

PLANTING LIVE STAKES

for Flood Protection in the Kootenay and Boundary Regions

What to Plant

Three woody species are successfully used for live-staking riparian areas:



Red-osier dogwood (*Cornus sericea*)



Willows (*Salix* spp.)



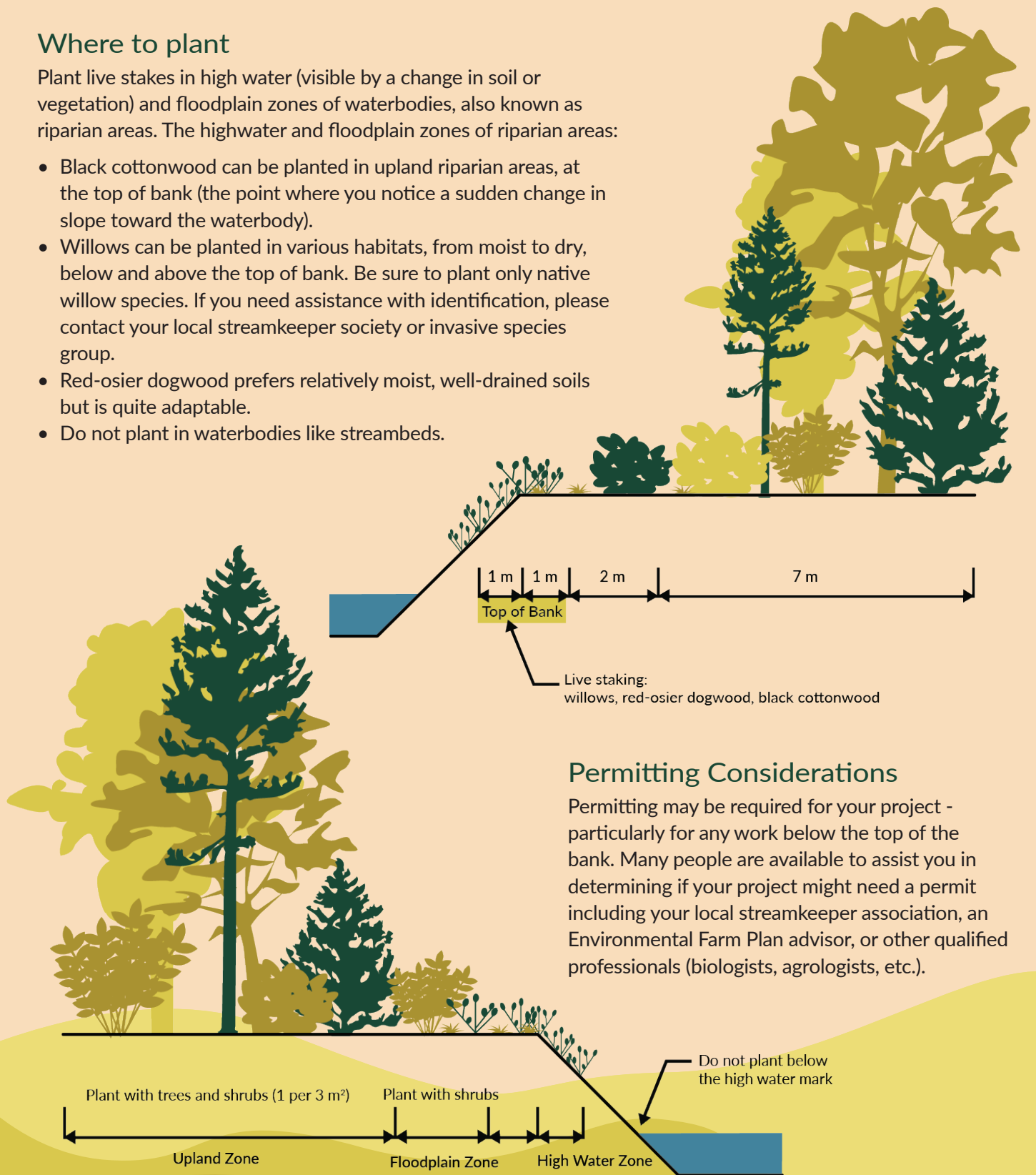
Black cottonwood (*Populus trichocarpa*)

