

# Chapter 7

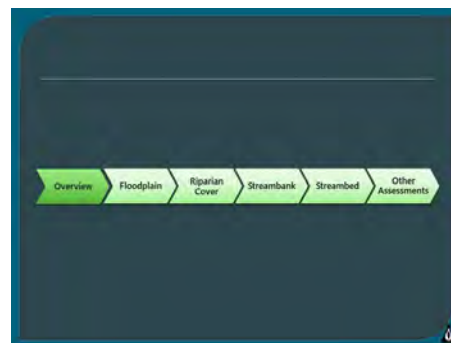
## Visual Survey



Visual Survey is the physical assessment of a stream site. This assessment helps to interpret water quality data and determine if there are observable problems in or around the stream.


In this chapter, you'll learn how to characterize the environment through which your stream flows. Specifically, we will cover the characteristics of the following parts of the watershed and stream:

- Floodplain
- Riparian cover
- Streambank
- Streambed
- Other assessments



### VISUAL SURVEY

- Observations of the environment through which a stream flows
- Water quality is dependent on local conditions
- Conducted twice per year
  - Once with foliage present
  - Once with foliage absent



Overview
Floodplain
Riparian Cover
Streambank
Streambed
Other Assessments

## Visual Survey

The purpose of visual survey is to record observations of the environment in and around the stream. These characteristics have a large affect on the water quality of your stream.

By documenting conditions using Visual Survey, we can look at changes in the watershed and stream over time, which help get a better understanding of how water quality responds to those changes.

Visual survey is conducted two times per year.

- Once with foliage present, around September or early October
- Once with foliage absent, around February or March

These are also the times we recommend doing biological monitoring.

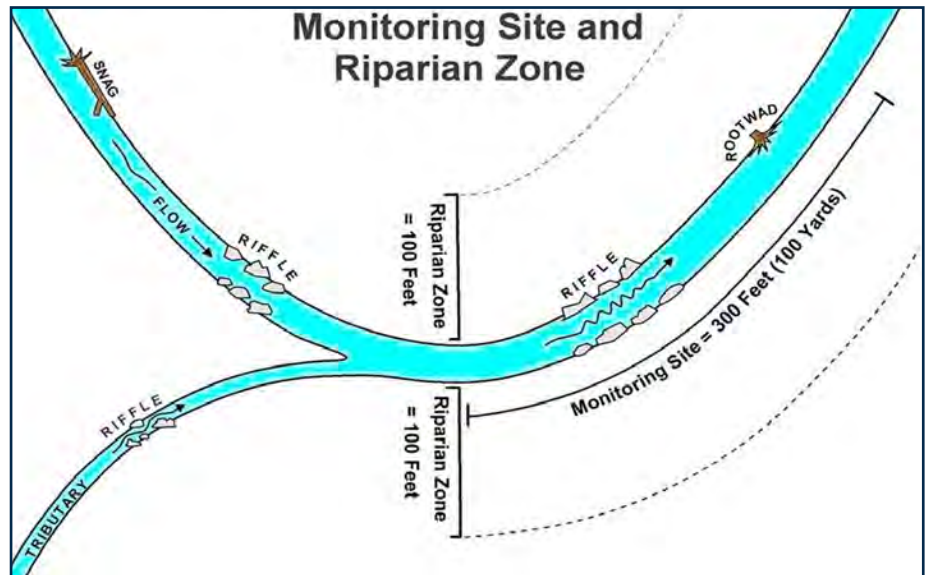
Visual survey should be completed along the same stretch of stream each time that data is collected.



#### VISUAL SURVEY DATA SHEET

Site # _____		Stream _____		County _____	
Site Location _____					
Date _____	Time (indicate AM/PM) _____	Weather (include cloud cover) _____	Water Temp (°C) _____		
Visual Data Reliability (dependent on weather) _____					
Participant _____					
*1. Floodplain land use: _____ % industrial _____ % commercial _____ % residential _____ % pasture hay fields _____ % row crops _____ % woods _____ % other (specify) _____ %					
*2. Riparian cover: _____ % trees _____ % grasses or weeds _____ % bare ground _____ %					

Overview
Floodplain
Riparian Cover
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## Visual Survey Data Sheet

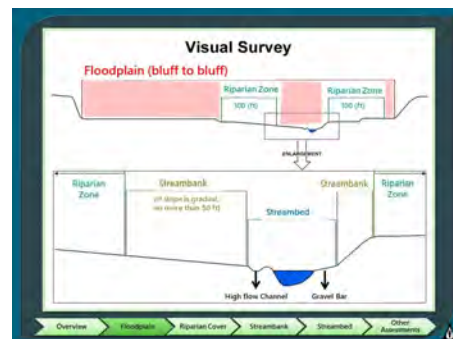
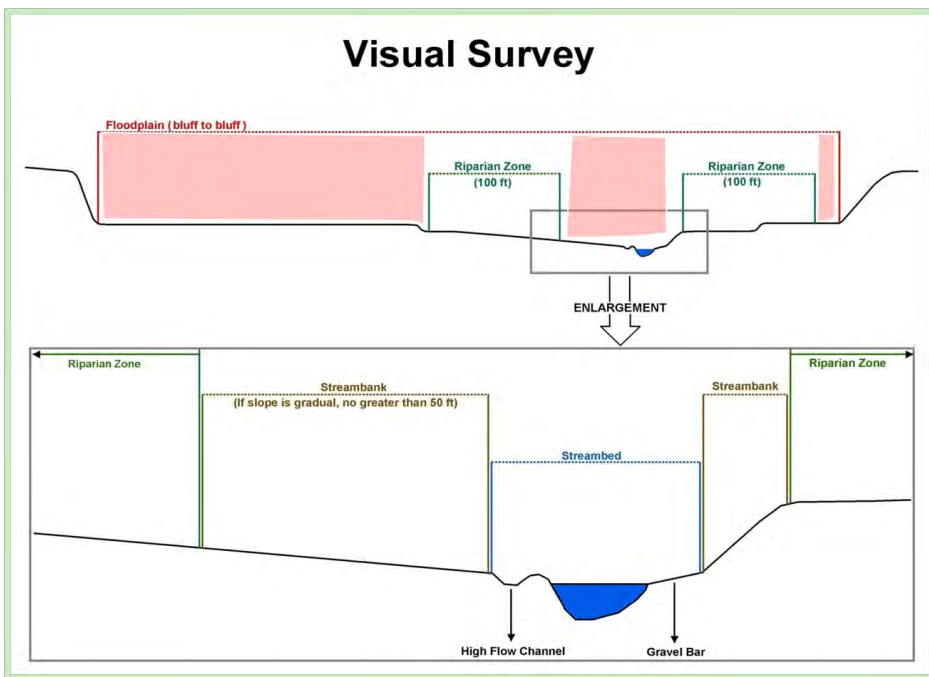
This data sheet is subjective. If you monitor with a team, have the same person make the determination for the values for every monitoring trip.

