CITY OF AUSTIN WATERSHED PROTECTION DEPARTMENT

COMMUNITY CREEKSIDE MONITORING PROTOCOL

A **Riparian Zone (**the area of land adjacent to the creek) acts as a buffer between the aquatic and terrestrial environments, serving to minimize impacts to water quality and quantity. The **ecological functions** of the riparian zone include: erosion control, water filtration, bank stabilization, temperature regulation, floodwater control, carbon sequestration, groundwater recharge, and plant and animal habitat and food source. As a riparian zone becomes increasingly **degraded**, these basic goods and services can be reduced. Changes in how the water moves across the land and through the creek are the primary causes of this impairment in ecosystem function. In addition, changes in the vegetation, soil health, and width of the riparian zone can also lead to losses in ecosystem function. The goal of **riparian zone restoration** is to restore the natural processes necessary to maintain ecosystem function. In general, an increase in riparian buffer size can increase ecosystem function (Figure A).

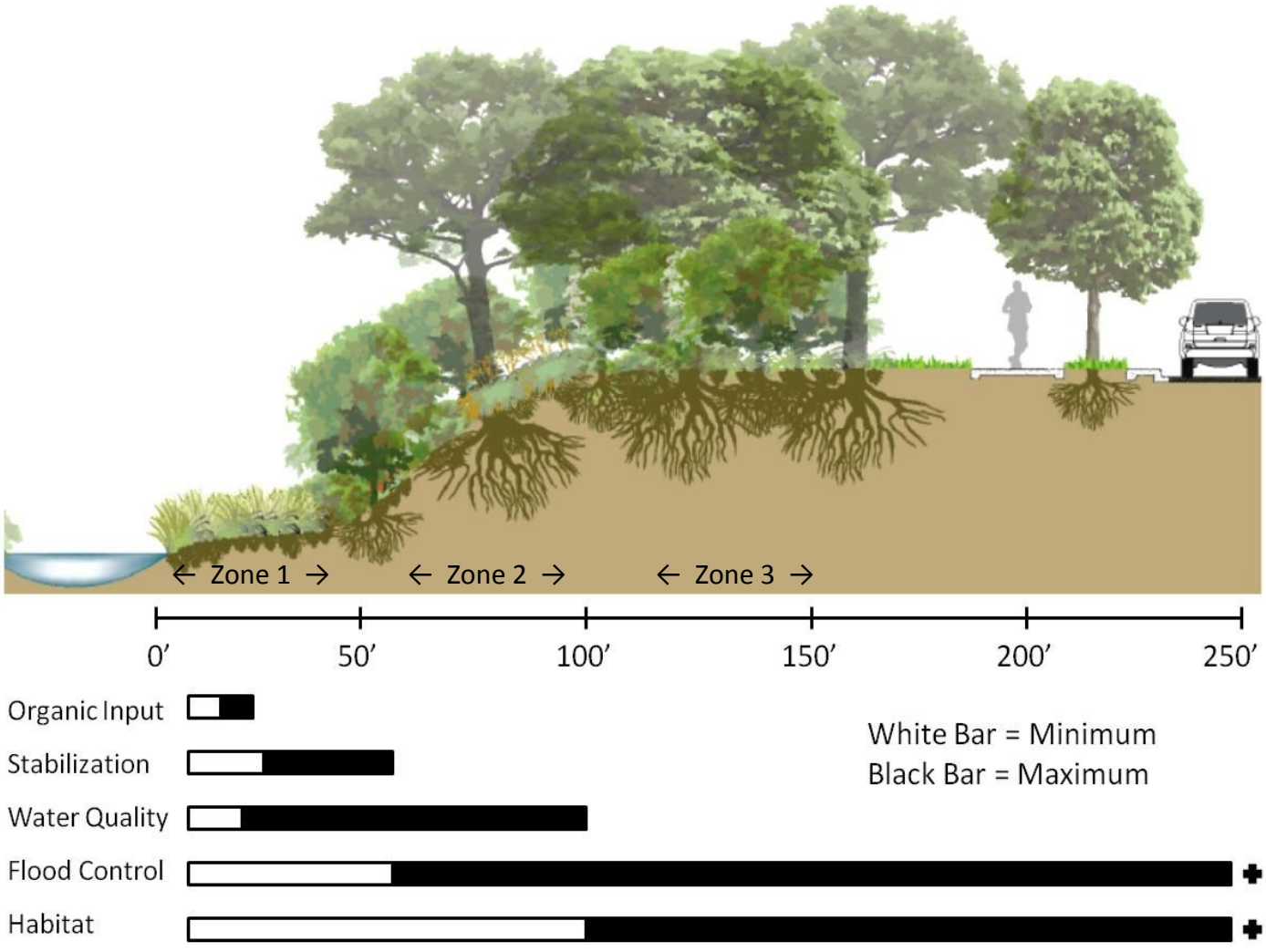


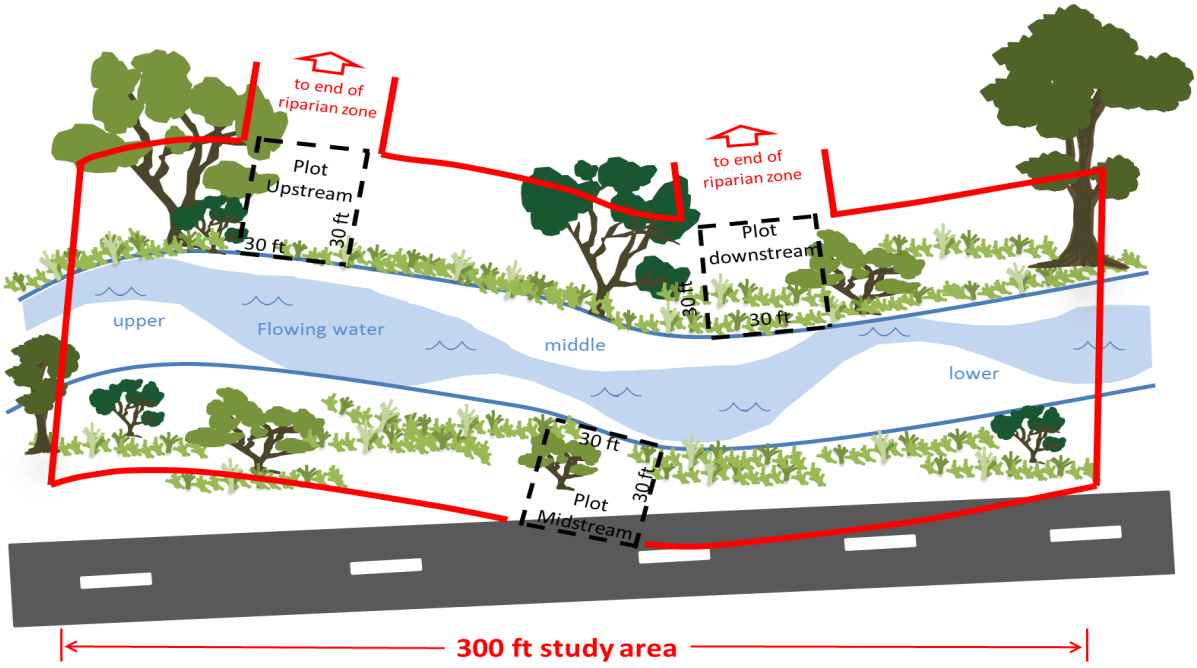
Figure A: Riparian buffer widths required to provide ecosystem services. White bar represents the minimal distance necessary to obtain associated benefit. Black bar represents the distance at which full benefits are being provided by the riparian zone.

