

Fish Habitat Restoration Methods Concept Specification

Planting Streamside Vegetation

Purpose:

- To stabilize stream banks, reducing erosion and resulting flood plain sediment deposition.
- To help regulate stream flow. For example, in winter, tree cover (forest or buffer strip) reduces the penetration of frost, retains surface snow for a longer period and allows for a slow spring melt. During the summer, in the headwater areas, trees allow for rain water to seep into the ground for storage, and then to be released slowly to maintain a steady summer stream flow.
- To provide shade and leaf fall food source for various aquatic insects and in turn fish and bird species.
- To provide aesthetically pleasing vegetative cover.
- To provide conditions for attracting certain wildlife and insect species.

Conditions Where Applicable:

- Location and species must be approved by an Adopt-A-Stream Biologist.
- Where streamside vegetation has been removed by human activities (e.g. agriculture, logging, & urbanization).
- Where trampling of stream banks by livestock has been severe.
- Where stream water quality is being impaired because of the removal of the streamside vegetation. For example, water temperatures may be too high to support certain fish species; or sand and silt or other contaminants may be entering the watercourse because of the lack of a buffer strip to filter out the eroded soil particles or nutrients.
- In some cases, all that is needed is to erect a fence. A fence will protect the bank from being trampled by livestock, vehicles or pedestrian traffic. A protected stream bank will soon allow the natural vegetation in the area to become established.
- Instream structures that form a proper thalweg (deepest part of the stream) will reduce ice scour and allow many banks to regrow healthy vegetation.

Habitats Created:

- Provides stable banks to reduce siltation.
- Provides shade.
- Provides leaf litter and food source for instream insects.

Advantages:

- Improve the aesthetics of the streamside.

- Attracts wildlife and insects species that provide food for fish.
- Can control erosion and may reduce flooding.
- One of the most economical and most effective means of soil stabilization.
- On severely impacted sites a good grass cover should be established between planted shrubs and trees. It can be expected to be established in the first year and will be well established in two or three years.

Disadvantages:

- Restricts other land use possibilities. For example, it may take some land out of agricultural production.
- Summer and late fall germination of certain seed varieties may be difficult.
- Some maintenance such as occasional removal of woody vegetation (e.g. alders) may be required.

Design Criteria:

- Seed growth is partially dependent on slope and soil conditions of stream banks.
- Streamside vegetation should consist of a mixture of grasses, shrubs and trees. In many instances it may be desirable to have a zone of grass and shrubs close to the stream edge and trees planted further back from the bank.
- In areas where you want to establish ground cover, plant a mixture of grasses and legumes close to the stream edge.
- In areas where you want to establish shade as well as bank cover, plant shrubs and trees.
- Consider native species that thrive under local conditions. It may be necessary to examine the site first to determine what vegetation is present.
- Dense stream bank vegetation is not always desirable. You may want to provide open areas for light penetration so that ground cover becomes established and fishability of the stream is improved.
- Consider soil types, drainage conditions, high water levels, and wind and sun direction before selecting the species for planting. Plants require proper conditions to become established and grow.
- The best time for planting is generally the early spring after frost. Fall planting can be done successfully only in light, open soils, when planting stock have dropped their leaves.

Soil Preparation and Mulch:

- Plants need soil to grow. This might seem obvious but many restoration projects plant grasses and bushes in mineral soil without adequate drainage, organic content, pH, or nutrients. If the topsoil is gone from the site, you will have to do proper soil conditioning will have to be done if the plantings are to survive.
- It is not likely that the planted grass, shrubs and trees will be watered as they would be

in a garden so it is important to plant during seasons with regular rainfall and mulch around the shrubs and trees to preserve soil moisture. Grasses may need a light mulching with hay or straw to keep the rain from eroding the soil and seeds and to keep soil moisture.

Design steps:

- The stream bank should be at a stable slope; if not, it may be necessary to grade the bank or stabilize it using rock riprap, log riprap or another structure.
- The species to be planted should be chosen carefully.

Grasses and Legumes:

- Plant a mixture of grasses and legumes.
 1. Legumes supply nitrogen to the soil and consequently enhance the establishment of the plantings. Legumes to consider are birdsfoot trefoil (*Lotus corniculatus*), or crownvetch (*Coronilla varia*). Both of these species have a long life and are adapted to a wide range of soils and moisture. Crownvetch, however, does best in dry to well-drained areas.
 2. Grasses to consider with the legumes are creeping red fescue (*Festuca rubra*) or tall fescue (*Festuca arundinacea*). Soil and moisture conditions may dictate the use of other grasses or legumes. Seed mixtures called “Highway mix” or “Conservation mix” are good combinations to use in the Maritimes. Most seed suppliers can advise on mixtures to use on the soil type of the area to be planted and the season.

