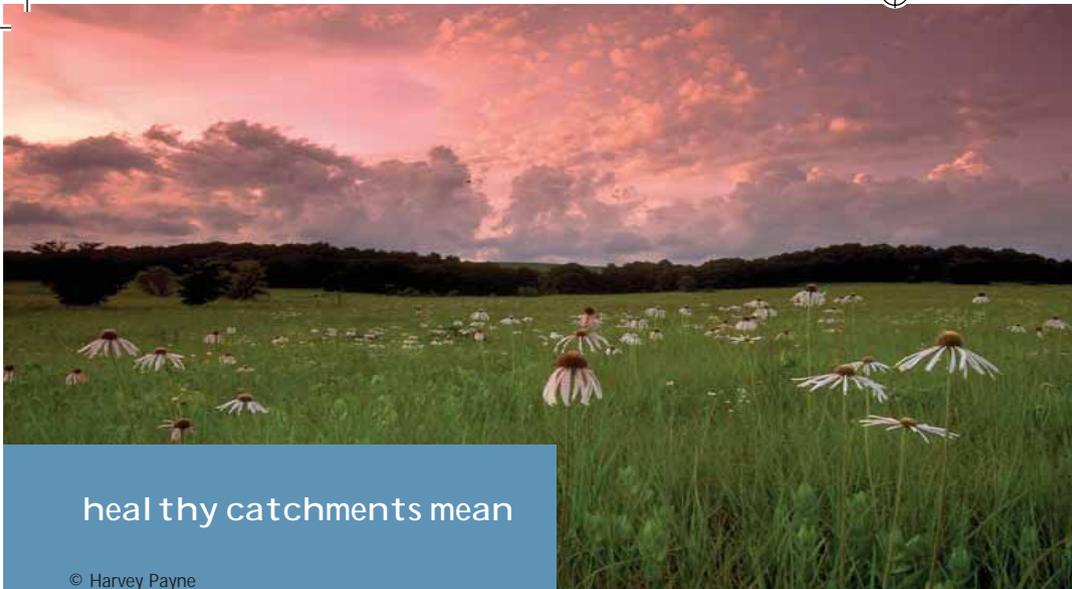


Streamside Management in the Hill Country

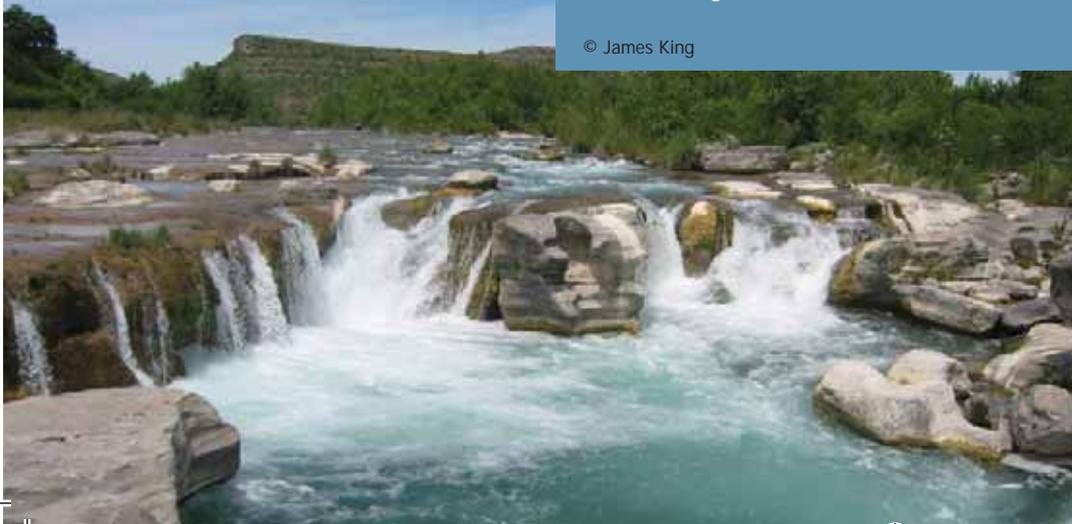
An Edwards Plateau Landowner's Guide





healthy catchments mean

© Harvey Payne



healthy streams and rivers

© James King

"In the primitive state of the country, the mountains and hills were covered with soil and there was an abundance of timber. The plains were full of rich earth, bearing an abundance of food for cattle. Moreover, the land reaped the benefit of annual rainfall, having an abundant supply of water in all places; receiving the rainfall into herself and storing it up in the soil. The land let off the water into the hollows which it absorbed from the heights, providing everywhere abundant fountains and rivers. Such was the state of the country, which was cultivated by true husbandmen, who made husbandry their business, and had a soil the best in the world and abundance of water.