COMMUNITY CREEKSIDE MONITORING PROTOCOL

METHODS

Your riparian study area should consist of an approximately 300-foot stream segment that best represents the area. A representative study area should include both healthy and degraded riparian sections but should attempt to capture average conditions. Conduct monitoring between late **April and October** when leaves are on trees. Annual monitoring of the same sample plots over time is essential for tracking long-term restoration progress and changes are best captured if the monitoring takes place within the same month every year.

- Select three sample plots (30 x 30 feet each) along the study area, on both sides of the stream bank (if possible). The edge of the plots begins at the edge of the active stream bed (where the water normally flows in small rain events).
- Measure your plot with 30 ft rope or measuring tape. Mark the corners of your sampling plots with flags.



300 ft study area with three representative sampling plots and sampling points.

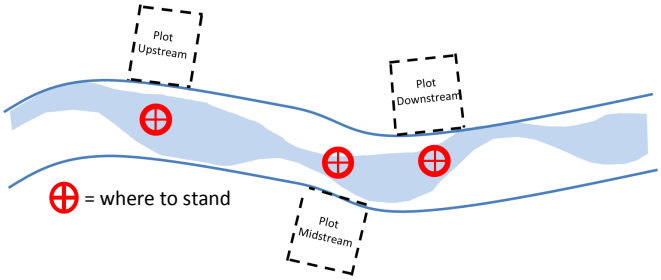
Tools and equipment: Manual, Score Sheet or mobile device, 300 ft. measuring tape, flags, clipboard, Central Texas Wetland Guide, COA Invasive Species Guide, and trash bags.