PLANTING LIVE STAKES FOR FLOOD PROTECTION IN THE KOOTENAY AND BOUNDARY REGIONS

Where to plant

Plant live stakes in high water (visible by a change in soil or vegetation) and floodplain zones of waterbodies, also known as riparian areas. The highwater and floodplain zones of riparian areas:

- Black cottonwood can be planted in upland riparian areas, at the top of bank (the point where you notice a sudden change in slope toward the waterbody).
- Willows can be planted in various habitats, from moist to dry, below and above the top of bank. Be sure to plant only native willow species. If you need assistance with identification, please contact your local streamkeeper society or invasive species group.
- Red-osier dogwood prefers relatively moist, well-drained soils but is quite adaptable.
- Do not plant in waterbodies like streambeds.



Permitting Considerations

Permitting may be required for your project - particularly for any work below the top of the bank. Many people are available to assist you in determining if your project might need a permit including your local streamkeeper association, an Environmental Farm Plan advisor, or other qualified professionals (biologists, agrologists, etc.).

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Equipment and Tools

For harvesting:

- Pruners or loppers
- Axe

For planting:

- Metal stake or post hole auger, to dig the hole
- Rubber mallet, to tap the cutting into the soil
- Shovel, to tamp the soil around the cutting

HARVESTING CUTTINGS

When to Harvest

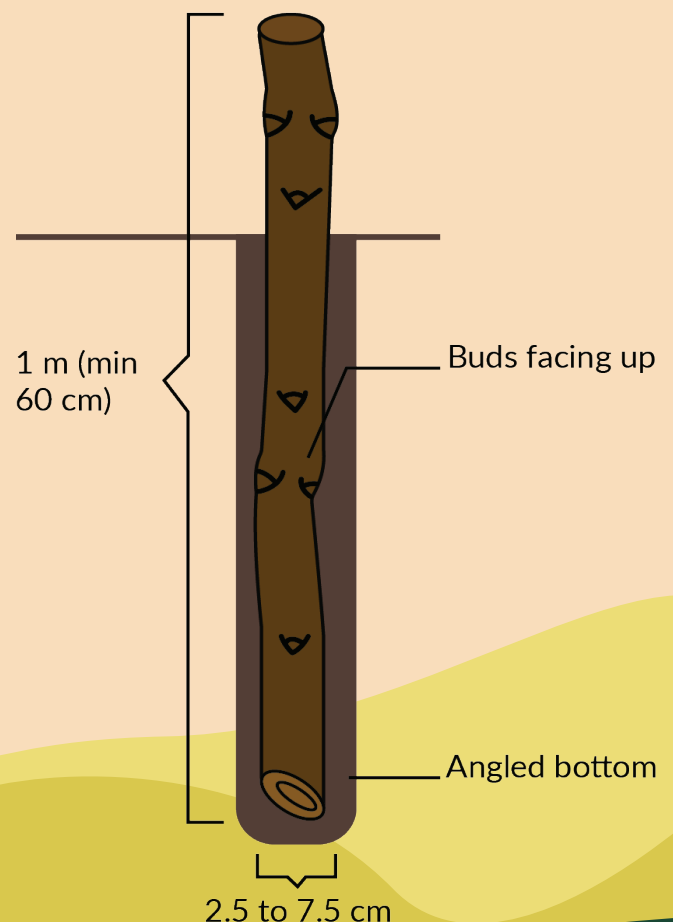
- Harvest in late fall (after leaf fall) to early spring (before bud break), when plants are dormant.
- If plants are likely to snap or split, do not harvest until freezing conditions are over.

Selecting a Location

- As a rule of thumb, harvest cuttings no more than 100 km away from where they will be planted, and within 300 m in elevation.
- Scope out locations for harvesting during the growing season, when it's easier to identify native plants.
- Select native plants growing in similar conditions to where they will be planted: consider sun exposure, distance to water, and availability of soil nutrients.
 - For example, willows growing in moist habitats will not be as successful if they are planted in drier habitats.

