



U.S. Fish & Wildlife Service

CHESAPEAKE BAY FIELD OFFICE ANNAPOLIS, MARYLAND

Coastal Program - Stream Habitat Assessment and Restoration

Riparian Buffer Vegetation Evaluation Methods

The most common consideration for what constitutes an effective riparian buffer is the width and the vegetation community. These are important considerations; however there are more attributes that should be observed before the long term health and functionality is determined. These tables were designed to aid with such a determination in the two most common vegetation types, forest and grass-shrub. The tables were constructed using information acquired from scientific studies in the eastern region of the United States and are best applied as such. They could potentially be expanded to include other regions as well if all precautions are taken.

Each of the tables is organized into four columns: Parameter, Measurement Method, Performance Standard and Source. The parameter column has the particular function of the buffer that is being observed. The measurement method column has the procedure that is used to observe that particular parameter. The performance standard column has three columns with the divisions denoting the functionality of the parameter and the source column has citation where the information was found.

Grass-Shrub Riparian Buffer

For many stream systems in North America, a grass-shrub riparian buffer is the appropriate type of vegetated stream bank. For many decades now there has been an assumption that the best kind of undisturbed native stream banks are woody forested buffers (USFS 1990, Petersen *et al* 1992). However, many of the ecosystems directly adjacent to stream in North America were grasslands before European settlement (Wells 1970). Particularly in areas less steep with lower banks, grassy vegetation maybe better at preventing erosion (Davies-Colley, 1997; Trimble, 1997).

Tools Required: Map of riparian buffer, 1m² quadrat, a way of identifying plants (e.g. dichotomous key), a cover density sheet to train ones eye for plant coverage, note taking materials.

Grass-Shrub Riparian Buffer Assessment					
Parameter	Measurement Method	Performance Standard			Source
		Functioning	Functioning At-Risk	Not Functioning	
Species Composition	Quadrat Sampling: The percent area covered by each species	Warm-season grasses and Shrubs >50%	Warm-season grasses and Shrubs <50%	Warm-season grasses and Shrubs <10%	Shultz, Isenhart, Simpkins, and Colletti; 2004
Vegetative Distance from Stream	Direct Measurement of the vegetated distance from the stream bank	>100ft plus an additional 2ft per every 1% slope increase	30ft-100ft	<30ft	Seth Wenger; 1999
Vegetation Richness (R)	Quadrat Sampling: The average number of different species present	4 or more	2 or 3	0 or 1	Yuan, Binger, and Locke; 2006
Bare Ground	Quadrat Sampling: The average bareground exposed in the buffer	Mostly good Ground cover	Mostly bare soil with no cover	Mostly impenetrable surface	Mankin, Ngandu, Barden, Hutchinson, and Geyer; 2007
Invasive Species	Quadrat Sampling: The amount of invasive species present compared to native species. Only if applicable	Mostly Native Species	Mostly Invasive Species	All Invasive Species	Richardson et al., 2007

Forested Riparian Buffers

The vast majority of riparian buffers within the eastern region of the United States are forested (Marquis, Ernst, & Stout 1992). Forested buffers provide many important services that would naturally occur in a healthy system such as shade, sediment reduction, nutrient retention and erosion control (National Research Council 2002). Therefore the health of the stream and water quality is largely influenced by the health of forested buffer which needs to be functioning properly at all levels to be truly effective.

Required Supplies: Map of the riparian buffer, densiometer, cruising prism, 1m² quadrat, method of plant id and measuring tape.

Forested Riparian Buffer Assessment					
Parameter	Measurement Method	Performance Standard			Source
		Functioning	Functioning At-Risk	Not Functioning	
Canopy Coverage	Densiometer Sampling	>60%	25-59%	<25%	MD Forest Harvest Guidelines
Stand Density	Prism Sampling or Fixed Radius Sampling	>60ft ² /ac	40-59ft ² /ac	<40ft ² /ac	MD Forest Harvest Guidelines
Regeneration	Quadrat Sampling	1539 or more seedlings or 616 or more saplings per acre	770-1538 seedlings or 308-615 saplings per acre	Not more than 769 seedlings or 307 saplings per acre	Marquis et al. 1992
Species Composition	Prism Sampling or Fixed Radius Sampling	Mostly Native Species	Mostly Invasive Species	All Invasive Species	Riparian Area Management, BLM, 1998
Vegetative Distance from Stream	Direct Measurement	>100ft	50ft-100ft	<50ft	Klaproth and Johnson, 2009

Citations:

Maryland Forest Harvest Guidelines: www.dnr.state.md.us/irc/docs/00013580.pdf
[Similar](#)

Michigan Stream Stability Assessment Guidelines:

http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CFgQFjAA&url=http%3A%2F%2Fwww.michigan.gov%2Fdocuments%2Fdeg%2Fwb-nps-stream-stability-guidance_246960_7.pdf&ei=GvgoUO3CL_Ky0AHEw4GADQ&usg=AFQjCNE1ZtD9Og1uLUcMqcnwDYKyc_3yw

Riparian Area Management, 1998

<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CGQQFjAB&url=ftp%3A%2F%2Fftp.blm.gov%2Fpub%2Fnstc%2Ftechrefs%2FFinal%2520TR%25201737-15.pdf&ei=HP4oUNWnK8re0QHU8oHQDA&usg=AFQjCNFBwNlwnc0HzvGqC4PxbziPIpkurrg>

Klaproth and Johnson, 2009:

<http://pubs.ext.vt.edu/420/420-151/420-151.html>

Mankin, Ngandu, Barden, Hutchinson, And Geyer, 2007

www.gpsaf.unl.edu/GPPubs/GrassShrubBufSed.pdf