

## **Fish Habitat Restoration Methods Concept Specification**

### **Log Riprap**

#### **Purpose:**

- To stabilize eroding stream banks.
- To narrow stream width.
- To create additional fish habitat.

#### **Conditions Where Applicable:**

- Instream location and sizing must be approved by an Adopt-A-Stream Biologist.
- In low to moderate gradient stream reaches (up to 3%).
- In streams less than 15 m. (50 ft) wide.
- In streams where flooding is light or moderate.
- In streams where ice damage is not a potential hazard.
- Avoid streams that exhibit a shifting substrate or hard rock rubble substrate.
- Banks to be stabilized should not be more than 1.0 m (3.1 ft) in height.

#### **Habitats Created:**

- Reduced siltation of habitats.

#### **Advantages:**

- Stabilizes moderately eroding banks.
- Uses natural materials. The cost of materials is low and the structure blends into the natural setting.
- The logs have uneven surfaces that provide hiding cover locations for fish.

#### **Disadvantages:**

- Building the structure is labour intensive.
- Does not work well in streams that have wide fluctuations in water level.
- Life expectancy of structures is relatively short compared to rock riprap.
- Maintenance may be required.

#### **Design Criteria:**

- This technique can be used to stabilize an eroding stream bank. A log wall is built up to the height of the eroding bank or to 30cm above the flood plain on the opposite side of the river whichever is the lowest.

- Build along an eroding bank where water depth is 0.3 - 1.0 m (1 - 3.1 ft). The eroding bank can be along a straight stretch or an outer bend.
- Do not narrow the stream to less than its 1:2 year mean daily flood flow design width.
- Determine the amount of material required for the project (rock and logs).
- All material must be on site before construction begins

#### Rock / riprap

- Use only the rock sizes approved in the plan and it is on site before you start
- Place the largest rocks along the toe of the work site and then fill in the rest behind them

#### Log / rock

- Use logs 15 - 35 cm (6 - 14 in) in diameter if available at the site, preferably wood that would be slow to rot.
- The structure needs enough logs to stretch the entire length of the erosion site and enough to stack up to the original height of the bank or 30 cm above the flood plain on the opposite bank. This wall is usually one layer thick.
- Rebar the logs together driving the rebar at least 40cm into the stream bed.
- The wall should lean back toward the bank on up to a 10% slope.
- Build up in layers filling the toe and back fill as you go up to the required height of the logs then slope the backfill rock to tie into the bank

#### Crib rock

- Construct a log crib pinned together with rebar or dock spikes.
- The crib work can either be a full box construction or tied back into the bank with dead heads. Full box construction can be done without digging into the bank and is preferred if it can be made stable.
- A overhang at the low water surface can be constructed along the outer edge for fish cover
- For backfilling structure, stumps, wood, or rock or gravel can be used but be sure any sand and silt cannot wash into the stream..

#### **Implementation Steps:**

- Determine location.
- Stake outer edge with temporary wooden stakes to mark the new bank. It is important that this be located with some accuracy as it is essential that the structure not narrow the stream to less than the natural bank width.
- Stockpile necessary materials at the site.
- Begin work at the upstream portion of the structure.
- If required for structural strength use heavy gauge fence wire to lash the logs to form a wall.
- It is important that the base logs be located right on the stream bed, not on silt or mud

which should be removed, exposing the underlying gravel before the logs are moved into place.

- Repeat the above procedure building up successive rows of logs
- Backfill the space between the log wall and the old bank to within about 15 cm (6 in.) of the top. This is a good way of getting rid of bank-side debris (brush, stumps, wood, turf, rocks, etc). Compact the mixture by jumping up and down on it, and put the heaviest items of fill on top to keep everything down.
- Properly constructed wooden devices such as these can last for years in low gradient streams. Moreover, if strong-rooted wood shrubs (red-osier dogwood, bank willows) are planted immediately behind the streamside logs, the root systems will grow to form a solid mat which, even if the logs should rot, will provide a firm and permanent bank.

### **References:**

Ministry of Natural Resources of Ontario, entitled “Community Fisheries Involvement Program: Field Manual”. 1982.

