LRWA Watershed Report

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*Opinions expressed herein are not necessarily shared by LRWA

LANDOWNER ETHICS, PROPERTY RESTORATION AND MANAGEMENT, FIRE, AND ILLUSTRATING AN ECOSYSTEM

(Notes from April 18, LRWA/La Cuna Center's AFTER THE RAIN Conference)

The **Keynote Speaker, Steve Nelle** spoke first, setting the tone for the whole conference when he spoke about "Landowner Ethics," or having "an ecological conscience." Nelle often quoted Aldo Leopold (1887-1948), an American naturalist, philosopher, and educator, by many considered the "father of wildlife ecology and modern conservation."

An "Ethic of Care" is what it means to be individually responsible for and care about the health of the land, water, Nature, and livestock.

Traditionally (as in the early to mid-late 20th century), landowners were usually generational. But now, many landowners are new to the land, and more into ecology, beauty, wildlife than in crops or livestock.

Nelle: "The Landscape is the owner's portrait of himself."

Nelle posed a question: *How can you care for the land without love and respect and admiration for it, as well as high regard for its [intrinsic] value?* High regard for the land ITSELF, not just what it can do for you. A sense of responsibility.

Leopold: *"...Husbandry is the heart of conservation."* The landowner is the "man and/or wife in Husbandry." To explain, Nelle quoted the classical Greek philospher, PLATO, in one of his major treatises: The Republic, *"... such was the state of the countryside, cultivated by husbandmen, who made husbandry (farming & animal management) their business with a deeply held inner conviction."* Why? For 1) personal benefit, 2) a benefit for future generations, and 3) the benefit of society.

Nelle: there is inherently a spiritual aspect to land ownership. Caring for the land is not just about emotion, it goes much deeper. It requires practical knowledge and skills, commitment, perseverance (there will always be setbacks), hard work, creativity (where art and science come together), character, humility, passion, and striving to see the Big Picture.

Nature is always dynamic – for example, regard the ever-changing, meandering rivers, the extreme droughts, wildfires, floods as all part of the continuum, the internal obligation of landowners. Leopold: "water is community property." Even with the Texas "right of capture" law, we are morally obligated to think of our neighbors. (But ironically not so true during the ongoing droughts of the 30s; it was more like strong over the weak. Leopold wrote in the 20s, 30s, 40s, and saw a need for attitude change.)

Another principle: CONSERVATION, NOT PRESERVATION. Especially

controlling the number of deer, primarily killing axis deer because of their destructiveness to riparian zones. So yes, you can use the resource, but also maintain it. **Healthy reparian zones are one of the most critical to the overall health of Hill Country ecological systems.** Today, we must remember that especially in Texas, private lands are the watershed that feeds the rivers, and private use sustains the public use of our rivers for recreation and the pursuit of happiness.

AFTER THE RAIN Speaker: Michelle Bertelsen. Bertelsen currently keeps two jobs, one at the Ladybird Nature Center and the other at the Blackland Collaborative. The former is a major botanical garden and research unit at UT Austin known for native plant conservation, landscape restoration and sustainable approaches to landscape design. The latter (Blackland Collaborative), continues this work, doing urban and rural restoration projects. The work combines scientific research and field (observed) experience. Education is typically needed, for example: there is no need to clear the underbrush. The goal is simply to build back the ecosystem (function), usually after decades of neglect.

Bertelsen: "Good land management manages for WATER QUALITY."

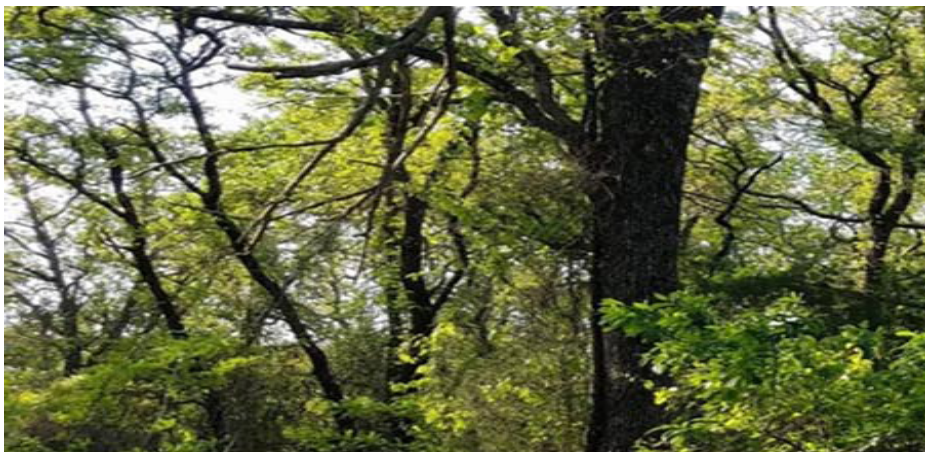
Ecosystem Function involves 1) **Conservation of resources** (example: don't overgraze), 2) **Self-Repair** - a healthy system can heal itself; 3) Water Quality, and 4) especially, promotion of Biotic **Energy Capture** by dense vegetation cover, with attention also given to the *kind* of vegetation cover. For example, compare the root length of St. Augustine grass (an inch or two) with Buffalo grass (much, much longer: six to seven foot roots! Unlike the former, the latter can capture water during extreme drought.

Restoration solutions depend on the amount of damage, ranging from simply improved management, to increasing the types of vegetation, to "just starting over."