Shrubs:

- An ideal shrub is red osier dogwood (*Cornus stolonifera*). This small shrub (approximately 1.8 m; 6 ft. high) is well suited to stream banks as it grows best in moist soils and spreads by producing runners or stolons. Other shrubs to consider are rugosa rose (*Rosa rugosa*), multiflora rose (*Rosa multiflora*), highbush cranberry (*Viburnum trilobum*) and speckled alder (*Alnus rugosa*). Several willow shrub species could also be considered. Most shrub species (especially speckled alder) require cutting back every third or fourth year for maintenance management to improve low and dense growth characteristics.

On less fertile or sandy soils, plant autumn olive (*Elaeagnus umbellata*). This medium shrub (2.4 - 4.2 m; 8 - 14 ft. in height) is well suited to stream banks as it quickly lays down a protective layer of litter.

On steep slopes, plant rugosa roses. This shrub (2 - 3 m; 6 - 10 ft. in height) is a good erosion control plant because of its dense growth, ability to grow on bare soil and thicket-forming abilities. It grows best on protected, south facing slopes. Well back on the stream bank, plant highbush cranberry. Highbush cranberry is a tall shrub (2.4 - 3.6 m; 8 - 12 ft.) and grows best in well-drained fertile soils or in wetter soils if the soil is fertile. Select species that can be found growing locally in similar locations.

Trees:

- Most native tree species can be used. As a general rule plant deciduous (hardwood) species on north slope (south facing) and east slope (west facing) and conifer (softwood) species on the south slope (north facing) and west slope (east facing). The species growing on site will be the best choice.

It is necessary to plan in advance.

- Many shrubs and tree species are only available at certain times of the year and need to be ordered in advance, particularly if a large site is being planted. Also, the best time for planting is early spring as soon as the frost is out of the ground. It is also necessary to prepare the site for planting. Site preparation is designed to remove weeds that may compete with the small, newly planted tree or shrub for moisture, nutrients and growing space that it needs to survive. Also, use native species that thrive in specific soil and moisture conditions. Many of these plants can be transplanted to a new site in early spring. If you are not familiar with the techniques of transplanting, request assistance from a biologist, district forester or community advisor.
- Remember, if working on private lands, get permission prior to any transplanting.

Implementation Steps:

Grasses and Legumes:

1. Although dependent on local conditions, a recommended mixture for planting a grass/legume mixture is 20 - 30 kg/ha (18 - 27 lb/acre) of grass seed and 15 -20 kg/ha (13 - 18 lb/acre) of legumes. Without the legume seed, a grass seed at 500 - 150 kg/ha is recommended.
2. Prepare a good seed bed and fertilizer (10-10-10 or 10-20-0 at 300 - 500 kg/ha; 268 - 446 lbs/acre), plant in the spring as legumes do not establish after mid-August, and mulch with straw or wood chips to reduce weed growth.
3. On steeper parts of the bank, it may be necessary to hold the mulch in place with coconut fibre mesh. This should be done in combination with cultivation or mulching to reduce weed growth.
4. Hand cyclone or hydro-seeder should be used to apply the seeds and fertilizer.

Shrubs:

1. Plant one or two year old nursery seedlings in a trench. If a trench cannot be made, remove some sod where the shrub is to be planted.
2. Plant in a zigzag row with a one-meter spacing to reduce weed competition (see Figure 1).
3. Mulch laid on the soil aids greatly in keeping soils moist and reducing weed competition.
4. Another method of establishing red-osier dogwood and willows is to plant fresh

cuttings from established shrubs. First, cut from the parent shrub shoots of last year's growth, 1/4 inch (0.6 cm) in diameter. Then, stick the cuttings in the water's edge and push the shoot down to the water level. Allow one or two buds to remain exposed. If rooted plants are available, chances of survival will be improved.

5. Spring plantings yield best results.

Trees:

1. Remove 1 square foot (one-ninth of a square meter) of sod from each planting spot with a shovel and plant the tree in the center. During planting, carry trees in a pail containing a few centimetres of water. Use damp moss or wet burlap for extra protection of trees in transit. Fence the planted area if grazing or trampling by livestock is a risk. The establishment and development of shrub and tree plantings can take place more rapidly with proper care.
2. Plants lost to animal damage or winter killoff should be replaced.
3. Plants may be fertilized to enhance their growth but this practice should only be done in combination with cultivation or mulching to reduce weed growth.
4. Mulching with sawdust, straw or woodchips is often recommended to keep the soil moist and reduce competition from unwanted plants.