Additional documentation consisting of photographs, GPS coordinates, and detailed notes should be taken when possible. Taking photos is a great way to track changes over time. Marking the location where photos were taken enables tracking changes over time.

Within the study area, follow the detailed methods for each parameter listed on the following pages. Record all information on the Community Creekside Monitoring Protocol worksheet at the end of this document. Once the worksheet has been completed, circle the appropriate boxes on the score sheet. Add up each section on the score sheet to determine the health of your riparian zone.

SAMPLE PARAMETERS

1. **Channel Shading**. Riparian vegetation shades the stream, helps maintain higher dissolved oxygen and reduced algal growth, which makes better habitat for aquatic life.
- Stand at the center of the channel (or the edge of the water if too deep)
- Look up at the sky
- Select the category that best represents the shading over the stream surface



0 to 25 % channel shade = poor (score 0)

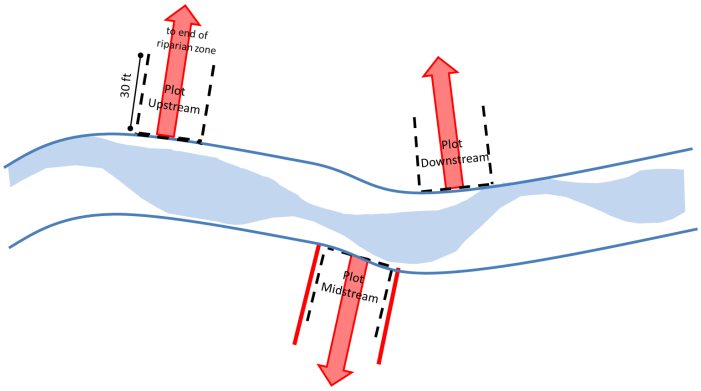
26 to 50 % channel shade = marginal (score 1)

51 to 75 % channel shade = suboptimal (score 2)

> 75 % channel shade = optimal (score 3)

2. Riparian Zone Width: for each plot

- Estimate the width of undisturbed vegetation (not mowed, paved, etc.) from the water, perpendicular to the stream channel, to the end of the riparian zone.
- Select the score that best represents the riparian width.



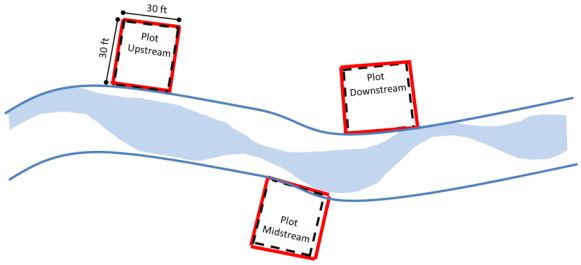
Start of a riparian width measurement.

End of a riparian width measurement .

Start and end of a riparian width measurement. In this example, the riparian buffer is smaller than the plot.

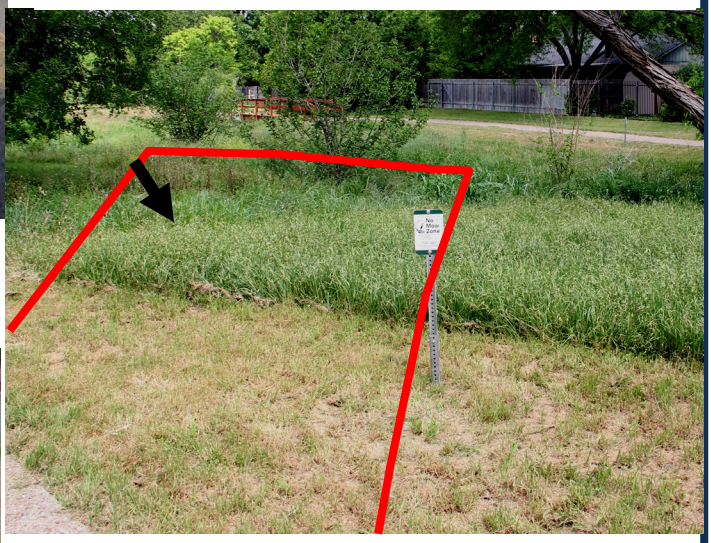
3. Undisturbed ground: for each plot

- Select the category that best represents the amount of the ground that is undisturbed (ie. ground not mowed, compacted, paved, or with bare soil)