Community diversity is important – such as combining grasses with brushy areas. With diversity, the overall community has more resilience. While some plants may be badly affected by a set of conditions, other plants will not be at any given time. Examples: woodies mixed with herbaceous plants; young trees with older trees. With varied species and functional diversity, plants will grow below the surface and make an underground matte that efficiently captures water.

Learn the elevation types of your land. A good arrangement of sloping land with human use includes: the property's upland, then a Home, then the riparian canopy and buffer that leads to the stream at the bottom. Note that water quality and taste often depend on elevation – and can differ substantially from upland deep wells to relatively shallow alluvial wells at low elevations.

The little low places (divots) in rolling land are important. The divots are a whole different plant community because they retain moisture more efficiently that the upper sloping land. Plant accordingly. The bottom of the divots normally stay wetter so are perhaps good for trees. But not foolproof: trees can still die during extreme drought.



Perhaps the important rule is simply to PAY ATTENTION. What is the condition of the soil? Negative – Soil compaction and signs of erosion from water run-off, with unwelcome ravines a

common result. To alleviate the erosion, install natural barriers on the slopes leading to the ravines to slow down water run-off (i.e. natural or adapted berms and rock arrangements). **Benefit:** the slowed-down run-off has time to soak into the soil and lead to more vegetation with their sought-after Energy Capture. Meanwhile, consider stuffing the rootballs of fallen trees or dead stumps into the sides of stream or ravine banks to help stabilize them.

Learn each of your plant types. Are the current plants native or invasive? Also manage for age diversity. For example, if you lose a few trees after a disaster, don't replace all at once; instead, "lean into" different plant communities. **A tip on planting seeds for good germination:** Bertelsen said that seed drill strategies work better than broadcasting seeds (the newly planted seeds need some kind of groundcover).

Restoration can also be Detective Work. What was here before, and before that, and where are the more successful areas and what is found there? Often, land history involves a thinning process and tree migration. Context could also be important – what borders your property? (urban elements, nearby bridges, etc?)

Bertelsen: "The Heart of Land Management is to do Something, then Wait and Watch. But the good news: when the land is restored, wildlife will come back immediately! "

AFTER THE RAIN Speaker: Brian Wright. Wright spoke about prescribed burns as an effective method to rejuvenate soil and vegetation on the land, a sentiment echoed by a few of the ranchers in the audience as well as the other speakers. He showed a video of the half-acre burn that led to the artwork executed by artist **Diego Miro-Rivera** titled ***"La Luna,"*** (aerial photo at left) that served as the logo for the *After the Rain* Conference and included in the Art Exhibition at the La Cuna Center.

There was also a large vertical sign in the meeting room that read: "Art, Texas," photo-printed using ashes from the burn as pigment! The sign was part of the exhibition next door, consisting of artwork executed by invited artists, who visited and were inspired by the local land. Wright explained at great length that the preparation for a prescribed fire is the most time-consuming and important part of the process. And that even after careful prep, if weather conditions change from being ideal, a burn will be postponed.

Wright stated that prescribed burn methods were developed to enhance productivity of the land, based on the relatively quick recovery of vegetation after wildfires. An example cited was a wildfire remembered well by all the locals, the North Art Complex Fire that burned over 4300 acres of brushland for 3 days in August, 2024.

As ranch manager for the White Ranch in Mason County, Wright has selectively used prescribed fire multiple times in targeted segments of the ranch, one of his "favorite tools," in tandem with other conservation practices such as native seed and pollinator planting projects. He has worked closely with the Mason County NRCS (Natural Resources Conservation Service.)

Next, **conference attendees toured the *After the Rain* Exhibition after an introduction by curator, Rachel Farrington,** also a conference organizer in conjunction with LRWA. Then a buffet group lunch provided by the Castell Store. Lots of good visiting over good food.

The final **AFTER THE RAIN Speaker** was Texas Tech Art Professor, **Carol Flueckiger,** and her graduate art students, Jennifer Askew and Leigh Harrison, who guided a hands-on drawing workshop so each participant could make a Prairie Plant composition using common drawing and watercolor techniques: color dripping - controlled by gravity, continuous line, and negative space. Then Flueckiger cleverly explained that everyone had just demonstrated the required elements to make a sustainable ecosystem, land and vegetation: air, water, soil and sun. It was a unique, informative and also FUN way to conclude the conference!

REGENERATIVE RANCHING

(Notes from the May 9, La Cuna Center Conference in Castell)

KEYNOTE: Dr. Rick Machen, Director, the King Ranch Institute for Ranch Management (retired), a partner of the East Foundation, San Antonio.

A QUICK HISTORY of mismanagement

The Hill Country wasn't always a juniper forest. South Texas wasn't always "brush country." What caused the changes? Removing all the bison that at one time extended from Canada down to Texas – a big herbivore influence that had always rotated their grazing. There was not one huge herd that moved. Back then, it was many "subset" herds doing the migrating.

Next came economical fencing, causing restriction of natural grazing rotations. Each landowner gained the responsibility of good stewardship. Natural wildfires lessened.

In Texas, farming came in, requiring fewer trees and decreased wildfire. In Kansas, even more so. (Note that prescribed fire is now a huge tool in South Texas).

Then came screw worms (in which the fly infests an animal's wounds, then larvae develops) - devastating for herds, until the screw worm fly was eradicated by 1966 (but Machen noted they're coming back).