As with all data sheets, the first section is the header information. This section is covered in the Site Selection chapter.

Many of the sections on the Visual Survey data sheet are for entering percentages for what is present in each part of the watershed or stream. These percentages should add up to 100%.

# Floodplain

A floodplain is the flattened portion of a stream valley susceptible to flooding. This extends from riparian zone to bluff on both sides of the stream. In many streams you will not see the bluffs from the water.



On the Visual Survey data sheet, you will assess the floodplain for the following land use:

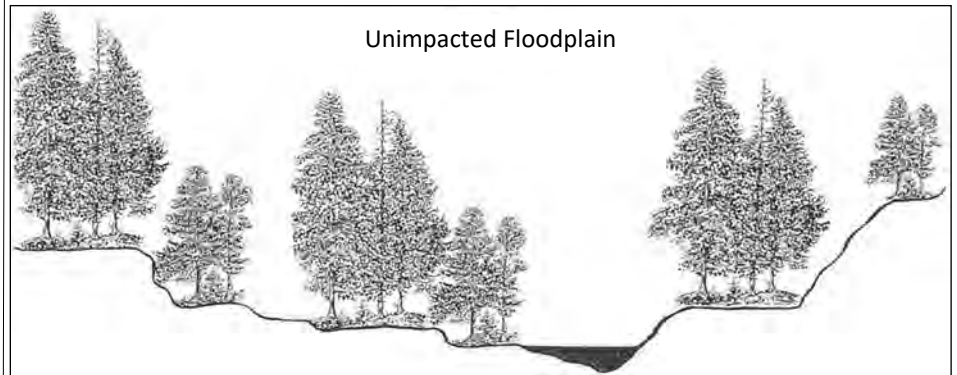
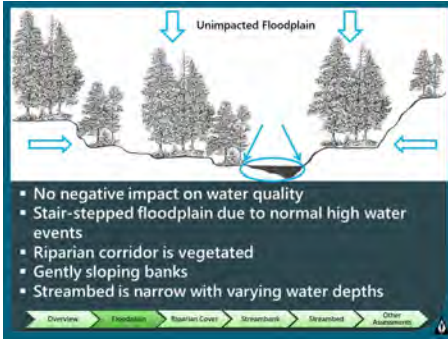
- Industrial
- Commercial
- Residential
- Pasture/Hayfields
- Row crops
- Woods
- Other (please specify)

## Floodplain

### *Unimpacted Floodplain*

In an “unimpacted” floodplain, land use has not negatively impacted water quality.

- The floodplain has a stair-stepped appearance due to normal intensity high water events.
- The riparian corridor is vegetated.
- Streambanks are gently sloping.
- Streambed is narrow with varying water depths.



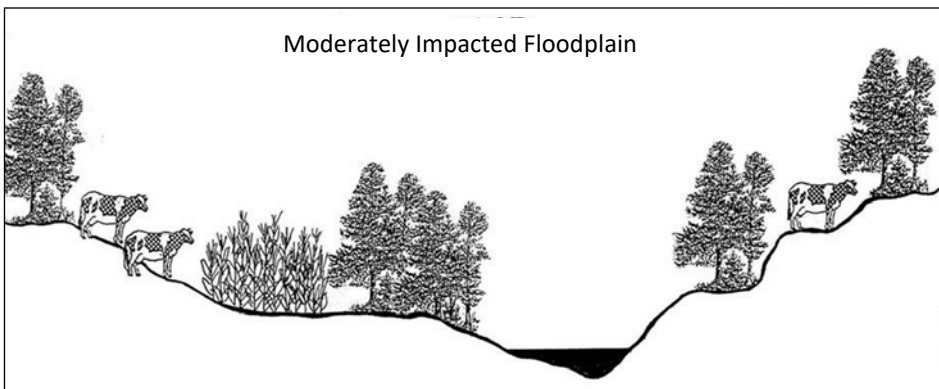
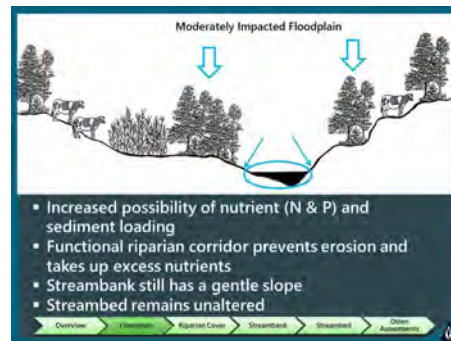


# Floodplain

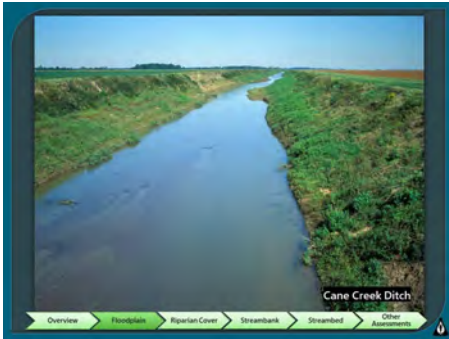
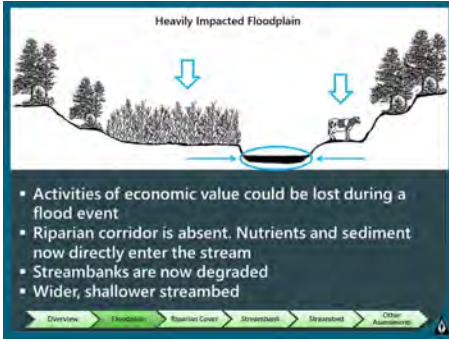
## Moderately Impacted Floodplain

In a moderately impacted floodplain, land use may affect the water quality of the stream, but the floodplain is still in good condition.

