

Sustainable drainage management

Best management practice

By Henry R Hudson



2 Brown trout

Complexity			Environmental value			Cost		
[Progress bar: Moderate to High]			[Progress bar: Moderate to High]			[Progress bar: Moderate to High]		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High

Definition & purpose

Undertake waterway management activities in brown trout (*Salmo trutta*) streams to help maintain an adequate food supply, suitable dissolved oxygen levels, cool stream temperatures, instream and overhead cover, clear, clean water; and clean gravel for spawning.

Location

- Trout spawning occurs in riffles (gravel ridges in the streambed that generally occur about 6 channel widths apart) in cool water streams (<10.5°C winter water temperature).
- Very young trout with yolk sacs (alevins) stay in the gravel for a few weeks. Fry (young fish that have absorbed their yolk sacs) emerge from the gravel to disperse and feed. The first year of life is usually spent near where they were born.
- As fish get older they utilise a variety of stream habitats. In running water adults hide in undercut banks, instream debris, surface turbulence, rocks, and deep pools. Some adults may migrate out of their birth stream before returning to spawn.



Work window

Spawning periods vary regionally, but the bulk of spawning occurs in May and June; with alevin emergence from the gravel riffles in September-October. Trout may remain in the spawning streams year round.



Brown trout. Photo: DOC.

Treatment objectives

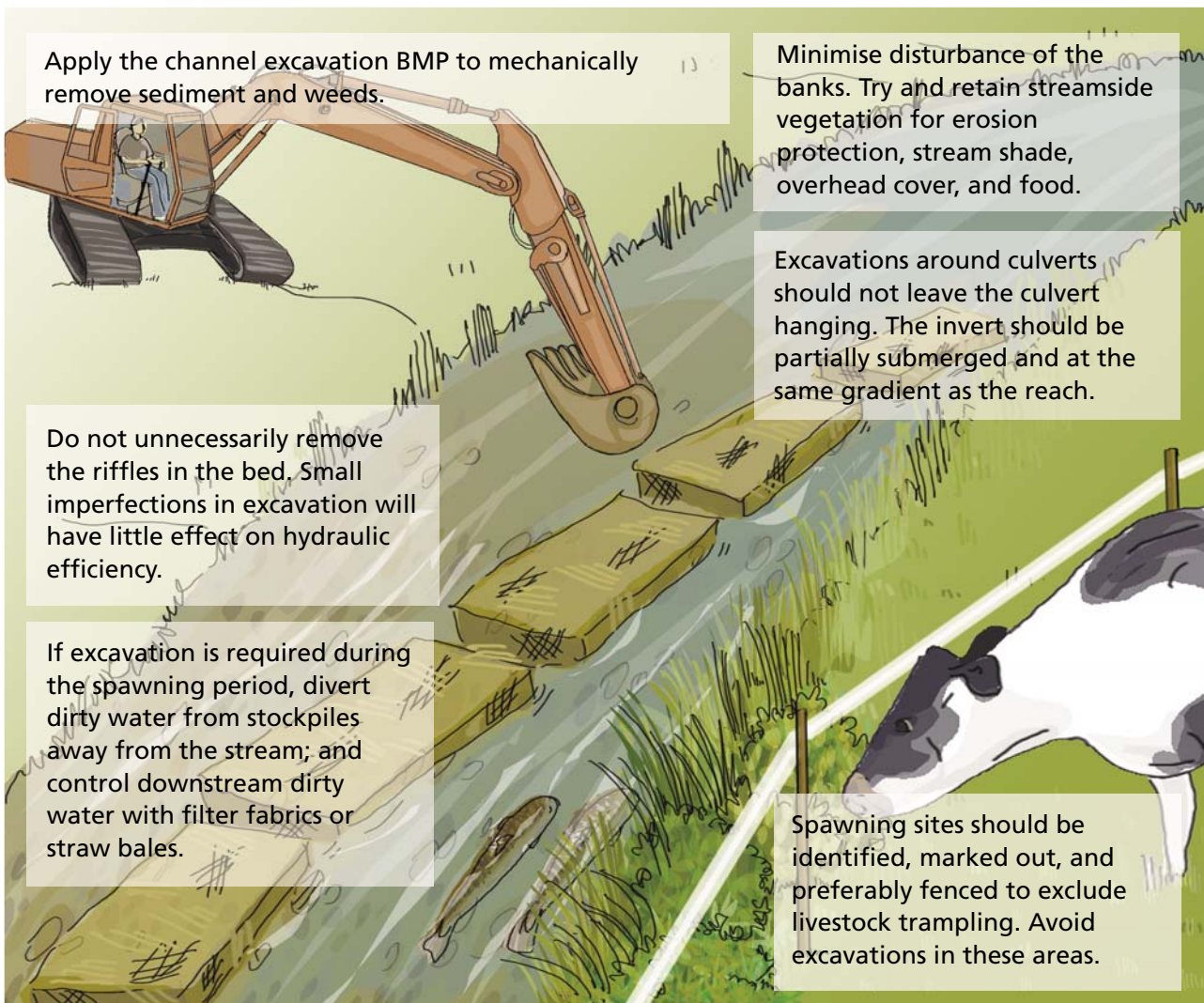
1. Channel disturbance that affects spawning reaches should be avoided in the period May to October.
2. Maintain suitable spawning bed material by avoiding deposition of fine sediment over spawning areas. Deposition of fine sediment (i.e. <2 mm diameter: sand, silt, and clay) should not increase the embeddedness of runs and riffles by more than 10% over a 24-hour period. (Embeddedness is the degree to which gravel-sized and larger particles are surrounded, enclosed, or covered by sand-sized and smaller particles. At <25% embeddedness, spawning habitat is excellent; and is considered good from 25-50% embeddedness).
3. The clarity of any receiving water should not be decreased by more than 50% instantaneously, or 30% over a 24 hour period, when measured by the black disc method. Downstream clarity, measured seven channel widths downstream of the end of the works, should be compared with clarity upstream of the works. (Trout are sight feeders and sensitive to reduced water clarity when migrating).
4. Maintain cool stream temperatures (preferably <11°C from May to October; and <25°C during summer low flows) (the lower limit of lethal temperatures).

5. Maintain high levels of dissolved oxygen (>11 mg/L May to October; and >8 mg/L for the rest of the year).
6. Maintain the pool riffle habitat (preferably 50-70% pools, with areas of slow water >50 cm deep during low flows; and 30-50% riffles).
7. Maintain vegetated, overhanging, relatively stable banks.
8. Maintain streamside cover to provide overhead cover and shade.
9. Maintain or provide unhindered fish passage.

Before you start

- Consult with District/Regional Council staff and Fish and Game about habitat value, and the requirements for avoiding sensitive times and places.
- Obtain necessary approvals from the local authority.
- Evaluate if extensive channel excavations can be avoided in the future by trapping sediment at preferred locations (See the Sediment trap BMP).

Procedures



Additional reading

Bjornn, T.C.; Reiser, D.W. 1991. *Habitat requirements of salmonids in streams*. American Fisheries Society Special Publication 19: 41-82.

Elliot, J.M. 1994. *Quantitative ecology and the brown trout*. Oxford University Press, Oxford. 286 pages.