References:

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.

Ministry of Natural Resources of Ontario titled the "Community Fisheries Involvement Program: Field Manual". (1982).

Adapted from Ecological Restoration of Degraded Aquatic Habitat: A Watershed Approach 2006 Published by Fisheries and Oceans Canada Oceans and Science Branch Gulf Region ISBN: 0-662-42818-8 Cat. Number: Fs104-4/2006E

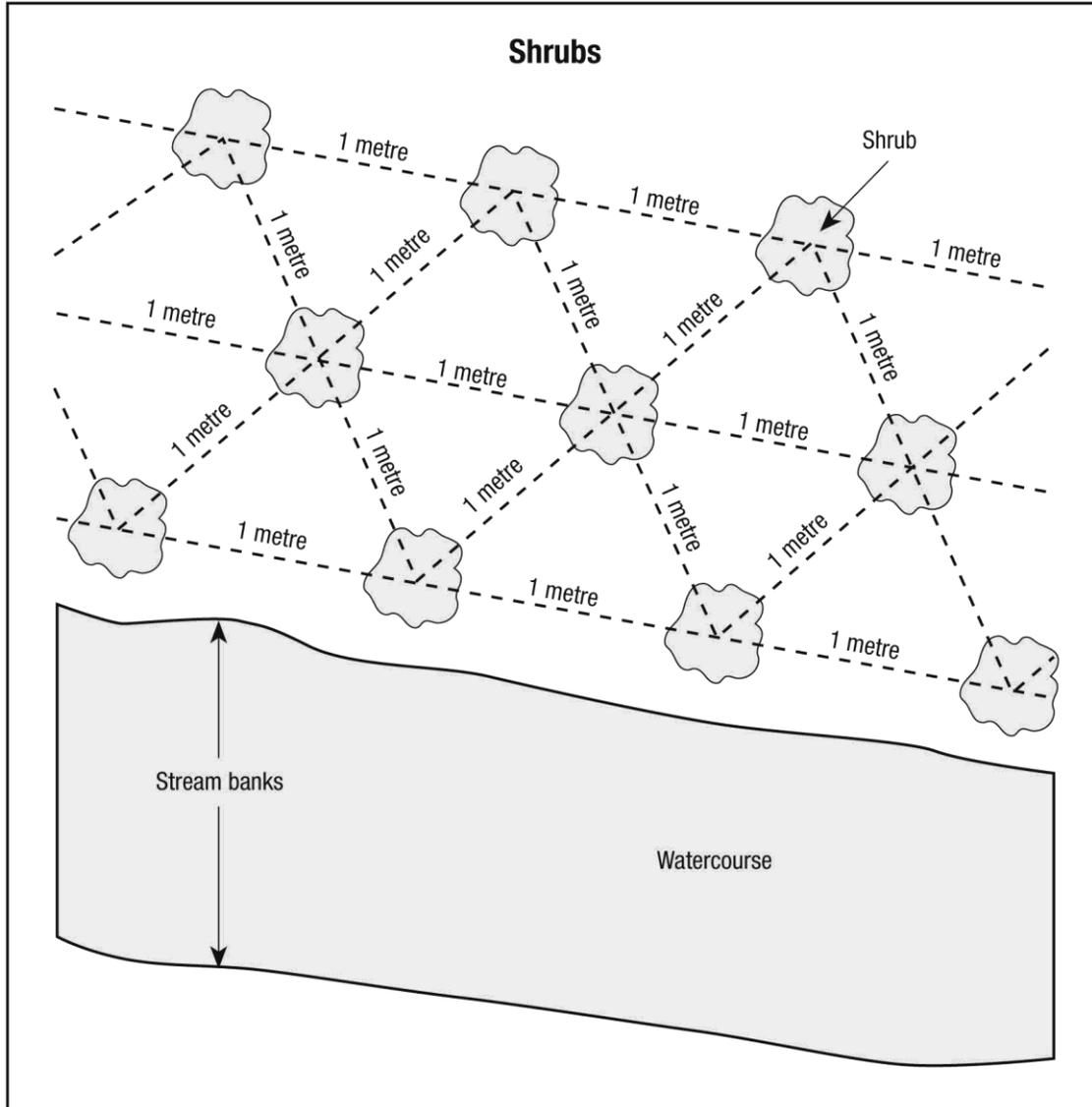


Figure 1. Conceptual drawing of typical shrub plantings (DFO, 1991).