Also, unfortunate was the introduction of non-native grasses such as King Ranch Bluestem and especially: "tanglehead." And new animal species (especially **exotic deer species:** Sika, Axis, Black Buck, Scimitar, Zebra, etc). Axis deer especially out-competed the White-Tail, and native white-tail deer cannot adapt when their normal food is gone. The **feral hog problem** was somewhat brought on by eradication of the screwworm. Machen cited one method to control feral pigs (but requires approval): feeding nitrite to them, causing them to sleep and die.

The Great Depression, the Dust Bowl, and the end of WWII resulted in a rural migration to the cities, but the opposite is going on today: mostly small ranches with stock (versus the big ranches of old), and many "newbie" landowners.

OK, so what now?

STEWARDSHIP IS JOB ONE.

Organic matter in the soil is very important, as well as COVERING THE SOIL. If not covered with vegetation, the soil will move (usually as in blow away or be carried away by water run-off). Run-off water moves the soil, thus another

reason to keep plants regenerating, and Machen **emphasized that pastures should be rotated in short durations during the growing season.**

Cattle are controlled by stocking rate and rotation, with multiple pastures and fencing of some sort. Virtual fencing will be a game changer. Cattle, deer and quail require different ideal habitats.

Regeneration starts at the soil surface and continues below:

- Management of soil temperature.
- Reduce evaporation loss.
- Enhance water infiltration.
- Build soil organic matter (soil structure for carbon capture and water retention).
- Promote plant diversity.
- ◊ Making continuous live roots (maintaining young and old trees of various types).
- ◊ Maintain the natural ***Soil Microbiome*** – the vast community of bacteria, fungi, viruses and archaea living in the soil.
- ◊ Sustainable grazing.
- ◊ Perhaps the biggest responsibility is managing forage demand by both domestic and wild animals.
- ◊ Improve the natural resources for future generations.

The BIG FOUR grasses for livestock: *Little Bluestem, Big Bluestem, Switchgrass, and Indian Grass.*

REGENERATIVE RANCHING SPEAKER: TAYLOR COLLINS

(Roam Ranch and Force of Nature)

Taylor and his wife acquired their 900 acre ranch eight years ago as beginners. But today they successfully raise bison and have aviaries for wild turkey.

The Collins' bought the land badly-managed; its ecosystem had collapsed (nothing could grow without chemicals), with hard ground and not much topsoil. Obviously the land needed regeneration. Their first step was to cover the bare soil with vegetation to capture water and help new plants grow. Solution: They distributed hay everywhere to cover the soil and keep it cool. (But Collins added: be sure to get hay grown without chemicals, or get fresh cut hay from a field.)

Cave Creek is on their property. When they arrived, it was a dry creek, but now it's running, the water table has risen and water is seeping out in places!

The Collins' chose to raise bison because bison are a "keystone species." And when this keystone species collapsed in the 19th-20th centuries, there went the soil quality.

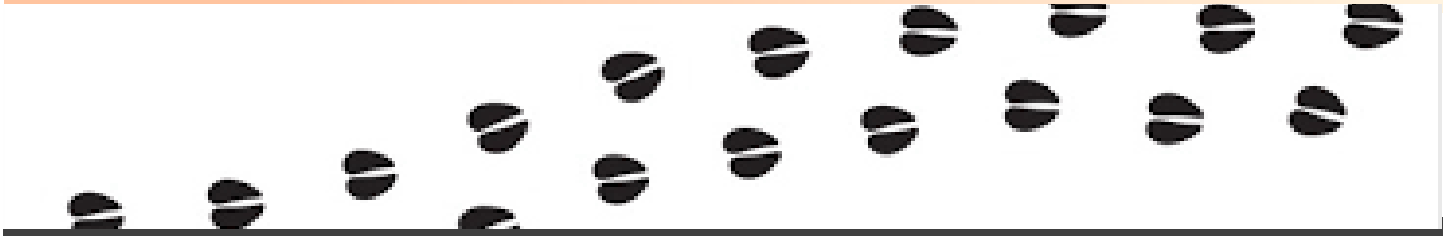
Today, Collins' primary technique in raising bison is to keep them constantly on the move, using 2-strand electric fencing. Sometimes they are moved several times in a day during dry weather or in riparian zones. In turn, they fertilize the soil constantly.

Collins: *"Nature's healing gets ahead of our perpetual tendency to destroy." Sometimes, mere tweaks begin the regeneration process.*

Tayor noted this grazing app: **PastureMap** from grassrootscarbon.com. It can tell you a lot about your pastures and how to care for them to practice Managed Grazing. Another source: Grassroots Carbon – that helps you collect carbon credits

(Taylor is a ranching partner). The grasslands are monitored and you get paid for how much carbon you sequester in the soil. First, the Audubon Society conducted a bird count on Taylor's land revealing only 8 species, but TODAY: 140 species! (Nature has such a capacity for forgiveness).

Collins: Only 100 years ago we were all agrarian, but no more. Today it's AGRI-SCIENCE. (Not totally a good thing because we have been driven from Nature). Industrial agriculture is making us "starve, but with our belly's full" (in other words, no nutrition) and economics today is predicated on what's lacking. BUT it could be the opposite. Simple examples: a single watermelon has 900 seeds, or a square foot of soil has 1000 seeds waiting to be activated. And guess what: Bison help with seed-spreading and activation because of their hooves! With sharpshooter, shovel-shaped hooves, they walk and run on their toes and each foot could have hundreds of seeds at any one time.



DID YOU KNOW?