In comparison of what then was, there now remains only the bones of the wasted body. All the richer and softer parts of the soil have fallen away and the mere skeleton of the land being left. For the fact is that a single night of excessive rain now washes away the earth and lays bare the rock. Now the land is losing the water, which flows off the bare earth into the sea."

Plato, *Philosopher*

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hill country water rivers, creeks, springs and seeps

Water, particularly “live”, or running, water is part of the definition of the Edwards Plateau region, or “Hill Country” for many people. The live water of the Edwards Plateau includes rivers, creeks or streams, springs and seeps which all share a direct relationship with the groundwater, or aquifers that underlie the region. Live water is dependent on the aquifers as are millions of people, plants and animals that call the Hill Country home. The aquifers and live water also interact with rain that falls sporadically across the region. The land, water and wildlife are all interwoven, therefore the decisions landowners make today will determine the amount and quality of live water available for both people and natural systems in the future. Running water is also a shared resource. All Hill Country streamside landowners live both upstream and downstream of someone. Your situation is impacted by the decisions of those living above you and likewise, your decisions impact everyone downstream. Good decisions and wise use benefit all.

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the relationship of the hills to the river watersheds versus water catchments

The amount and quality of running water in rivers and streams is determined in large measure by the characteristics of the land it drains, commonly referred to as its “watershed”. Every acre of land in Texas is within a watershed and the land use within an individual watershed will determine how much water enters the river, if the water enters a river fast or slow, whether the water is clean or not clean. In groundwater systems like the Edwards Aquifer of Central Texas, land use on the watershed will impact the quality and quantity of water that enters the groundwater system. Even if your land does not have river or creek frontage, it is very important to the surface and ground waters of the Edwards Plateau. Proper land management, at appropriate scale, can transform “watersheds” to “water catchments” where rainwater is slowed and retained on the land. Slowing runoff into our rivers and streams can improve water quality, improve recharge to groundwater and sustain live water flows over longer periods. Appropriate land management that transforms watersheds into water catchments is a worth-while endeavor for us all.

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even the largest edwards plateau river starts, at least in part, along intermittent tributaries.

the form and function of a river

A river or stream has two main functions, to move water and to move sediment which includes soil, pebbles, rocks, and or boulders depending on the river. A river's course and physical form is a reaction to the water and sediment it has to move, which is tied to conditions in the watershed, the elevation change of the land and the geology of the land it runs through. Rivers and streams will shift course and type of channel as the elevation, amount of water or amount of sediment in the system changes. Hill Country rivers have very different characteristics at their headwaters than further down and when these rivers drop off the Edwards Plateau, they are completely different. Alteration of the river's flow through dams or other structures or through surface or ground water withdrawal can impact the amount of water and sediment in the system. These changes can also alter the river's flow.

Scientists and engineers who study and work with rivers have developed several classification systems to describe different rivers, or different parts of the same river, based on the type of channel. They can also make a determination on the condition of the watershed based on the river's form at a certain point on the landscape. This can be an important part of identifying watershed level problems.

The condition of the watershed, along with rainfall and groundwater influences, determines the amount of water and sediment in the creek or river. These factors and ranch-level management decisions determine the condition of the river's riparian zone and instream habitat which make up the live water habitats of most interest to landowners.



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what is a riparian zone?

how does a healthy riparian zone help my land?

The riparian zone is the band of vegetation that occurs adjacent to the stream bank. In the Hill Country, riparian zones in their natural state typically include grass and grass-like vegetation on the edge of the stream as well as shrub species and trees along the banks and in the floodplain. Healthy riparian zones are very important landscape components in the Hill Country as they provide important

habitat for wildlife and fish, wildlife travel corridors, water quality improvement, sustained stream flows, stream bank stability during flood events and many other benefits. They are also an important recreational resource for anglers, hunters and canoeists, among others.



the riparian zone is the land immediately adjacent to the stream which floods during heavy rains.

