The Grizzly Beat
Transcript, Dr. Jesse Logan
April 25, 2016

Grizzly Times: This is Louisa Willcox, and welcome to the Grizzly Beat. We're here today with Dr. Jesse Logan, a climate expert, forest ecologist and outdoorsman extraordinaire. Dr. Logan had the insight to predict an unprecedented climate-driven outbreak of mountain pine beetles in Yellowstone whitebark pine forests, which we have witnessed in the last 15 years. Whitebark pine seeds provide a critical food for the Yellowstone grizzly bears. Dr. Logan is here to explain those interesting relationships and his work. Jesse, can you share how you got into research on the grizzly and the white bark pine connection?

Jesse Logan: Sure, I'd be happy to Louisa. About mid-career I was working as a tenured faculty member at Virginia Tech and it was really a great job. I had good support. I loved the university there, but I was really never I guess content would be the word and the reason was I grew up in the West in the Rocky Mountains and I just could not adjust to not living in the Rockies, the wild things we have here.

So when I had a chance to take a job with the Forest Service in Logan, Utah, I really didn't think about it. I accepted in a heartbeat and wound up in the early 90s in Logan, Utah working at the Forest Sciences Lab as project leader on the West-Wide Bark Beetle Project. Soon after I got to Logan, I got a call from a woman Dana Perkins, who was working with Tom Swetnam. out of the Tree Ring Lab at the University of Arizona on whitebark pine, and she was doing a project aging these great ancient old stands. And one thing she found, she was working up in the White Cloud and Sawtooth Mountains was there was a pretty serious mortality then that occurred in the early 1930s, and she thought maybe this was related, maybe this was mountain pine beetle-caused mortalities. So she contacted me and asked if I could come up and take a look and see what I thought.

So, I enlisted the former project leader, Gene Amman and we took a trip down to the Sawtooths to visit some of Dana's site and sure enough we were able to find evidence that this mortality was caused by mountain pine beetle back in the 30s. Simultaneously, I'd been working on a model, a mathematical computer model, relating mountain pine beetle population dynamics to weather and climate essentially for my entire career, not the main focus all that time, but off and on. So I had a good model in hand and thought "wow, what was going on in the early 30s that might have resulted in this mortality?"

It was easy to figure it out. The 1930s, particularly the early 30s, were really hot and dry. I mean, just think of the dust bowl, and in fact the winter of 1932 I think is probably still the warmest winter on record. So, that was a thought, and at about the same time the first IPCC report came out in 1990 with some pretty serious predictions about climate warming, so we had a model in one hand, and we had predictions of what the future might hold in the other, and some interesting science questions relating to this outbreak that occurred in these high elevation forests. So we put that all together and came up with some pretty startling predictions which you alluded to, that there could be real trouble in these high elevation forests, that typically are just too cold for

animals like the mountain pine beetle to make a living. So we started to do these computer simulations and I said, "this is really an interesting project."

And I fell in love with whitebark on the first visit. I grew up in the southern Rockies outside the distribution of whitebark, but these are magnificent ancient forests in amazing places. The combination. So, I really got interested in the problem and this was like early 90s. So I devoted resources to put some sophisticated weather stations up on a place called Railroad Ridge, one of Dana's sites, and it's at that time the beautiful climax whitebark forest at a little over 10,000 feet. And I think the first year we had our weather stations up and going was 1993/94.

I was called back to the Washington office. The then director of the Insect Forest and Disease Research Unit just wanted to know why I was spending all this money for expensive instrumentation working in an ecosystem where mountain pine beetle really didn't occur and it wasn't a problem. I didn't have a really good answer for that. I just said, "Well, I think we got some interesting stuff that might happen." Besides I'd spent the money, so there was not much that could be done.

So we monitored, kept track, got up on Railroad Ridge a couple of times a year to maintain our weather sites and gradually, weather and climate was warming over this period of time. But about ten years later and we really found some interesting things with mountain pine beetle ecology at that time as well. For one thing, we found that there was a resident very low level population typically in whitebark -- and that was really not a known or appreciated.

But anyhow, there was a really hard four wheel drive road to get up on Railroad Ridge, and then in the spring of 2003, we crested over the top and in this beautiful whitebark forest where there had been solid green -- there was no evidence of mountain pine beetle mortality -- all of the sudden there were these brilliant red trees showing up. And mountain pine beetle kills the tree in one summer, the following summer they turn this very obvious red. So there's no mistaking the sign of mountain pine beetle. And my first thought was, "Oh shit man, it's happening."

And sure enough, by 2005 there was significant mortality. In 2006 that system had just about collapsed. This was a widespread phenomenon throughout the distribution of whitebark including the Greater Yellowstone Ecosystem. And really the timing here was very similar. Things started to happen in the Avalanche Peak area around 2003. And in the next four or five years, all across the ecosystem, whitebark was just collapsing. And it's very obvious -- to see these trees turn a brilliant red and fully the needles die, so it's obvious to anyone who's looking.