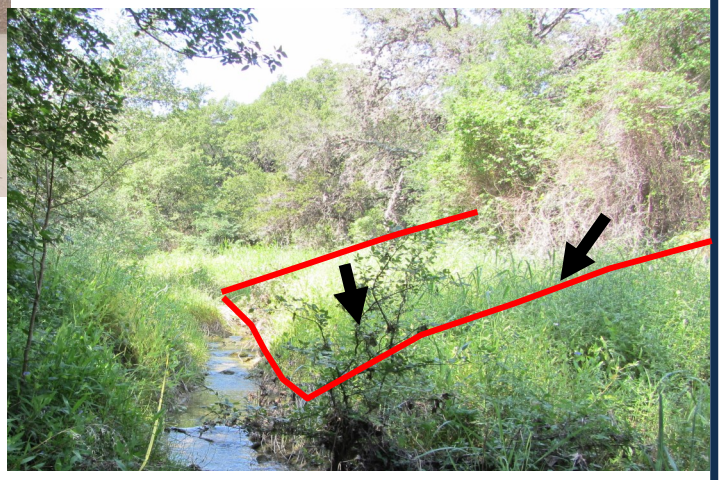


Poor (score 0) undisturbed ground covers less than 25% of the plot (red line). Most of the area is compacted, mowed, and/or has impervious cover

Marginal (score 1) undisturbed ground covers between 26% and 50% of the plot (red line). The black arrow shows where the ground is undisturbed



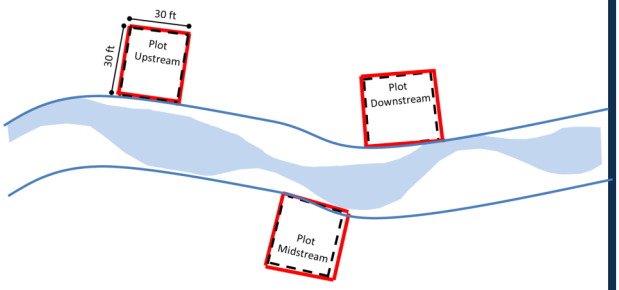
Suboptimal (score 2) undisturbed ground covers between 51% and 75% of the plot (red line). The black arrow shows where the ground is undisturbed



Optimal (score 3 optimal) undisturbed ground covers more than 75% of the plot (red line). Black arrows show where the ground is undisturbed

4. Plant Layers: for each plot

- Envision the plant layers as the 'shadow' the plants in each layer could cast (**Figure F**).
- Assess the plot while focusing on one plant layer at a time and look at only the vegetation within the plot. All branches over the plot are counted as cover, regardless of their trunk location.
- Select the score that best represents the amount of plant cover at each layer and then average the score for each plot (round to one decimal). See examples (pages 7 and 8).

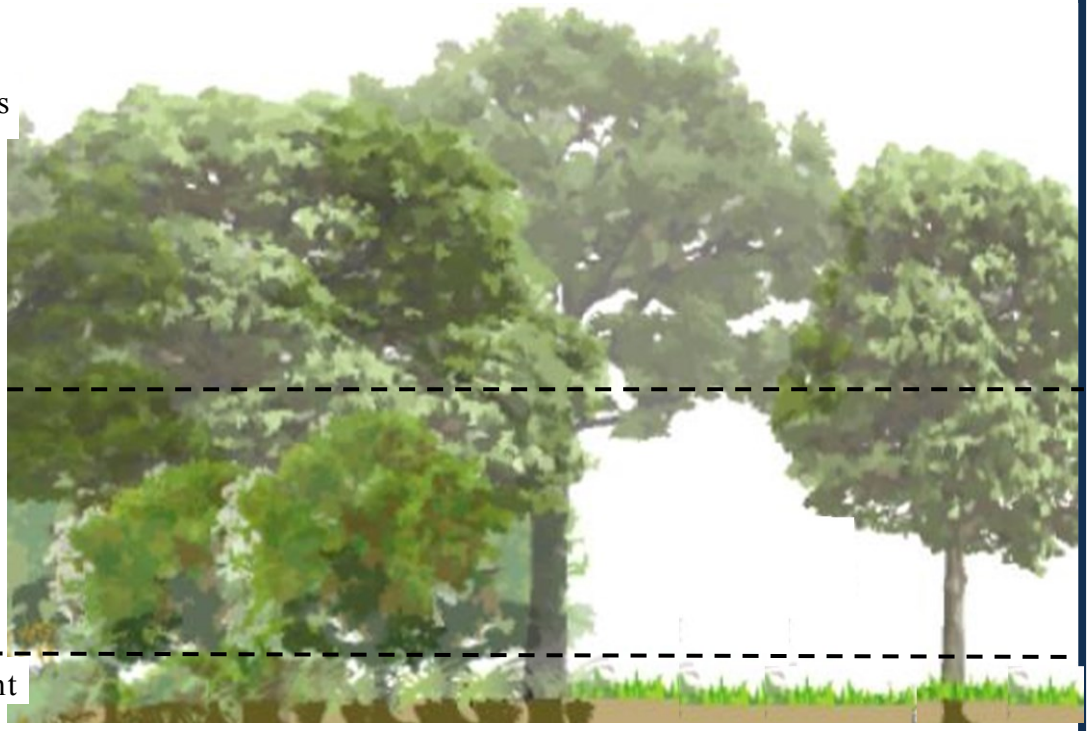


Groundcover (below knee height): **0** = < 10 % **1** = 10-40 % **2** = 41-75 % **3** = > 75 %