What makes an ecosystem tick? Understanding how ecosystems function is critical to ensuring they can still provide the same ecosystem services to humans: protecting homes from floods, filtering pollution, or providing habitat for fish, crabs and other wildlife. SERC* researchers use two approaches to determine how an ecosystem behaves: the zoomed-in field of functional ecology and the big-picture field of ecosystem function. (*Smithsonian Environmental Research Center)

Functional ecology investigates the different roles species play in their environments. It zeroes in on species traits—the special features or abilities that set species apart. For example, many plants have evolved defensive traits to protect them from hungry insects or deer. Nicotine in tobacco, caffeine in coffee, or the sharp spines on holly leaves all can help a plant avoid being eaten. As another example, black mangroves can tolerate colder weather than red or white mangroves, so they are able to advance farther north along the east coast of the U.S. Functional ecology looks at the different niches that species carve out for themselves in their environments and how those niches can change over time. Some species have such a large imprint on the way their ecosystems operate that scientists refer to them as ecosystem engineers!

Using a more birds-eye view, ecosystem function looks at the combination of all processes in an ecosystem and how they work together. 'Ecosystem functions' include not just individual species, but all the biological and physical interactions that occur in an environment.

Diversity forms one of the biggest questions for SERC researchers. Are species more likely to survive in a diverse system, or surrounded by their own kind? Species that are functionally different—like insects that eat different kinds of plants—can complement each other and co-exist. Species that are functionally equivalent—that do essentially the same thing—are more likely to be rivals. On the human side, does diversity help an ecosystem better perform other processes we rely on?

Here is another viable way to add to your water supply (besides water wells and rainwater collection):

ATMOSPHERIC WATER GENERATION (AWG)

Notes from the April 22 GEAA (Greater Edwards Aquifer Alliance) Water Wonks Zoom hour with Presenters: 1) **Audrey Marek,** Trinity University Environmental Studies major and Intern at GEAA since 2025, and 2) **Eric Sheng**, co-founder of Aquaria, a company specializing in water harvesting/generation (AWG).

What is AWG?

AWG is a technology that collects and condenses water vapor to make liquid water. The basic process has been for around thousands of years. An example are the Aztecs, who used huge mesh-like nets of woven grasses to collect fog; or residents of the Canary Islands who collect dew with nets (see photo at right); or in the Atacama Desert, a desert plateau on the Pacific coast between Peru & Chile, considered the driest nonpolar desert in the world, where residents collect fog with nets.

A Primary TYPE OF AWG technology is VCRC-based atmospheric water generators:

- A VCRC-based AWG system works similarly to a refrigerator or air conditioner, using a compressor, condenser, and evaporator to cool air and extract moisture.
- Air flows over cold surfaces (that could be chilled steel coils), condensing atmospheric water.
- To be energy efficient, advanced VCRC systems are often combined with renewable energy to make sustainable water harvesting solutions, especially in arid climates.
- Performance is highly sensitive to ambient temperature and humidity (i.e. the warmer and more humid, the better).

SORPTION-based AWGs are viable in very dry places under 20% humidity, but with relatively low water yields. They use hygroscopic materials as dessicants (drying agents) to absorb water vapor from the air, offering a high-efficiency alternative to condensation-based AWGs, that use materials like metal-organic frameworks (MOFs), zeolite, or silica gel to capture water, which is then released and condensed using heat. The AirJoule Company uses this technology. https://airjouletech.com/

How AWGs are currently being used:

- Personal Use units (home, office – but not for lawns). They start from 10 gallons, and can be scaled up to 200+ gallons. Usually for off-grid living, or simply to avoid city water.
- Recycling water from air conditioners – best for non-potable water (examples: the Credit Human Building in San Antonio; and a hotel in the UAE/ Middle East).
- Solar-powered AWGs are often found in cities, such as misters & water fountains at bus stops, or watering systems for new trees. Solar power is also commonly used for water access in remote areas.
- Larger AWG applications include military use, disaster relief, and ongoing relief for water-scarce communities. Most require small, portable AWGs.

A COMPARISON OF THE COST OF AWGs to OTHER ALTERNATE WATER SOURCES for Home Use

(3-4 people; does not include electricity)

AWG	Potable Rainwater collection	Drilled water well 450'
$30K-60K	$30K-40K	$50-70K

SIGNIFICANT POTENTIALS for advanced AWGs

- Ultra-pure water for semi-conductor plants (ex: it takes 1400-1600 gallons of tap water to make 1000 gallons of ultra-pure water). AWGs can bypass this limitation.
- Could be useful for data centers because AWG water stops the issue of minerals in the water (a problem with evaporative cooling (the current data center most common cooling protocol).
- Some AWGs can use low-grade data center waste-heat (30-60 degrees C) from servers to power the AWG process. This turns a cooling burden into an asset, as the heat helps generate water.
- AWGS could enable a "water-sustained" data center that makes its own cooling water, decoupling its operation from the municipal water supply, critical for reliability in water-depleted areas.
- Negative Water Usage Effectiveness (WUE): Some Advanced AWG systems harvest more water than they consume, therefore can achieve "negative" water usage, contributing water back to local communities rather than drawing from them.

AWG Use in Central Texas

The Hill Country and coastal cities are ideal for AWGs because of high humidity and at least in the case of Corpus Christi currently, extreme water shortages.

Yes, we are in a water crisis in Texas, and current traditional cleaning technology can't keep up with it anymore because of forever chemicals, microplastics, increased drought, earthquakes, fire; and then there are the water-hungry **data centers** – all straining current resources. Note that relying on new pipelines to bring in more water involve very large, expensive projects, take a long time to complete, and then there's the maintenance of pipes over the long haul. For example, in San Antonio there were 7400 leaks and breaks in 2024 alone!