- The possibility of nutrient and sediment loading is increased by crop management practices and animal production activities.
- A vegetated riparian corridor mediates these threats to some extent by preventing erosion and taking up excess nutrients.
- The streambank is moderately changed but still has a gentle slope.
- The streambed remains unaltered.



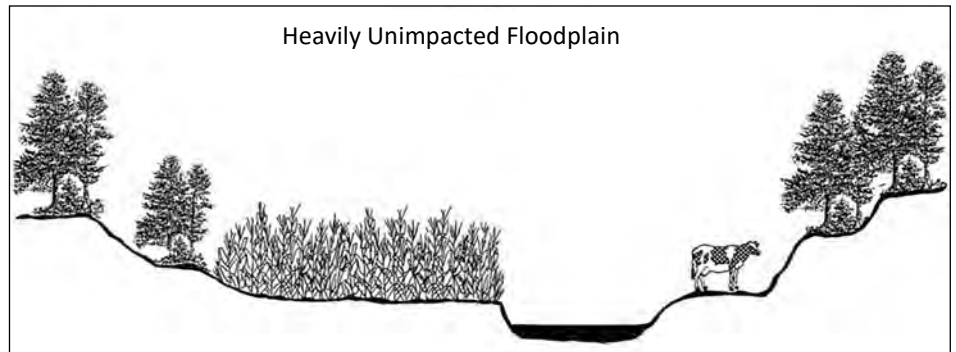
# Floodplain



## Heavily Unimpacted Floodplain

In an heavily unimpacted floodplain, it contains land uses that have economic value and could be lost during a flood.

- Nutrient and sediment loading are a greater threat.
- Permanent vegetation in riparian corridor is absent along with its benefits. Nutrients and sediment now directly enter stream.
- Streambanks are steeper and more vertical due to erosion or downcutting.
- They are vulnerable to severe erosion because there are no roots to stabilize the banks.
- Streambed is wider, shallower and more uniform due to sediment filling in the stream.



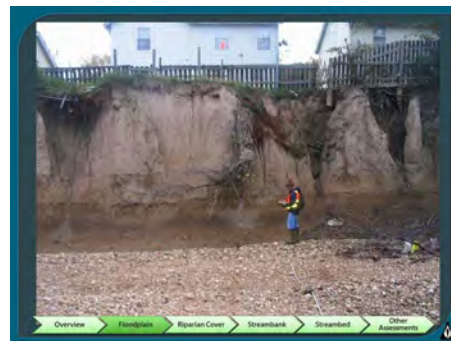
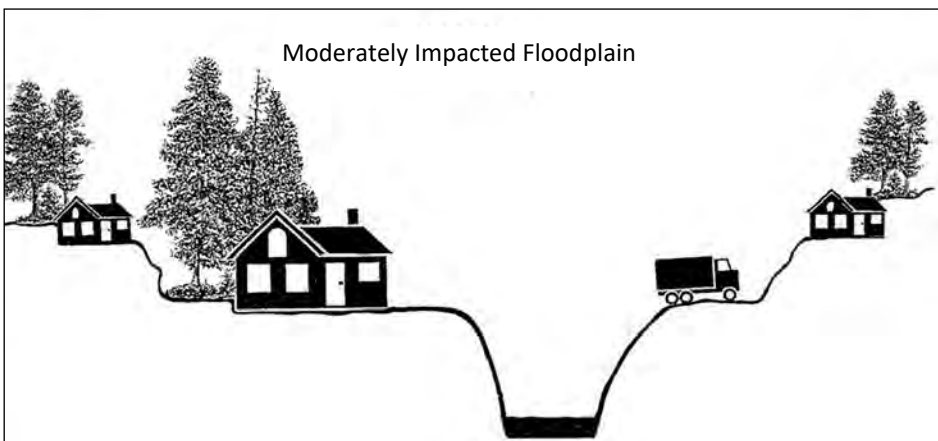
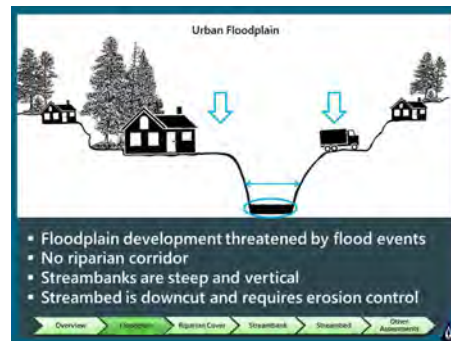