Understory (knee height to 15 ft.): **0** = < 10 % **1.5** = 10-40 % **2.5** = 41-75 % **3.5** = > 75 %

Canopy (over 15 ft.): **0** = < 10 % **2** = 10-40% **3** = 41-75 % **4** = > 75 %

Figure F: Riparian Zones



Canopy: > 15 ft.

Understory: 1.5 -15 ft.

Groundcover: knee height

Example 1

Layer	Percent	Score
Groundcover	> 75 %	3
Understory	< 10 %	0
Canopy	41-75 %	3

The average score for this plot is 2.0

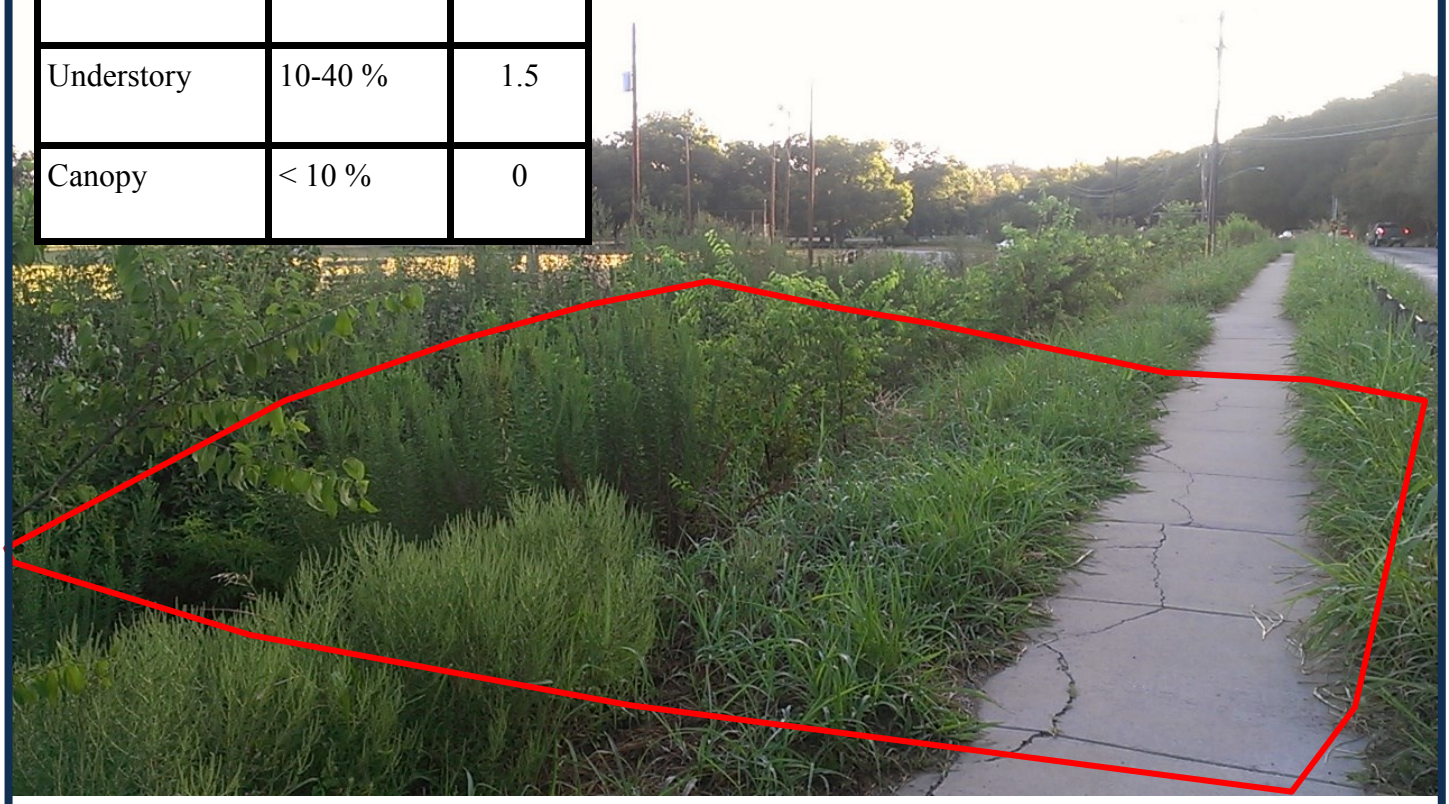
Example 2

Layer	Percent	Score
Groundcover	41-75 %	2
Understory	41-75 %	2.5
Canopy	41-75 %	3

The average score for this plot is 2.5

Example 3

Layer	Percent	Score
Groundcover	41-75 %	2
Understory	10-40 %	1.5
Canopy	< 10 %	0



The average score for this plot is 1.17, which is rounded up to 1.2 for reporting.

