ROLL CALL

Lieutenant Collins  
Supervisor Connelly  
Supervisor Conant  
Secretary Crowfoot  
Deputy Director Curry  
Supervisor Fuhrer  
Assemblyman Gallagher  
Captain Million  
Director Nemeth  
Senator Nielsen  
Councilmember Pittman  
Superintendent Teague  
Genoa Widener

ALSO PRESENT:

Nick Saffold, Kearns & West

PRESENTERS:

Sharon K. Tapia, P.E., PMP  
David Sarkisian, P.E., CEG  
Dr. Rune Storesund, P.E., GE  
Eric Halpin, P.E.
AGENDA

Item 1: Welcome and Introductions
Item 2: Action Items & Roadmaps
Item 3: Dam Safety Program: Regulatory Perspective
Item 4: Dam Safety Program: Public Safety Perspective
Item 5: Risk Assessment
Item 6: Spillway Cameras
Item 7: Public Comment
Item 8: Adjourn

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NICK SAFFOLD: Good morning, everyone. We're going to get started. I'm Nick Saffold with Kearns & West. I'm going to be helping support today's meeting. In just a minute, I'm going to turn it over to Secretary Crowfoot. But I just wanted to run through a few instructions and then do a quick Roll Call.

Today's meeting is being held in a virtual format in accordance with California Executive Orders to protect public health during Covid 19. There's going to be time for public comment and questions following today's presentation.

Today's meeting is being conducted over a Zoom webinar and it's being recorded. The complete virtual meeting guide with these instructions can be found on the Citizens Advisory webpage. If this resource does not address your issues, our colleague, Eva Spiegel, is available during the meeting to help you troubleshoot. You can reach Eva at 530-400-9608. You can also ask technical questions by clicking on the icon on the bottom of your screen and submitting a question.

The Commissioners as well as the experts presenting today will be able in "Presenter" mode, and Commissioners will be able to mute and un-mute themselves to ask comments and make questions, ask questions. Members of the public will be
muted and in listen-only mode until we reach the public
comment period.

And now I'm just going to describe a few of the ways
that you can make public comment over the Zoom platform.
There's two ways that you can ask a question. You can raise
your hand on the Zoom platform within that icon, which should
be located at the bottom of your screen. If you do that, the
Webinar Host, Justin, will call on you and un-mute you so you
can speak. And then, if you wish to submit a written question
or comment to be read for you, you may click on the "Q&A" icon
at any point during the meeting. That icon can also be
helpful for any kind of troubleshooting. If you're
participating by phone instead of Zoom, you just need to press
"#2" to raise your hand to speak during the Public Comment
period. You also may have to un-mute your phone manually, so
just be mindful of that. And then each speaker will have
about three minutes, and your time should be shown on a timer
on the screen.

Again, this meeting is being recorded and a transcript
will be posted at a later date on the Citizens Advisory
Commission webpage.

So now I'm just going to do a quick roll call, so,
Commissioners, if you wouldn't mind just un-muting yourselves,
and then when I call on you, say "here" or "present."

Lieutenant Collins, are you with us?
LIEUTENANT COLLINS: Here.

NICK SAFFOLD: Supervisor Connelly?

SUPERVISOR CONNELLY: Here.

NICK SAFFOLD: Supervisor Conant?

SUPERVISOR CONANT: Present.

NICK SAFFOLD: Secretary Crowfoot?

SECRETARY CROWFOOT: Here.

NICK SAFFOLD: Deputy Director Curry?

DEPUTY DIRECTOR CURRY: Here.

NICK SAFFOLD: Supervisor Flores? Supervisor Flores, are you with us?

Supervisor Fuhrer?

SUPERVISOR FUHRER: Here.

NICK SAFFOLD: Assemblyman Gallagher?

Supervisor Kimmelshue? Supervisor Kimmelshue, are you with us?

Deputy Licon? Deputy, are you with us?

Captain Million, are you here?

CAPTAIN MILLION: Here.

NICK SAFFOLD: Director Nemeth?

DIRECTOR NEMETH: Here.

NICK SAFFOLD: Senator Nielsen?

Councilmember Pittman? Councilmember, are you with us?

Mayor Reynolds?
Lieutenant Stokes, are you with us?

Superintendent Teague?

SUPERINTENDENT TEAGUE: Here.

NICK SAFFOLD: Supervisor Vasquez? Supervisor, are you with us?

And Genoa Widener?

GENOA WIDENER: Here.

NICK SAFFOLD: Thank you. A few folks might be joining late, but we'll keep rolling here. Is there anyone that I missed? Or anyone that is off mute?

COUNCILMEMBER PITTMAN: I'm here; Pittman.

NICK SAFFOLD: Councilmember Pittman, thank you.

Okay, great.

James, we can go to the next slide, please. Great.

Secretary, I'm going to turn it over to you now.

SECRETARY CROWFOOT: Great. Well, thanks, everyone, for joining what is our seventh Meeting of this Commission. As always, thanks for taking the time from your busy days to participate. We're, obviously, meeting virtually once again for this meeting, but given where we're at as it relates to returning toward normal life, I am confident that we'll be back in person meeting as a Commission up in Oroville later this year.

We have two-and-a-half hours for today's discussion, so we'll conclude by 12:30. We've got a good, packed agenda
today. We'll get a quick update on Commission Meeting, the 
Roadmap for Commission Meetings from here, and specifically 
our Action Item Tracker, which was a suggestion made in a 
previous Council Meeting -- or Commission Meeting to actually 
track the actions that we're discussing in these meetings to 
ensure that they happen.

We have a series of Dam Safety Program presentations 
from DWR. Importantly, we'll also hear a presentation on Risk 
Assessment, one from Dr. Rune Storesund, who was a 
Comprehensive Needs Assessment Ad Hoc community group member; 
and one from Eric Halpin, Consulting Engineer, who spent most 
of his career with the U.S. Army Corps of Engineers in the 
Risk Management Program at the Army Corps prior to going into 
private consulting. So both Rune and Eric will have an 
opportunity to provide their separate independent perspectives 
from Department of Water Resources. We'll have an opportunity 
to ask questions as well.

And then we'll discuss the status of the Spillway 
cameras. We heard loud and clear from Assemblymember 
Gallagher around the concern of taking out those temporary 
cameras. So I think DWR is going to share some good news on 
that front.

Lastly, we'll have Public Comment.

Before we get into the agenda, I think it's helpful 
for me to see if Karla Nemeth, who, of course, directs our
Department of Water Resources, has since joined the meeting to give an update on drought and what it actually means for Oroville.

DIRECTOR NEMETH: Thank you, Secretary, and I'll be brief. It's good to see all the Commissioners and the public. This is just a really important public touchstone for the Department. And, certainly, we're all experiencing the drought, and I wanted to give you all just a brief update of where lake levels sit at Oroville, what we project for the summer. We do have a community electronic newsletter that goes out periodically so you can get more information there or, certainly, reach out to my office.

As you all are probably well aware, it has been the driest two years in the Feather Watershed since the mid-1970s, so we are drier than 2014/2015 in this part of the state. Right now, the Oroville sits at just below 50 percent of average for this time of year. Right now, total releases out of Oroville are about 1800 cubic feet per second, and we are really managing those releases to do a couple of things. One is to meet water quality regulations downstream and the other is to make sure that we are getting enough water in the river for fisheries management. We are keeping the low-flow channel above 600 cubic feet per second. That's really important for salmon and steelhead. So there's regular coordination happening between DWR, the Department of Fish and Wildlife and
federal biologist about how to best manage those things.

For our Feather River Settlement Contractors, the rice
growers up here, they are at 50 percent of their contracted
amount, which is what happens when we get into these
critically dry conditions. We are not exporting water from
the bank’s pumping plant to customers in the Central Valley or
Southern California. All that export water is coming from
water that’s currently stored in San Luis Reservoir that was
stored there over the last couple of years, with the one
exception, there is a small amount of pumping that feeds parts
of the Bay Area, but that’s how we will continue to operate
throughout the summer. We are working with the Water
Resources Control Board about how to balance carryover storage
in Oroville, so how much we keep in Oroville as a hedge
against a dry year next year, as a need to deal with
endangered species issues and water quality conditions down in
the Delta. So this is a year when the State Water Contractors
are relying on stored supplies to meet their water needs
because it is so dry.

Lastly, I’ll close on lake level, because I know
that’s really important to community members up here,
recreation. So essentially where we are this year, of course,
is low, low, low. We do believe that as the lake level
continues to drop, it is going to start to impact some of our
boat launch facilities between Memorial Day and the Fourth Of
July holiday, particularly, at Lime Saddle and at the spillway and then at Loafer Point. The Bidwell Canyons, we've got a stage-three boat launch and we anticipate those to remain open through early July. Typically, what we do when we get these really dry conditions is an opportunity for the Department to extend boat launch deeper into the fluctuation zone of the reservoir. Obviously, you can't construct when you're under water. But this is an opportunity for us to build facilities that enable those boat launch ramps to be functional even during drought periods. And that's what we'll be looking at this fall and winter, particularly, if it remains dry. And I would say all of this is a way in which the Department is looking to maintain all the benefits of this facility, particularly the important recreation benefits to this community, even as we have a deeper fluctuation, if you will, given the pressures of climate change. So, you know, the flood management, which I think we'll probably hear a little bit more about flood and dam safety, but, also, when it's very dry, you know, what are the things we can be doing to maintain recreation benefits when the lake level drops so low?

I'll stop there. Thank you for indulging me, Secretary. Perhaps, I'll just say I do need to step out at 11:15 to handle some drought issues. Chief Deputy Director Cindy Messer is here, and she will represent the Department here on the dais. So thank you.
SECRETARY CROWFOOT: Thanks so much, Karla.

Matt Teague, I'm not sure if you are on the line?

Yes, you are. I wanted to ask you if you had any other discussion -- anything you wanted to add? You lead the State recreation area at the lake, around the lake. Anything you want to add on the impact of drought and recreation that you want to share publicly here.

SUPERINTENDENT TEAGUE: I think Director Nemeth hit most of the topics when it comes to the developed boat ramps. A topic in the news and the media that most people have probably seen is the houseboat removals. And we have been working with boats and the marinas and the new owners there in removing the necessary houseboats to accommodate the capacity that is appropriate for these projected lows.

As hard as it is on these houseboat owners, the process has actually gone somewhat smooth based on the volunteer process that the marina came up with. So they have removed the houseboats at this time. They are staged in most of the parking lot areas that we have up at the stage one facilities, and they will continue to be housed there until we look at a better rainfall of a situation in the watershed.

SECRETARY CROWFOOT: Great. Just because drought is, obviously, top of a lot of people's mind, I want to make sure, I want to see if any Councilmembers have any questions of Karla or Matt in terms of how the reservoir is being operated
or its impact on the local community. Okay, then. Moving on, I'll just -- Sorry; Captain?

CAPTAIN MILLION: Thank you. The only question I have is talking about, like, the recreational that's come up in question in our agency because we have three lakes -- or four lakes; King Collins, Boars(phonetic), portion of Englebright and Camp Far West. We're seeing a pretty significant influence, especially with Folsom limiting to five mile per hour. Didn't know if some of the public facilities were going to be potentially closed in the future? Because, obviously, that is going to have a residual trickle down effects to the surrounding communities and lakes, and, obviously, that's going to increase our influx of boaters and recreational use and could have an impact on our ability to provide, you know, how much more public safety, where is it going to go to. I don't know if that's been considered or not?

SECRETARY CROWFOOT: Matt, do you want to take that?

SUPERINTENDENT TEAGUE: Yeah, as Director Nemeth said, we're looking at the beginning of July sometime where we're going to basically lose most or all of our developed concrete boat launch facilities. So the discussions have been taking place where we're looking at other lakes in the area that have higher levels and facilities in the water. We're assuming there is going to be increased visitation going to those reservoirs.
SECRETARY CROWFOOT: Your point is there just won't be ways to access the lake, but not that the lake is going to close, per se?

SUPERINTENDENT TEAGUE: Well, we do -- I'll let DWR speak to this, but we do -- there are a couple of primitive facilities that are four-wheel drive only that the public can't access the lake. But, yes, it becomes very limited at Lake Oroville for boating access.

SECRETARY CROWFOOT: Got it. Assemblymember, thanks for doing double duty. I know you just got out of a legislative hearing, and you're actually probably -- looks like you're outside? Welcome. Looks like you have a question or comment?

