into actually implementing it at a meaningful scale.

BSJ: In your paper, "A quantitative comparison of forest fires in central and northern California under early (1911–1924) and contemporary (2002–2015) fire suppression," you discovered "no statistical difference in annual number of human-caused fires between the early suppression and contemporary time period." In your opinion, why has this number stayed constant?

BC: That was an interesting finding. The paper was based on a data set we found in this giant ledger sitting at the Forest Service research office in Redding. It supposedly had a comprehensive account of all fires from 1911 to 1924 that were either on or adjacent to national forest land. That data was interesting because I think some people have speculated that fires have gotten so bad recently since there have been so many more human issues; the population is much greater than it was historically, and we have people out camping in the woods that are not very familiar with forests and thus are not as careful as they should be. However, based on the data set in the ledger, that was not the case.

We hypothesized that there were people back then setting fires on purpose, perhaps not legally. For example, one of the easiest ways to clean up debris for people working in the woods after a timber harvest was to burn it. There may have also been some carelessness at play; some of the equipment that they would use back then did not have the same ability that our technology has now to arrest sparks. This is all speculation, though. We do not have a great explanation for why the numbers are the way they are. Importantly, what the data does highlight is the fact that we cannot just blame the larger population and more human-caused fires of today as reasons for why we are seeing the types of fires we are seeing.

BSJ: What factors have caused the number of larger-sized fires to increase earlier in the year?

BC: Based on the ledger's data, if today's fires are not due to human ignitions (at least not as frequently as in the past), then we are looking at fuels, climate, or both as possible drivers. These recent fires are well outside of anything seen historically from that data set or from several other reconstructions of historical fires. From a fuel standpoint, forests have changed drastically compared to the past. If we think about forest conditions, there are always inputs (for fire ignition) on the forest floor due to needles dropping, branch breakage, and dead trees. The only way that material is being dealt with is through decomposition, but there is no way the microbes are keeping up with the input rates. That is where fire used to come in historically. Fire would come fairly frequently in our forests every five to ten years or so and consume some of those fuels, generally keeping the density of trees in check. Since we shut fires out and changed care for the forests, we inadvertently increased the ability of fires to spread at a higher intensity.

The next factor leading to large-scale fires is climate. The fact that we have longer, warmer dry seasons just gives more opportunity for fire to burn. We couple that with the fuel condition, and we see that we are really in a bad way with regards to the way fires are spreading. Thinking about where we are going to be in the near future with climate tells me we need to go full speed on this problem. That means doing large-scale forest restoration, something we have not yet proven that we can do. There is an element of inevitability to wildfires now; we cannot pretend that we will be able to put them all out.

"There is an element of inevitability to wildfires now; we cannot pretend that we will be able to put them all out."

BSJ: How do active restoration methods differ from each other?

BC: There are two main ways that we can do forest restoration. On the mechanical side, we can cut down trees, later using

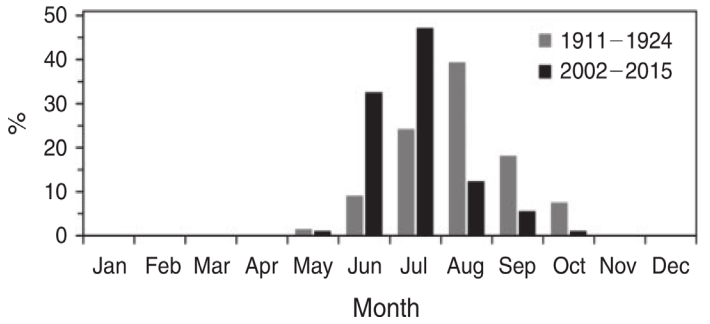

Figure 1: Percentage of total recorded large (>2024 ha) fires by month in the early suppression (1911-1924) and contemporary (2002-2015) periods. *Note the significant increase in large fires during June and July in the present-day versus what was recorded a century ago.*

them for timber or for energy by burning them. On the other side, we can use active fire, which involves a combination of strategies where we use either prescribed fire or "managed wildfire," allowing naturally ignited wildfires to burn under conditions where we could have put them out. This can be risky.