How to Cut

- Choose healthy looking plants: no visible damage, including wildlife browsing, or insect damage or eggs.
- Check that the inner tissue of the branches is moist and green from the cut end.
- Choose stems at least as wide as your thumb and about as long as your arm.
- Keep in mind that wider stakes may be more successful in dry areas but may be harder to plant in compact soil.
- Cut the bottom of stems on an angle and the top flat.
- Trim all leaves and twigs, and any branches smaller than 2 cm long off the cuttings to leave a single, straight, bare stake.



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Harvesting Sustainably

- Avoid damaging other plants and the surrounding areas.
- Do not harvest from sensitive areas, such as riparian areas with limited vegetation or protected areas.
- Harvest only a small number of cuttings from each area—from about 1 out of every 20 plants.

Soaking

- As soon as possible after harvesting, soak the cuttings in clean, cool water for at least 24 hours and at most 10 days.
- Make sure that 80% to 100% of the cutting is submerged.

Storage

If you can't plant the cuttings within 10 days of harvesting, you can store them until you're ready to plant in the spring.

- Keep the cuttings in a cool (0 to 4°C), moist area, out of the sun
- Wrap the cuttings in plastic to retain moisture
- Alternatively, store the cuttings in snowbanks over winter

Purchasing from a Nursery

- You can purchase your stakes if you don't have the time to harvest them yourself.

Sagebrush Nursery

Oliver, BC

250-498-8898

<https://sagebrushnursery.com/>

Keefer Ecological Services Ltd.

Cranbrook, BC

250-489-4140

<https://keefereco.com/services/ecological-services/>

CABIN Resource Management

Nelson or Kelowna, BC

778-475-3655

<https://cabinworks.ca/>



Note that nurseries may require a longer notice, depending on the number of stakes you order.

PLANTING LIVE STAKES FOR FLOOD PROTECTION IN THE KOOTENAY AND BOUNDARY REGIONS

PLANTING YOUR STAKES

Timing

- Late fall or early spring
- Ideally within a few days of harvesting cuttings

Depth and Spacing

- Plant cuttings 10 cm to 50 cm apart, or 10 cm apart if planting at the bottom of the bank, where the slope begins to level into the waterbody (also known as the toe of bank).
- If planting black cottonwood stakes, space them 1 m apart.
- Make sure that at least 75% of the cutting is underground, or at least 80% if planting in a drier area.

Placement

- Start planting nearest to the water or the toe of the bank, and work upward.
- Space stakes randomly to imitate nature (avoid straight rows).
- When planting in areas with good moisture and/or soil quality, plant more stakes, clumped together.
- Discard damaged cuttings or cut away any damaged portions.
- Place cuttings perpendicular to the slope, angled edge down and buds facing up, with at least two buds above ground level.
- Maximize contact with the water table if possible.
- Do not add rooting hormone.
- Pack soil around the stakes to ensure good soil contact.
- Water thoroughly except in winter or during freeze/thaw cycles.



note: photo shows work below the top of the stream bank, which would require a permit.

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Protecting Your Live Stakes

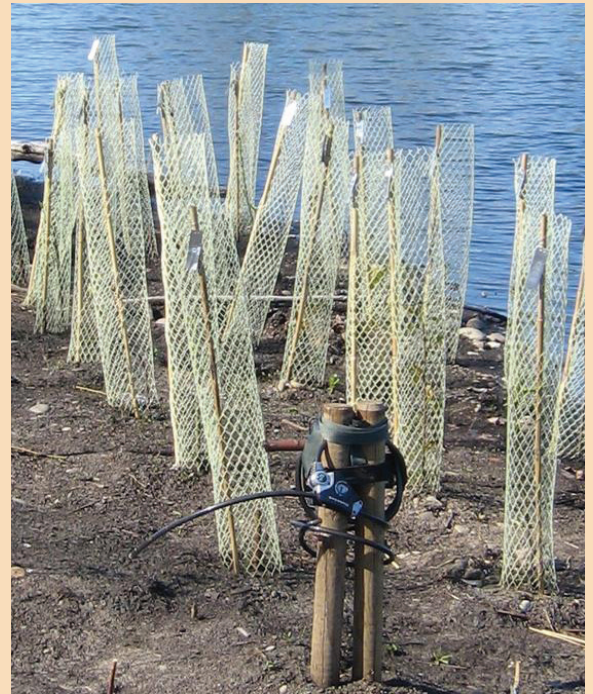
Animals (both livestock and wildlife) can limit staking success by eating the leaves or bark of the cuttings. Here's how you can protect your live stakes from damage by wildlife.