Benefits of a healthy riparian zone

- Exceptional wildlife habitat
- Healthy and productive instream habitat
- Reduce velocity of flood water, reduced erosion
- Filter sediment and improve water quality
- Catch sediment and improve water quality
- Store water in banks and floodplain
- Prolong base flow
- Recharge aquifer

Benefits of a healthy riparian zone to biodiversity

- Complex plant communities (native grasses, shrubs and trees)
- Many unique species
- Attractive to birds, mammals, reptiles and amphibians
- Diverse and abundant invertebrates (insects) an important part of the food chain
- Critical to fish and other aquatic life

how can i recognize a healthy riparian zone?

A healthy riparian zone normally has a diverse collection of native vegetation including grasses and grass-like plants, shrubs and trees. These plants should be those that are normally found in close association with water. Many of these species have deep roots that serve to bind the soil of the stream bank and protect against streamside erosion. A list of plants typically found in Edwards Plateau riparian areas can be found near the end of this booklet.



© Nueces River Authority

a combination of grasses and woody plants are necessary for a healthy riparian zone.



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riparian zones can become degraded from overuse by livestock, wildlife or people.

how do i recognize an impaired riparian zone?

An impaired riparian zone can sometimes be difficult to recognize unless the impairment is severe. A lack of vegetation, exposed soil and eroding banks are signs of a degraded riparian area. Vegetation more typical of upland, or drier sites, can also be a clue. Riparian zones dominated by exotic or introduced species such as Coastal Bermuda grass, St. Augustine, King Ranch Bluestem, or similar vegetation should be considered impaired. Areas that have been groomed into a park-like setting (grass and mature trees) or one that is continuously grazed are generally impaired.

Common Riparian Problems

- Manicured landscapes encroaching into riparian zone
- Concentrated grazing
- Excessive numbers of axis deer, feral hogs or other exotics
- Concentrated recreational activities
- Exotic grasses
- Exotic trees and shrubs
- Dams
- Construction in the riparian zone

how does a riparian zone become impaired?

There are many factors that can imperil a riparian zone. Altered stream flow from dams or other stream bank modifications upstream can impair a riparian zone. Overgrazing or overbrowsing by livestock or wildlife can impair a riparian zone. Construction along stream banks, removing vegetation and planting introduced species can all impair a riparian zone. If your riparian zone is impaired, you will have stream bank stability problems, reduced wildlife habitat, degraded fish habitat and silt and possibly pollutants will more readily enter the stream.



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Riparian areas can respond quickly to changes in management. These pictures taken from the same point along Bear Creek in Oregon during 1977 (top) and 1986 (bottom) illustrate the degree of vegetation recovery and channel formation possible from changes in timing and intensity of livestock grazing.

what can be done to improve or maintain riparian zone health?

The single most effective strategy for maintaining the health of your riparian zone is maintaining or restoring appropriate native vegetation. In many cases, this can be accomplished by restoring appropriate management to the site. If the riparian area is part of your grazing program, ensure that you have the ability to manage the grazing by fencing the riparian zone. You may also want to consider developing alternative sources of livestock water or specific watering areas in the riparian zone to limit livestock impacts. If you do not have livestock, but keep your riparian zone groomed for recreation, consider a change in land management to allow the native vegetation to grow in most of the area and maintain a smaller recreational footprint at the water's edge. If you farm up to the rivers edge, or your riparian zone is dominated by introduced or exotic vegetation due to past land use, you may want to consider replanting with a mixture of native grasses, shrubs and trees.

Do's and Don't of Riparian Management

- Do** encourage and allow dense native vegetation to grow
- Do** restrict recreational activities or rotate locations
- Do** restrict riparian grazing to 30-60 days per year
- Do** control exotic trees such as Chinese tallow, ligustrum and chinaberry
- Don't** mow and manicure riparian areas
- Don't** alter the channel or banks
- Don't** remove dead and fallen trees
- Don't** burn in riparian areas
- Don't** graze continuously with livestock

instream habitat includes the water, stream bed and banks of the stream and is strongly influenced by vegetation at the water's edge

what is instream habitat and why is it important?