ASSEMBLYMAN GALLAGHER: Yeah, I realize I kind of missed the beginning here. I just stepped off the floor, and I'm going to try and be in and out here as I can.

Obviously, the important work that we're doing here with the Commission continues, and I just -- you know, as an introductory statement, I just want to say I'm, you know, looking forward to the presentation today. I have looked at Rune's report and I think he raises some very important issues that we should be looking further into and seeing how we can implement those things. And there's some recommendations that I think we should pay very close attention to, you know, not just today, but through our future work. So I wanted to
outline that.

    I realize we're in a very tough situation right now when it comes to the drought and this very dry season. A lot of things that people didn't anticipate have come to transpire. I mean, maybe just one quick question to Karla, or whoever can answer, you know, I get this question a lot is why is it that, you know, a lot of our northern reservoirs seem to be at their lowest point ever historically but, you know, people look at maps and they see that the Southern California reservoirs are, you know, full? What is the reason for that and can there be some explanation as to why that might be the case?

    SECRETARY CROWFOOT: Great question.

    I'll just mention Senator Nielsen is also in a legislative hearing and he's also going to join when he's out of that.

    Over to Karla.

    DIRECTOR NEMETH: Thanks, Assemblymember, for bringing that question. So what's happening in our system today, as I think a lot of folks are aware, most of our storage is in the form of snowpack. And as few as six weeks ago, we had about 70 percent snowpack on average across the Sierra. Although, the Feather Watershed, I will say, was particularly dry this year.

    But what happened in those intervening weeks was
record temperatures and very dry soils from the preceding dry
year, and I think what we're really seeing is this steady
increase in ambient air temperature which is really drying out
the soils. So within that six-week period, we went from
70 percent snowpack to two percent snowpack. I think it's
actually down to zero as of last night, and very little
runoff. So that's the key, is we had the snowpack, it melted,
and it seeped into the ground because of the dry soils, but
also evaporated because of the warm temperatures. And so,
that has been a game changer for us. We've never seen that
kind of rapid snow melt in California before, particularly
during the month of April. So we are making adjustments to
our forecasting models so that we can understand that better.

As it relates to Southern California, so, certainly,
reservoirs in Southern California, they're capturing rainfall.
And it hasn't actually been as dry this year in Southern
California in terms of precipitation. But they do use those
local reservoirs to store water that they move when it's wet.
So water that's now in Southern California reservoirs is water
that was moved in 2017 and 2018. So, Assemblyman, probably,
from -- you may have missed my opening comments.

Last year and this year, we did not meet State Water
Contractor water supply needs out of Oroville. All the water
that DWR supplied to those contractors was from water that had
been stored in San Luis from 2017 and 2018. They take that
water and they move it down to their local reservoirs and they
store it there. That's really important, because in a year
like this one, the water that we have in Oroville is needed to
meet our Feather River settlement contractors, which are the
local rice growers, but also needed to meet fishery needs and
water quality needs elsewhere within our system.

So that's how the system is working, but that is
essentially why you see this -- you see this depletion of
reservoirs in the northern part of the state, very dry,
historic snow melts acceleration and historic low runoff into
the reservoirs, and that's what's creating this scenario.

SECRETARY CROWFOOT: Thanks so much, Karla.

Supervisor?

SUPERVISOR CONNELLY: I have two comments. One is in
past history, before dams, the environment caused droughts to
occur and fish suffered. It seems like we're so worried about
keeping the Delta flushed out and helping the fish that we're
throwing all our local recreation under the bus, and I think
there should be more compromise on that and ability to hold
water for recreational use. It's having a huge impact on us.

The second thing is, I have a question. I have
houseboat people that, you know, put their family savings into
their houseboat and is a way to recreate with their families,
and they cannot afford to remove their houseboat nor store it.
Is there some way to give them assistance? We're talking
working families here that are contacting me and they don't know -- they may have to sell their boat or do something.

SECRETARY CROWFOOT: Thanks, Supervisor. I'll just take the first question, which is, you know, thank you for emphasizing just how important the recreation is and how much of a blow it is when residents can't actually use that. I think we take that really seriously.

Karla mentioned, you know, all of the operational changes that are being made for the State Water Project. Most importantly, from my perspective, with the State Water Project, we have to actually allow enough water to flow down the rivers into the Delta to protect that drinking water source from being fouled with salt water. If we lose control of that salinity protection, we'll lose drinking water for upwards of 27 million Californians, two-thirds of Californians.

So I don't think we consider an either/or, and we do want to understand how we can limit impacts on recreation. But I can't stress enough how important it is the decisions that Director Nemeth and DWR are making right now to protect the water supply for upwards of two-thirds of California.

On the question of houseboats and for families that are in a really bad way actually having to take their houseboats out, Superintendent Teague, Matt, thoughts on that or turn it over to anybody from DWR?
SUPERINTENDENT TEAGUE: I would like to start off and say that we definitely sympathize for not only the houseboat owners, but, also, the private business owner of the marinas.

We also recognize that with all the incidents that have happened here at the lake and over the years, houseboat owners have been cut off from access to their boats. You know, the last drought where we had to remove houseboats and the marina had to remove houseboats to satisfy the capacity needs. The spillway incident, the Camp Fire, the recent North Complex fire, and even COVID-19, when we had park closures, and trouble for houseboat owners to access. So it has really been quite an impactful five or six years for these folks, and we do sympathize for that.

The reality is, is that with these drought conditions we've never seen before and these extreme lows, we have to look at the reality that future capacity of the number and quantity of houseboats that are out there, it's, you know, it is somewhat unrealistic. So we're working through that to try to manage with the concession owner of what is that realistic number to try to avoid these unforeseen conditions and these unfortunate conditions for these recreation houseboat owners.

SECRETARY CROWFOOT: Thank you. Turning over to Supervisor Conant.

SUPERVISOR CONANT: Yeah, very quick. Karla answered some of the questions that I had. But one last question is
what is, if any, inflow presently into the reservoir?

DIRECTOR NEMETH: Ted Craddock, I think you're on the line. Do you have that information?

MR. CRADDICK: Karla, I'll ask John Leahigh, who is on the line, to maybe speak more specifically to inflow and outflow currently. John, can you answer that question?

JOHN LEAHIGH: Yes, yes, I can, if I can find the mute button here.

Currently, the inflows are just a little less 2,000 CFS coming into the lake, so that's -- you know, that's extremely low for this time of year, as Karla had mentioned earlier. The efficiency of the snowpack was only 20 percent. We only saw 20 percent of the water content of the snowpack actually come into the lake this year, which was something really unheard of. We've never seen that sort of low efficiency on the inflow from snowpack.

SECRETARY CROWFOOT: Thanks, John. I want to move us along. I have one more just update, which is the Legislature and the Governor are considering next year's state budget, and I want to update on the Governor's May Revision Proposal.

So the Governor typically introduces a budget in January, the Legislature considers it and passes the budget by June. Every May, the Governor's office sends a revision of its proposed budget. Typically, it's tweaking around the edges based on how revenues came in. Well, as a result of
very strong economic recovery as well as federal stimulus, we have significant one-time funding. So the Governor proposed actually five billion dollars of funding to build the State's water resilience, both our drought resilience and our flood resilience. And so, there are some -- from our perspective, anyways, in the Governor's administration -- some really important investments including more funding for the Forecast Informed Reservoir Operations that we've talked about in the past in an effort to really, you know, finish that process for Oroville.

There is a specific proposal that I want to just ask Ted to briefly overview because it addresses Oroville, and it would be a proposed 200-million-dollar investment in some improvements that would allow for more power generation out of the Hyatt Powerplant.

So, Ted, don't take us too deep in there, but I just want people to be aware of what was proposed.

MR. CRADDICK: Yeah, sure will. Thank you, Secretary.

So as you all recall, last summer we had a couple of extreme heat wave events that resulted in, you know, power outages across the state and really highlighted the importance of adding additional power resources to the State's overall electric grid.

One of the things we used to do at Lake Oroville in the Oroville facilities was operate the complex in what we
call "pump storage mode." And so, it's a way that allows Lake Oroville and the Thermalito Afterbay Facilities to provide additional power generation at peak times of the day when energy use is at the highest demand locally and throughout the state.

And so, with the Governor and the Secretary's support, there is a proposal to provide 200 million dollars for us to make improvements at the Oroville facilities to allow resumption of the pump storage operations. We suspended those operations primarily because we were having difficulty meeting the cold water temperature requirements for the fishery, and through some changes we can make to the plumbing of the Oroville facility system, it will allow us to meet the objective of Fishery targets, plus also resuming the pump storage operation to allow additional energy generation to support the local electric grid and the state electric grid.

SECRETARY CROWFOOT: Thanks so much. So we can go deeper into that offline if there are Commissioners with questions. And, Ted -- I should say if anybody has questions or wants more information on that they should just let us know and we'd be happy to organize that discussion.

I want to move us on and -- let's see. I just want to make sure -- here's what I'm going to suggest, Nick, typically -- or I should say in our Agenda as the next item we have talking about the Actions Tracker and Roadmap. If we can,
Nick, and if it's appropriate, I would like to postpone that and get right into the Dam Safety Discussion, because I want to make sure we have enough time for that, given that's kind of the core of the meeting here today.

Nick, unless you interrupt me and stop me and tell me we can't do that, let's move to Item No. 3, which is the Dam Safety Program for this Regulatory Perspective and the oversight measures in place, and turn it over to Sharon Tapia, who leads the Department of Water Resources Divisions for the Safety of Dams, what we know as DSOD.

NICK SAFFOLD: That sounds great, Secretary.

SHARON TAPIA: Thank you very much. First slide, please.

So good morning. My name is Sharon Tapia, and I'm the Chief of the Division of Safety of Dams, more commonly known as DSOD. It is my pleasure to share with you today an overview of the California Dam Safety Regulatory Program.

The mission of the program is to reduce life loss and property damage from an uncontrolled release of water resulting from the failure of a dam or its and appurtenant structures. Those are like the outlets, spillways and the saddle dams.

DOSD has state regulatory authority for dam safety for over 1240 non-federally-owned and operated dams of varying types and sizes ranging from six feet to 770 feet tall and...
storing up to three-and-a-half million acre feet of water.

These dams are owned by over 600 owners with varying technical capabilities and financial resources, but, ultimately, these owners are responsibility for the safe operation of their dams.

Next slide. New legislation often follows major failures and incidences, and that includes the California Dam Safety Program. So, prior to 1929, California did not have a state regulatory program for dam safety, but in response to the catastrophic failure of the Saint Francis Dam on March 12th of 1928, the California Dam Safety Program was created a year later in 1929 to regulate on-streams dams with respect to dam safety. Then, in 1956, the Authority for State Regulation of Dam Safety transferred from the Department of Public Works to the newly-created Department of Water Resources. A few years later, in 1965, following the 1963 failure of the Baldwin Hills Dam in Los Angeles, significant changes to the Water Code and the Code of Regulations occurred, such as bringing off-stream dams under State jurisdiction. The Department's statutory authorities under Division 3, Part 1, of the California Water Code, additionally, regulations for the implementation of the program are under Title 23, Division 2, Chapter 1, of the Code of Regulations. The chart on the right depicts the criteria of a jurisdictional-size dam, which is basically based on the height of the dam and its storage
capacity. So, generally, dams that are 25 feet or more in
height with a storage capacity of 50-acre feet or more are
under State jurisdiction.

Next slide. There have been four major initiatives
that have recently bolstered dam safety in California. Most
of these actions were mandated under urgency clauses for
public safety. First is the Governor's 4-Point Plan to
Bolster Dam Safety and Flood Protection. This was announced
on February 24th of 2017, but it was instrumental in
accelerating legislation requirements for inundation maps,
emergency action plans and spillway reevaluations.

Then, just months later, SB92, or Senate Bill 92,
became a law. The main components of this bill focused on the
hazard potential classification of dams, again, inundation
maps and emergency action plans, bolstering of enforcement and
changes to the annual dam fees.

Then, about a year later, Assembly Bill 1270 became a
law on February 26th of 2018, and this bill specifically
defined Inspection Frequencies, Requirements for the cycling
of gates and hydraulic control structures, and it required the
DSOD convene a panel of experts to review its Dam Safety
Protocols.