In the Hill Country, many folks have AWG as supplemental to wells and rainwater harvesting (see picture at right). The Edwards Aquifer is one of the best in the nation, but its karstic structure means it can be depleted quickly. And there are so many towns right on the edge of the Edwards Recharge Zone.

At least there is the Texas Water Fund, with $20 billon to give out over 20 years. Aquaria is working with them. Best solutions for successful grants: rainwater harvesting, AWGs and Reuse – all together they will significantly help. Also note **Senate Bill 14 (2025),** that makes cities and other entities give fee credits to developers when they have reuse and water conservation built into their plans.

ENVIRONMENTAL ENFORCEMENT IN TEXAS

Notes from the May 27 GEAA (Greater Edwards Aquifer Alliance) Water Wonks Zoom hour with Presenter: Neil Kucera, an attorney with the Hays County Criminal District Attorney's office.

Kucera began by posing the question: "Do counties engage in environmental enforcement?" Answer: (not a surprise to most of us) Yes, because the EPA is not doing its job currently (and for the past several decades).

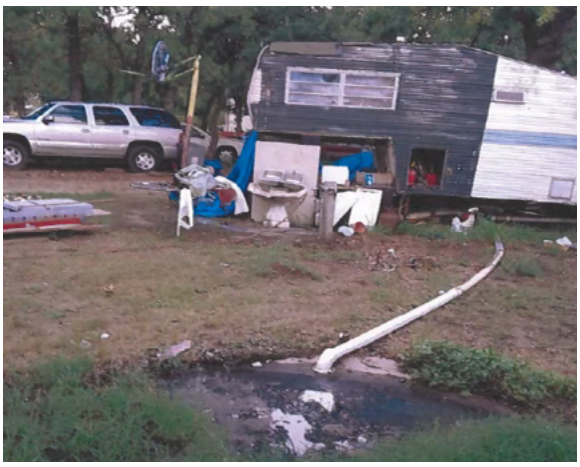
The federal government only sets the standards. **96% of environmental enforcement of the air, water, and solid waste regulations fall to the state and local level.** Kucera added that today we do fairly well with solid waste and water, but not so great with air pollution. TCEQ (Texas Commission on Environmental Quality) does some enforcement on water violations and sometimes sends a case to the county. Counties cannot zone, but cities/municipalities can set almost any law unless the State say NO (doesn't happen often, but has). And the counties enforce state law.

Believe it or not, our waterways today are much better that decades ago. Infamous examples: the Charles River near Boston, the Hudson River as it passed NYC, and the Cuyahoga River (Ohio) that caught fire in 1969 because of so much pollution! Despite Nixon's veto, the Clean Water Act was subsequently passed and has been effective.

How does the Clean Water Act work in Texas? A review: we have surface water and groundwater, the former controlled by TCEQ, the latter is the rule of infinite capture under one's land with some regulation by groundwater districts. For industrial discharges, a TPDES (Texas Pollutant Discharge Elimination System) permit from TCEQ must be obtained first and it sets daily load limits. Municipal discharges usually consist of treated wastewater and stormwater, and with 50,000 residents or more, the city has to have stormwater treatment (MS4). Kucera added that Bexar County (San Antonio) has a good record of protective standards and enforcement.

INTERESTING FACT: The Texas Water Code (TWC) is tougher than the Federal government and most other states (especially TWC chapters 7 and 26). An example is the criminal enforcement procedure for Unauthorized Discharge (TWC 7.145/7.147). In most criminal prosecutions, the term "culpable" must be proven (meaning: "with awareness"), but with TWC violations, **culpability is not needed.** The CRIME IS THE ACT ITSELF. The process usually follows with a restraining order, then a temporary injunction, then a permanent injunction. Also, it is possible to prosecute in both civil and criminal court, but difficult, and you cannot use the outcome of a civil case to affect the outcome of a criminal one.

WHAT MUST BE PROVEN? First, ***Who is the "Person?"*** A person is not just an individual; it can also be a business, association, co-op, limited liability company, or any other organization governed by the Business Organizations Code. ***What type of permit?*** Is it a General (or Batch) permit (for multiple facilities) or an Individual Permit? (The TCEQ website has a page for Types of Permits.) ***What does "Discharge" mean?*** Is it a "point" source (specifically knowing where the pollutant is coming from), or is it a non-point source?—non-point usually applies to stormwater, unless it has been narrowly channeled.



What is the pollutant? The Texas Water Code is a clearing-house for multiple environmental crimes: 1) Underground Storage Tanks, 2) Hazardous Wastes, 3) Medical Wastes, 4) Used Oil, 5) Lead Acid Batteries, and 6) Sewage.

How is the pollutant being deposited? For example, is it draining, seeping, running, disposed of, and other action verbs. Is the pollutant material Biological, Radioactive, Sewage, Solid Waste, Inert Materials, or Heat? An example of inert materials would be dirt. Radioactive water could come from

mining or a hospital. Sewage is usually because of a failing septic system (see photo previous page).

