

Stafford Lehr:

Slide 1

Thank you, everybody. It's a pleasure and an honor to be here this morning and I'd just like to say, this first slide is actually a little bit mislabeled. The drought in California was not officially declared over until 2017, but I think the information presented here is cumulative and while this is in-stream flow related to fisheries and aquatic life. What we found with the drought in California, was it touched all facets of society.

Our response had to be very broad and from basically all points of the compass. There were some things that we had a distinct advantage, that was provided to CA state agencies. There was a political will to do something in a very rapid timeframe and provide financial resources and legal tools to do so. Understanding, maybe not every state would have these type of tools, it really enabled us to respond very quickly, rapidly across the entire spectrum of the ecosystem and in the society of California.

Slides 2-4

So, you all have seen these maps, what was a progression of drought across the United States. And this is from the US drought monitor, and as we start to hone in on California things become more and more intense.

And as you can see here at the peak of the drought in September of 2015, majority of California was listed as exceptional drought. The highest category given. This was a beginning tidal wave impacts, the drought actually started in two 2012 but it really didn't hit it home with the politicians until about 2014.

That was when the reservoirs, without receiving the snow-melt runoff were beginning to become depleted. We hadn't had any rain by February, our rainy season is November through pretty much the end of March. This period is when we get our most intense storms that build up the Sierra snowpack which is our giant storage sponge for California.

Slide 5

Beginning in January 2014, the alarm bells were starting to go off in the political hallways, and it was like, "Wow, we're in trouble." One of the first tools that was provided to us, was the governor declaring a state of emergency. What was unique about it was, the official recognition of wildlife and protection of threatened and endangered species was listed as one of the actions that needed to be mitigated for, in response to drought.

Never before had the Department of Fish and Wildlife ever been named in an emergency declaration. So, the governor convened a drought task force and that was basically representatives of virtually every state agency, we convened weekly and met in the governor's office. We talked about everything from where communities' wells were going dry, to, "Oh my gosh, we've got fish, the streams are drying up, and we need to go do something about them."

So, we also activated our state emergency operation center. I was tasked to that center on a daily basis for about five days, but incident command systems respond great to earthquakes, fires, tornadoes and things like that. They had no clue on how to respond to drought. It was like a slowly moving glacier and there are like, "All right, let's get all the fire trucks rolling, get all the cops going."

It's drought, you don't work that way. So that was part of it but as I said, this was our first tool that we got was a declaration of emergency. Then we had basically face to face meetings with the highest elected officials on a weekly basis, and then thirdly was we had significant money that started to flow. We passed an emergency budget act and these numbers represent the total amount of money that was spent over the three years and the continuous appropriation.

The state allocated a large chunk of money, \$3.7 billion. Our department received \$65.5 million in direct emergency funds over three years. And I've got an ongoing appropriation of \$2.6 million to continue some of the really cool stuff that we started to do and dealing with ongoing issues that finally resonated with the leadership in the state after we'd been crying poor mouth, for about 20 years.

Slides 6 and 7

We started to see all these facets of California starting to suffer. And one indicator was wildfires, our wildfires over a five-year average had increased by 50% and in one year they increased over 40%. The number of acreage, huge increase in acreage. Basically, the state was almost all on fire at one point and then drought then began to manifest itself over towards the end of the three years in what it was doing to California's forests.

At the end of 2016 based upon US Forest Service surveys and Cal Fire surveys, we had over 60 million dead trees in the Sierras, Nevada. And this is just one example all that brown, is dead. And as you know due to drought, trees produce less sap, in come the bark boring bills, bang! they kill the tree, they move on. So, it's just this tidal wave effect across the Sierras. This is most pronounced in the southern Sierras and less and progressing northward less so.

Slide 8

In California as Mark Twain said, "Whisky is for drinking, water is for fighting." And we finally had to come together and figure out how we could operate better. We convened a real-time drought operations team because we had real-time issues dealing with temperature and water quality mandates. This team met, sometimes daily. But at best weekly and they began to discuss how we were going to release water from reservoirs, think of California's Central Valley as a giant bowl and we have rim dams all around the edges of the bowl and they store the water. And as the water was not the best quality for cold water fishes ... they were already low on water, so we didn't have massive cold water pools.

So, our cold water pools, the area that we would release water for keeping salmon and steelhead and other fishes in good condition, was severely depleted. We had to figure out how we were going to draw from the right area, the right reservoirs, trying to get the water at the best time to get it down for the most sensitive life stages of the species.

The California Delta has water quality mandates. There's salinity, there's turbidity, there's all sorts of stuff that goes into trying to protect native fishes in the Delta and provide water to 39 million people. And that's the top of pie of the split when everybody is suffering. We had water rights issues, we had senior water rights versus junior water rights. Who is going to win in this battle?

Everybody had to give up, everybody must suffer. Thankfully the governor and the administration and the legislators said, "Fish are not going to be forgotten about here." So, we had almost equal standing at the table. FERC Licenses. You know I'll just say this, without the in-stream flow counsel, FERC hydropower re-licensing in California would not be where it is at.