Lastly, Assembly Bill 2516 became law on January 1 of
2019, and this bill required the Public Posting of Information
Related to Dams with Reservoir Restrictions.
Next slide. Many of California's dams are in or upstream of densely populated urban areas, as you can see from the map of California. Like many dams across the nation, the average age of dams in California is about 70 years old, and many of these dams were built before the modern era of dam design and earthquake engineering. These dams are owned by a variety of dam owners, ranging from private citizens to the State of California, and this includes the Department of Water Resources, which has 19 dams that are regulated by DSOD.

Dams are classified by their downstream hazard potential, which is based solely on the potential impacts downstream to life and property should the dam fail under a full reservoir condition. Understand that this hazard is not related to the condition of the dam itself. So a thing that categorizes hazard potential into three categories of increasing severity, low, significant and high, and within California we've created a fourth category called extremely high. More than half of the dams regulated by DSOD are classified as either high or extremely high, meaning that failure of the dam could likely result in loss of life. We used extremely high hazard classification to note dam failures that could cause considerable loss of human life or could result in an inundation area with a population of a thousand people or more. While the failure of a significant hazard dam may result in property damage to others, they are not expected
to result in life loss. As well as low hazard dams, they are expected to result in little or no property damage and no life loss.

Next I will be going over DSOD's organizational structure within DWR, its staffing levels and the regulatory functions performed by DSOD.

Next slide. While the Department is both a dam -- sorry. While the Department is both a State dam regulator and a dam owner, organizationally, these chief functions are independently managed by separate Deputy Directors. DSOD reports to the Deputy Director of Flood Management and Dam Safety, while the Division of Operation and Maintenance reports to the Deputy Director of the State Water Product. Although, DSOD is under the Department, we independently regulate Department-owned dams just in the same manner as we would any other State-regulated dam. Additional separation is created by DSOD being an offsite building away from headquarters and having a separate funding source. DSOD's funding is solely through dam fees paid by dam owners. Added oversight of Department-owned dams is mandated under Section 6056 of the Water Code and Article 5 of the Code of Regulations. An independent consulting board is required to make independent findings every five years of Department-owned dams, and anytime a Department-owned dam has certificate of approval for storage issued or amended.
Next slide. DSOD's supervision of Dam Safety is carried out by an expert team of engineers and engineering geologists organized under four technical engineering branches: Geology, Field, Design and a Reevaluation branch.

With recent legislative changes to bolster dam safety since 2017, DSOD's authorized staffing levels have increased from 61 to 81 staff which resulted in the formation of the new re-evaluation branch. This branch is leading DSOD's efforts with respect to reviewing and approving of dam-owner submitted inundation maps that are to be contained in their emergency action plans, as required by Senate Bill 92. In addition, this branch is leading DSOD's new efforts to implement risk-informed decision making under amendments to the program as required by Assembly Bill 1270.

Next slide. DSOD conducts independent design reviews on proposed new dams and any enlargement alteration repair for the decommissioning of an existing dam. Analysis performed by DSOD Staff includes structural, geotechnical, hydraulics and hydrology and inundation mapping. Re-evaluation studies are conducted on existing dams, which may involve focused reviews such as spillway condition assessments or more in-depth risk studies. Engineering geology, though, is a key component of the program and it provides site specific geological and seismic hazard assessments for existing and proposed new dams, which is specially important given California's complex
Next slide. DSOD's engineers and engineer geologists play a key role in the regulatory oversight of construction projects. Inspections are conducted to ensure that projects are being built in accordance with plans and specifications approved by DSOD. Staff have the authority to stop work in the field anytime work is being performed out of compliance.

Next slide. DSOD has regulatory authority to supervise the maintenance and operations of dams and reservoirs insofar as necessary to safeguard life and property from dam failures or an uncontrolled release of the reservoir. All dams, except those classified as low hazard, are mandated to be inspected once every fiscal year. Low hazard dams are to be inspected at least once every two fiscal years. In addition, dam owners must fully operate critical control features on outlet systems and spillways every year and in our presence every three years.

Next slide. DSOD is also prepared to respond immediately to dam safety incidences and emergencies. When DSOD is notified of an incident or an emergency, we immediately deploy a team out to the site to assess the situation and to provide technical advice and directives to dam owners and emergency management agencies. For a large scaled emergency, such as a major earthquake, DSOD would stand up an emergency operation center and deploy multiple teams to
Next slide, please. In closing, DSOD continues its ongoing efforts to collaborate with State and Federal Dam Safety agencies, industry and academia and to be affiliated with National Dam Safety Organizations to advance dam safety for the benefit of California and the nation. Thank you very much.

SECRETARY CROWFOOT: Thank you, Sharon. We can -- let's hold on questions or points of clarification until after Dave Sarkisian's presentation. Let me turn it over to you, Dave.

DAVE SARKISIAN: Thank you. Is the audio okay?

SECRETARY CROWFOOT: It is.

DAVE SARKISIAN: Thank you very much for the opportunity to share our State Water Project Dam Safety Program with everybody. If we can advance to the next slide. Again, this is Dave Sarkisian. I'm Chief of our Dam Safety Services within our Division of Operations and Maintenance as part of the State Water Project, and so what I've got here today is --

SECRETARY CROWFOOT: Dave, to Sharon's point, so there's the Division for the Safety of Dams and that's one division, and then you're on the division under the State Water Project, right? Is that --

DAVE SARKISIAN: Correct. So my chain of command is
with Mr. Craddock.

SECRETARY CROWFOOT: Got you.

DAVE SARKISIAN: Very happy to share with you what we're doing from kind of the owner's perspective, how we're working to enhance public safety with our State Water Project Dams. Let's move to the next slide.

So we have a 26 State Water Project Dams up and down the state, as you can see. We have quite a number, 10 within Oroville Field Division up north; that includes the Thermolito Dams as well as what we will call the upper Feather River Dams and Frenchman, Grizzly Valley Dam.

Within Delta Field Division, Bethany Dams, Clifton Court Forebay Dam, Del Valle Dam, Patterson and Dyeer Dams.

Within San Luis Field Division, these are what we call the joint use facilities, where we operate and maintain the dams, but the actual owner is the U.S. Bureau Of Reclamation; that includes O'Neill Forebay Dam, Sisk Dam, Little Panoche Detention Dam and Los Banos Dam.

And then, down south, in Southern Field Division, we've got quite a number of dams; Pyramid, Quail, Castaic, Devils Canyon Second Afterbay, Cedar Springs Dam, Crafton Hills Dam and Perris Dam. And so, quite a geographic spread. A lot of high hazard and extremely high hazard consequence dams within our portfolio.

Next. And so, from my perspective, the Dam Safety
Programs -- kind of industry prior to 2000 or about that time frame -- were focused largely in these areas of Surveillance & Inspections; Dam Safety Assessments that an owner might undertake; Reservoir Operations, being mindful of the flood control aspects of a reservoir; Maintenance; Design and Construction, and that might be something driven by Dam Safety, or maybe there's a project in proximity to the dam where it -- the dam safety needs to have some oversight and review of the projects; Emergency Action Plans; and then Independent Reviews.

And for our State Water Project Dams, as Sharon had noted, we're subject to the Director of Safety Review Board for State Water Project Dams. And for our FERC license dams, which includes the Oroville Thermalito Complex, we're also subject to the Part 12, the Independent Consultant Safety Review which occurs on a five-year basis. And so, this has kind of been standard industry. What I've got to share with you are kind of where we're heading and kind of what we've done the past couple of years.

So let's advance to the next slide. In 2017-2018, really triggered by the Oroville spillway incident, we had a number of reviews. Of course, there was the Independent Forensic Team Reports, which had a number of recommendations for DWR, but also industry-wide recommendations for the entire dam safety industry to consider. We also had an Owner's Dam
Safety Program Audit, and that was required by FERC on a
five-year cycle. To enhance that audit, we asked that audit
team to -- in addition to providing that audit service, but
also go a little bit deeper and utilize what's called the ISO
55000 kind of asset management approach, and ASDSO, the
Association of State Dams Safety Officials peer-review process
and kind of meld those two and take a deeper look at our
program. We also had our Management, met with some of our
peers in the industry to get -- to look at what they're doing,
what kind of new approaches they're taking with their Dam
Safety Programs. Lastly, we utilized what we call a Maturity
Matrices, to take a look at ourselves. It's kind of a series
of tables that you can work through and can do a self-
assessment of where you think your program is at. And so,
following the spillway incident and into 2018, this was quite
an effort internally.

Let's advance to the next slide, please. So through
this process, all these reviews, we had some common areas.
Not too surprising, a lot of these aligned with the IFT
Report. They included updating our Dam Safety Policy,
Defining our Top-down structure in a better way and enhancing
communication through that structure, Increasing training and
interaction with dam safety organizations, Implementing
Cross-Divisional Dam Safety Teams, and then Linking our Dam
Safety Program to our Asset Management Program, which was
started in 2013, and really trying to align how we're treating our different State Water Project Assets uniformly and standardize that approach. We wanted to make sure what we're doing in Dam Safety would align with that. Lastly, Improving a Culture of Continuous Improvement.

Next slide. So we took those Recommendations, started what we call Road-Mapping, you know, how are we going to get this work done, and developed a Multi-year Dam Safety Program Initiatives. We had 30 initiatives or tasks. We consolidated those to 16, which you can see in the box there. They touch across a lot more than, you know, that 2000-era Dam Safety Program, bringing in things like Risk Management, looking at our Business Processes, Communication and Change Management, things that a lot of Dam Safety Programs and industry, you know, had not yet really evolved or matured to undertake.

Next slide. So I'll walk through just a couple of these Initiatives. I realize we're kind of short on time, so I may go a little fast year.

Initiative 1 was to really solidify our Guiding Documents; that included our policy which we updated in 2018, as well as our Dam Safety Program Document, which describes our program, really highlighting that public safety is our highest priority for the Department and the State Water Project. Also, you know, making clear assignments and responsibilities and accountability within the program.
Next slide. As part of our new policy, we identified these Program Elements. So you see some similarity between this and that prior slide, but know we've introduced additional program elements in areas where we really want to expand what we're doing and really create a program that's holistically working to enhance public safety. So, again, adding in things like Risk Management, Project Delivery, you know, working to execute our projects effectively, Communication both internally within the Department, getting people aligned for the common purpose, but also externally with our stakeholders. Also, working to build our Technical Expertise, conducting Program Reviews, where we're able to take a look at ourselves and really see how are we doing and make adjustments as necessary based on those reviews.

Next slide. Under Initiative 2 was to Complete our Dam Safety Program Functional Design. And so, in 2018, we did receive additional positions and what we did was expand what was the dam safety branch with three sections and elevated that to an office-level organization and added the additional branches that focus on Risk and EAPs, Program and Project Delivery, and then Maintenance as well. So we kind of held onto our geographic flavor because that always aligned well with how we worked with our field divisions, but brought in these new components into the program.

Next. In terms of Risk, our Asset Management Program
had already made progress in terms of a Risk Matrix for All State Water Project assets. We also benefited greatly from the Oroville Dam Comprehensive Needs Assessment, and that being a very focused risk assessment on the Oroville facilities. And with that, we developed our own internal or Dam Safety Program Risk Matrix that's actually very similar to what was used for the CNA so that we can start taking a look at our other facilities from the risk perspective and really help prioritize to reduce risk across the entire State Water Project Dam portfolio. So far, in addition to Oroville, we had level-two risk analyses conducted for Pyramid and Castaic as well. And so, those identify the potential failure modes, assign a risk estimate, but they don't go as far as the CNA, which also looked at the measures, where measures were identified and the risk reduction that could be achieved was described under the CNA project.

Next slide. In terms of Emergency Preparedness, we've had a lot of work there on updating inundation maps across our portfolio. Those are available online through DSOD's website and we have kind of the link there. We also have been updating our Emergency Action Plans. Those go through a review process with Cal OES. And then, we've been busy with our annual EAP Seminars, conducted those virtually as well as Tabletop and Functional Exercises. And then, something that goes beyond the EAP, we're starting to developed Internal
Rapid Response and Recovery Plans, which are plans much more detailed to a specific dam and describe what could be done if a failure mode started progressing. And so, we'll be building those out over the next couple of years.