“Instream” habitat determines the kind and amount of fish, insects and other organisms that live in the water. Components of instream habitat include: water quality, water chemistry, water quantity or flow, shading of the water surface, characteristics of the streambed such as shape and streambed material as well as other factors such as decaying wood and other organic matter. Slow moving, cloudy, deep water over a silt or sand bottom will provide habitat for a different group of organisms, than will shallow, fast moving, clear water over a gravel bottom. Both of these habitat types will occur on many Central Texas rivers. Learning more about the structure and flow of your stretch of the river can help you determine what types of organisms you might expect to find there.



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quality of instream habitat can be dependent on downed wood and natural channel characteristics such as rocks and gravel.

how does instream habitat become impaired?

Many factors can impair instream habitats including those that can degrade riparian zones. These include reduced or otherwise altered flows from dams or water withdrawals, excessive sediment loading or excessive floodwaters from land use practices in the watershed. Local impacts can also result from streambed modification such as gravel clearing, dredging or removal of dead wood and a degraded riparian zone. Instream habitats modified by large scale or local influences will not support the same quantity and quality of aquatic life as those that are part of a river or stream that is functioning naturally.



Aquatic organisms can be indicators of water quality and instream habitat characteristics. An abundance of green sunfish (top) with few other species can be indicative of lower quality instream habitat, while an abundance of Texas shiners (bottom) along with other species can indicate higher quality instream habitat.

Photos from *Freshwater Fishes of Texas: A Field Guide* (In Press) by Chad Thomas, Timothy H. Bonner, and Bobby G. Whiteside, Texas A&M Press, 2007.

what can be done to improve or maintain quality instream habitat?

Two of the most important factors in maintaining quality instream habitat are the maintenance of natural stream flow and good water quality. These factors in many cases are determined by land and groundwater use throughout the watershed, but they can also be impacted locally by construction of new dams and water crossings, non-functional riparian zones and sediments or nutrients entering the river. Limiting other modifications to the streambed and stream channel will also help to maintain quality instream habitat. Restoring riparian zone functionality is an excellent way to improve instream habitat along your river or creek front.

who can help me with management of my watershed, streams and riparian zones?

For more information and publications on riparian zones visit the Texas Riparian Association (www.texasriparian.org) and the Alberta Riparian Habitat Management Society (www.cowsandfish.org). There are many sources of assistance available to landowners and communities interested in maintaining or improving their streams, riparian zones and watersheds. Technical assistance, much of it at no cost to the landowner, is available from state agencies such as the Texas Parks and Wildlife Department (www.tpwd.state.tx.us), Texas Cooperative Extension (<http://texasextension.tamu.edu>) and local Soil and Water Conservation Districts (www.tsswcb.state.tx.us/swcds.html). Assistance is also available from the USDA-Natural Resources Conservation Service (www.tx.nrcs.usda.gov), private consultants, conservation organizations such as The Nature Conservancy (nature.org/texas) and other organizations such as the Lower Colorado River Authority (www.lcra.org), Nueces River Authority (www.nueces-ra.org), Guadalupe-Blanco River Authority (www.gbra.org) and Guadalupe-Blanco River Trust (www.gbrtrust.org). In some cases there may be financial assistance available for land and water conservation projects from these same sources.



© Bill Stout

riparian zone plant list for the edwards plateau

The function of riparian zones is determined by a combination of erosion, deposition, hydrology and riparian vegetation. As a streamside landowner, the factor you can most influence is the plant community that exists in the riparian zone. Different plant species, or groups of plants, provide unique attributes or riparian zone function. A diversity of plants, both in species and structure, is needed to provide optimum wildlife habitat for example. The plant community is also critical to streambank stability. Stable streambanks usually need a mix of species that include those with both fine roots and those with larger, more substantial roots. In most cases, this requires a mixture of sedges or rushes, grasses and woody species. A good illustration of this concept is concrete. For concrete to be durable, it needs the correct mixture of cement, sand, gravel (fine roots) and reinforcing steel (large roots). Below is a list of plants typically found in functional riparian zones of the Edwards Plateau. Not all plants are typical across the entire ecological region and this list is not exhaustive.