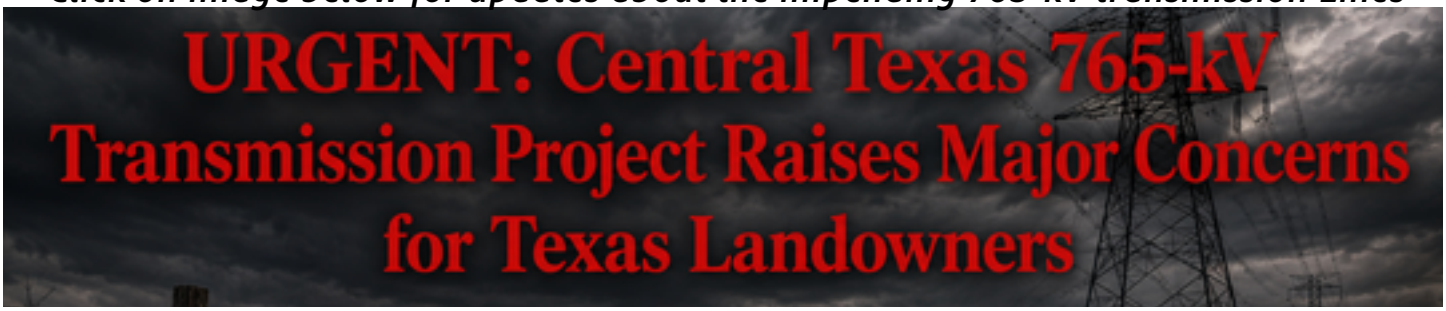
Regardless of source or type, for a pollutant to lead to pollution - it must go into "the water of the State." The Texas definition of "water of the State" is more inclusive than national regulations. Texas' definition includes dry creeks and intermittent streams, known as **"dry water."** In 2023 "navigable water" was expanded to include wetlands.

Kucera especially stressed **NEVER dumping pollutive materials of any kind into storm drains.** That act can result in large fines (up to $250K per occurrence), jail, or prison up to five years. Related advice for homeowners: when washing your car with soap and city water (and city water probably has chlorine, that can hurt fish), make sure the drainage goes into the ground (such as your yard), not to the street (because if the latter, the polluted water will surely find a storm drain). And for rural folks, also beware of dumping liquid sewage on your own land, as it can easily cause ditches to form that will take the water elsewhere.

Common transgressions of irresponsible developers are not properly securing an ongoing construction site and bulldozing new roads too close to a ditch or waterway. During a hard rain, runoff of the silted water from the unprotected site will find a stream to pollute. ***(At right is a photo taken by the late environmental warrior, Ron Duke, of a bulldozed road for a new development near Hunt, pushing silt into the North Fork of the Guadalupe, late 2024.)***

Kucera added that Texas Environmental Enforcers do try to show some restraint, and the ultimate goal is remediation. Meanwhile, if an individual believes that the TCEQ is not doing its job, and if that individual can can convince their county commissioners of the crime, then that individual can file suit under Texas State law (a "Citizen suit" provision).

Click on image below for updates about the impending 765-kV transmission Lines



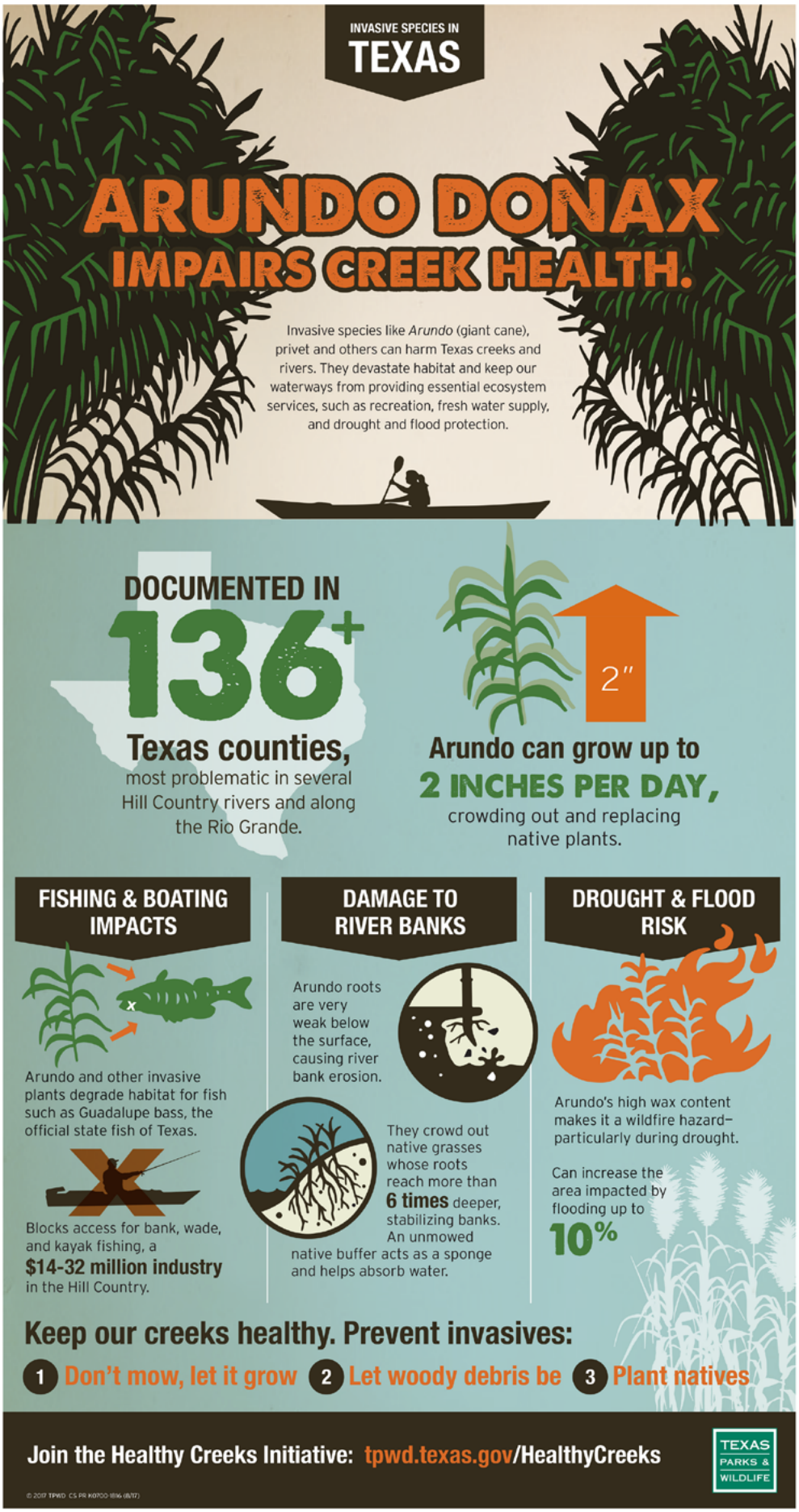
WASTEWATER NEWS...