Anyhow, I was aware and had published our findings when things started to happen, and I was aware of the connection between whitebark pine and grizzly bears. I retired in 2006, moved up to this ecosystem. And so it was really sort of natural when the first delisting by Fish and Wildlife of the Yellowstone grizzlies came down in 2007 that I would become a part of this whole story as it unfolded. And in some respects, it was fortuitous that I retired because I was free to write and express what my thoughts were at the time. And even though I was retired, continued research into this problem in this ecosystem for several years after, so it was kind of an alignment or maybe a mis-alignment of stars, I guess, that really got me into this.

GT: So, the first effort by the federal government to delist or remove federal protections occurred right after you retired, Jesse, in 2007. So, it was interesting timing. The federal government removed protections and you were part of the successful legal effort that restored those protections in 2009 and that legal effort turned on the destruction of a key food source, one of the key food sources, white bark pine. You wrote an important legal affidavit and were key to that legal drama. What was that experience like for you?

JL: Well, first of all it's a lot of work. The current delisting rule is 53 pages of three column 9 point type, so that's a lot to get through. Even without the 473 pages of appendices and the 133-page conservation strategy and then along with all this there were 25 pages of references sited in this work -- and this is complex stuff. It's not trivial information to try and get through. And the comment period is 60 days. This is really a daunting task, so you really have to be focused and dedicated and sometimes it's wearing to work on what is really an unfair playing field with these sorts of time constraints.
So it's a lot of work, but the issue is worth whatever you can do. It's unethical not to respond I think.

Back to the 2007 rule, it was just egregiously flawed with respect to the evaluation of what was going on in whitebark pine. There was a direct statement in that delisting rule that 16 percent of white bark in the Greater Yellowstone Ecosystem had experienced some level of mountain pine beetle mortality. As I said, it's obvious when you look up the high country, even from a distance with binoculars or even without, that something is happening up there. And at that time no one really knew the level of mortality, but it was obvious it was much greater than 16 percent. So, you kind of wonder if these guys ever get mud on their boots. Anyone who had been in the ecosystem and traveled around knew there was something big going on.

So, it was an easy flaw in the delisting to comment on and to document. And as you mentioned I prepared a brief outlining where the failing was -- and it was successful, which in the litigation, the rule was reversed. And that's pretty amazing because as I said before the deck is really stacked in favor of the federal government. When there's a question about an issue like this the court will take the federal scientists' word on the issue unless it's obvious that something's really wrong -- and in this case, it was clear. And our evaluation of the 16 percent eventually was really reinforced by an aerial survey I was involved with, and you helped get together as a matter of fact, that we conducted in 2009.

And we found that more like 95 percent of the whitebark had experienced some level of mortality rather than the 16 percent that was claimed in the delisting rule. The fact of over 50 percent at that time of whitebark had experienced mortality levels that would really impact all of the important ecological services that whitebark provides. Providing an essential food resource for grizzlies is important, but it's only one of the many things that whitebark, as both a foundation and keystone species, provides for this ecosystem.

So, the first response, it was a lot of work, but the bottom line was it ended in successful reversal of that ill-founded decision on the part of Fish and Wildlife.

GT: So Jesse, here we are seven or so years later, and we have another grizzly bear delisting rule out on the streets. And here you are devoting a considerable amount of your time again, reviewing many hundreds of pages of government documents to justify the removal of grizzly bear protections and allow trophy hunting. And so you as a scientist are putting your science brain on the problem -- and what are your thoughts on this time around?

JL: Well, the ecology really hasn't changed, just the political landscape has. As far as hunting, and particularly trophy hunting of grizzlies, I guess I should in the interest of full disclosure, indicate, some of the best times in my life have been spent hunting, but I use or eat everything I kill. And killing is just really a small part of it. But no one is hunting grizzlies to eat them. This is, as you said, this is a trophy hunt being legalized by this action. And killing an animal like a grizzly, the very embodiment of wilderness, of wildness, just to hang the head on a wall or something like that -- to me, it's not ethical, so I have -- that's my personal opinion. But to try and divorce myself from that and be objective about what that means.

This past year, 2015, there were what, close to 60 known fatalities of grizzlies in the ecosystem and so that translates to 70 bears killed out of a population of 700. So, you're removing 10 percent of the population in one year of perhaps the slowest reproducing mammal in North America. That's not, this past year is not an anomaly, and it's part of a trend. The conflict, the numbers of bears that are killed in the ecosystem are on the rise and continue to be. So, I don't think it takes a Ph.D. in population ecology to understand that killing 10 percent of the population in one year is not sustainable.

In my opinion, turning over -- and this occurred with threatened and endangered species protection, it's a federal law, you're in trouble with the feds if you kill a griz, but if you put that in the hands of the states of Wyoming, Idaho and Montana, to varying degrees, antagonistic to the very idea of large carnivores to begin with, I think a lot of those laws are going to be replaced with a wink and a nod: "Oh I was in danger so I shot the bear." "Okay, mate, on you go."