> "We could think that we wrote a perfect prescription, but the randomness of fire is exactly what some of these forests need to create these varied habitat types."

On the mechanical side, the main problem we face is that this method can elicit a lot of distrust from the public, particularly from an environmental protection standpoint. In part, this stems from how decades ago, there were several instances of poorly executed logging where the biggest trees were repeatedly cut. These big trees are really resistant to fire; they are tall, have thick bark, and their crowns are well off the ground. By logging big trees repeatedly for decades, in conjunction with fire suppression, we shifted the character of the forest, harming especially those species that are threatened and endangered. Now, when people see equipment in the woods for mechanical restoration, they think that it is just a euphemism for logging. This is one of the issues with which the Forest Service, in particular, is struggling. We now have many safeguards in place environmentally; on most Forest Service grounds, they generally will cut smaller trees that are most prone to fire while avoiding trees bigger than 30 inches in diameter.

These are some of the struggles that we face, but I want to stress that both methods of restoration can be pretty effective. Mechanical restoration is likely a little more precise—we can cut exactly the trees we want. We could write it out and say, "This is how I want the forest structured," and we could have that plan translated almost perfectly. When we use fire, we can have ideas for how we want to use it, but there is some randomness to the process. We have to be willing to take a little bit of uncertainty. However, mechanical thinning is also not a true replicative of what actually went on in the ecosystem. We could think that we wrote a perfect prescription, but the randomness of fire is exactly what some of these forests need to create these varied habitat types. The reality is that it is not a debate between which of the methods is the better strategy; both are necessary.

BSJ: You have mentioned that landscape-level analyses could potentially inform a prioritization scheme for achieving large-scale forest resilience to fires. How feasible would implementation of this project be, and what are potential complications?

BC: We struggle with doing true landscape treatments and projects now because of our historical use of something called the "stand scale" for forest management. This method looks at specific parts of the forest (between 20 to 50 acres) at a time to determine what each "block" needs. As such, we have not quite put it all together at a large scale to think about how we can manage for different characteristics across the landscape. We need a change in mindset where the landscape is considered a unit instead of individual pieces of land. Yes, they may be differentiated by us into different blocks, but they are connected at an ecological level, and the presence of fire would influence that entire area. I am not exactly sure if we also need better planning tools for forest managers or if we just require this mindset and cultural shift. I know that people are already talking about this shift, and I think it is happening to a certain extent in some areas, such as the Plumas National Forest. We just struggle sometimes with adapting for different constraints on implementation. For example, we might need to consider protecting or not causing a disturbance within certain areas dependent on the species living there. When we start considering all of those different constraints on the landscape, we sometimes force ourselves into blocking it up into these little chunks. Hopefully, that is something we can overcome.

BSJ: In your paper "Impacts of different land management histories on forest change," you state, "While it is clear that climate has a role in [the recent increase of large fires], the role of forest change cannot be ignored." In the media, climate change is frequently presented as the root cause of forest fires, with far less attention attributed to forest change. What are your thoughts on this disparity?

BC: This has been an issue we have been trying to get across, and our efforts lately have been fairly effective since media attention to fire has increased in the last couple of years, particularly in California. Recently, we have had two unique fire seasons. Last year, we had massive amounts of fire all over the state. This year, in Northern California, we mainly had a couple of massive individual fires that included fires down in giant sequoia country—another focus of the media. It has been a good opportunity for us to highlight the impact of forest change.

It is easy to blame the recent fires on climate because things have changed so rapidly. Indeed, the climate has increased the dryness of forests, and the frequency of lightning is perhaps another related issue that has a climate "piece" to it. From a media standpoint, though, just mentioning climate may be the easiest sell because it does not require much accompanying explanation. I am not saying

that these individuals in the media are lazy; it takes time to understand the complexity of this issue, factoring in the varied impacts of fire suppression, logging, and accumulation of fuels. When people go to these forests, they mistakenly assume they are looking at the forests' natural conditions since these forests have always appeared the same to them. It is really difficult for them to gain perspective of what these forests looked like historically. It is a harder message to get across how much forests have changed, but, to a certain extent, I think recent efforts are helping. We are now able to use many different data sources to demonstrate some of this change.