Next slide. You know, we realize our staff are really key to our success, and so, we want to really make sure we're building them up over time. And so, we've spent some time identifying the knowledge, skills and abilities that we're looking for to execute our positions within my office, Dam Safety Services, and we utilize this model from the U.S. Department Of Labor Engineering Competency model, which is compromised of multiple tiers. Kind of starting at the bottom, just the basic Personal Effectiveness Competencies and working your way up kind of through -- if you can kind of envision as one goes through college, one enters the workplace, the skills they're building over time until they get to up in like the Tier 5 area where they're in a position that's highly technical. Hopefully, at that point, they have got those basic technical competencies, but they're also building the knowledge of the facility they're working on, that they're understanding the instrumentation, the performance, the history. And so, that's what we're trying to build with star staff here in Dam Safety Services. This is to really make them a subject matter expert on our dams.

Next slide. To do that, obviously, a link to
training. And so, we've formalized and expanded our training. We've executed contracts with ASCE as well as ASDSO to engineering organizations that commonly provide training, and having the contracts, we've been able to continue that this whole past year in the virtual environment, which is actually, I think, created a lot of cost savings since there's no travel involved. We've also developed what we call Dam Safety Awareness Modules that are just about a half hour, 40 minutes, web-based, On Demand, and we've assigned that to all State Water Project employees. And that's just all about getting awareness about dam safety, because our program is much more than my office. It spans our other State Water Project divisions. We're supported by Public Affairs, by many other parts of the Department. We want to make sure that they understand that State Water Project has dams and that we have a dam safety program and we rely on them to fulfill our mission. We're also working on Field Division specific modules that really get into the aspects of individual dams; and those, again, will be recorded and available so that when we have new staff come on bored, we've got training right there available that's very specific to their job duties.

Next slide. Industry Outreach. You know, the Department has always had a good connection with the Dam Safety community, but we recognize, listening to the IFT recommendations, that we needed to increase that. So we've
worked hard to collaborate with the Army Corps & Reclamation and we've -- with Assist Dam Remediation project coming up there's been a lot of points of contact with Reclamation. We've worked to get our folks out to Dam Safety conferences and more workshops and increased our participation in CEATI, which is an industry driven, utility driven organization with a really strong Dam Safety interest group, which gives us an opportunity to see what other programs are doing, learn about the best practices they're developing and stay on top of new technologies as well.

Next slide.

SECRETARY CROWFOOT: Just a time check. Just a couple, few more minutes.

DAVE SARKISIAN: Sure. We're working hard to enhance our communication. Opportunities like this are just an example of being able to share what we're up to.

Next slide. And lastly, just a Formal Program Management Review. And so, we've got biweekly meetings with Mr. Craddock, Mr. Yarborough and my division chiefs to let them know what the program is up to. If I have a specific need, I'm able to share that with them and get the help I need, as well as quarterly meeting with our regulators. And then, we're looking forward to our next Program Review and Audit, which will be in the 22/23 time frame, where we'll get a good check of our progression and maturity as a program.
With that, thank you very much for the time.

SECRETARY CROWFOOT: Thank you both, Sharon and David. It's a lot of information to take in, of course, but important that you provide the comprehensive overview.

Nick, question; can these PowerPoints be included on the Commission's website so that people can download them and take time to absorb them?

NICK SAFFOLD: Yes, they're already posted on the website so people can access them and they're also in an accessible ADA format as well.

SECRETARY CROWFOOT: Good. There may be some questions that folks have. My recommendation would be to hold off on the questions, because we have two more important presentations on this topic. And so, let's move on to Dr. Ruin Storesund to present on the Dam Safety Risk and Risk Assessment.

As you probably -- as you may know, Dr. Storesund is with the U.C. Berkeley Center for Catastrophic Risk Management. He was also the Comprehensive Needs Assessment Ad Hoc Community Group Member. So welcome, Rune.

DR. RUNE STORESUND: Thank you, Secretary. Can everyone here me?

SECRETARY CROWFOOT: Coming through loud and clear, Rune.

DR. RUNE STORESUND: Good morning. It's nice to see a
lot of familiar faces and names on the Zoom roster here. So
I'm excited to have the opportunity to share with you some
concepts and ideas stemming from my involvement with the
Oroville Dam CNA Ad Hoc Committee. I refer to the Oroville
Dam Complex as a socio-technical system. And I do this
intentionally in order to signify the importance of not just
the physical performance, but also the risk enhancing and risk
reducing factors associated with human and organizational
factors. I personally see these human and organizational
factors as far more important than just a physical hazards
posed to the system.

The topic of Risk Management in Socio-Technical
Systems is complex and requires far more than one presentation
to explore. I don't have time to get in this today, but would
be more than happy to come back later and share insights with
the community if there's interest.

Next slide, please. A little about me. I have a
unique perspective that is systems-based and looks at the
whole life cycle of a system, with consideration of both the
physical aspects as well as the human and organizational
factors.

My educational background consists of a Dual Degree
Program where one can choose any humanity degree from U.C.
Santa Cruz and then be guaranteed a transfer to U.C. Berkeley
in your choice of Engineering discipline, and that's assuming,
of course, you show up and pass your classes while you're at Santa Cruz. So I received a B.A. in Anthropology from U.C. Santa Cruz, a B.S. in Civil Engineering from U.C. Berkeley. I worked for a bit, then got Masters in Geotechnical Engineering at U.C. Berkeley, worked a bit more, came back and got my Doctorate in Engineering in Civil Systems from U.C. Berkeley.

Today, I'm wearing the hat of Executive Director for U.C. Berkeley's Center for Catastrophic Risk Management, or CCRM. I also have a consulting practice, a software development company, a construction company, and just recently started a nonprofit on the topic of safety, risk reduction, resilience and reliability.

Next slide. I have a varied register of Disaster Research in Forensic Engineering. My focus includes the human and organizational factors rather than just the focus on the physical aspects of failure. This Disaster Research has identified some cross-cutting phenomena related to the safety and reliability of critical infrastructure systems. While the industry sectors may differ, they all share one common feature; they're managed by people. My goal here today is to share some of these cross-cutting themes with you in hopes of leveraging them to enhance the safety and reliability of not just Oroville Dam, but all dams in California.

Next slide. So a bit of background relative to myself and Oroville Dam. I served as a Risk Management Expert for
the Ad Hoc Committee between 2018 and 2020 at the request of Senator Nielsen and Assemblyman Gallagher. I have produced a technical report with my comments and implications for community safety related to the CNA process, and it's my understanding that most of the Committee Members have received a copy and it's also posted on my SafeR3 projects website.

Next slide. So there are a number of basic fundamentals that I would absolutely love to cover today, but -- next slide -- unfortunately, with only 20 minutes, I won't really be able to talk about much of any of these before. Like I said before, I'm happy to come back at a subsequent meeting, or if you have further interest, I will be offering a risk management boot camp for decision makers in the Fall, so stay tuned to that.

Next slide. So I believe we're all here and this effort has been established to achieve safety. The reality, though, I think is we're actually searching for a way to achieve that safety. DWR wants to ensure safety and the community wants to feel safe. The problem is, there's no silver bullet. What we've done is fooled ourselves into thinking that a regulator such as CERT or a group of individuals who ascribe to the label of "Dam Safety Expert" can somehow wish us into safety through magical probability of failure estimates. But these estimates are really just guesses, and there's no physical way we can actually test or
prove or confirm that these guesses are correct.

Next slide. So, in my report, I recommend exploration of what I call Performance Insurance. This seems like a fairly straightforward concept. If one promises a certain level of performance and fails to deliver, then the impact of parties should be made whole financially. This puts financial accountability on the dam owner-operator and its consultants.

Now, I've spent the last few months exploring this concept and was surprised to find that the insurance and bonding industry frankly sees dams as high risk. This means that their perception of the need to pay out on a dam claim is high. During my conversations with these industry leaders, they point to lack of empirical performance data and express substantial doubt on the reliability of the risk estimates generated by the dam community. It's not an issue of the magnitude of the money, as mega projects are bonded all the time, it's solely a determination that dams are not quite as safe as promised. My takeaway from this is, if the insurance industry doesn't believe these dams are as safe as reported, why should the community believe anything different?


And before I get too far, I think it's important to acknowledge and appreciate Sheriff Honea for his courage and leadership to ensure public safety at a time when the integrity and performance of the spillways were in question.
It's my personal belief that he acted admirably in the face of uncertainty and made the responsible and correct decision. He is my hero.

Back to 2017. Here we have the best of the best technical and dam safety individuals, arguably in the world, working on the dam, despite three previous in-depth potential failure mode, or PFMA analyses, FERC and DSOD oversight, extensive dam safety programs in place and countless hours from subject matter experts on probability of failure, nobody from DWR was able to attest to the safety of the dam. When Sheriff Honea asked if there was something he was missing, some confident assurance of safety, nobody spoke up. Now, in hindsight and some years later, doubt is being cast on the notion that the emergency spillway structure was really vulnerable to collapse from the observed head cutting. This, I'll argue, is counterproductive. What we really should be asking ourselves is what backups have we implemented so when future surprises happen we have contingency options? The reality is that if Oroville Dam were to breach, it's unlikely we'll have enough time to evacuate all those in harm's way. In fact, the stark reality is thousands of people will likely be dead before the evacuation system has even been fully activated. What we should be doing immediately is implementing backups like the low-level outlet. I'm not sure why we're still thinking about this. While the spillway has
been updated, the flood control outlet structure has not, and if the flood control outlet structure goes off line for any reason, the only other meaningful way to discharge water before overtopping the dam is via the emergency spillway, which has a little more than half the discharge capacity of the full design intent of the two spillways. So my caution to you is, at the end of the day, this is yet another example of hopeful thinking rather than safety thinking.

Next slide. From my perspective, the Ad Hoc Committee has passed the baton to this Oroville Citizens Advisory Commission. I see numerous opportunities for the CAC to take a meaningful and immediate leadership role and proactive risk reduction to be helpful not just at Oroville Dam, but all dams. We all know deep down that it's unlikely the dam is going to fail tomorrow, but we have clearly established that the current techniques are deficient. We know it takes decades to implement substantial improvements. We know we have aging infrastructure, and the anticipated service life of the infrastructure is not known. We know that assumptions from 50 years ago likely do not fully account for the future conditions the dam might encounter as a result of climate change. Statistics will tell us we have had two evacuation events in the past 50 years and it's very likely to happen again in the future. As a result, it's critical that we start laying a foundation of resilience today. That requires us not
to just think differently, but act differently. Next slide.

   So I think this cartoon does a masterful job of
illustrating our typical approach to Risk Management. First,
there's some recognition or perception of a potential risk.
In the case of this cartoon, we have a boulder that may or may
not fall on two individuals at the base of the hill. There's
deliberation between the individuals as to the likelihood that
the boulder will actually fall on them. Meanwhile, and quite
separate from the outcomes of their deliberations, the boulder
starts to move and the parties evacuate the area, which is
then referred to as "risk management." Having the situation
require action versus proactive measures implemented before
action is required is preferred because it's easy for the
decision maker. There was no question. Action was required.
My challenge to the CAC is, Let's do better than this cartoon.
Next slide.

   What can we do? Well, I can actually think of lots of
things that can be done. And the CAC could commission or
strong suggest the commission of anyone or even all of these
Mini Projects. Let's start off with re-engaging the IFT and
have them do a review of which lessons to be learned have been
implemented. Let's be more explicit in defining what we mean
when we say "safe." If everyone has a clear understanding of
what is safe, we'll then be able to much -- we'll then be able
to be much more mindful and send out alerts if we see that
we're straying from the expected safe conditions into unexpected or potentially unsafe conditions. I think we can be up front about financial accountability associated with performance if we promise a certain level of performance and it's not achieved, who will be made whole and what payout constitutes being made whole. We can do detailed assumption audits where we go back and, one, confirm that we have a complete inventory of initial design assumptions and, two, review those design assumptions to ensure they're valid and appropriate today and for the intended service life into the future. Where we're missing the original design assumptions, back calculations will be needed to re-establish assumptions so we can assure they're valid and appropriate today and for the intended service life into the future. We should be scrutinizing asset management as well as the operations, maintenance and management methods and procedures. Finally, we should be mandating life-cycle based management of all aspects of the dam starting today. Life-cycle based management is far superior to the risk processes currently being proposed because, one, it formally states the expected service life of all components assemblies and systems; and, two, allows for the explicit and direct comparison between what was supposed to happen and what's actually happening. This is a hundred percent measurable.