5. Invasive Species Cover. for each plot

- Select the score that best represents the amount of invasive cover at each layer.
- Average the score for each plot (round up for 0.5 and above).

Groundcover (knee height)**:** **0** = >40% **1** = 20-40% **2** = 5-20 % **3** = < 5%

Understory (knee height to 15 ft.): **0** = >40 % **1** = 20-40% **2** = 5-20 % **3** = <5%

Canopy (above 15 ft.): **0** = >40% **1** = 20-40% **2** = 5-20% **3** = <5%


Glossy privet

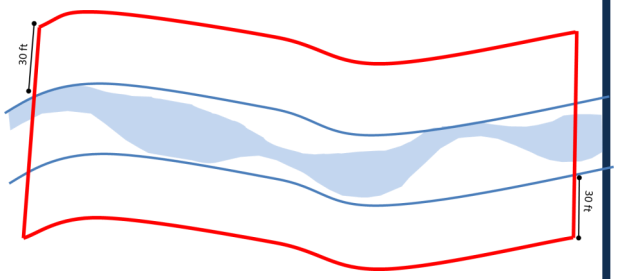

Chinaberry


Chinese Tallow


Tree of Heaven

Common invasive riparian trees of Austin. Source: USDA Invasive Plants in Southern Forests Field Identification Guide. For additional identification information see www.austintexas.gov/invasive.

6. Native Tree Size Classes. The presence of seedlings and saplings of riparian trees is an indication of current and future riparian forest potential. A healthy, functioning riparian zone will contain all age classes of native riparian tree species. Absence of one or more size classes is often a result of disruptions to natural ecosystem processes. Absence of seedlings and saplings leads to changes in the plant community and species loss.



Throughout the **entire 300 ft. study area**

- Determine the presence or absence of different sizes of the native riparian trees (**Figure I**).
- Record the appropriate size classes present on the worksheet. Some common riparian trees of Austin are listed below (**Figure J**). For additional identification information visit the Texas Forest Service Trees of Texas website (http://texastreeid.tamu.edu/content/links/) or the USDA plant

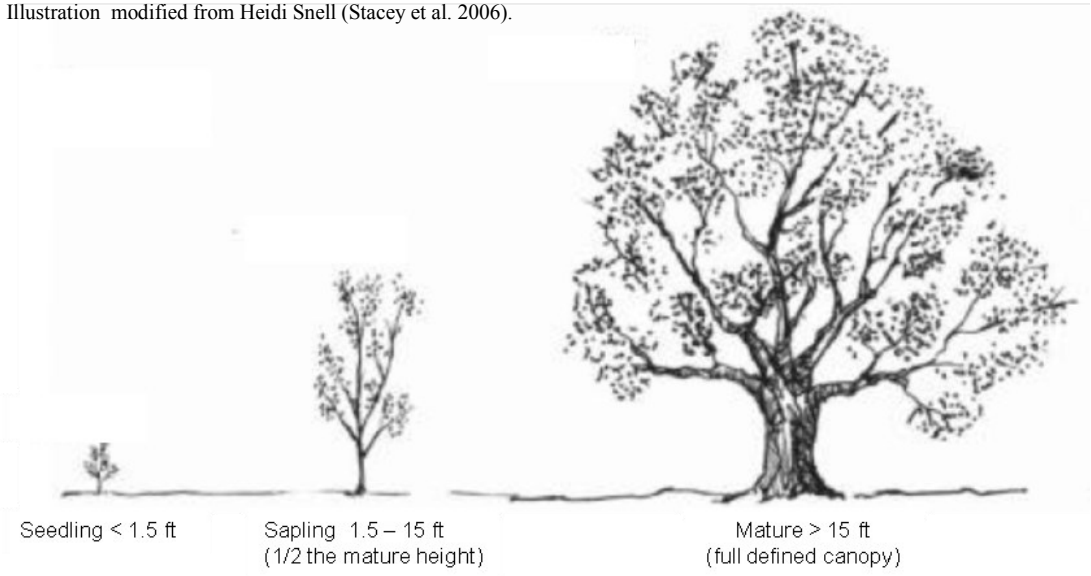


Figure I: Seedlings are defined as knee height or less. Saplings are taller than knee height to about 15 ft but have yet to reach half their mature height and lack a fully defined canopy. Mature trees are approaching their maximum height and display a fully developed canopy.