# Floodplain

## Urban Floodplain

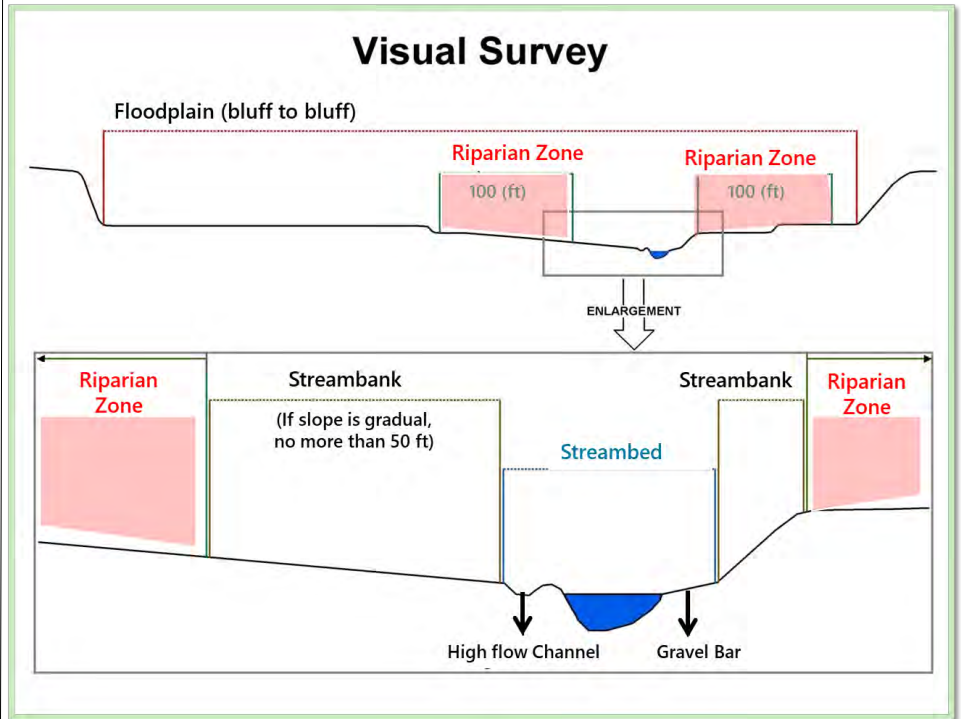
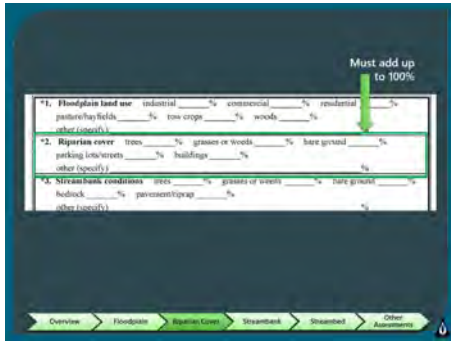
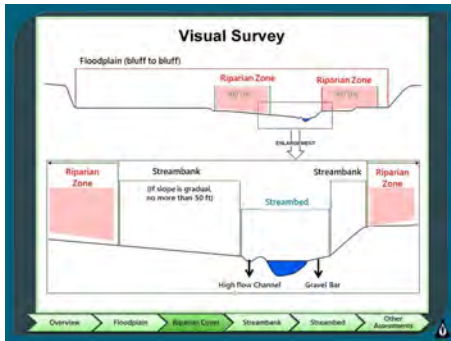
In an urban floodplain, land uses include residential, roads, and other developments that will be threatened by flood events.

- Land uses including residential, roads, and other developments that will be threatened by flood events.
- The riparian corridor lacks vegetation.
- Streambanks are very steep and vertical. These banks will be prone to erosion.
- Streambed is down-cut and uniform. Dencutting is a process of erosion that causes deepening of the stream.
- All developments in this floodplain are at risk if there is a flood event.



## Riparian Cover

The riparian zone or riparian cover is the strip of land on each side of the stream. This starts at the top of the streambank to 100 feet back on both sides of the stream.

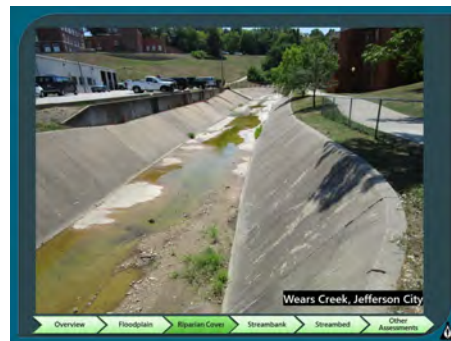
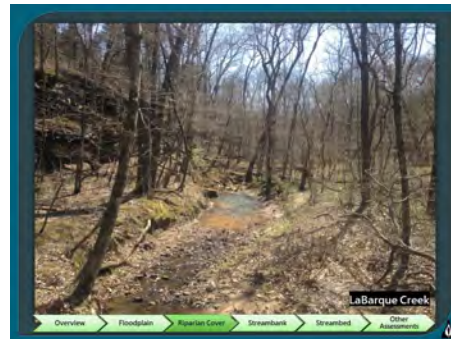


Visual Survey assess the following cover in riparian zones:

- Trees
- Grasses or weeds
- Bare ground
- Parking lot/streets
- Buildings
- Other (specify)



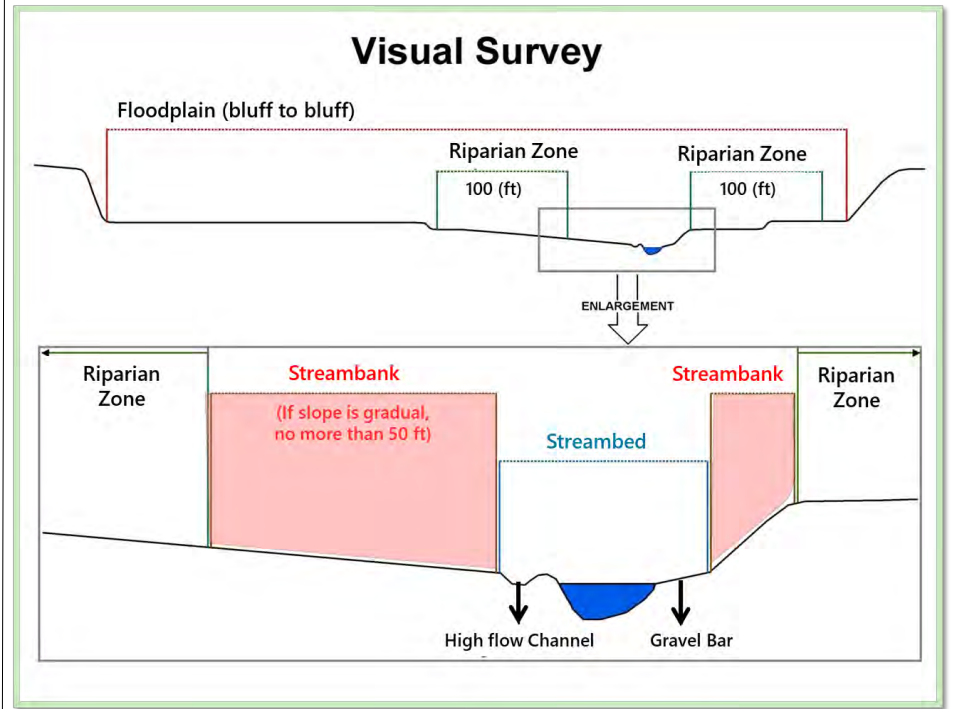
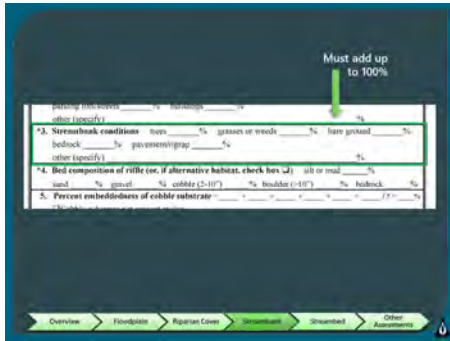
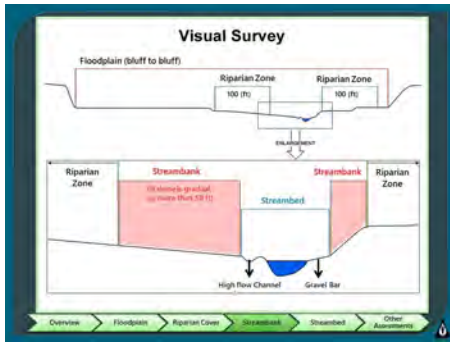
# Riparian Cover