Next slide. So I must confess, to date, I haven't
found any explicit documentation of what constitutes "Failure." When you look at the (unintelligible) shown in this figure, there's only two categories of Consequences listed; first, Public Safety, which is the blue highlight at the bottom of the figure, and, two, Financial Impacts in the yellow highlight at the bottom of the figure. It's unclear who's responsible for the direct and indirect financial impacts. Is this chart establishing that DWR will pick up the financial impacts? If so, is it correct that DWR will have the cash reserves on hand to pay out any of the realized consequences? Or, is this chart saying that the community is going to have to bear the burden, and the technical term for this phenomena is "risk transfer." That asks the question, has the community been alerted to this risk transfer and has the community agreed to accept this preordained assignment of financial responsibility? I suspect the answer is "no."

Next slide. So not only is there vagueness and ambiguity in terms of what "failure" is, failure also changes what time. This is known as the "bathtub curve," where you have a higher failure rate in the early stages of a system; these are referred to as "burn-in failures." Then you have an extended period of time with more or less constant failure rates. Then as you approach the end of the service life of a structure, the failure rate starts to increase as a result of wear-out failures. In almost all risk analyses, only one
probability of failure value is given. This is a problem because it completely neglects the increasing failure rate with wear-out failures and is blind to when the wear-out failures start occurring. This is not safe.

Next slide. As I've noted before, the current risk approaches rely on the imagination of experts to develop failure scenarios and then estimate their likelihood. That's the substantial basis by which "safety" is described. The problem -- and I'll represent to you this is a substantial problem -- is that an expert's imagination is limited. You just can't imagine all the possible failure scenarios. Now, does that mean we shouldn't be doing these exercises? No, I am not saying that. What I am saying is we need to do that and more. You need to cross-check with multiple techniques. If you evaluate using six different methods from six different perspectives or disciplines and you see convergence, you're probably close to the mark. If all six give you different answers, that should tell you that more work is needed. If you rely solely on one technique, you would never know you had a problem until it was too late. That is not safe.

Next slide. So here's how I would encourage us to think about confronting uncertainties associated with safety with a spectrum of organizational capabilities. In the top row, we have situations where the magnitude of uncertainty for the likelihood of failure are pretty small. That means we
have a high degree of certainty with respect to the occurrence. On the bottom row, there's more uncertainty, to the point where we have very little or no certainty. For the consequence portion of the risk, we have a similar breakdown where the left column are instances where we have a high degree of certainty, but then in the right column, we have very little to no certainty with respect to the type and magnitude of consequence that will be realized.

I've labeled these as four boxes. Box 1 is what I consider to be the Traditional Quantitative Risk Analysis. There's low certainty with respect to both the likelihood of failure and consequence of failure. We can fairly, reliably assign a probability distribution, shape parameters, and have a fairly good handle on the important variables to be considered. Problems are well-structured, well-defined and bounded. This is essentially exercise. We kind of know what the answer is before we start, we just may not know the exact magnitude.

Box 2 is a situation where we know we're in failure mode, but we don't know how bad it's going to be. I refer to these as unfolding events. The key factor to minimize the consequence of failure in this area is access to appropriate resources, especially reliable near realtime or realtime information, and First Responders do this routinely.

Box 3 in the lower left are instances where we have a
pretty good idea what the consequence is going to be, but
we're very uncertain as to the likelihood of occurrence. This
can be thought of as possibilities, and climate change is a
wonderful example of a Box 3 risk.

Finally, we have Box 4 in the lower right-hand corner;
these are surprises or black swans. These are the epitome of
crisis and have the characteristics of being ill-structured,
undefined and can be completely unbounded.

So let me be clear, it's not my contention that these
are discrete regions and you're either in or out, these are
spectrums of gray and are highly time dependent. My main
point here is that these are different settings of
uncertainty, and different uncertainty settings require
different approaches. And it's imperative that organizations
develop tools and capabilities so when the time comes they're
able to more reliably navigate the highly uncertain context.

Next slide. As you have heard before, "If all you
have is a hammer, everything looks like a nail." So I'm
strongly suggesting organizations have more in their toolbox
than just a hammer.

Next slide. I'll quickly mention the concept of
Johari's Window. Note that you may not have all the answers.
There are things that may not be known to you but may be known
to others; that is a resource.

Next slide. I talk about this in more detail in my
report, but this figure illustrates through the Johari's Window the opportunity we have to leverage tools, approach methods and capabilities developed in other industries to the dam industry in order to enhance the safety and reliability of our dams. The items in red are tools, approaches, methods and capabilities known by other industries that, from my perspective, would enhance the safety and reliability of dams. Our opportunity is to extend these tools approaches, methods and capabilities into the dam industry so we have a more robust menu of techniques to evaluate safety, cross-check our perceived degree of safety, and ensure a safer and more reliable dam. Again, let me reiterate, I'm not suggesting we do away with risk-based approaches, but add to them.

Next slide. My time is just about up here, but before I conclude, I would like to deputize everyone in this Zoom meeting with the Risk Management Pledge. So if everyone who is willing to take the pledge of Risk Management, raise your right hand and repeat after me. You can be on mute; that's okay.

But it says, "I, state your name --" I see a few lips moving out there in the world; good, okay "-- promise to appreciate the value and importance of uncertainties in civil systems and help decision-makers avoid confident ignorance by arming them with pragmatic information and avoiding over-simplification and E3 errors." E3 errors are solving the
wrong problem precisely. "I also promise to triangulate answers instead of relying solely on one technique."

Congratulations. You've all been deputized into the Risk Management Pledge.

If you go to the next slide, that's the end of it for me.

SECRETARY CROWFOOT: Rune, thank you so much. That was comprehensive and focused and cogent. I appreciate it. I think that probably people will have questions. My recommendation would be to move on to Eric for the final presentation, and then we can open this up to Commission dialogue. So let's move on to Eric.

ERIC HALPIN: Thank you, Secretary. Can you hear me okay?

SECRETARY CROWFOOT: Sure can.

ERIC HALPIN: I really appreciate the opportunity to talk to you about something that is really important and I care a lot about. Of course, this is Oroville Dam in the background, and if you work in the dam industry like I do, you know it as really an iconic structure really in all of North America. I've been fortunate to work on it in different aspects.

Next, please. So most of my experience comes from my 40 years with the Corps of Engineers, where I led the largest dam and living infrastructure portfolio in North America where
we invested about a billion dollars a year.

I was the primary interface with elected officials in Congress as well as those in the administration, and I also led the International Partnerships with other countries on the issue of safety programs. That certainly gave me a different perspective what's going on around the world. By the way, the Dutch are doing safety programs like the Americans now and they even call it "American-style." So there you go. And last couple of years, I do this now for Clients in Industry.

Next. So this is the outline of my presentation, mostly focused on a lot of stuff that Sharon and Dave captured and what is the state-of-the-art program, because I think that's essentially what they described, really talk about the challenges and communicating to people how do you sustain that through time, and then finally talk about some trends and challenges in the future.

Next, please. So this is one of my favorite authors, and I think the only thing I would like to say here is that governance, as with safety programs, really depends on both the people and the governance systems they work within, so I'm going to talk about governance systems, which is Safety Programs.

Next, please. First topic is really talk about the state-of-the-art of the Dam Safety Program. Next.

So, like Sharon mentioned, you know, following some
well-noted failures in earlier part of last century, safety programs -- the traditional safety program was built around that. So they were talking about lower San Fernando, Picton, Vajont Dam in Italy, and essentially it has three major components. One is, you're trying to understand the infrastructure by inspecting it and by looking at instrumentation. Two, you want an idea of predicted performance and part of that was done by evaluating compliance with standards. And then the third one was to have some independent regulation of safety, checking of safety, if you will. So, although, that's not the modern framework, all of these elements are in a modern Dam Safety Program.

Next. So pictorially this is what that looks like. The traditional focus was just on the infrastructure. So it wasn't necessarily that much on the hazard or the extreme events or the consequences of failure. It was really kind of focused on how we built them and not how they'll perform. Because Mother Nature is going to exploit every lack of integration in the infrastructure on a 24/7 basis. And then, finally, was really focused on this whole idea that safety was compliance with a design standard.

Next. So this is what those traditional programs yielded. It's a risk chart that shows 3,000 risk assessments on Dam and Levee infrastructure in the U.S., okay? Couple of big takeaways from this. This is kind of what following
standards alone got us. It's a seven-orders magnitude spread
in risk, or a factor of 10 million. So a huge variation. We
over-invested in some and we under-invested in others. I was
personally responsible for some of those dams in the upper
right there that are scary. And we worked on the wrong
priorities. We really didn't understand the infrastructure
and how it would perform. And in this really dynamic and
uncertain environment, it's very clear we can say that one
size of standards, or the traditional approach, really didn't
fit all projects.

Next. Thanks. So this is a modern safety program,
and I think Dave did a great job of running through what this
is. But I'll just -- from a high level, now we try to
understand dams via things like risk analysis and risk
assessment, and that incorporates everything we traditionally
did like standards. And so, that's just not one kind of risk
analysis, that's many kinds, and it's many perspectives at the
table with experts. Then we use that understanding to make
better decisions, so that's risk management. And then,
finally, we recognize that dams don't exist in isolation, they
are part of the communities. So communication of risk is
really important to everyone doing their piece in helping
manage risk. The envelope around all of that is governance.
So that's -- again, Sharon and Dave talked about it's the
people, it's the process and the policy that goes with that.
So that's the modern dam safety program.

   Next, please. Just a minute to say, why is this strong risk framework really necessary? Because it does take a lot of investment, as California has seen. So two big things to point out. Because they were designed in pieces by separate engineering disciplines, integration is a problem and integration can get exploited by the natural environment. So the weight of credibility is having a system that will show you not how they were designed but how they're going to perform. Risk analysis is a tool that modern programs use to do that. So we've often said, if we can understand the problem, solving the problem is not so hard, and that's true.

   The second thing is dams last for hundreds of years. There's one dam in the national -- International Registry of Dams that's over a thousand years old. So they're going to be around a long time. So they need to be able to endure or cross a lot of change. So change in what we understand about science, what we understand about models and methodology. So risk is a nice framework to be able to capture how to deal with all of that change.

   Next, please. So pictorially this is what a modern risk-informed program looks like. It's looking at the hazards, seismic and flood probabilistically, it's looking at how the infrastructure is going to respond to that hazard probabilistically, and that's including every kind of analysis.
that exists out there. It's actually bringing the best
analysis to the table. And then, finally, the big change is
really having an explicit consideration of what the possible
consequences and vulnerabilities are. So the modern program
steps back from the dam, looks at the problem a little more
broadly, and is able to really better understand the problem.

    Next slide, please. So just a little bit, few slides
on how do we sustain the state of the practice. Because one
of the questions following Oroville is, should that have
happened? How does industry respond it to?

    Next, please. So one thing to understand first is all
engineering is some balance between the things we are trying
to achieve -- so in this case it's safety, prevention of loss
of life, prevention of economic damage -- receiving those
project benefits -- you know, clean water for 20 million
Californians is a pretty big deal -- against the economy. So
what does it cost in people and money? And so, you never can
achieve absolute safety, because you never have absolute
economy, do you? So it's a bit of a balance there. What's
really important is the constraints on the left-hand side of
the slide. So, within that balance, there's external
influences of legislation and regulations of funding. And
then, a really important thing, which Rune touched on a little
bit, which is the state of the practice, which is a primary --
in a common-law legal system is the primary way that industry
and organizations that are dam owners and regulators receive some kind of assurance that they are doing the right things the right way. So I'll talk a little bit more about state of the practice.

Next, please. So where's it done? So, right now, if you look at a map of the world, you've got North America really leading the practice of Dam Safety Programs and decision-making in the world. So it's the second largest portfolio in the world of large dams, and all four major federal agencies in the U.S. are doing it exactly the same way. Canada is doing it the same way. Then, you have a number of countries in Europe that have gone to fully risk-informed decision-making, including the Dutch, the Spanish, the Brits and the French. Then, of course, Australia and New Zealand, they have long been leaders in this area. An interesting thing, though, is the World Bank who is one of the largest investors of dam -- of money in dam projects, has come out with their own guidance that mirrors what we're doing in the states; that is a risk-based dam safety program. So, as they invested in South America, in Africa and Asia, they were requiring the same approach there. That's why India now, with the third largest portfolio of dams in the world, has gone to a fully risk-informed dam safety program.