<u>Sedges-Rushes</u>	<u>Grasses</u>	<u>Forbs</u>	<u>Shrubs</u>	<u>Trees</u>
spike rush	switchgrass	water willow	buttonbush	cypress
emory sedge	Eastern gamagrass	water primrose	indigobush	sycamore
saw grass	bushy bluestem	tall goldenrod	elderberry	black willow
bulrush	knotgrass	frogfruit	baccharis	pecan
scouring rush	rice cut-grass		roughleaf dogwood	walnut
				elm

streambank health checklist

(adapted from Alberta's Cows and Fish Program's Riparian Health Checklist)

Answer the thirteen questions to find out how healthy your streambank is. If you are unsure about an answer, leave it blank.

1. 85% or more of the riparian area is covered with vegetation (of any kind). Yes No
2. More than 50% of the riparian plants are taller than knee height. Yes No
3. Shrubs and trees such as buttonbush, cypress, willow, sycamore, pecan or elm are growing along or near the stream edge, and grow without a browse line or hedged appearance. Yes No
4. There are young trees and shrubs that will replace the older ones over time. Yes No



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5. Exotic plants such as bermudagrass, King Ranch bluestem, St. Augustine, dallisgrass, chinaberry, ligustrum, salt cedar, Christ-thorn make up less than 15% of all the plants growing in the riparian area. In other words, native plants dominate the riparian zone. Yes No
6. Plowing or mowing is setback at least 100 feet from the stream Yes No
7. The bank is NOT damaged by recreational use, livestock or other activities. There are no exposed and eroding soils or slumping banks. Yes No
8. The stream channel is narrow and deep in most places Yes No
9. The stream appears to be able to cover the floodplain every 1 to 2 years. Yes No
10. Water in the stream is clear and NOT cloudy, full of sediment, algae or moss. Yes No



11. There are no retaining walls, rip-rap or other bank stabilizing structures.

Yes No

12. Wildlife are often seen in the riparian area and fish live in the stream.

Yes No

Total YES _____

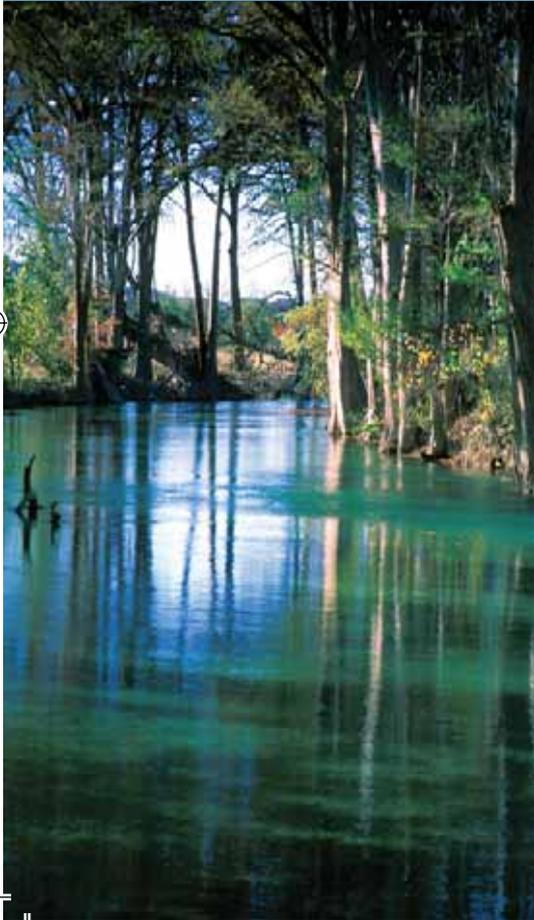
Total NO _____

If you answered YES to 10 or more questions it is likely that your riparian area is healthy and functioning well providing key riparian functions such as trapping sediment, buffering the impact of flooding, providing primary productivity and providing fish and wildlife habitat.

If you answered NO to 10 or more questions it is likely that your riparian area is unhealthy and not functioning properly. Such a riparian area can show signs of erosion, absence of fish and wildlife, and reduced water quality.

If you answered NO to 5 or more of these questions the riparian area could be healthy but with problems. Some riparian functions may be impaired.





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