# Streambank

The streambank is the portion of the stream area that rises from the streambed and reaches a crest. If there is no noticeable crest, consider the streambank to extend no more than 50 feet from the edge of the streambed.

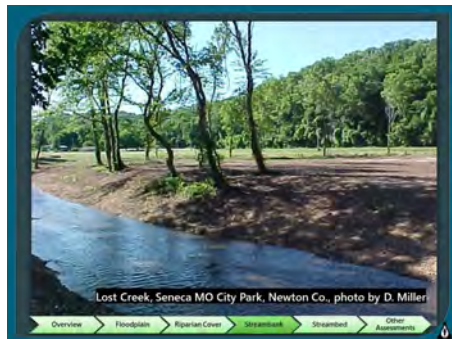
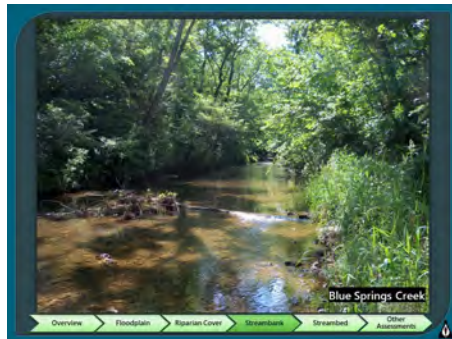
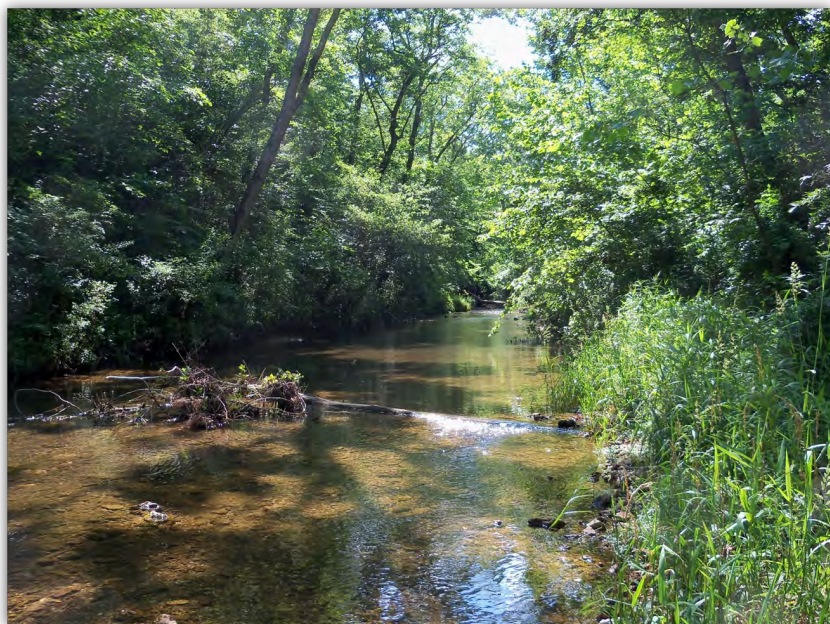


Visual Survey assess the following conditions of the streambank:

- Trees
- Grasses or weeds
- Bare ground
- Bedrock
- Pavement/riprap
- Other (specify)



# Streambank





# Streambank





# Streambank



Why does this negatively impact habitat?

Wears Creek, Jefferson City

Overview Floodplain Riparian Cover Streambank Streambed Other Assessments

Overview Floodplain Riparian Cover Streambank Streambed Other Assessments



\*3. Streambank conditions trees \_\_\_\_\_% grasses or weeds \_\_\_\_\_% bare ground \_\_\_\_\_%  
bedrock \_\_\_\_\_% pavement/trap \_\_\_\_\_%  
other (specify) \_\_\_\_\_%