Next, please. So, again, the IFT Report, I think it was really important and it's a great example of how our
industry responds to the incidents like the spilling incident in Oroville. Personally, when I was with the Corps of Engineers, one of my jobs was to lead the federal response to how we were going to react to the Oroville incident. So I went in front of the House T & I Committee and the Senate EPW and talked to them about the legislation that would require the Feds to collaborate on an independent peer review of the risk analysis process. So that has happened. It's a big report called the Tri Services Report; and it kind of keyed in on some of the same things you see there in the Change paragraphs, which is Risk Analysis needed to consider things a little bit differently. I think really, importantly, though, it's said a couple of other things, IFT and the Tri Services, which is you need to not throw the baby out with the bath water. So you should sustain some of these things that really, in the case of Oroville, helped the community make good decisions along the way. And so, that is the brutal debate that comes with independent peer review is really important and we have to keep a focus on doing that independently, and then this complexity that comes from systems and human factors is important to consider, but we have to recognize that safety programs are there in part to manage that complexity and uncertainty.

Next, please. So here's the foundational guidance documents that guide the federal agencies and, in turn, many
of the State agencies and international practice in Dam Safety right now. It is incorporation of risk and how we analyze problems and how we make decisions based on that analysis. So the interesting thing about the guidance documents is they're scaled, they deal with dams of all sizes and types to enable you to make consistent, good decisions. And then they're adaptable over time and changes in the environment while being equitable. That's one of the big powers of risk.

Next, please. So a busy slide, but let me explain it a little bit. On the bottom there you have Physical Systems. I use, actually, an example of Isabella Dam. You see, dams are generally made up of multiple physical infrastructure systems, just like Oroville is. Those dams are part of multiple dams on single river systems, and then those river systems are part of larger watersheds. So the physical interactions on the watershed level get really complex. Then you add on top of that the governance features, the political, environmental and social factors and external influences that might come from national and regional efforts, there's a lot of human systems to deal with. But safety programs, in trying to manage that complexity and uncertainty really deal with the first two. And, frankly, that's enough at this point. The practitioners that actually have to do this, they understand that complexity, but they don't have the luxury of taking an academic approach to it. You actually have to do things. So
I appreciate Dave's presentation and Sharon's. These are the very specific things they're doing.

Next, please. So this is the Edenville Dam in Michigan, made the news in the last two years. This is just to point out that problems like were experienced there are addressed within a Risk Informed Dam Safety Program. So where we have processes that deal with complexities, particularly system complexities and physical interactions between different elements on dams. I won't go through them, but some of those are actually familiar to you because of Oroville.

Next, please. Safety programs also deal with human factors, and I would agree with Rune that human factors are the wildcard always and probably in any industry.

So on the right there, you see the example of gate reliability. Gate reliability can change a risk assessment three orders of magnitude, a factor of a thousand, because there's humans involved. So -- but we have ways, fault trees and different risk analysis to deal with that and to kind of understand what's the most likely outcome, but how bad could it be and how good could it be, and that probability distribution around that. So we are dealing with issues like that, at least to some degree.

Next, please. So how else is our modern Dam Safety Programs dealing with mitigating the effect of human factors in risk and uncertainty? So here are things. You'll see a
long list that are part of a good program, and it's actually
part of what you see in almost every incident that comes out
of Dam Safety. By the way, the Dam Safety Industry is -- has
a failure rate that's about one in 10,000. So the existing
programs, although we all believe they should continue to
improve, have an extremely low failure rate. But meetings
like this public meeting is part of a good program. It's
collaboration with stakeholders, getting different
perspectives about what matters to different elements of the
community. So you're now part of the solution, I would say.

Next, please. So just a couple of slides on looking
forward to some of the trends and challenges and opportunities
we have within safety programs.

Next. So, first of all, the Risk Analysis Community,
as pointed out by the Tri Services Federal Guidelines
Independent Review that came out of Congress, is moving
forward with a bunch of things. One is, we understand the
importance of extreme events. So extreme seismic events,
extreme flood events, in the one million -- a one-in-a-million
chance in a year kind of event. We're getting better models
to do that. There is a big need in industry to build a
stronger bench of consultants to support owners in risk
analysis, and that's happening pretty rapidly. There are
already some great tools out there for systems and human
factors, things like HEC-RAS out of the Hydrologic Engineer
Center and human factors. But we can't forsake where governance is, and that governance is actually part of the answer to these three things as well. So you see advancements in governance as well. Building an organization around the concepts of Risk Management, like Dave pointed out.

Next. So it's probably worth stepping back from Oroville and saying, you know, compared to incidents, not just in damage in engineering, but in engineering, period, there's some themes that keep coming back, and it's why we have things like independent peer review is that it does take multiple perspectives, that the numbers you crunch out in a risk analysis are not decisions, they're just another piece of evidence to help you make a better decision.

And then, finally, this recognition that I'm a civil engineer with a couple of degrees in engineering, it's -- the civil part of it means that things we design and build and operate exist in society, and so, there's an interface, an engagement with society, like this public meeting, that are actually really important to embrace.

Next. So Challenges. We do have challenges going forward, and I'm going to touch on them in two slides here. So I think we have to be careful of how we deal with the complexity of uncertainty, but there's going to have to be some simplifications, because at the end of the day, it's nice to have an academic approach to that. But decisions still
have to be made by owners and regulators.

Two, we can't forsake what actually has helped us make
good decisions and drive failure rates so low. So that's good
governance systems. And then the question for everyone now
outside of California is, how can you not take risk analysis
approach? How can you afford to not do it? When I was at the
Corps of Engineers, risk informed decision-making did two
things; it doubled our budget for what we wanted to spend
money on and it cost avoided seven billion dollars. So it
helped in all areas in just making better decisions.

Next, please. So we do have a problem like many
industries with the issue of Overconfidence Bias. So this is
Alan Greenspan. You probably know when we said this quote.
This was in 2008, right before the massive economic downturn.
And Overconfidence Bias is just us looking to the future and
overemphasizing the positive and under-appreciating the
possible negatives. So we have to realize that this exists
within our industry as well. And the best way to deal with
that is to bring multiple perspectives, multiple approaches
and a diversity of thought to how we solve problems,
particularly for these iconic massive projects like Oroville
that are so important to the regional and national economy,
really. And Risk Analysis has actual methodologies to help
deal with Overconfidence Bias.

Next, please. So, finally, I hope we can change this
conversation. I really like this quote, because I think it's true, and that is because traditionally we have said safety is binary, safety is your safe or you're unsafe. The reality is, all safety programs are doing it, they're trying to manage risk. And so, we should ask people to trust that we're going to manage risk the best we can, because ultimate to either side of this equation is not a realistic goal, it's not a possible goal. So I hope these -- this theme of risk management came through.

Next, please. I think I got us almost within time limits. Thank you. I appreciate it, again, the opportunity to talk to you.

SECRETARY CROWFOOT: Eric, thanks so much for your presentation. Also, really compelling and helpful for the non-experts among us.

Nick, I wonder if you can move us back to gallery view, away from the slides, or somebody can, maybe James, so we can see each other as we're talking, and librate Eric from being the speaker here so we go back in the gallery view.

So, from my perspective, a lot to unpack or a lot to consider within those four presentations. And most of us on the Commission I don't think are civil engineers or dam safety experts. So for me, anyways, there's a lot to absorb there that's going to take a little more time than just this meeting.
We do want to provide an opportunity to for initial questions, thoughts, and then my recommendation would also be given the time constraints of any one meeting that these are issues that we revisit, of course, in subsequent meetings. To me, the heart of this Commission's work is, you know, ensuring effective risk management and addressing safety questions. And so, this seems like a topic that we need to -- obviously, doesn't get addressed in one meeting.

I want to welcome Senator Nielsen. I let everyone know, Senator, that you and the Assemblymember had legislative hearings this morning. But really appreciate you being here as always and for your leadership. Again, I always point out you guys are the reason why we have this Council.

Let me pause and just open this up for questions or thoughts from the Commission, recognizing that this won't be the final discussion of the presentations or suggestions or content raised in the presentations. Genoa?

GENOA WIDENER: Hi. So, man, that was a lot to take in without stopping for questions in between everything.

But I guess I'll start with the most recent little presentation. At the end of that he said, you know, that we need to -- when we're dealing with risk management and risk analysis in the dam industry, the public needs to have that trust that the experts are, you know, doing the best that they can to keep us safe. And, unfortunately, that is one thing
that we, you know, are still struggling with here in Oroville after the 2017 incident. So, you know, it's going to take time to build back that trust, I think. It's encouraging to see, you know, the new things that have been implemented by the Department of Safety of Dams since 2017 and Dam Safety Services, but it is also important to acknowledge that those things were implemented because of a serious failure on their part to keep Oroville safe and to accurately assess the risks that were happening here at the time.

I also heard a lot of communication being so important in the Dam Safety Industry and talk of shareholders, operators, owners, regulators and communication. But the public really needs to be a part of that communication as well. That's why I'm so thankful for this Commission. I think there needs to be, maybe, a little bit more clarity when we're talking about risk assessments from DWR, especially from the Department of Safety of Dams to the public.

Reading over Dr. Storesund's report and then the State Water Project responses to his report, you get an idea, I think, of the lack of clarity when we're talking about risk and when we're talking about new developments and things that are being implemented in the response that the State Water Project had to Dr. Storesund's report, I repeatedly saw that, Oh, these recommendations that Dr. Storesund is making is -- they're similar to proposals, they're consistent with elements
being implemented, they're similar to proposed potential regulations, but those are all proposed regulations, those are things that are in the process of being implemented.

So when we're talking about how safe the dam is and you're still in the process of implementing these safety measures, I just don't think that that's accurately communicated to the public that we're working to make the dam safer, we're working to make sure that the future of Oroville is safe, but to say that we are at this moment might not be the most accurate thing to say if you're still in the process of implementing new guidelines and things like that.

The other thing that was in the response was that -- I guess I just need some clarification, maybe from DWR, about what is considered a failure. There seems to be a problem with calling the 2017 incident a "failure," which was described as an "uncontrolled release of reservoir water," that was generally regarded as the definition of "failure." I was here in 2017, and when the water came over the emergency spillway, it looked pretty uncontrolled to me. So I just want some clarity on, you know, DWR, do they consider that a failure? Because I do. It was an uncontrolled release of water, correct?

So the other thing that I wanted to touch on was -- I'm so, I'm just looking at all my notes; this was a lot to take in during this meeting.
SECRETARY CROWFOOT: I agree.

GENOA WIDENER: Eric, I believe, was the last presenter, was his name. He talked about how there's a thousand-year-old dams. But it is important to recognize that in the case of the Oroville Dam, a lot of the materials that were used to build this dam had a 50-year useful life expectancy, which has come and gone. And so, yes, I'm sure there's thousand-year-old dams still standing somewhere, but that would not be the case with the Oroville Dam.

And as far as the communication goes, I've touched on this before and it's always bothered me, that, you know, we're still calling the installation of new piezometers "early implementation." It seems like those, just little things, that if, you know, we were more honest and clear about the situation, I think that we could rebuild the trust with the public and DWR, because the Department of Safety of Dams recommended new piezometers at least 25 years ago. So to say now, we're in 2021, and it's in early implementation, that's just crazy. I mean, it doesn't make any sense to me. So it's little things like that that really cause those kernels of distrust to grow in the community and for people to feel like they're not getting the whole story.

So just things to think about when we're looking over these reports and trying to digest this meeting. I mean, I appreciate everyone's presentations. I understand the process.
of risk management, but at the basis of it it's about trusting
the people that are analyzing the risk. And, you know, I
understand this is very methodical, but the risk definitely
changes when you can look up and see the dam above you. Your
perception of how high that risk is is a lot different when
you're living underneath it. I, myself, have been evacuated
twice because of the dam. So it's putting a lot of trust into
the owners and the operators of the dam, and we're still
working on rebuilding that, I think. Risk analysis, I mean
it's all about perception, right?

