

Fish Habitat Restoration Methods Concept Specification

Rock or Boulder Groupings

Purpose:

- To provide overhead and lateral cover.
- To break up uniform currents to help break up and dislodge sands and silts.
- To provide resting areas for feeding salmonids.
- To increase the scour in pools.

Conditions Where Applicable:

- Instream location and sizing must be approved by an Adopt-A-Stream Biologist.
- This technique is for streams with low to moderate gradients of 3% or less.
- In pools, boulders can be placed to aid in scouring sediments and to provide cover.
- In rare cases it may be appropriate to:
 - Place small boulders or cobble on gravel riffle areas, which lack suitable resting areas for salmon parr.
 - On deep runs, boulders can be placed to create resting areas for salmon and trout.
 - Small boulders can be placed in runs along the bank to create quiet areas for fry.

Habitats Created:

- Fry and juvenile cover.
- Adult holding sites.
- Removes silt and sand from substrates and improves insect habitats.
- Digs pools for summer and winter low flow refuges.

Advantages:

- They look natural.
- Increase available cover habitat for fish.
- Scour sediments sorting out the fines and improving insect and juvenile habitats.

Disadvantages:

- High costs if boulders need to be transported.
- Placement is labour intensive.
- Large boulders require machinery.
- Boulders placed near banks can cause scouring. Placement and sizing of the boulders is very important.
- Rocks are often oversized and can cause the change in the natural pool riffle pattern by placing a pool out of sequence.

- Boulders may become buried over time.

Design Criteria:

- Assess the habitat and the need for the structures. This should be done by experienced biologists.
- Map out the section to be improved, detailing the depths and main current.
- Boulders are generally placed in or near the thalweg if they are used for parr and adult cover.
- Do not obstruct more than 10 % of the stream on runs and riffles.
- Pool boulder size depends on the size of the stream and application. Typical sizes range from 30 cm to 90 cm.
- Angular boulders are preferred.
- In pools, a cluster of three or four boulders works well.
- Works should be carried out during mid-summer low flows.
- Avoid using boulders in streams prone to ice scour and severe flooding.

Implementation Steps:

- Obtain landowner permission before collecting field stone or crossing their land with the rock.
- Have the boulders transported to the project site and stockpiled near the river.
- Finalize patterns and locations for rock placement.
- Begin placing the boulders at the downstream end of the project and work upstream.
- Larger boulders can be carried on a rock stretcher.
- Place boulders on a substrate relatively free of larger rock and set them securely into the stream bed.

Riffle Areas:

- This technique is seldom used in Maritime streams because the riffles normally armour themselves with suitable size cobble and small boulders to act as cover for salmon parr.
- Boulders should be 25 to 35 cm in diameter.
- Boulders are placed in the thalweg in a staggered fashion approximately 1 m apart.

Deep Runs and Pools:

- Boulders up to 90 cm in diameter.
- In a deep run, they are sized so that the top of the boulder is at the surface of the water in low flow and set in the thalweg approximately 2 m apart.
- In pools, boulders up to 2 m in diameter can be set in clusters of three or four in the thalweg.

Fry Habitat:

- The intent is to create pockets of dead water along the outside edge of pools or deep runs.
- This technique should only be used in rivers with 50 % or greater pools or on still waters.
- Place a large boulder (up to 60 cm) along the outer edge of the flow so that it is just breaking the water surface in low flow. Boulders are placed one boulder diameter apart.

References:

Ministry of Natural Resources of Ontario. Community fisheries involvement program: field manual.

Bastien-Daigle, S., A. Vromans, and M. MacLean. 1991. A guide for fish habitat improvement in New Brunswick. Fisheries and Oceans Canada. Canadian technical report of Fisheries and Aquatic Sciences. 1786E: iv + 109 p.