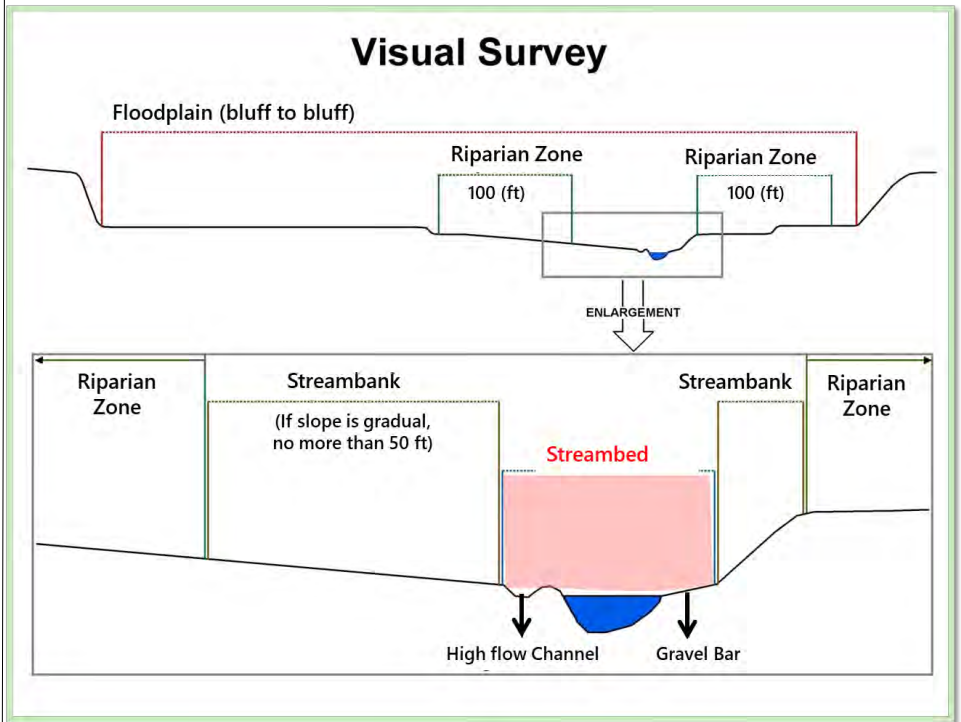
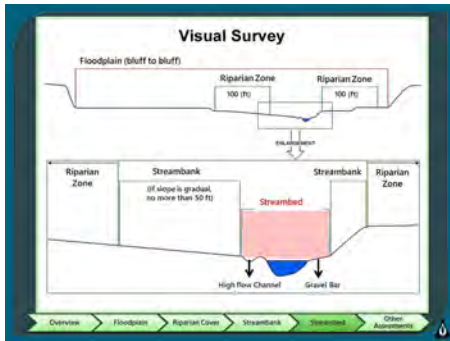
Grindstone Creek, Boone Co.

Overview Floodplain Riparian Cover Streambank Streambed Other Assessments



## Streambed

The streambed is the portion of the stream where water flows under normal conditions. You can usually tell a difference in substrate and vegetation between the streambank and the streambed. Gravel bars are considered to be part of the streambed since they are covered by flowing water for at least part of the year

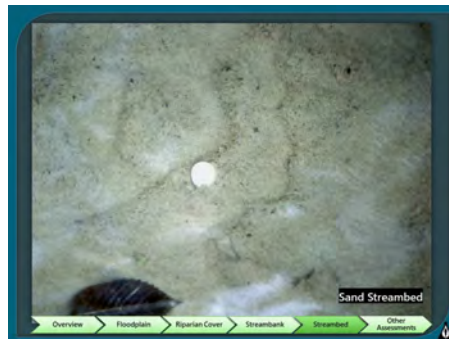


Visual Survey assess the following composition of a riffle in the streambed:

- Silt or mud
- Sand
- Gravel
- Cobble
- Boulder
- Bedrock

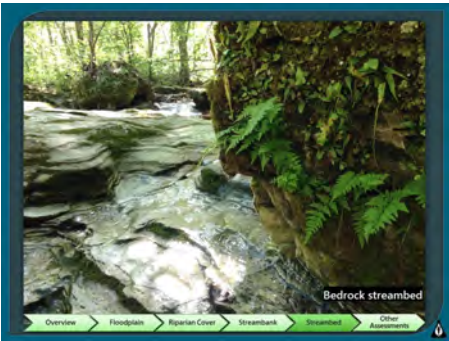
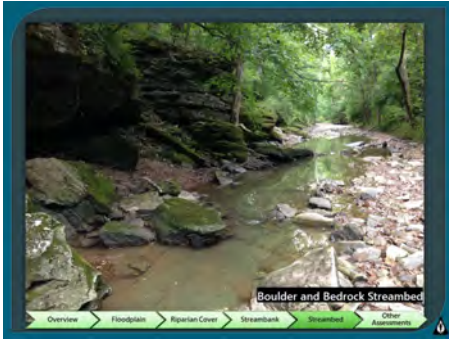
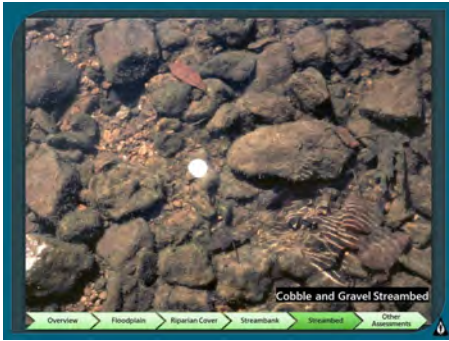


# Streambed





# Streambed



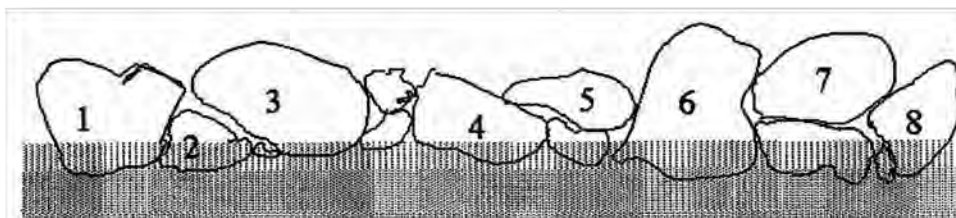
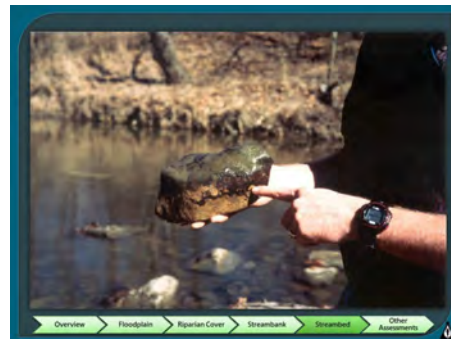
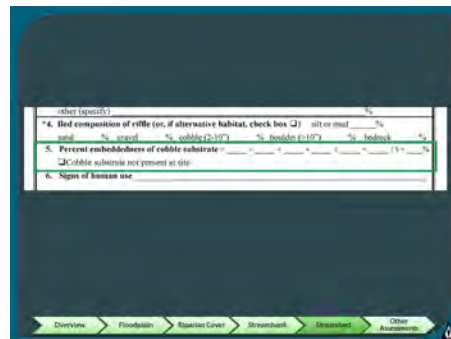


## Percent Embeddedness

Within the streambed, the percent embeddedness of cobble substrate is also assessed. You will pick up 5 cobble rocks from the streambed and determine the average embeddedness from all five rocks. If there is no cobble at the stream site, just check the box on the data sheet that cobble substrate is not present.