The point is, it is not climate or fuels individually, but both together that are impacting forest fires. We do not have to have an argument about which one is more important; they both have happened, and they both are still happening. It is easier to manage the forest in the short term rather than the climate, although we should have goals to address the latter issue over the next few decades. However, since we do not have this amount of time to wait with regards to the way fires are burning, my argument is that we have to commit to forest management in the near term while at the same time trying to deal with some kind of climate mitigation over the long term. For some folks, the climate piece alone, unfortunately, meets a narrative that they want to tell. There are a lot of factors that come into trying to tell that story properly, but I think we are making headway on getting both the fuels and the climate piece into it.

"The point is, it is not climate or fuels individually, but both together that are impacting forest fires."

BSJ: In January of 2020, you testified in front of the House of Representatives regarding the impact of wildfires on the environment and energy infrastructure. What was this experience like, and what impacts do you hope this hearing has on future policy?

BC: That was a really interesting experience that I was fortunate to be able to have. It was nerve-wracking and a little overwhelming speaking to lawmakers since I was surrounded by people staring at me from stadium-like seating. It was a lot of pressure but a great opportunity to try to get the message out about the role of forest change and the fact that we can actually do something about it with large-scale restorations. I talked a little bit about some of our experiences with doing forest restoration treatments at the university's Blodgett Forest. While some representatives in that subcommittee meeting truly wanted to engage in a conversation, some people were clearly coming at it from a climate standpoint (perhaps to help their constituency) and others were clearly coming at it from the angle that our forest management has been terrible. It was so funny to see that right in front of me. We see it on TV with how politicized everything has been lately. But to see it right in front of your face, about a topic on which you are the expert, and have them telling you their spiel about it was somewhat interesting and funny.

Figure 2: Figure 2a (above) is an area treated for fuel reduction and forest restoration in the early 2000s, which later burned in the 2007 Antelope Complex and again in the 2019 Walker Fire.

Figure 2b (left) is an area that severely burned in the 2000 Storrie Fire. The photograph was taken in 2010 following no forest management for a decade following the fire. Both are sites of active research.

BSJ: What are your thoughts on increasing or resuming the implementation of traditional indigenous burning practices?

BC: The idea of how Native Americans historically managed the landscape has always been intriguing to people. Many like to think that indigenous peoples lived in harmony and peace with nature. Although I am sure that was partly true, these communities actually were actively managing forests with fire as their main tool. People are now referring back to the knowledge of these tribes as a way to scale up our implementation of fire. This is a neat development as it makes some people more willing to use fire. Your average firefighter from the Forest Service saying, "We need to burn this land since it has too much fuel," is not as palatable to people compared to someone with a tribal background saying "Here is how we have used fire historically across our landscape. What do you think about doing a similar burn on your land?" I fully support anything that gets more good fire on the landscape. One of the areas where this is already being demonstrated is up in the Klamath Mountains in Northwest California, where tribes have their own licences to burn as well as great existing partnerships with the Forest Service. It is a neat model that has proven to be highly effective in that area, and it could be expanded with great gains.

REFERENCES

1. *Headshot*: [Photograph of Brandon Collins]. Brandon Collins.
2. *Figure 1*: Collins, B. M., Miller, J. D., & Sapsis, D. B. (2019). A quantitative comparison of forest fires in central and northern California under early (1911–1924) and contemporary (2002–2015) fire suppression. *International Journal of Wildland Fire*, 28, Article 2. https://doi.org/10.1071/WF18137
3. *Figure 2a*: [Photograph of forest burned in Antelope Complex and Walker Fires]. Brandon Collins.
4. *Figure 2b*: [Photograph of forest burned in Storrie Fire]. Brandon Collins.