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KEVIN: [SLIDE 1] Hello once again. I'm going to start off with a little primer on Texas surface water rights and water management in Texas. [SLIDE 2] The key thing to know is that when you get a surface water right in Texas, it's in perpetuity. They do give out term permits, but generally, if you have a water right, it's forever. And so there's only one shot at making sure things are right. Texas is primarily a prior appropriation state—first in time, first in right. And only since 1985—and this is just a general statement; doesn't apply to everything—have special conditions been added for environmental flow protection, which includes instream uses as well as freshwater inflows to our bays and estuaries along the Gulf.

No new permits can be granted for instream flows. There is a clear law that's put a moratorium on that. However, you can amend a water right to convert it to instream flows and then perhaps donate it to the Texas Water Trust, which today there's been exactly three rights put into the Water Trust. So, there are very few incentives for doing so. Several basins are over-appropriated or nearly fully appropriated, and I'll show you a map [SLIDE 3]. In red, these are the basins or the parts of basins that don't have surface water available for additional water permitting. The blue indicates there's some water available, and the white indicates that at times there's water available. So that might be an area where you can get a term permit. So you can see a large part of the state is fully appropriated. [SLIDE 4]This is a graphic that a lot of us like to show in Texas showing the cumulative increase in volume of water rights that have been granted since about 1900 through close to the present, and just indicating there with the red bars on top which rights might have some environmental flow conditions in them. So it kind of sets the stage that a lot of water has already been permitted and a lot of that permitted water does not have environmental flow conditions on them. So, remember that as I continue through this story.

[SLIDE 5] Groundwater is pumped under the rule of capture. So if you own land in Texas and you're not regulated by a groundwater conservation district, you can

pretty much pump all you want without regard to the effects on springs or upon your neighbors' wells. There's no connection to surface water rights permitting, but over the last 10 or 15 years or so, the legislature setup groundwater conservation districts in some part of the state. Not all parts of all aquifers are covered by these districts. And as many of you know, some aquifers, regardless of the control paradigm that you have, they're over-drafted severely. We have a lot of streams in Texas that no longer flow because they have no groundwater contributing to them anymore. [SLIDE 6] This is the map of the groundwater control or conservation districts that have been set up by the legislature. So if you are a water developer looking for a place to purchase or lease land and extract water from groundwater wells, you target these white areas, because you're pretty much going to be able to put in as big a pump as you need to and extract the water from the ground with no real consequences for affecting your neighbors or springs. There are quite a few issues going on right now as we speak related to finding a willing land owner to lease his property and having a water company put in wells and pump it.

[SLIDE 7] As populations continue to grow; our water demands likewise are growing. The Texas population is expected to reach close to 50 million by 2060. So, we do have a couple of programs in the state to address the needs of rivers, streams, and bays and estuaries. The first one I want to talk about came to be in 2001. We call it the Texas Instream Flow Program. We need to go out and get science to determine what the necessary instream flows are in rivers and streams. So, that legislation said to the three water agencies, you're all going to work together and come up with appropriate methodologies to identity the flow conditions necessary to support a sound ecological environment. So, just in there, there's a lot of uncertainty on how you define sound ecological environment. We also had to identify appropriate methodologies since there's been a long battle in Texas about appropriate instream flow methods. The Tennant Method, which is discussed in IFC Book II, was a desktop method that Texas Parks and Wildlife had embraced, modified a bit and called it the Lyons Method. In 2002 or so, we

said, “What about these methodologies? [SLIDE 9] How are we going to do this across this big state, where we have all these different kinds of river systems?” [SLIDE 10] We needed some guidance and reduction in uncertainty about these things, so we hired the National Research Council to do a review of the Texas Instream Flow Program. Basically we drafted an approach, and we gave that to the NRC. We met with the committee—a couple of the committee members are here today—and they published a book called *The Science of Instream Flows: A Review of the Texas Instream Flow Program*. You can either buy it online or download it for free from the TIFP website [http://www.twdb.texas.gov/surfacewater/flows/instream/]. And if you want to look at it, I've got one here.

But in response to that review, which I really don't have time to go into, the three agencies developed another document, which we call *Texas Instream Flow Studies: Technical Overview* for doing these studies. [SLIDE 11] And as you may gather, we laid out a process. The yellow parts on the left there indicate where we're incorporating stakeholder involvement along the way as we move from understanding what is in the system, what kind of fish are there or what the hydrology is, what are the geomorphic issues, all the way through a study design, data collection, data integration, and generating a final study report. We've got stakeholder involvement on the left and scientific peer review built in on the right. It’s a big challenge to carry along people throughout the whole way so that at the end you can get buy-in from the people that live in that basin and manage water in that basin.