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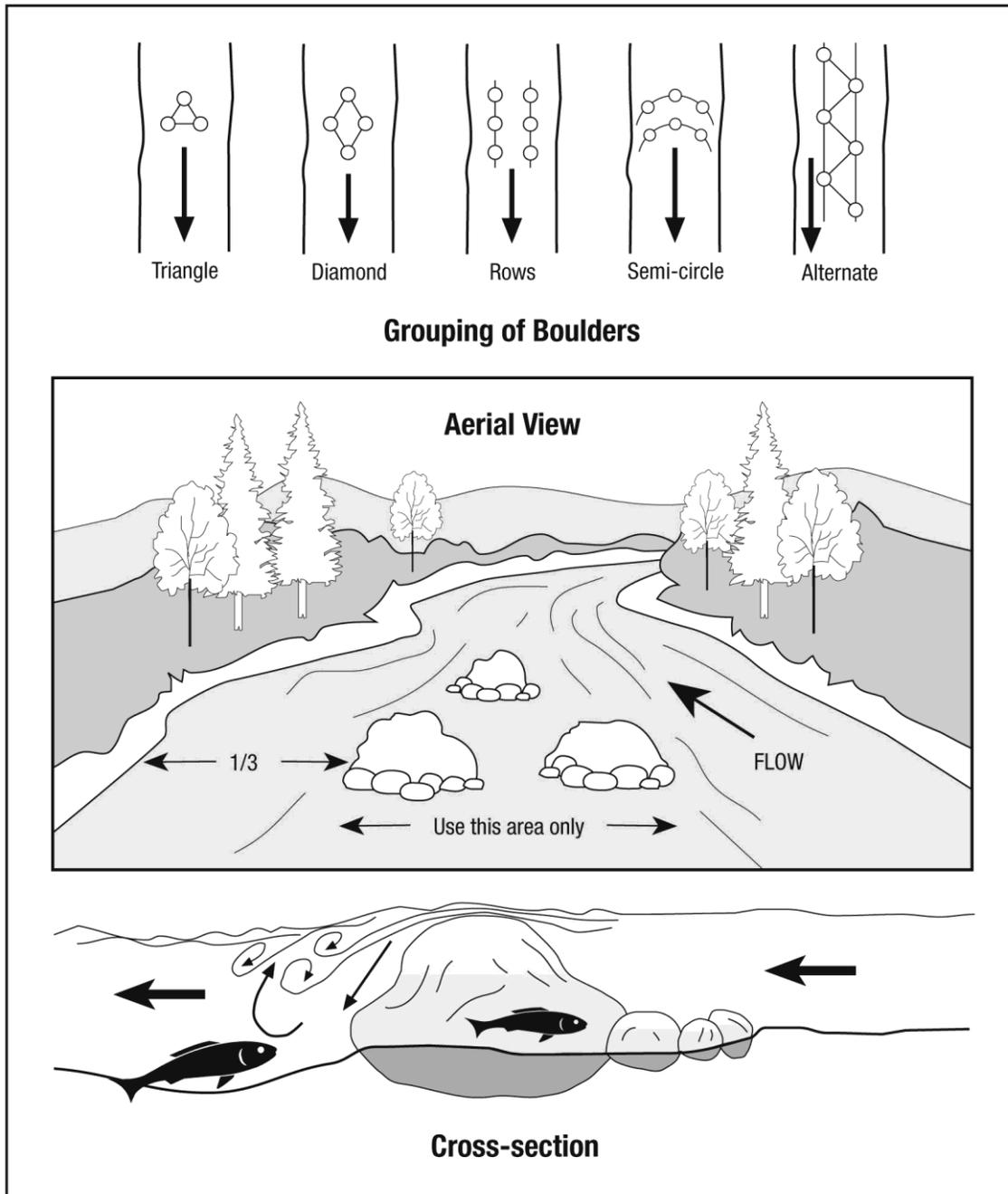


Figure 1. Conceptual drawings of boulder clusters (DFO, 1991).