

Riparian, Channel and Environmental Inventory, RCE

The Riparian, Channel and Environmental Inventory (RCE) (Petersen 1992) was developed to quickly assess the physical and biological conditions of small streams in lowland, agricultural landscapes in temperate regions that have been physically modified. We have modified the inventory some to better reflect conditions within the Western Pennsylvania watersheds. We encourage each participating school to complete this inventory for their primary sampling site. The site descriptions and inventory results for each school will be posted on the Creek Connections web site. Please send a picture of your sample site also so that it can be posted on our website.

The inventory only characterizes a small stretch of a stream (about 100 m); conclusions about a watershed cannot be made from one site. Remember that the quality of a stream water sample is a function of the entire upstream watershed--not just characteristics at the sampling site. Furthermore, the inventory was developed to assess physical disruption of the channel and riparian zone. Importantly, it does not assess the impact of point sources of pollution such as storm drainpipe discharges. This inventory would be best used in conjunction with chemical and/or biological testing.

Using the RCE inventory: The inventory is used by estimating the values for sixteen characteristics over a selected length of the stream (100 meters is suggested). The highest score for each characteristic varies from 15-30 depending on the value of the characteristic to the overall index. The highest total RCE score possible is 360; the lowest possible score is 16.

The sixteen characteristics included in the inventory all directly or indirectly relate to the biotic health of a stream. For example, several characteristics of the physical structure of the stream are extremely important to the quality of habitat for aquatic life. A channel undergoing a lot of erosion typically has an unstable bed and low diversity of habitat types.

This inventory will be helpful to develop an overall story for your sample site, and could assist with interpreting the chemical data you collect. Over the years, the inventory numbers can be compared to see if changes in land use, riparian zones, stream physical parameters, or biota have occurred.

References

Petersen, Robert. 1992. The RCE: a riparian, channel, and environmental inventory for small streams in the agricultural landscape. Freshwater Biology. Volume 27, pages 295-306.

Norris, Marian. 1997. Adaption of the riparian, channel and environmental inventory for use by high school students and for use on small streams of the French Creek Watershed. Senior Thesis. Allegheny College.

Glossary

bars (gravel or channel): areas of sediment/gravel deposition (fall out) in the stream channel.

channel: the physical structure that contains the stream; water only fills the entire channel when flooding.

darters: small, colorful fish that “dart” along stream bottoms; generally indicators of good water quality.

debris dam: a collection of fallen trees, logs, and twigs that have gotten wedged in the stream channel.

detritus: broken-down organic, particulate matter: ex. partially decomposed leaves, twigs; organic muck.

pool: deeper, usually calm area of stream, commonly on the outside river bend.

riffle: shallow, fast-flowing area, commonly on straight streams sections between bends.

riparian zone: area on the stream bank and next to stream bank.

sculpins: spiny, large-headed, broad-mouthed fish often scaleless; generally indicators of good water quality.

substrate: the material at the bottom of the stream channel, can be rocky, sandy, muddy, etc.

stream: the flowing water within the channel; we hope you didn't need to look this up.

RIPARIAN, CHANNEL, AND ENVIRONMENTAL INVENTORY
 modified from Petersen, 1992 by FCEEP for FCEEP, 1997 (now Creek Connections)

BASIC DATA

Stream name: _____ Site #: _____ Date: _____ Time: _____

EXACT Location: _____

Observers: _____

Stream width: _____ m Stream depth: _____ m Stream length examined: _____ m

Stream flow condition: high medium low very low Days since last significant rain: 0 1 2 3 4-7 8+

INVENTORY

Determine the condition of the stream CHANNEL and RIPARIAN ZONE at which you are standing and up to **50 m upstream and downstream (100 m total)**. Estimate the average condition over that distance and select ONE of the four scores for each characteristic.

I: LAND USE

1. Land-use pattern beyond the immediate riparian zone
 - Undisturbed, consisting of forest and/or natural wetlands 30 _____
 - Permanent pasture mixed with woodlots and wetlands; few buildings and roads 20 _____
 - Mixed row crops and pasture, or mixed grass lawn and homes 10 _____
 - Mainly row crops, or mostly streets, pavement, buildings, and parking lots 1 _____

2. Width of riparian zone from stream edge to field
 - Marshy or woody riparian zone >30 m wide 30 _____
 - Marshy or woody riparian zone varying from 5 to 30 m 20 _____
 - Marshy or woody riparian zone 1-5m 5 _____
 - Marshy or woody riparian zone absent 1 _____

3. Completeness of riparian zone
 - Riparian zone intact without breaks in vegetation along entire 100 meter zone you are evaluating 30 _____
 - Areas without vegetation occur at intervals of > 50 m 20 _____
 - Areas without vegetation frequent with some erosion (gullies and scars) every 50 m 5 _____
 - Many areas without vegetation, erosion occurring (gullies, scars) along entire length; or no vegetation 1 _____