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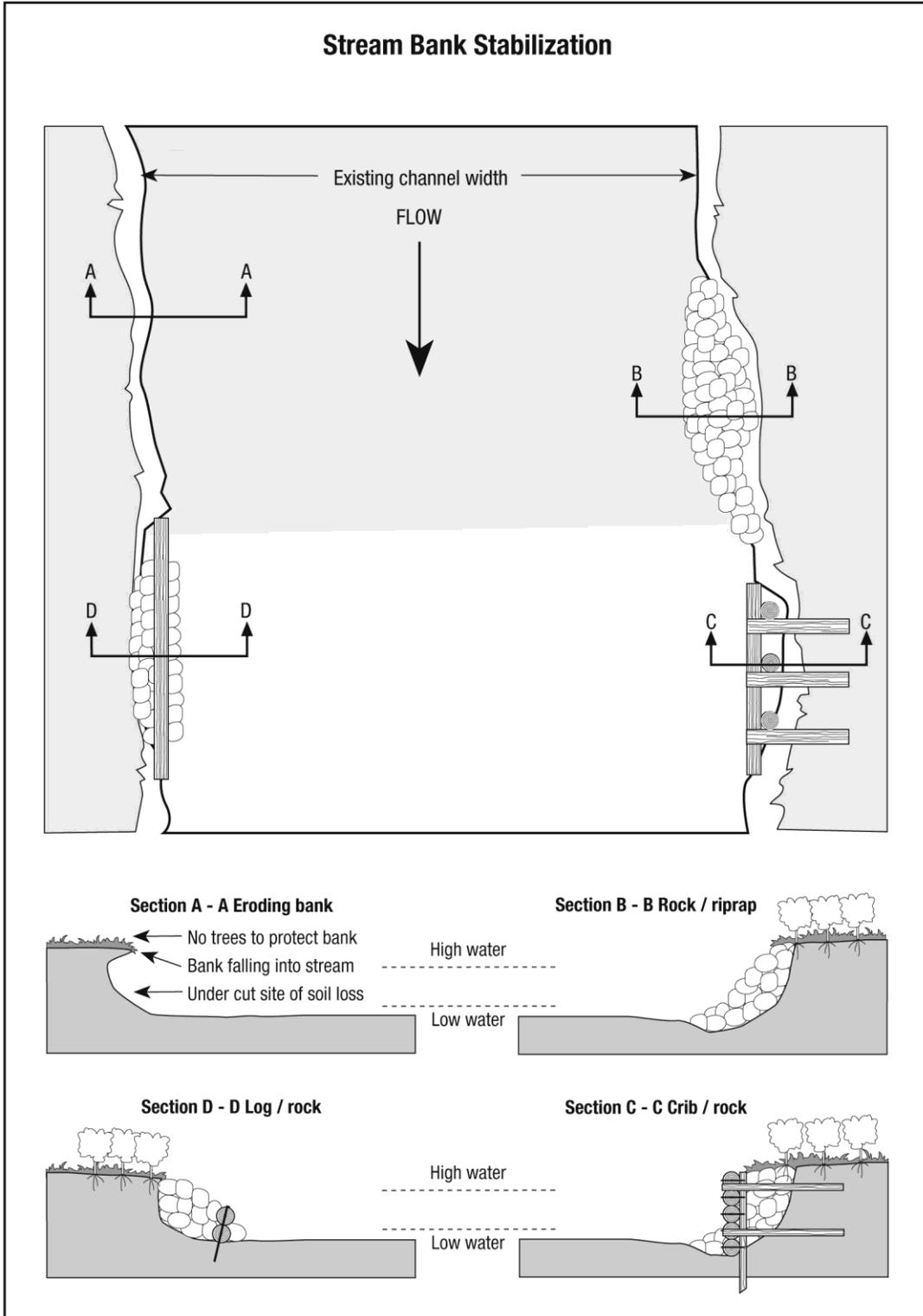


Figure 1. Conceptual drawings of several types of stream bank stabilization techniques.