Embeddedness can be determined by looking at algae or oxidation on a rock.

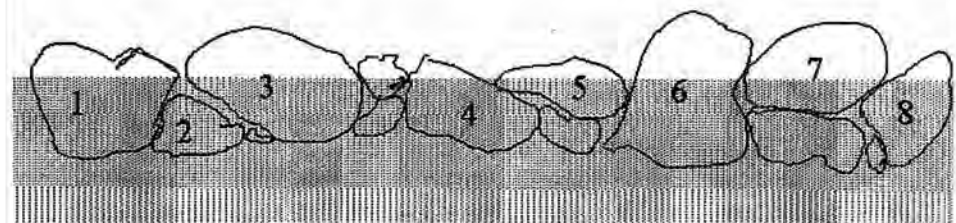
Measuring embeddedness is an indication of soil erosion. The greater the embeddedness, the greater the soil erosion and sedimentation.



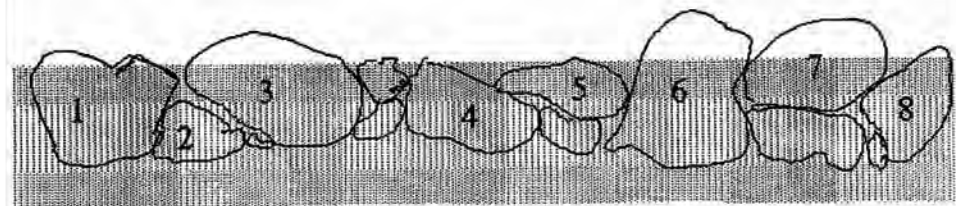
**0 - 25% Embeddedness**



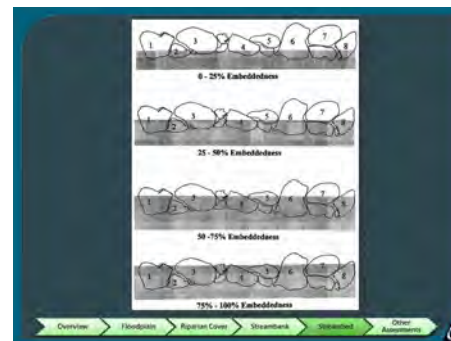
**25 - 50% Embeddedness**



**50 - 75% Embeddedness**



**75% - 100% Embeddedness**





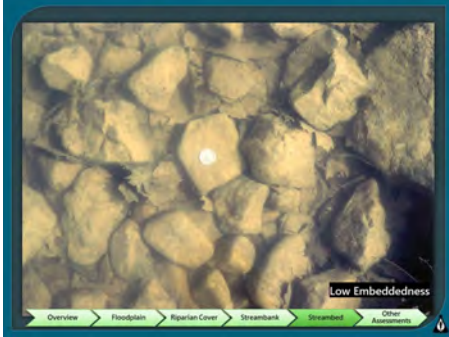
### SEDIMENTATION EPA REGION 7 REPORTS:

- Single largest cause of impaired water quality in rivers
- Third largest cause of impaired water quality in lakes
- Sediment runoff rates:
  - Construction sites:  
~ 20-150 tons/ac/yr
  - Ag. Fields with BMPs:  
~5 tons/ac/yr



Overview Floodplain Riparian Cover Streambank Streambed Other Assessments

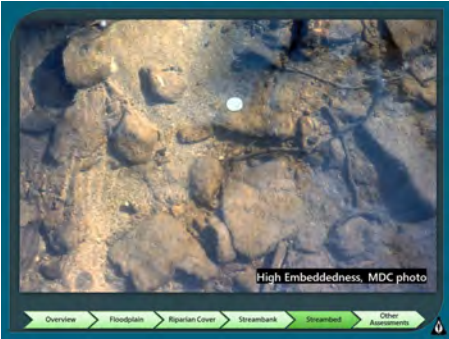
## Percent Embeddedness



Overview Floodplain Riparian Cover Streambank Streambed Other Assessments



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Overview Floodplain Riparian Cover Streambank Streambed Other Assessments



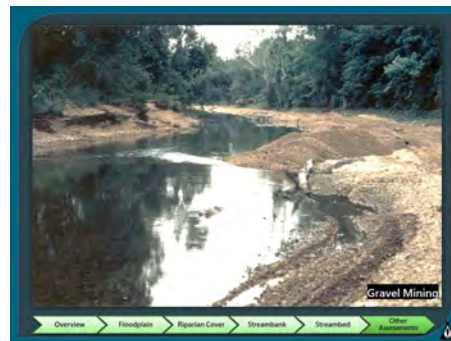
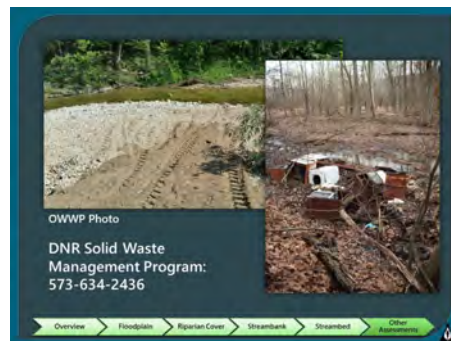


## Signs of Human Use

The Visual Survey will assess your site for any signs of human use. This can include, but is not limited to, the following signs:

- Campfires
- Litter
- Fishing tackle
- ATV tracks
- Horse trail

If you see signs of illegal dumping at your stream site, please report that to DNR Solid Waste Management Program at 573-634-2436.