[SLIDE 12] The disciplines that we base all of our studies and our flow regime recommendations upon are the ones you've heard about today. [SLIDE 13] The flow regime, including base flows and subsistence flows, which are flows that occur during dry times. We have high flow pulses and overbanking flows. And just as an example, with overbanking flows, [SLIDE 14] we came up with these diagrams to where we can try to illustrate how these disciplines are brought

together to develop a particular flow regime component recommendation. So for example, the blue is the hydrology, and the brown is the geomorphology. And we've got "biological arrows" pointing to flood flows that support riparian vegetation, and also water quality considerations. But it kind of gives the guidance there that hey, here's how we want to do things to address each of the flow components. So I'm only showing you one of the four.

[SLIDE 15] And then we have this diagram where we want to integrate these different flow components to come up with a flow regime that incorporates those flow components as well as inter-annual and intra-annual variation.

The second process [SLIDE 16] I want to talk about is what we refer to as the Implementation Bill or Senate Bill 3, which was passed in 2007. These are the players (referencing diagram). It's kind of a complex process, but you can see it starts at the top with the Governor and the Lieutenant Governor and the House Speaker appointing these Environmental Flow Advisory Group members, who then appoint a Science Advisory Committee that provided guidance to this process. Then for each of the river basins, the EFAG appointed a Stakeholder Committee, which had to have representation from a number of different groups, including the river authorities that manage the water in that basin. Then each Stakeholder Committee appointed the Expert Science Teams, and the state agencies (TPWD, TWDB, TCEQ) provided support to those Expert Science Teams.

[SLIDE 17] Next, I'm going to go through a little bit about how that's played out, and each of the basins had a timeline except for the Canadian and the Red River basins up north. They didn't get a timeline and were left out of the process. Each Expert Science Team [SLIDE 18] had exactly one year to use the best available information to come up with a flow recommendation for that basin, including freshwater inflows to the bays, and it's supposed to be based upon what the ecology of the system needs. It didn't always play out that way. The science

team made their recommendations [SLIDE 19] and gave them to the stakeholder committee, who then balanced those recommendations with existing and future water supplies. Then the stakeholder committees provided their recommendations to the Texas Commission on Environmental Quality, which is our regulatory agency. TCEQ did additional balancing as well to end up with environmental flow (e-flow) standards for the state. Now, as part of the process, once these e-flow standards were set up, there would be strategies developed to meet those standards. To date, none of the groups have come up with those strategies to meet the e-flow standards. The e-flow standards only apply to new water rights as well. You apply for a new water right; you're going to have that standard in your water right.

Now, [SLIDE 20] they will be subject to periodic review, so if we continue to collect science data through the Instream Flow Program, we can then provide that to the Expert Science Teams, they can review it, they can make new recommendations, and so forth, kind of an adaptive management process. [SLIDE 21] And there are challenges and I've already hit on some of these. It's time-limited, it relies on existing information or there is very little data to develop basin-specific flow-ecology relationships. And science and politics don't always mix. There was a lot of politics that came into the process. But in the end, [SLIDE 22] we do have e-flow standards across the state, and there are gaps out there in the coverage like the lower Rio Grande on the border with Mexico. There are no standards in the lower Rio Grande.

[SLIDE 23] This is an example of our environmental flow standard from the Devils River. It does have a subsistence flow. It has base flows with different seasonal components to them, and for dry, average, and wet conditions. Those base flows or ecological base flows would vary by season and hydrologic condition. The magnitude of the high flow pulses is pretty minimal, as is the frequency of the pulses. [SLIDE 24] So there are some potholes. I've mentioned many of these. Most of the water's already been permitted, many basins are over-

appropriated, and strategies to meet the standards did not materialize fully. SB3 contemplated that there would be set-asides or reservations. That did not work out either.

We cannot have new permits – we can only convert existing rights to e-flow, and there are no incentives for converting rights to environmental flows. The rule of capture has been challenged many times, but it's always been held up by the court and the legislature. The map on the groundwater conservation districts still shows big gaps, and they don't cover all the aquifers. Funding continues to be limited. [SLIDE 25] And so, how do we address some of these things? We continue to build upon the science foundations that we have, continue to do the studies like the instream flow program. We need to engage people – think of the public, think of universities, the professors that are doing academic research. How can we engage them and get them to work on improving the science that we need to inform our decisions about river management?

Those strategies to meet the standards need to be developed. We need to somehow fill in those gaps in the maps on the groundwater control districts. We need to improve their abilities too to manage the aquifers that they're charged with managing. There are some limitations there. They don't address alluvial aquifers. One of the things we're working really hard on is developing a decision support tool to help us identity water rights that might have great conservation value and then determine how we can work with those water rights holders on a voluntary basis to donate them to the Water Trust. And then of course tapping the water markets may be another strategy. We're going to need to play the game as well. So with that, I will turn it over to Claire. [SLIDE 26] [SLIDE 27] END [SLIDES 28 through 31 are for additional information]