

Control Instructions for Invasive Knotweeds **(*Polygonum cuspidatum*, *Polygonum bohemicum*, *Polygonum sachalinense*, *Polygonum polystachyum*)**

Updated June 2007

What does knotweed look like?

- Bamboo-like green or reddish stems
- Bright green leaves 1 to 12 inches wide with smooth (not saw-toothed) edges (leaf size and shape can depend on the species as shown in the photo)
- Starts growing in April; full sized by July
- Large spikes of small, white flowers in late summer
- Dormant in winter, the dead, brown stems may remain standing
- Dense patches can grow up to 12 feet tall
- Bohemian (a hybrid) leaves are a mix between Giant and Japanese



Above-left to right:
giant, Japanese, Himalayan knotweed leaves

Where does it grow?

Knotweed thrives in any moist soil or river cobble, in full or partial sunlight. It is most common in the flood plains along rivers and creeks. It also grows in roadside ditches, waste areas and beaches.

How does it spread?

In the Pacific Northwest, knotweed usually spreads when roots are moved by floods or in soil contaminated with root or shoot fragments. Mowing knotweed can also spread it further. Because root fragments as small as ½ inch can start new plants, even one patch can produce hundreds of new plants.



Why are you getting rid of this weed? Why is it so harmful?

- Knotweed is fast growing and extremely aggressive. One small plant can grow up to a foot a week! Huge patches can grow fast, invading river and creek banks.
- Knotweed, left unchecked, prevents other plants from growing beneath it, and animals and fish don't use it for food or shelter.
- Without intervention, knotweed can permanently displace native vegetation, destroy fish and wildlife habitat and reduce recreational opportunities.
- Initial research indicates that knotweed pulls nitrogen out of our nitrogen-deficient soil without returning it with leaf fall. This could eventually disrupt the food chain in an aquatic system.
- Knotweed threatens our current and future salmon populations through loss of insects and shady areas.
- Knotweed infestations compete with trees. Trees not only provide more shade for fish habitats, but also provide better root structure to slow erosion, and decomposing logs produce important nutrients for animals that live in or around the water. Also, trees supply large woody debris which slows water velocity and creates pools, improving habitat for salmon.
- Knotweed can invade man-made structures such as foundations and roads, causing expensive damage.



Why use herbicides to control knotweed?

- Clallam County and other organizations have tried manual control methods and concluded they were ineffective for all but the smallest infestations. The Nature Conservancy was only able to control one small patch (25 stems) with 17 monthly cuttings over three field seasons. Clallam County does not have the resources to use this method because of how rapidly knotweed is spreading. The size of existing infestations on many of our rivers is already daunting, and we need to act quickly before the problem is totally out of control. Some patches have over 1000 stems, and one site in Clallam County had over two solid acres of knotweed!
- Knotweed has a huge root system with the ability to resprout following cutting. Thus, manually pulling or digging the root system usually leaves behind rhizomes that can resprout in a couple of weeks.
- The herbicides chosen to treat knotweed have been selected for the lowest toxicity possible, as well as for the maximum efficiency to kill the plant.

What herbicides are you using to kill knotweed?

Several different herbicides are being used to remove knotweed. These include:

- **Glyphosate**, the active ingredient of Roundup. **Aqua Neat, AquaMaster, or Glypro** are brand names of glyphosate products designed to be less toxic to the environment and labeled for use on rivers, lakes, and streams.
- **Imazapyr**, (pronounced ih-maz-uh-peer,) in small amounts, may be mixed with glyphosate. Some brand names for imazapyr products used in water are **Habitat** or **Polaris AQ**. Imazapyr is similar to glyphosate, has a very low toxicity to most animals, but does remain in the soil longer than glyphosate. Mixing two kinds of herbicides together often improves the effectiveness when compared with using each herbicide individually. By mixing the glyphosate and imazapyr together, we can reduce the total amount of herbicide used.
- **Surfactant**, (sometimes called a sticker) is an ingredient that is added to the spray mixture to ensure that the foliage soaks up the herbicide. We have chosen ones that studies have shown to have low toxicity to animals, especially ones that live in water.
- **Marker dye**. A blue-colored dye called Blazon is mixed into the herbicide spray mix. The dye indicates where herbicide has been applied and minimizes accidental human contact. This dye is not toxic.