Remember the multi-year fight between landowners on the S. San Gabriel River and the City of Liberty Hill's wastewater facility locateddirectly downstream? (Related stories in past LRWA newsletters.) It culminated in not one, but two expensive and contested cases with TCEQ. At the regular TCEQ Commissioner's meeting on March 28, 2024, they decided on the lowest limit ever (20 micrograms per liter) for the Liberty Hill wastewater plant. Almost low enough to drastically lessen the algae that had been choking the once-pristine river for years. (An expert witness during the last contested case, Dr. Ryan King of Baylor University, had proven that after 15 mcg/L of phosphorus enters a pristine stream, excessive algae will begin). But TCEQ settled on 20mcg/L, primarily because it's certified testing labs were not equipped to read levels below 20. So what has happened since?

The City of Liberty Hill protested and fought against the verdict for some time, and those fighting for the river waited to see if TCEQ would do anything to enforce the order. It was documented that even when the LH wastewater plant voluntarily lowered its limit to 50mcg/L (from the original permit limit of 150mcg/L), excessive algae continued. On March 11 of this year, TCEQ FINALLY issued an enforcement order. The most surprising detail in the document was that Liberty Hill is planning to build a Direct Potable Reuse plant to use its wastewater. If implemented, this means that the city could go from being one of the worst examples in Central Texas, for its algae pollution, to being one of the best examples, for embracing DPR. You can learn more on the website for Liberty Hill's DPR project, Pure Water LHTX. TCEQ's order refers to it as an Advanced Water Purification Facility (AWPF). However, TCEQ is giving Liberty Hill a lot of time to get this plant running — the order said that the city has 2,038 days (a little more than 5.5 years) before it must start meeting its 20 mcg/L phosphorus limit, which means that local residents will probably have to live with excess algae in the river for that length of time. Unfortunately, this is currently the only potential bright spot in the fight to keep our pristine streams.

ONE STEP FORWARD, POTENTIALLY MANY STEPS BACK

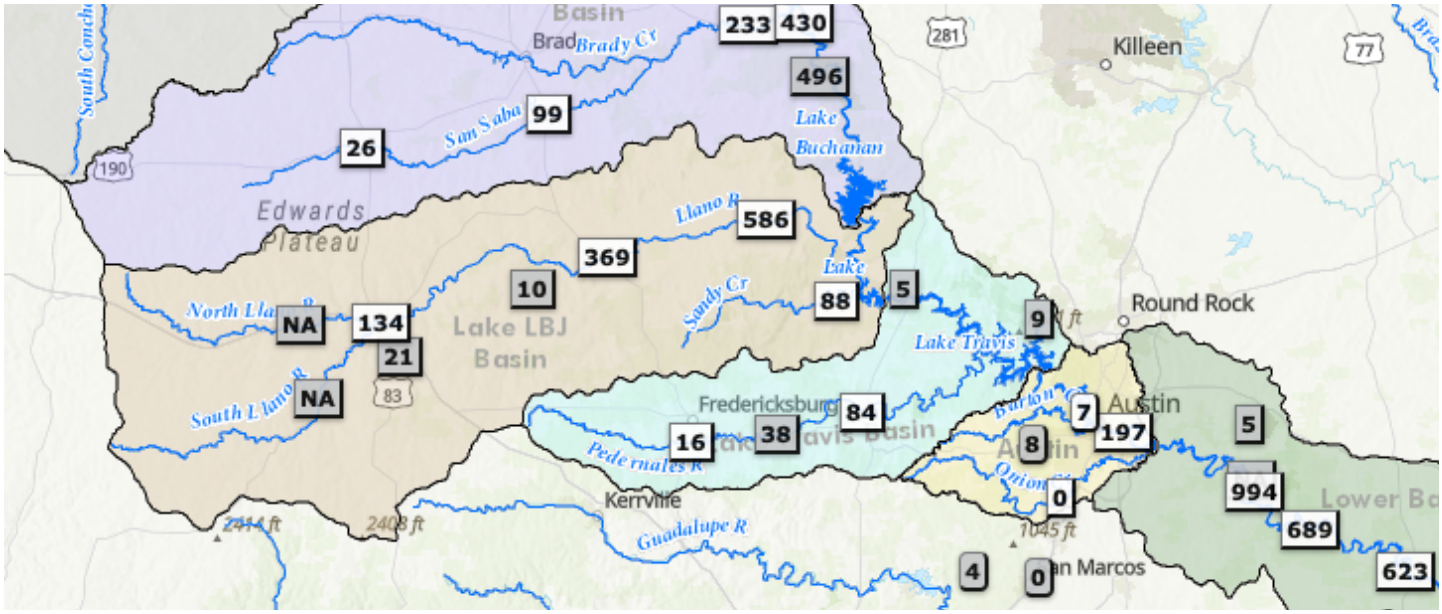
Meanwhile, multiple new developments have TCEQ draft permits for direct discharge into Hill Country pristine streams, with a significant number over the Edwards Aquifer Recharge Zone. (Keep in mind that the Edwards Aquifer's cavern-like karstic architecture makes it very susceptible to that which soaks in from above.) Some of the worst proliferations of such permits will be dumping partially treated wastewater into pristine Salado Creek and its tributaries in Bell and Williamson counties, collectively up to 8 million gallons per day! (With a phosphorus limit of 150mg/L written into the permits, not 20!) Needless to say multiple conservation groups are fighting back, such as the Greater Edwards Aquifer Alliance (GEAA), Save Texas Streams, and the newly formed Save Salado Creek.