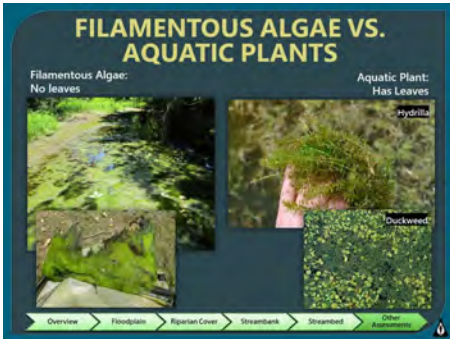
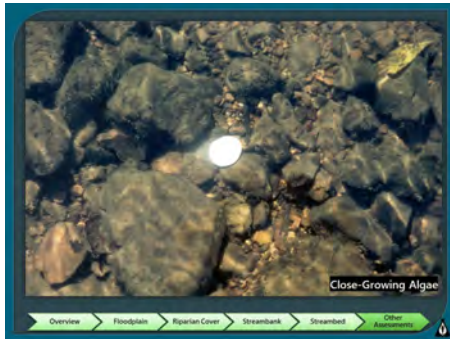




# Algae

The Visual Survey data sheet first assesses how much of the stream bottom is covered by algae. Then it has you assess what percentage of that is close-growing (less than 2") or filamentous (greater than 2").

Aquatic plants can be confused with algae, especially filamentous algae. Filamentous green algae consists of fine, green filaments that have no leaves, roots, stems, or flowers. It forms green, cottony masses that are free-floating or attached to rocks, debris, or other plants. Sometimes algae bubbles, generated by the plant or created by its decay, get trapped in the mats and make them buoyant. It grows in practically any water that can support life and receives good light. As a general rule, if you don't see leaves, it's probably algae. If you can see leaves, it's an aquatic plant.





## Harmful Algal Blooms

Harmful algal blooms, or HABs, are becoming more prevalent, and we encourage volunteers to report them. They are usually caused by warm temperatures combined with a high nutrient load in a water body, and are formed by blue-green algae, or cyanobacteria, which can produce cyanotoxins. These toxins can cause illness and death in humans and animals. They often look like green or blue paint has been spilled on the surface of the water, or like pea soup. They are most common in lakes and ponds, but can be also be found in streams, especially in slow moving water or water that is pooled.

If you are unsure whether or not a water body has a harmful algal bloom, remember: ***When in doubt, report, and stay out!*** More information on HABs, including the reporting form, can be found on DNR's website.

**HARMFUL ALGAL BLOOMS (HAB'S)**

- Caused by warm temperatures + high nutrient load
- Cyanobacteria can produce harmful toxins
- Often looks like spilled paint or pea soup

Overview | Floodplain | Riparian Cover | Streambank | Streambed | Other Assessments

**HAB REPORTING**

- Visit [dnr.mo.gov](http://dnr.mo.gov)
- Type "HAB Notification Form" in search bar
- Click on first result
- Fill out form and email to [moHABreport@dnr.mo.gov](mailto:moHABreport@dnr.mo.gov)

MISSOURI DEPARTMENT OF NATURAL RESOURCES  
ENVIRONMENTAL SERVICES PROGRAM  
SUSPECTED HARMFUL ALGAL BLOOM (HAB)  
NOTIFICATION FORM

Overview | Floodplain | Riparian Cover | Streambank | Streambed | Other Assessments

## Missouri Harmful Algal Blooms (HABS)

When in doubt, report and stay out!



DNR Webpage



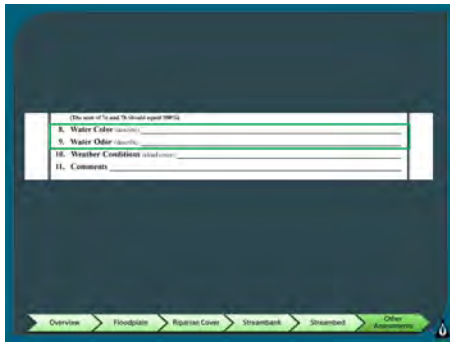
Report HABS



Reported HABS  
Map Viewer



## Water Color and Odor



It's easiest to evaluate water color and odor by scooping up some stream water in a clear plastic container.

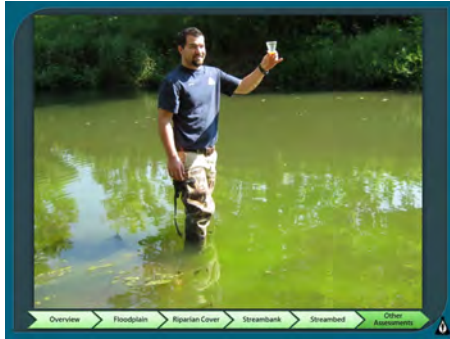
Water can be a variety of colors. If there is algae in the water, it might be green. With high sediment load, it could be brown. It could even appear milky or have an oily sheen.

Examples of colors are noted on the back of the data sheet.

In many streams, the water will have no odor.

In others, it may smell musty, organic, or even smell like sewage. You might smell chemicals or oil.

Describe the smell to the best of your ability. Examples of odor are also on the back of the data sheet.



## Weather Conditions

The last section in the Visual Survey data sheet is Weather Conditions, specifically cloud cover.

Sunny, mostly sunny, partly cloudy, cloudy, rainy, snowy – all are good examples.

Knowing these conditions can help us interpret visual survey data.





## Comments

On all data sheets, there is a section for Comments and Fish Present.

In the comments section, add any observations you think might be important or of interest.

Examples include: “Lowest flow ever observed,” or “Trees recently cleared from banks.”

If you observe dead fish or other evidence of a pollution event, it is fine to write it here, but please call the emergency numbers for the Environmental Emergency Response hotline.

Under Fish Present, Simply check the yes or no box if you saw a fish in your site.

We don’t need to know species or quantities. We just care to know that the stream supports aquatic vertebrates.

Something else you may want to mention in the comments section is the observation of foam or iron-oxidizing bacteria. Foam in a stream can be caused naturally by decomposition. To determine if it is natural, use the stick test. If the foam breaks apart when wacked with a stick, it is natural. If it doesn’t break apart it could be a detergent or another chemical. This would be a concern. It’s somewhat common to see bright orange slime, often accompanied what appears to be an oily sheen on the water. This is caused by naturally occurring iron-oxidizing bacteria, which get energy from the iron minerals leaching out of the soil. If you can break the sheen with a stick, it is organic and not a cause for concern.