SECRETARY CROWFOOT: Well, I just want to acknowledge
that. I mean, I consider the rebuilding of trust a journey,
and I think that there's a lot more work to do, to your point,
Genoa. And I think I'll just personally say, I totally hear
you. You're somebody that lives under that dam. This is a
different issue to you than if you worked for the state or
lived somewhere else in the state. This is a matter of you
and your family's safety. I want to acknowledge that. I also
want to agree with you. As I said, this is a lot to digest.
I think it's a really constructive set of presentations, but I
also think I, for one, need some time to digest this and
understand how we use this Commission to rebuild that trust
and to really explore, you know, suggestions made by Rune and
Eric and also understand from DWR, you know, really how
they're integrating these reforms and broader perspectives. I
think this is an important step forward for the Commission.
Again, I want to reduce any pressure to have some sort of, you
know, fulsome discussion on this here in the next 45 minutes,
because it's going to take a lot more than that.

Councilmember?

COUNCILMEMBER PITTMAN: Thank you, Secretary. As one
that survived and participated as a coordinator in the 1997
evacuation, the high-water event, it strikes me that I wish we
had this Commission back after the '97 event so we might have
been a little better prepared for the events that we
experienced recently. Certainly, got to give high remarks to
Senator Nielsen and Assemblymember Gallagher to put this
Commissioner together. I think the idea that we're all sworn
in as observers and filling the leadership role, as we look to
us all downstream of the dam and the river, I think it's the
strength of the future is going to be in our hands as we move
forward. So I appreciate the discussion. Certainly, a lot of
stuff to digest. But I believe that the communication is
going to be the big issue.

Like I said, back in '97, after the event, we just had
a quick recovery. Many people don't remember the devastation
that occurred even in the Hughes Lake Area, Marysville, lives
lost at that time. So if we learn anything, I don't think we
had any lives lost in this recent event. But at the same
time, this is going to be a future leadership trendsetter for
these type of structures. So thank you all. I appreciate everyone's participation.

SECRETARY CROWFOOT: Yeah, and I'll just agree with you, communication is going to be really critical. These are such technical issues, and I think they can't stay in the province of technical experts. I think that's part of what this Commission is about, so policymakers can actually understand what's happening or what else needs to happen.

I want to get on Rune, but I just want to call on a Councilmember, Supervisor Conant.

SUPERVISOR CONNELLY: Finally.

SECRETARY CROWFOOT: Sorry; I didn't see your hand raised. I see Supervisor Conant, and it's like he's got the yellow hand raised.

SUPERVISOR CONNELLY: Go ahead.

SUPERVISOR CONANT: I think thought Connelly was going to speak first even though I was called on.

I would just like to say thank you. This was a great presentation, great issue, but just called to light more some of the things that I've thought for a long time about the failure. Not only the spillway, but the inability to manage the water coming down the river, rising, huge amounts, 50,000 second feet down to nothing and back up, which destroyed the habitat along the river, destroyed farmers' operations, destroyed fish habitat for the future. We still haven't
recovered from that. I don't know -- you know, some of that
habitat that was destroyed, some of those trees were literally
hundreds of years old and they're gone now, and they line the
river and the river is a much shallower channel now than it
was. It's done a lot of damage, and it will never recover
from that, at least in the modern, our lifetime, I don't
think. That's some concerns I have. I think that all could
have been handled better. I think everybody agrees with that.
And it just goes to show you that this project should have --
we're looking back, and it's always good to quarterback on a
Monday night after the game, but, you know, I think there were
some things that were very flawed in the whole design of the
spillway that should have been caught earlier if proper
testing and management had been done earlier on. I'll leave
it at that.

SECRETARY CROWFOOT: I appreciate that. I think
that's a reality check just to understand that the damage from
the incident continues. I think --

SUPERVISOR CONANT: If I can add one more thing? Not
only that impact of people who farm downstream that were
directly impacted, but because the water was left so high for
so long in the river, trying to get a handle on it and get the
water down, it should have been managed better, and that's
where the secondary spillway -- another spillway might lower
the level of the dam in the future. We need to look at that.
It also damaged operations and orchards and farming operations all the way down past Sacramento.

SECRETARY CROWFOOT: No, I appreciate that. You know, this is the only Commission of its kind that's actually legally required to have the people -- it's the only Commission I sit on of this kind that is legally required to have everybody on here and actually have the conversations that we're having, which indicates just ultimately how serious the incident was.

Let me turn to -- oh, Supervisor Connelly?

SUPERVISOR CONNELLY: Thank you very much. Secretary, I really appreciate your very well-prepared, you're very educated on things, and kind of set me straight on a couple of things. I appreciate everybody's presentation, everybody that is here. And I'm not an engineer. I'm a self-educated guy, you know, simple guy, but I represent a lot of people like Councilman Pittman that are pretty scared about the dam and the way it was.

But a couple of observations, you know, just being a laymen, I'll throw this out there. You said over and over we need to digest all this, but immediately I saw two presentations that basically, Look how great we are and what a good job we've done and how rare it is anything could ever happen, you know, you got a one in ten-thousand's chance or whatever. Then I heard a third presentation by Mr. Storesund
that presents a new way to do safety. And I put it to the
safety of all dams, and a particular one in my back yard,
should be on par with a nuclear flat top or a nuclear
powerplant. And I think if you would consider this,
Secretary, that we could take Rune's presentation and try to
implement it -- I mean really implement it -- push it through
so that our safety leads everybody's and everybody will feel
much better about it. I don't think that that's a big ask. I
think every water contractor, everybody that receives water
from here would benefit from that safety coming to that level.
I think the safety industry could change because of what he's
proposed.

The status quo has failed us. I mean, we had dam
safety. We had FERC. We had DWR tell us that the spillway
was safe when, obviously, it was not constructed safely or
maintained properly or forecast to fail, and it did. And
that's a little bit scary to me, and I'm speaking -- this is
just me, a layman, talking; we need to think more than
generational. We need to think a hundred years out or farther
so that my grandchildren will be safe and other people around
this. And it's great to say how great we are and how people
are imitating us now, but I think Rune's report, having read
it and just the titles on what he wants to implement, if we
would follow -- if you did serious consideration to following
through with that, I would like to see that happen. That was
my only comments. Thank you very much.

SECRETARY CROWFOOT: Thank you. And I'll call myself a layman on this as well because I don't have a good understanding of the technical issues.

I do think it's progress that DWR had, you know, invited this independent analysis through the IFT. I do think it's helpful to have these external perspectives. You know, the way I interpreted the two presentations from Sharon and Dave at DWR is less about sort of defending the status quo and more about saying, Hey, the incident at Oroville catalyzed some really important changes and these are them. That being said, I agree that we need to, you know, assess both Rune and Eric's work to understand, you know, what else possibly we could be doing or should be doing.

And then, when I say "time to digest it," just because I haven't had the benefits of understanding their presentations outside of 20 minutes, I just want to understand what exactly they're suggesting. But I do think that the intent is to strengthen the process and to improve both safety and the sense of safety that people have as part of restoring trust.

So I hear you. You have my commitment to actually take time to understand what's being recommended here and then to continue to talk through this at the Commission so that this doesn't get -- we move on and all the sudden this is in
the background. This, to me, is the crux or the core of why
the Commission was created in the first place, is to
understand what we can be doing and everything from
quote/unquote risk management to communication.

SUPERVISOR CONNELLY: Thank you for your comments.
SECRETARY CROWFOOT: Thank you. Senator?
Rune, I haven't forgot about you, I just wanted to
give priority to the Councilmembers. Senator?

SENATOR NIELSEN: I want to thank you. James, I have
been delayed because we have been, in fact, in session this
morning. I don't really feel I've missed anything, but I have
had something greatly reaffirmed, that the value of what we
are doing here together is incredible, in all respects. And I
will attest how rare it is -- this was built upon an idea that
goes back to the 1980s, the Sacramento River Conservation
Forum, which was about how do we manage the Sacramento River
and its complicated problems and the diversity of interests
thereby affected. It's worked and now it's working here,
because the citizens are having the opportunity to be directly
involved. Sadly, this is contrary to what's going on in the
rest of government right now.

In the State Capitol, folks, the biggest thing that is
happening is the members of the legislature ceding your
authority, the citizens' authority, to governors and governors
usurping the local authority and state legislative authority
to do whatever they want to do almost unilaterally. And
that's my greatest frustration of the moment.

But to set that aside, because we are dealing with
that issue, it was interesting -- just probably part of what I
was doing while I was absent from the first part of this was
debating legislation called The Canal Conveyance Capacity
Restoration Fund, Canal Capacity Restoration Fund. What this
relates to is decades of the whole State Water Project.
Oroville is the headquarters; that's a stop -- where it all
starts. But it doesn't mean anything if you have just the dam
and you don't have a conveyance system. And there's been a
deterioration over decades for many reasons, including
subsidence of the conveyance system. And now there's a
recognition that that, too, has got to be dealt with.

Interestingly enough, it can be, in fact, to a degree
dealt with replenishing the ground water. And that's a part
of the water bond, what funds have been directed for ground
water replenishment, which will help with the subsidence, but
it's going to help with all of this because of our declining
water levels pursuant to the drought and whatever. So these
things are kind of fitting in together as far as giving me
some greater hope for the future.

And, again, I want to -- almost every time I talk I
commend the Secretary for his very personal involvement. This
is absolutely rare in government, to the citizens that out
there, that this doesn't much happen. Even legislators don't get as much access as what you are getting, in many cases. That's very precious and very special, and it gives us a lot of hope for the future that that dam is going to be fixed in good order and going to operate well and be well-managed and coordinated and a part of the whole system.

I'm going to express a little of my frustration right now, though, and that's we tried to do something seven years ago that would have helped us in this period of drought. And this is not the fault of the secretary at all; it goes back all those years. But the water bond, 2.7 billion dollars was set aside for large surface storage seven years ago. We come down seven years, we do not have one gallon of water large surface storage. The only thing in process is Sites Reservoir, and that's having some bumps along the way in no small measure because of the agencies of state government. Again, that's not the Secretary's problem. We all have to deal with it. And we're going to have to continue to be very diligent. What is different though is the legislators are seeming to wake up and to vote on this capacity restoration fund was interesting. I think there was only one "no" vote. And that was kind of a unique circumstance. So, in the macro, meaning the whole system of water in California, I think that there is a modicum of hope here for us, and I feel pretty darn good about it. I think I can speak well for James also on
this.

Another thing of some passing interest, in both the Water Bond and in the Statute, the New Water Plan for California that was negotiated in 2010 -- and I spent thousands of hours on that -- I was able to secure provisions in both the bond and the statute that affirmed a human right to water. Now, that would seem to be a silly thing to even think about. But with my experience up to that point, that for various reasons, most -- many of them litigation, the human right to water had been greatly diminished, if not just wiped out. And now we do have in statute -- and some people forget about it because it's very seldom ever talked about. And, in fact, yesterday the first time that it showed up in a legislative letter. This was a letter from a member of the legislature, the auditor, the State Auditor, and it acknowledged in 2012 California was the first state to enact a human right to water law, and then it stated every human being had a right to safety and to water, in other words. Now, that has arguable degrees of legal standing, but it does have legal standing, and it does mean that that's a part of water policy to the future of California. That, to me, is significant and fundamental and was timely, as I got to report to you, that that just now showed up in a legislative document. I'm blabbing about it all the time because I don't want people to forget that we have a right to water as humans. But, anyway,
that's just kind of a petty -- no, it's not petty; that's a big deal, personal thing. But let's get back to where we're at here.

To me, this is really exciting, that Rune has done a magnificent job and the technical committee did also, giving us their take on what had happened and where we need to go in the future, help us chart a course. And I truly believe that we have the expertise, the people of the State of California, the officials in government and in the local communities and the citizens themselves, through their various and sundry organizations and entities, we're going to be able to do some really good things in the future. I feel very confident about that. I hope you do, too, and I appreciate all of you who have been participating regularly in these meetings. We're going to keep them going.

Again, I want to thank the Secretary and Karla Nemeth, too, for their very personal interest as Directors. They're very busy people, but they have devoted their personal attention to this that's so important to us and to all of the State of California. That's my two bits worth, but thank you, Folks.

SECRETARY CROWFOOT: Thank you so much, Senator. I'm going to call -- I think Councilmember Pittman may have his hand up as an artifact of a prior comment he made. So then I'm going to call on Rune in a moment. I want to do a couple
of things. I want to make sure folks that are joining from
the community can provide public comment, and so we'll that.
I then do want to end on time at 12:30, given the folks on
the phone or here today have, obviously, a number of other
duties. We clearly need to continue this discussion at our
next meeting, which is going to take place in late August.