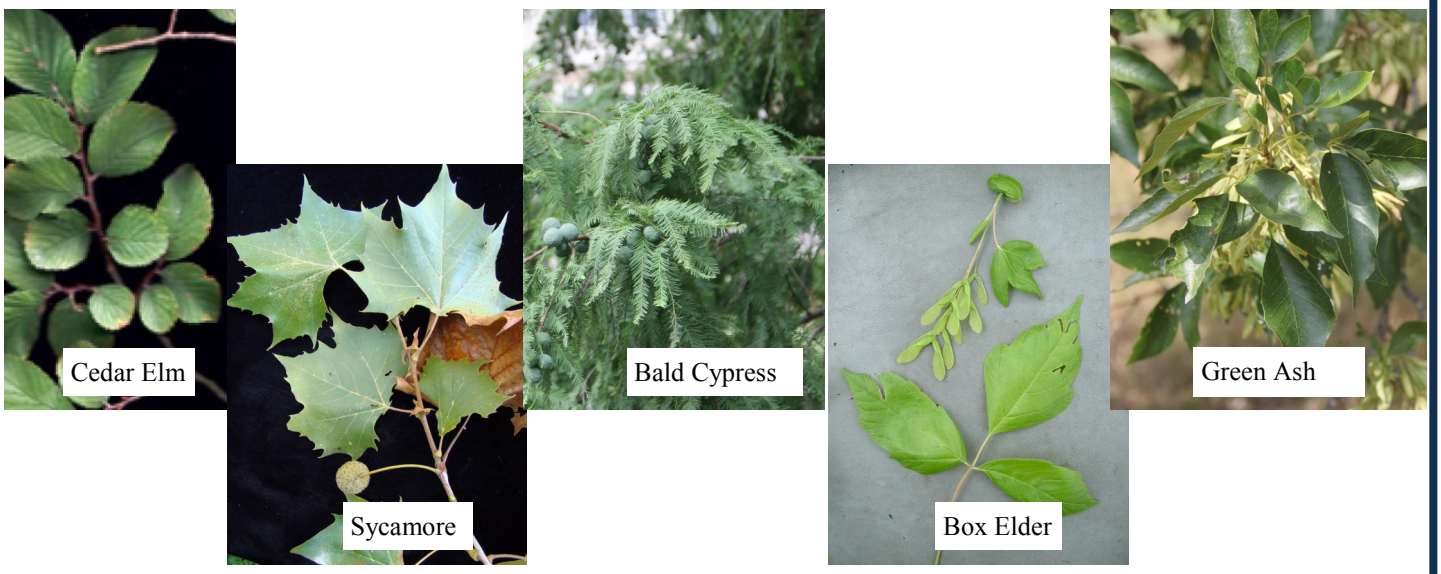


Figure J: Common dominant native riparian trees in Austin. Source: USDA-NRCS PLANTS Database.

7. Large Woody Debris (LWD). Tree branches and trunks that have fallen in streams dissipate stream energy and improve channel stability. Streams with adequate LWD have greater habitat diversity, a more natural meandering stream shape, and reduced flooding downstream. LWD also provides important habitat for aquatic life.

Throughout the **entire 300 ft. within the stream channel:**

- Look for fallen wood with at least **6 in. diameter and 3 ft. long,** partially exposed to the water or in the stream channel.
- Record the number of LWD pieces present.

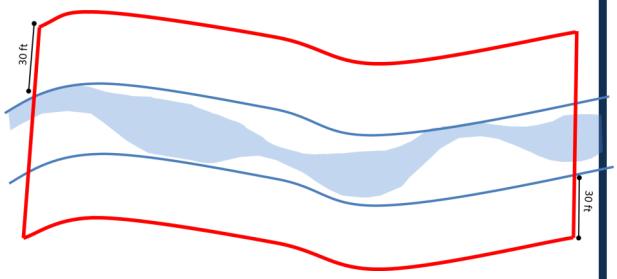


Figure M: Downed trees and limbs in the creek channel are examples of Large Woody Debris.

8. Snags. Dead standing trees provide critical habitat for many bird and insect species. In addition, snags are a source of Large Woody Debris for the channel.

Throughout the **entire 300 ft. study area:**

- Look for dead standing trees with at least 6 in. diameter and 6 ft. height.
- Record the number of snags.