We had licenses in place that dealt with basically five-year water types. From extremely to critically dry to above normal. Except, we based our critically dry on 1976, 1977. This drought broke that, and we had to actually go back in to some of the FERC licenses and work with the licensee and FERC and our state water resource control board, to actually create a sixth category. I'll just call it extreme critical.

We had agency stakeholder collaboration, basically all getting together around the table saying, "You know what? We all are really suffering, we've got to figure it out, everybody can take a little bit less." We had innovation, we began to work with water rights and with the National Marine Fisheries Service, NOAA. We've got a lot of endangered species, endangered fish in California both co-listed federally in state.

What we were finding was some of our most critical streams for some of the most sensitive listed fishes, the senior water right holder or a riparian water right holder, they are like, "I got the right to take that water." So, what we decided to do was go in and say, "Look, can we give you some regulatory assurance? Can we enter into a voluntary agreement with you, that will let you take a little more water during when during the wetter part of the year and then you forego your diversion during the driest part of the year? In exchange for that, we're not going to come after you under Endangered Species Act."

And lo and behold, a lot of them agreed. They got a regulatory assurance, they agreed to forgo some of their diversion during the most critical time of the year and we didn't go after them for potential take when they were diverting during the wetter part of those seasons. We also agreed to work with small diverters, letting them set a minimum flow that they were at maximum diversion rate 10 GPM and we'd allow them to divert during the highest runoff period, store water. But then they agreed in writing, to not divert during the summer-time.

Slide 9

So, these are the examples of the impacts that we faced across the state, we had flow changes, temperature, water quality, we had fish stranding captures, we had disease outbreaks with wildlife. Avian color or botulism, ich, and we had columnaris. We just had everything coming down at us at once across the entire spectrum.

We had wildlife encounters, the City of Bakersfield, we had bears in downtown Bakersfield and we had 24 incidents within a four-week period. Of bears moving out of the wildland urban interface, down into the urban area ... And you know a bear in a schoolyard doesn't go well. We had mortality and critters dying drought, just natural selection basically. They just couldn't make it.

Slide 10

So, we began a whole suite of activities, we lead fish rescues, we did wildlife relocation, we closed fisheries, we really spooled up hatchery management because poor water quality really affected hatcheries, both anadromous and recreational trout hatcheries. Our enforcement staff keyed in on illegal diversions namely centered around cannabis cultivation, we had water quality impacts with pollution events and we had just a boatload of wildlife encounters.

We had drought contingency planning on our land system, we own about 750 properties well over a million plus acres. And we have water management on those properties. So, we needed to spool up, how do we do better, be more efficient to get the water in the right place at the right time for the right species?

We basically fallowed acreage, we said, "You know what? Those waterfowl areas we're not going to flood them up, we're going to conserve our most resilient wetlands because those are where we need to just keep those habitats breathing and alive." The voluntary drought initiative, I spoke of that. Where we and the federal government worked with water right holders and property owners to forgo, we got them regulatory assurance under the Endangered Species Act both state and federal, and as I said we worked with small domestic diversions.

Slide 11

So, from the hatchery perspective, at least with the anadromous fishes, [Winter and Spring run Chinook salmon], they are very iconic races of salmon in the Central Valley, Winter run is a species in the spotlight with the National Marine Fisheries Service. It was listed in the 80's, early 90's and it's at critically low production. And right now, it dropped down to really extreme levels.

We increased the smolt production, we increased the temperature monitoring and then we began a re-introduction plan to an additional watershed in the north part of the valley. And then we began to look at barrier remediation on a couple of creeks. On the Klamath River, the Klamath River suffered an extreme disease event in early 2000's, and so we were concerned that we were going to have another disease outbreak in the Klamath.

Slide 12

We reconvened the fish health assessment team, we basically set up a joint incident command structure with the tribes and states, we began joint monitoring with the tribes. Working with the Bureau of Reclamation there were three flow augmentation events were created to get water downstream to basically cool the system down, push out anything that was going on, and we had two of those in the Trinity River and one in the main stem near a facility called Iron Gate.

Slide 13

From the fish rescue standpoint, we had 812 rescues, we rescued over 52 different species, 51 species in 52 different watersheds and over a quarter million fish were rescued. So, what did we do with the rescued fish? Well, first we set up a tiered process we began to evaluate the systems of most critical need, we used some metrics and indicators, we got to a threshold, we said we need to go and rescue those critters.

Slides 14-16

The most extreme case was, bring them into captivity. Well, we couldn't do this with the traditional hatchery system. So, we ended up purchasing these unique ... Basically turnkey systems. These were self-contained systems that basically had filtration and chillers all in one. We rewired, re-plumbed facilities, and we began to deploy these throughout the state. And this is an example of one in a situation where we collected virtually every individual of the McCloud River redband trout, we brought them into captivity.