Fencing

- Effective against beavers, ungulates, and livestock
- Wire fencing, mesh, or tree/vole guards
- Tree guards protect the bark from voles and rodents in the winter
- Most effective around individual or small groups of stakes
- Install as:
 - Minimum 1 m in height
 - Openings 10 cm or smaller
 - Anchored to the ground with stakes or fence posts

Other Deterrents

- Deer-repellent oils and plants
- Motion-activated sprinklers (these will also water plants at the same time)
- Ultrasonic animal repellents



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SUCCESS CHECKLIST

- ✓ Monitor regularly
- ✓ Water twice a week for 2 years
- ✓ Maintain plant protection

Monitoring and Maintenance

Monitor your stakes regularly for at least 2 years to determine success and adapt if needed.

Watering

Water your stakes during the growing season where the stakes are not in regular contact with the water table. Water:

- A minimum of two times a week
- Three times a week if temperatures exceed 28°C
- Water in the mornings or evenings



Other Maintenance

- In the first growing season, prune all but a few leaves to reduce water loss.
- In the fall, gently tug a few stakes to see if planting was successful.
- Plant more stakes in areas where they didn't survive.
- Control weeds using manual or mechanical methods.
- Remember: Root growth is the most important in the first year – just because you don't see leaves, it doesn't mean that the stake is dead!



Additional Tips

- Seed disturbed areas at a low rate with a non-aggressive blend of grasses and native flowering plants to out-compete weeds and secure the surface soil.
- Apply mulch, such as wood chips, straw, or geotextile fabric, to help suppress weeds, retain soil moisture, and control erosion above the high water mark.
- Avoid trampling or compacting the soil when entering the planted areas by foot or with equipment.

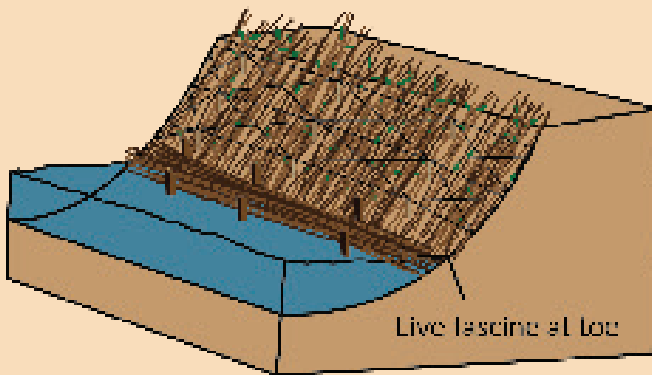


OTHER PLANTING TECHNIQUES



Live Silt Fences

- These will slow down water flow and collect sediment across areas that have been eroded by small streams and ditches.
- Use willows or black cottonwood.
- Plant stakes in rows, 3 cm to 4 cm apart, perpendicular to the flow of water, or up to 1.5 m apart on steep areas.
- Use stakes at least 50 cm long, buried at least 50 cm into the ground.



Brush Mattress

- This is a mat of live branches pinned to a slope using live or dead stakes and biodegradable fabric and will stabilize dry streambanks.
- Use any of the three woody species.
- These branches do not need to be trimmed like live stakes and may be thinner and longer.
- Anchor the mat using bundles of branches placed along the toe of the bank.



Wattle Fences

- This style of fence is suitable for moist banks and will stabilize very steep slopes by creating terraces.
- Use willows.
- Reinforcing posts can be thicker live stakes or rebar.

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