Figure N: Snags

COMMUNITY CREEKSIDE MONITORING PROTOCOL WORKSHEET

SITE NAME _____ CREEK _____

WATERSHED _____DATE_____

	Upstream Point	Midstream Point	Downstream Point	Score
1 Channel Shading	0 = < 25 % 1 = 26-50 % 2 = 51-75 % 3 = 75-100 %	0 = < 25 % 1 = 26-50 % 2 = 51-75 % 3 = 75-100 %	0 = < 25 % 1 = 26-50 % 2 = 51-75 % 3 = 75-100 %	(average of all three plots) _____
	Upstream Plot	**Midstream Plot**	**Downstream Plot**	**Score**
2 Riparian Zone Width	0 = < 25 ft. 1 = 26-60 ft. 2 = 60-100 ft. 3 = > 100 ft.	0 = < 25 ft. 1 = 26-60 ft. 2 = 60-100 ft. 3 = > 100 ft.	0 = < 25 ft. 1 = 26-60 ft. 2 = 60-100 ft. 3 = > 100 ft.	(average of all three plots)
	Upstream Plot	**Midstream Plot**	**Downstream Plot**	**Score**
3 Undisturbed Ground	0 = < 25 % healthy 1 = 25-50 % healthy 2 = 51-75 % healthy 3 = > 75 % healthy	0 = < 25 % healthy 1 = 25-50 % healthy 2 = 51-75 % healthy 3 = > 75 % healthy	0 = < 25 % healthy 1 = 25-50 % healthy 2 = 51-75 % healthy 3 = > 75 % healthy	(average of all three plots) _____
4 Plant Layers For each plot, add Ground, Understory, and Canopy points and divide by three. For the overall score, add scores from plots 1-3 and divide by 3).	**Upstream Plot** **Ground** 0 = < 10 % cover 1 = 10-40 % cover 2 = 41-75 % cover 3 = < 75 % cover **Understory** 0 = < 10 % cover 1.5 = 10-40 % cover 2.5 = 41-75 % cover 3.5 = < 75 % cover **Canopy** 0 = < 10 % cover 2 = 10-40 % cover 3 = 41-75 % cover 4 = < 75 % cover Average Plot score (one decimal)_____	**Midstream Plot** **Ground** 0 = < 10 % cover 1 = 10-40 % cover 2 = 41-75 % cover 3 = < 75 % cover **Understory** 0 = < 10 % cover 1.5 = 10-40 % cover 2.5 = 41-75 % cover 3.5 = < 75 % cover **Canopy** 0 = < 10 % cover 2 = 10-40 % cover 3 = 41-75 % cover 4 = < 75 % cover Average Plot score (one decimal)_____	**Downstream Plot** **Ground** 0 = < 10 % cover 1 = 10-40 % cover 2 = 41-75 % cover 3 = < 75 % cover **Understory** 0 = < 10 % cover 1.5 = 10-40 % cover 2.5 = 41-75 % cover 3.5 = < 75 % cover **Canopy** 0 = < 10 % cover 2 = 10-40 % cover 3 = 41-75 % cover 4 = < 75 % cover Average Plot score (one decimal)_____	**Score** (average of all three plots, keep one decimal) _____

For each parameter, circle the number in each box and write the average in the right column.

COMMUNITY CREEKSIDE MONITORING PROTOCOL WORKSHEET

	Upstream Plot	Midstream Plot	Downstream Plot	Score
5 **Invasive Species Cover** G = ground cover U = understory C = canopy	0 = > 40 % invasive 1 = 20-40 % invasive 2 = 5-20 % invasive 3 = < 5 % invasive G_____ U_____ C_____ Average Plot score (one decimal)_____	0 = > 40 % invasive 1 = 20-40 % invasive 2 = 5-20 % invasive 3 = < 5 % invasive G_____ U_____ C_____ Average Plot score (one decimal)_____	0 = > 40 % invasive 1 = 20-40 % invasive 2 = 5-20 % invasive 3 = < 5 % invasive G_____ U_____ C_____ Average Plot score (one decimal)_____	(average of all three plots) _____

	Along whole study area Size Classes Present (circle)	Score
6 **Native Tree Size Classes**	Seedlings Saplings Mature trees	**0** = 0 classes **1** = 1 size class **2** = 2 size classes **3** = all 3 size classes _____

	Score
7 **Large Woody Debris**	**0** = no LWD pieces **1** = 1-3 LWD pieces **2** = 4-6 LWD pieces **3** = > 6 LWD pieces _____

	Score
8 **Number of Snags**	**0** = 0 snags **1** = 1-3 snags **2** = 4-6 snags **3** = > 6 snags _____

Add the scores for each parameter and circle the overall Riparian Score below

Riparian Score	**Optimal > 21**	**Suboptimal 14-21**	**Marginal 7-13**	**Poor 0-6**