Well, when you bring a wild fish into captivity, all sorts of stuff go on. These are not domesticated cows and so we ended up having to deal with predation, we ended up having to separate the different age classes, what do you feed them? Well, our hatchery staff went around set up bug zappers, and we started collecting bugs in the hatchery buildings to feed the fish until we could transition them onto Purina trout chow or, whatever they feed them.

Slide 17

So, this is an example of the facilities that we installed in multiple points across the state, this is a more extreme example dealing with Coho Salmon. This is actually an Army Corps facility, but this facility became very critical at the peak of the drought.

Slide 18

We talked about fishery closures, are you willing to shut down a recreational fishery to protect the species most at risk? Yes, we shut down four of them and basically at great

expense to the local economy and then we also worked on protecting the anadromous species by closing the fishery. We went to the Pacific Fisheries Management Council for additional restrictions in the ocean fishery and inland to protect the winter run chinook.

Slide 19

Well, here's probably the biggest thing that ... Eyes wide open, if we were to release these fish into the Sacramento San Joaquin system in the Delta, they would have cooked. So, we trucked the fish. Well, there was a there was a price to pay and these fish when they returned three years later they strayed all over the place. And so, oh well, we had to do something they were going to be dead anyways.

We evacuated four of our hatcheries, basically water too warm, poor water quality, we installed chillers and filtration at one facility, we basically put in place plans to put chillers and filtration at three of our anadromous facilities. This is not a cheap date, these are big facilities, they're very expensive. And then at the peak of the drought I had whirling disease break out at three of my trout hatcheries.

Slides 20-21

These are just some examples of tracking the fish, basically pull them down to a location, thank you very much to Idaho Fish and Game for loaning us one of their big semi trailers to help with this operation. Basically, it was fleet. I had that Fed Ex call me up and say, "How can we help?" Well, it was kind of specialized trucks needed." But it was kind of cool, what is that slogan they used to have? We were able to joke on our floor, anyways, this is just more of that operation.

Slides 22-23

When I talked about chillers and filtration at a facility, this is a \$3.5 million improvement to this trout hatchery here. This became absolutely critical in the peak of the drought, this is just an example of the retrofit of the equipment we've put in place.

Slide 24

These here are UV filters and large mass drum filters.

Slide 25

Our law enforcement division responded across multiple fronts. We had our legal water diversions, we had fishery closures that they needed to enforce, and as I mentioned we had a lot of human wildlife conflicts.

Slides 26-27

This is what was going on in these small coastal streams, and this is in the heart of the emerald triangle. What they would do, was they would create these little diversion dams and it would totally dry up the stream. Our enforcement teams would go in there, I cannot tell you how many miles of black pipe, but we removed over 1500 of these of the illegal diversion dams and they were in the most sensitive watersheds. This is just another example of this when you can actually see some water on the right side upstream of it, bone dry below it.

Slide 28

Our wildlife drought response, we basically ended up having to do captive breeding programs for some of the most sensitive animals. One little critter called an Armargosa vole. It was a wetland dependent mammal and it was already critically endangered, we brought that thing into captivity working collaboratively with the University of California Davis. And we ended up having a breeding program and then we were eventually able to get these things back out in the wild.

We had increased wildlife encounters as I mentioned. And I'm telling you we had lions in places that you wouldn't expect, we had more coyote problems, we had more bear problems, wildlife was going to grandma's rose garden instead of where it was supposed to be.

Slide 29

We began to build resilience and durability on our refugees. We had 37 water infrastructure projects, we had coordinated water operations, just to be able to keep water in the right place, at the right time, for the right critters.

So, this is an example of what we did with some of the funding, basically we have a lot of wells on our properties and they're very inefficient. So, we used this money to put in increased efficiency pumps, we implemented using solar. So that we could just upgrade across the board many of these facilities

Slide 30

Human wildlife conflict, we had critters appearing everywhere. So, we geographically pre-positioned equipment, we had prioritization, we developed a 24 hour response network, and we improved support facilities. What do you do with a bear when you can't take them back to where he was supposed to be because he's just going to come back and feed on a trash can?

Slides 31-32

We had lions in places where they weren't supposed to be, we had bears that we had to get back in and deal with Human wildlife conflict, we had critters appearing everywhere. So, we geographically pre-positioned equipment, we had prioritization, we developed a 24 hour response network, and we improved support facilities. What do you do with a bear when you can't take them back to where he was supposed to be because he's just going to come back and feed on a trash can?

Slides 31-32

We had lions in places where they weren't supposed to be, we had bears that we had to get back in and deal with

Slide 33

In sum, there was a lot of successful tools that we were able to implement. We basically built partnerships with private landowners and NGOs, we worked on building resiliency into our hatchery networks and on our lands, we prepared for disease and human wildlife conflict, and then we spooled up a major law enforcement response, and it actually resonated to build a conservation facility. That's a big ticket item about \$90 plus million. At least we have people listening but that resources haven't come yet.

Slide 34

With that, this is the way it's supposed to look. Anyways, thank you very much. I really appreciate it and look forward to questions at the panel discussion.