4. Vegetation of riparian zone within 10 m of the channel
 - >90% plant density of mature trees or shrubs, or native marsh plants 25 _____
 - Mixed young tree species along channel and mature trees behind 15 _____
 - Vegetation of mixed grasses and sparse young tree or shrub species 5 _____
 - Vegetation consisting mostly of grasses, few trees and shrubs; low plant density; or no vegetation 1 _____

II. PHYSICAL STRUCTURE OF STREAM

5. Debris dams (a natural collection of fallen trees, logs, limbs, and rock material that have gotten wedged in or along channel)
 - Channel with old debris dams - old logs and rocks firmly set in place 15 _____
 - Logs and rocks present but back filled with some sediment 10 _____
 - Debris dams loose, probably moving with floods 5 _____
 - Debris dams sparse, easily moved; or debris dams absent 1 _____

6. Channel (NOT OF WATER ITSELF) width to depth ratio (ability to contain high flows)
 - Divide: if answer is <7; ample for present and annual peak flows 15 _____
 - Channel Width if answer is 8-15; adequate, overbank flows rare 10 _____
 - Channel Depth if answer is 15-25; barely contains common high flows 5 _____
 - if answer is >25 or stream is artificially channelized; overbank flow common 1 _____

7. Channel bars
 - Little or no channel width enlargement (bank erosion, undercutting); coarse-grained bars present 15 _____
 - Some gravel bars, pore spaces between rocks well washed with little silt present 10 _____
 - Sediment bars of rocks, sand, and silt common 5 _____
 - Channel divided into braids around sediment bars; or stream is channelized 1 _____

8. Stream-bank stability
- Banks stable, of rock and soil held firmly by grasses, shrubs, and tree roots 25 _____
 - Banks firm but loosely held by grass and shrubs 15 _____
 - Banks loose, held by a sparse layer of grass and shrubs 5 _____
 - Banks unstable, of loose soil or sand easily disturbed 1 _____
9. Bank undercutting
- Little or none evident or restricted to areas with tree root support 20 _____
 - Bank undercutting only on curves or narrow channel areas 15 _____
 - Bank undercutting common, some banks falling in 5 _____
 - Severe bank undercutting along channel, banks falling in 1 _____
10. Stony substrate; feel and appearance
- Stones clean, rounded without sharp edges (smooth pebbles, cobbles); may have blackened color 25 _____
 - Stones without sharp edges and with slight gritty feel 15 _____
 - Some stones with sharp edges, obvious gritty feel 5 _____
 - Stones bright; silt and grit covering them, sharp edges common 1 _____
11. Stream Bottom
- Various sized rocks, gravel, and sand mixture; open spaces common between rocks 25 _____
 - Loose stony bottom with some silt having settled in spaces between rocks 15 _____
 - Mixture of silt, sand, and gravel; open spaces between rocks sparse; bottom firm in places 5 _____
 - Uniform bottom of sand and silt held loosely together, easily moved, very little or no stony substrate 1 _____
12. Riffles and pools
- Riffles distinct, occurring at intervals of 5-7 times the stream width (not channel width) 25 _____
 - Riffles and pools irregularly spaced 20 _____
 - Long pools separating short riffles 10 _____
 - Riffles and pools absent or stream channelized 1 _____
- III. BIOTA**
13. Aquatic vegetation
- When present consists of moss and patches of algae 15 _____
 - Algae dominant in pools, larger plants along edge, some in center 10 _____
 - Algal mats present, some larger plants, few mosses 5 _____
 - Algal mats cover bottom, larger plants dominate the channel 1 _____
14. Fish
- Darters and sculpins present in most riffles 20 _____
 - Darters and sculpins scarce and difficult to locate 15 _____
 - No darters or sculpins, other species in riffles 5 _____
 - Fish absent or scarce 1 _____
15. Detritus
- Mainly consisting of leaves and wood without sediment covering it 25 _____
 - Leaves and wood scarce; fine organic debris without sediment 10 _____
 - No leaves or woody debris; coarse and fine organic matter with sediment 5 _____
 - Fine organic sediment - black in color and foul odor (anaerobic) 1 _____
16. Bottom-dwelling aquatic insects
- Many species present in riffles and pools, on rocks and sand/gravel 20 _____
 - Many species but only in riffles and on rocks 15 _____
 - Few species present in riffles and pools, on rocks and sand/gravel 5 _____
 - Few if any species and only in riffles and pools, on rocks and sand/gravel 1 _____

TOTAL: _____

RESULTS

<u>Class</u>	<u>Score</u>	<u>Evaluation</u>
I	293-360	Excellent
II	224-292	Very good
III	154-223	Good
IV	86-153	Fair
V	16-85	Poor