So, Rune, why don't you finish us up with any
observations you want to share, and then we're going to move
to public comment.

DR. RUNE STORESUND: Thank you, Secretary. I just
wanted to commend this group for the work that they're doing.
The conversations that I'm hearing I think are the right
source of conversations on the journey towards trust. So keep
up the good work.

The other thing that I would like to sprinkle into
your deliberations as you move forward is let's not get too
focused on all the extreme events or bad outcomes, let's also
have conversations about expected conditions. So Oroville is
a little unique in that it's part of a design discharge
through both the primary spillway and the emergency spillway.
It came up to 700,000 CFS. That's the maximum release that
can come out of that dam. So I think good conversations for
the community to have is what sort of impacts and response
would we see at 150,000, which is kind of the maximum normal
release, but then what happens at two-hundred-,
three-hundred-, four-hundred-thousand? So if those
conditions arise there is an idea of what the evacuation zones
are and what to do and they're not surprises, and I would
bundle that into kind of normal operations discussions
separate and aside from the million-year earthquake. That's
it. Thank you so much.

SECRETARY CROWFOOT: Thank you so much for all of your
work on this. Thank you, too, Eric. Two excellent
presentations.

Let's turn it over to Nick. Help us understand, move
us into public comment.

NICK SAFFOLD: Thank you, Secretary. I know we're
limited on time, but we have three folks, it looks like,
Ronald Stark (phonetic), Matt Mentink (phonetic) and Beth
Bello (phonetic).

So, James, if you wouldn't mind allowing Beth to speak
and then we'll go to Matt and then Ronald.

I also just want to mention, Secretary, that there are
ways to communicate, other communications channels with the
Commission. We have an email address on the website and we
also have a phone number, if anyone wants to reach out or
provide public comment that way or ask a question.

SECRETARY CROWFOOT: Thank you. Beth?

PUBLIC MEMBER: Good day. I'm Beth Bello; I'm a
resident here in the Kelly Ridge, and our home is directly
adjacent to the Lake Oroville State Recreation Area. Today
I've heard multiple presentations on safety, drought, and
climate change.

I would like to bring up concerns on fire fuel
reduction in the Lake Oroville State Recreation Area. Fire
science has changed since the Fuel Reduction Plan was created
over a decade ago for the Lake Oroville State Recreation Area.
It is time for change. Millions of dollars have been spent
building boat ramps at Loafer Creek and Bidwell Canyon. Why
is not more money put aside for safety to protect our
wonderful recreation area through fire prevention? I have
serious concerns on the need to reduce the fire fuel
reduction, ladder fuel reduction in this area directly
adjacent to the Kelly Ridge community. The critical area in
need is from the south end dam parking lot up both Bidwell
Canyon, down BB (phonetic) trails to the Visitor Center, down
to Kelly Point -- onto the Bidwell Canyon Marina. It will not
matter how much defensible space we make at our homes if we
are faced with a huge wall of fire from dense underbrush, dead
manzanita, pines adjacent 101 feet from our homes. Fire by
nature travels up hills and creates wind from the heat. It is
obvious where the fire would travel, and that is to our home.

I am aware of the recent fire fuel reduction in Wilfer
(phonetic) Creek, but, ironically, this does not have
residents. There's an excessive amount of unmanaged growth
adjacent to the residential community properties and extends all the way down to the reservoir. These areas are a huge time bomb waiting to go off. Our neighborhoods will not have a fighting chance if there is a fire. If we have a fire in and our homes are lost, there's serious and costly economic and environmental implications that would far surpass the reduction cost. Most recently, the Camp Fire that threatened Kelly Ridge estimated 1.35 billion dollars from Cal Recycle for the debris removal. Anyways, this fuel reduction plan is over a decade old. Fire science, along with climate, has changed.

Thank you for letting me bring up this serious concern about fuel reduction, which is very badly needed, and the plan changed from 100 feet out from our properties to much more beyond.

SECRETARY CROWFOOT: Thanks so much. Just know that we are focused on investing more in that fuel or vegetation management, and we made some progress at the State Recreation Area. And maybe Matt Teague -- I'm not sure if we can get Beth's contact information, you can share more about what we're planning. But point well-taken that there's more that needs to be done. I think we're moving onto, Matt.

Senator?

SENATOR NIELSEN: Let me pipe in here to give you a little bit of confidence and hope. This has been a
frustration again of mine. We're on 40 years of we didn't
manage our forest and wildlands, we just locked them up.
Well, unfortunately, because of the disastrous fires, plural,
all over California that has changed now, and the Secretary is
right -- and I'm the Vice Chairman of the Senate Budget
Committee, so I'm sitting right in the middle of it. Real
money is now being put into forest and wildland management.
Even up in our neck of the woods -- and they'll get ahold of
you, Ma'am, and chat with you, and if you want to chat
further, call my Chico office and give them your specific
concerns.

But the point is, in the macro sense and in the micro
sense, a lot is happening. And that's really encouraging. We
could not ever used to even talk about managing the forest and
the wildlands or removing the brush. Another aspect of it,
which I have been very forceful about acknowledging and trying
to educate people, it is not only the personal lives of our
citizens and the property, but it's the wildlife. Some people
who have advocated locking up the forest and the wildlands and
not doing anything are ignoring and putting at risk our
wildlife. And that's just intolerable.

At least, I can tell you that there's some progress
being made, there's hope ahead, and that's the good news in
this area. But for many years, there was no good news.

SECRETARY CROWFOOT: Point well-taken.
Onto Matt. James?

WEBINAR HOST: You should be able to unmute, Matt.

PUBLIC MEMBER: I think I got it; thank you. I'll try to keep it at three minutes, so, Ron, you can get your three minutes in.

A lot of questions I'd like to talk about regarding safety. What I choose to do instead is to try and help continue to improve this Advisory Commission. Today's meeting was the first in which we actually gave a presentation at DWR. Thank you, Rune and Eric, for that.

Advisory means advising, not citizens, but the agencies as well. It was -- we saw the layout of the Recommendation Log. We missed a couple items. We were supposed to follow up on Hyatt today, and next meeting we're supposed to have visitors from the State Water Contractors join us, as we talk about Asset Management. We added number 12, which I thing is the Contact Log so that we can submit both advanced questions to the Presenters of the meetings but also ask follow-up questions after the meetings.

With that done, I think the tie-on piece to that is that the questions submitted after the fact, have a website -- listed on the website so all the other Commissioners and members can read these after the fact questions and answers so they don't get repeated in future meetings. We're making great progress. I think this is turning into what was
envisioned when this charter was created.

For next meeting, Asset Management, my recommendation I would like to make for today is we received the FERC Part 12 recommendations, 39 recommendations in there, and very good ones. I think what it tells us is how much we don't know, how many additional studies we need to find to better quantify the risk before we dive into selecting one of the ten alternative measures that the Comprehensive Needs Assessment provided.

What we didn't see was the DOSD's recommendations. We didn't see the internal recommendations for Dave Sarkisian's team on what internal employees are finding themselves rather than simply relying on FERC. My suggestion is that we take all of these, we take the FERC recommendations, the level-two recommendations, the DOSD recommendations, we take the Comprehensive Needs Assessment recommendations, we even take the five-year capitalization plans that are already scheduled over the next five years and we create one sort of all-encompassing documents that encapsulates all the work that needs to be done for the public to be better informed.

Since this is all about communication and trust, if we aren't provided with all the work that's out there through all these different oversight agencies, how do we know that we're following up. Especially, given the history that we waited eight years for a Probable Maximum Flood Study that was acceptable by FERC. We waited 12 years for piezometers.
waited 16 years for a geology report on the hillside emergency spillway, waiting 40 years for a new Water Control Manual that doesn't send 11 feet of water over the unprotected emergency hillside for the storage that was never provided at Marysville. There isn't a very good history of urgency when it comes to safety. So if we take all of these and we put them in this all-encompassing document similar to the recommendation log, we can call it the "recommendation log of regulatory recommendations," if you want. But it will provide us a status, a timeline, a schedule. Status timeline and schedule is contained within the Part 12 conclusions. Not only was it recommended by the independent councils that timeline, schedules and recommendations is provided to the public, but the charter for this also says that we can ask for whatever relevant information we want regarding timelines, schedules and maintenance. And it's even in State Water Contractors own Safety Policy, communication to externals. So that is already there, this collective data is already in Dave Sarkisian's division, it's also in Ted Craddock's hands. We just need you to turn it into a public version.

SECRETARY CROWFOOT: Got it.

PUBLIC MEMBER: Thank you.

SECRETARY CROWFOOT: Matt, thank you.

PUBLIC MEMBER: Rest of the time is yours, Ron.

SECRETARY CROWFOOT: Matt, thank you. I recognize
that we skipped over an update on the Tracking Log that we are now using. I would say we start with that at our next meeting and then also consider integrating Matt's good suggestions around aggregating some of the recommendations and data to make them much more understandable and trackable by the public. Big thanks, Matt. More to come on that in, probably, next meeting. Over to you, Ron.

PUBLIC MEMBER: Ron Stark, former member of the ad hoc group. This is a quick tale of standards at two capitals. I want to thank Eric and the Corps for their attention to Isabella Dam, which is under extensive reconstruction, half a billion dollar reconstruction, because, in part, the spillways did not meet the probable maximum flood standard. And the capital, of course, is Bakersfield, the capital of country music in the Western United States. And the reclamation is still working on a billion-dollar reconstruction of Folsom Dam, in part because there was no -- it could not meet the new probable maximum flood at Folsom. In contrast, the Department of Water Resources, in response to a letter from FERC inquiring about the 140,000 CFS gap between the spillway competence at capacity at Oroville, responded since we last talked, that, Well, you know, we didn't really think we need to meet that standard. With FERC, that's a standard, it's not just discretionary action. At least it has been in all the times that I've seen. And I can't express to you how
disappointing that is that the Department would tell FERC that. And, of course, there was no discussion about one of the flood water management consequences of not having the kind of confidence at the spillways. So I would like to have a chance to re-brief the Department and to brief the Secretary on the details of this important matter. Thank you. 12:30; just in time.

SECRETARY CROWFOOT: Thank you, Ron. Folks, we're to the end of the scheduled meeting. As usual, we'll end on time. I want to flag a few things. One is, clearly, we've start to unpack questions and ongoing concerns here that we should continue to discuss in the August meeting.

Nick, can you just remind people when the next meeting is, August?

NICK SAFFOLD: August 27th.

SECRETARY CROWFOOT: August 27th. That's on the calendar.

We'll make sure to hit on, at the beginning of the next meeting, both an update on the Tracking Log so that the discussions and what we decide or direct out of this discussions at the Commission actually gets done.

And we'll have an update on the cameras that were on the spillway. Bottom line up front is DWR is working to keep camera or cameras operating there given public interest in doing that. Those have been temporary cameras, but they're
working on having those continue to provide realtime footage. 
So more on that at the next meeting. 

    Huge thanks to everybody for your time, particularly, 
those of you who don't do this as part of a regular job. 
People like Genoa, who are members from the public who are 
volunteering their time. 

    Senator Nielsen, let me just turn it to you for any 
final works. I think Assemblymember Gallagher has left us, so 
I turn it to you, Senator. 

    SENATOR NIELSEN: Everything's fine. I thank you very 
much, everybody. Very productive. We're going to keep it 
going. 

    SECRETARY CROWFOOT: Thanks so much, all. Have a good 
day. Have a good weekend. Happy Memorial Day weekend. 

    (Adjourned at 12:32 p.m.) 

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REPORTER'S CERTIFICATE

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I, ANN R. LEITZ, a Certified Shorthand Reporter of the State of California, do hereby certify:

That I am a disinterested person herein; that the Zoom Advisory Commission Meeting was taken before me, in shorthand writing, and was thereafter transcribed, and is a true and correct transcript of my shorthand notes so taken.

I further certify that I am not of counsel or attorney for any of the parties to said meeting nor in any way interested in the outcome of said meeting.

I declare under the penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated this 2nd day of June, 2021

/s:/Ann R. Leitz

ANN R. LEITZ, CSR NO. 9149