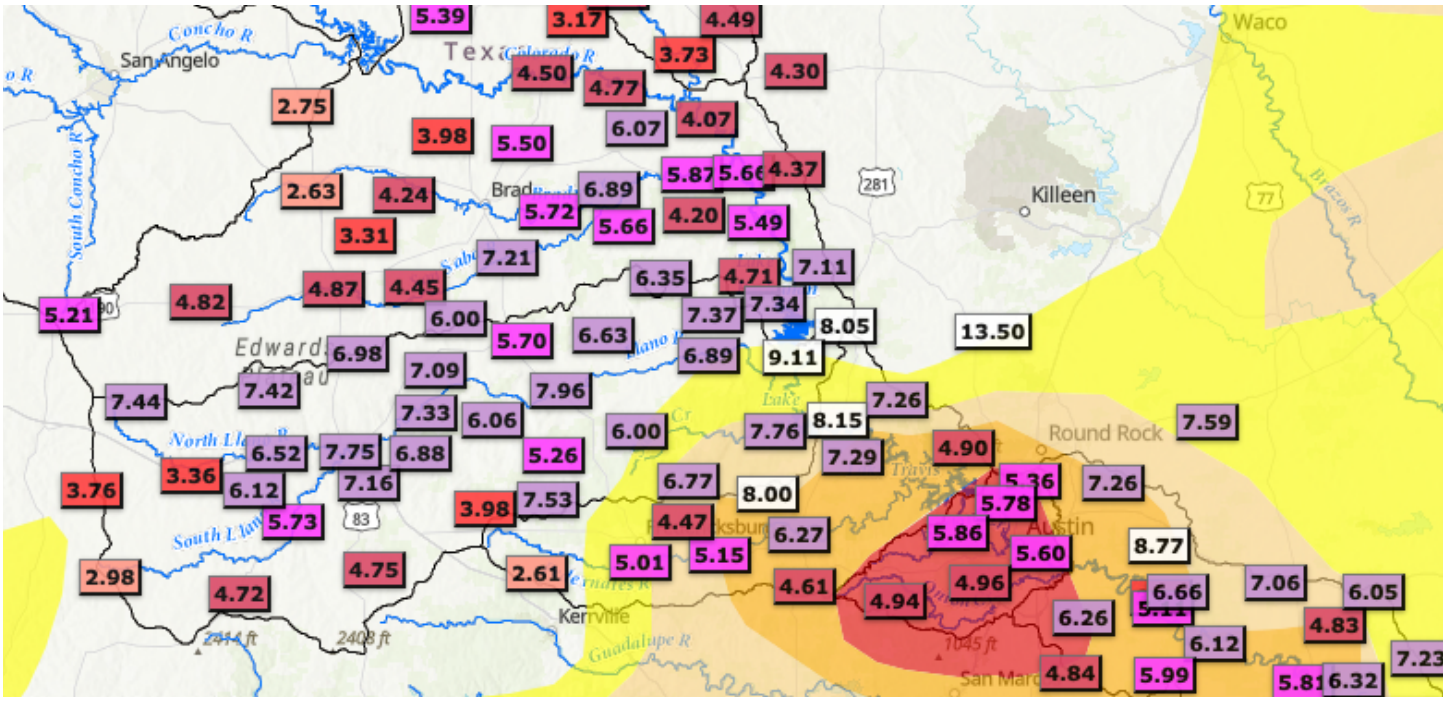
Healthy Creeks Initiative to Combat Invasive Arundo

FOR COMPLETE INFORMATION, Please go to https://www.llanoriver.org and then click on the link that reads: **Healthy Creeks Iniative to Combat Arundo**

LCRA Hydromet Stream Flow as of 5.30.26



Lower Colorado River Authority's Hydromet is a system of more than 275 automated river and weather gauges throughout the lower Colorado River basin in Texas. The website displays gauges maintained by the City of Austin and USGS. The Hydromet provides near-real-time data on stream-flow, river stage, rainfall totals, temperature and humidity. https://hydromet.lcra.org



LCRA Hydromet Rainfall & Drought Monitor last 30 Days as of 5.30.26