Even with protection, you have this level of mortality that's occurring that's simply not sustainable, And in my opinion, this would be the beginning of a downward spiral leading to extinction or expatriation, however you want to say it. You know it's a pretty simple formula: births minus deaths equals population growth and if deaths are greater than births, which is very slow birth rate as we said, then the population declines. It's that simple. I don't think it's a difficult question. It's morally and scientifically unfounded.

GT: Jesse, back to the whitebark pine issue, perhaps for a minute, you hear from the Forest Service that you used to work for that trees re-grow, and the Forest Service is putting a lot of resources into whitebark pine restoration efforts. There is a disease white pine blister rust that's affecting white bark pine also, that is precipitating a lot of restoration work. What do you think the prospects are for white bark pine to re-grow in the Greater Yellowstone?

JL: Well, disturbance in general, ecological disturbance is a complex issue, and sometimes what's apparent isn't, as in the case of fire. For many years fire was just held as this destructive force. And it became clear after many years of fire suppression that its really an important part of the ecosystem. But you've got to put that in context. And the same issue with whitebark. I think

we need to really think about what's going on. And you're right, nothing lives forever, trees die. No question about that.

But when I try and consider what the situation is with whitebark, I can't help but be discouraged. There are several factors that are impacting that population, first the 88 fires. The 88 fires in Yellowstone burned large areas of whitebark pine. And whitebark reproductive strategy is well-positioned to re-colonize relatively small patchy fires, but these huge areas that burned in 88 in whitebark have not come back. I spent many days skiing in the Clover Mist fire and in the whitebark part of that forest, there's essentially zero regeneration. And in fact if anybody's interested in experiencing checking this out, I'd be happy to take someone in on skiis. Skiing is the best way to travel in these situations because all the downfall and things covered with snow. It's fast travel and convenient.

Anyhow, the 88 fires removed maybe up to 30 percent of the whitebark and that's a lot of that has simply not come back. Then beginning in 2003, as we've mentioned, unprecedented mountain pine beetle activity resulted in over a period of six years, as taking out another 50 percent or so of the remaining trees and impacting 95 percent of the stands -- and that was 2009, so that's been seven years ago. And on top of this is an introduced disease white pine blister rust and that's more insidious really than the bark beetle.

The bark beetle kills the tree or the tree kicks the bark beetle out. It is that simple. But with blister rust, the tree is infected and it may take 20 years and some trees recover, but it may take 20 years before the tree actually dies. But the mode of infection tends to be at the terminal tips of the branches, and that's where the cones are produced, so often in blister rust trees, you'll have a green tree, it looks alive, but reproductively it's dead, it's not producing cones. So we call the bark beetle forest "ghost forests" because when the bark weathers away they turn this kind of ghostly grey. You might call a blister rust infected forest a "zombie forest" because it looks alive, but it's not producing cones.

So we have three things that have happened over a really short period of time: the '88 fires, the unprecedented bark beetle outbreak that started in 2003 and is continuing, and this increasing level of blister rust infection. And you mention the Forest Service is going to great amount of cost and effort to produce blister rust resistance seed stock, but in this ecosystem, whitebark takes about 50 years before it even starts producing cones.

So, even if you could replant a forest and on the scale that we're talking about, mortality that's occurred here, in the most rugged, the most remote part of the ecosystem -- even if you could do that, it's going to be 50 years before you start to reap the benefits as far as the grizzly is concerned. So in the short term, the impact is not recoverable. We have lost that component. That important component of the ecosystem that was providing the most critical food for bears in the system.

In the long run, I think it really is necessary to adopt a strategic approach. It appears to me that a lot of what's being done is simply re-planning blister rust resistant trees in places where whitebarks already had serious problems and the expectation is in the future, that these places are not going to be suitable habitat for whitebark. So we need to think strategically. There are places,

and there are, where maybe there is a future for whitebark in the long term in this ecosystem and that's at tree line and above tree line. So I think there's some really important research questions to address is how to use these blister rust resistant trees in a way that Clarks nutcrackers who plants the whitebark will help disperse them and reestablish these forests in places where they may have a future at high elevations where climates still is more resilient to climate change.

And blister rust is only one of the problems. I mentioned that there's also important work to be done that finding trees that are more resistant to beetles and select for resin response that will help the tree defend itself. There's no reason to expect trees that are resistant to blister rust are also going to be resistant to beetles or vice versa. These are probably pretty independent. And then I think it's really a valuable thing to try and better understand the establishment of whitebark at tree line and above tree line. So there's research that can be done. There are strategic approaches we can think about but these are long-term responses.

The thing that is the impacting the disturbance that's impacting grizzlies and will in surely my lifetime, are not going to be recovered. They're lost.

GT: This is Louisa Willcox with the Grizzly Beat. Next week you can listen to the second part of the interview with Dr. Jesse Logan, when he talks about how the mountain pine beetle, the size of a grain of rice, shapes the whole ecosystem that grizzly bears and other species live in, more about his fascinating career studying climate change during the hostile Bush years, and how wilderness has shaped who he is.