General Steps for Knotweed Control:

1. **Positively identify your knotweed.**
2. **Treat after canes are four or more feet tall. Treatment is recommended from around May-October, or until plants are dying back for the season.**
3. **Check your site. To use herbicides in or near water, you must be a licensed, aquatic applicator. Most aquatic sites also require a special permit.** Contact the Weed Board for help with knotweed control in aquatic sites at 360-417-2442 or in the west Olympic Peninsula, call 360-963-2300.
4. **It is a violation of Federal law to use herbicides in a manner that is inconsistent with the label.** Carefully read all directions for use before applying. Call if you have questions.
5. **Post notices** that an area has been treated wherever there is **public access**, such as businesses or parks. Most notices can be **taken down after 24 hours**, but **check for most current regulations**.
6. **Before treatment, protect yourself** with non-absorbent gloves (thin latex works well), eyewear, long-sleeved shirt, long pants, and closed toe shoes. The greatest risk generally occurs when mixing or pouring concentrated herbicide. Consider protecting your mixing site with disposable plastic to catch any spills. Carefully wrap up and dispose of the plastic properly after treatment, or you may wash in the same way as herbicide equipment. See instructions below.
7. **Have water available for mixing or rinsing equipment after treatment.**
8. **Treatment: Injection, Foliar, Wipe-(See individual pages for specific application instructions).**
9. **Document** your treatments so we know how much you had, what you did, and how well the treatment worked. Monitor where you have treated for several years. Re-treat as needed. Don't let plants come back!

2007 Treatment Recommendations and Rates Summary:

- For **small patches** (less than 2300 canes) with large diameter canes: Inject 3-5 ml of undiluted glyphosate. If using AquaNeat-do not use more than 7 ½ quarts/acre. Be sure to check the acreage limit for the specific product you are using.
- For treatment of **large patches (or if foliar application is desired)**: Spray foliage until wet using a solution of one of the following:
 - 6%-8% solution of glyphosate** (For AquaNeat this equals 7 oz. -10 ¼ fl. oz per gallon water),
PLUS ½ % to 2% **surfactant**, (Use the specific label to determine how many ounces per gallon must be added to equal this percentage. Many non-aquatic formulations of glyphosate already contain some surfactant),
PLUS **marker dye**, (Blazon Blue for aquatic sites, many others available for terrestrial) as needed (just enough to make it blue, **as little as ½ fl oz.** per gallon of water).

OR

- **3%-5% glyphosate**, *PLUS* ½ to 1% **imazapyr** (For Habitat this equals 0.6 oz-1.3 fl oz per gallon water),
PLUS ½ % to 2% of **surfactant**, (See above-Use the specific label to determine how many ounces per gallon)
PLUS **marker dye** as needed, (just enough to make it blue, as little as ½ oz. per gallon of water).
- For **re-treatments**: several options and recommendations:
 - 1) Inject at highest allowed rate, if cane diameter is large enough.
 - 2) Foliar treat at the higher rate. Plants may have been missed the previous season. For those showing herbicide symptoms, use the combination of glyphosate (AquaNeat) and imazapyr (Polaris AQ or Habitat), at the higher rates mentioned above, with higher rates of surfactant.
 - 3) For small plants wipe with 33% solution of glyphosate (mix one part of AquaNeat product with 2 parts water) plus 10% by volume of surfactant (12 oz per gallon). Add enough marker dye to make it blue.

OR

Wipe a total of 33% solution of glyphosate (eg. AquaNeat) plus imazapyr (eg. Polaris AQ or Habitat)-add surfactant as above, and marker dye.

- 4) Where feasible, and after multiple retreatments have greatly destroyed much of the root system and reduced overall infestation, consider digging last spindly plants and as much of the root as possible. MONITOR site for several years, and remove any plants that develop.

NOTE: Some programs have used triclopyr successfully. Ask your weed control specialist for the latest information about rates and efficacy.

Improper disposal of knotweed canes or roots often leads to new infestations. Never throw untreated knotweed plants or parts into the water. Burn canes and roots or allow knotweed debris to dry thoroughly in a location that can be monitored frequently to ensure that no resprouting occurs.

INJECTION

- **INJECTION:** Use on patches less than 1400-2000 canes, depending on the label and application rate. Canes need to be about ¼ inch diameter or larger (about the size of a little finger). Smaller canes will likely need to be sprayed or wiped with a concentrated mixture (see Wipe below). Only glyphosate is registered for injection.
- **Herbicide:** Use concentrated glyphosate **only**, no surfactant, or dye. **Glyphosate is a non-selective herbicide that can injure other desirable plants**, so be careful not to drip or rinse onto non-targeted plants. **Check the label for maximum rates.** Generally, **YOU MAY NOT USE MORE THAN 7 1/2 -8 quarts of glyphosate/acre.** Do not exceed the maximum rate allowed on the label!
- **Equipment:** Each injector kit contains: a numbered injector gun, an herbicide canister, a capped measuring tube with a long and a short needle inside, and an allen wrench. Marking paint and a garbage sack are optional, but suggested.



Knotweed Injection Equipment

Directions for injection:

- **Measure** the area of the infestation to determine how much herbicide is needed.
- **Post** an herbicide notice if it is required. Remove as allowed.
- **Write** down the amount of herbicide in the container before you pour any out; this makes it easy to know how much has been used by the end of the treatment.
- **Put on personal protection equipment**, including gloves and eye-protection. Wear long-sleeved shirt, pants, and closed-toe shoes.
- **Assemble** the injector tool. To attach the needle, pull back the quick release ring on the gun. Attach the needle, with the **hole pointing down**. Be sure the quick release ring snaps fully into place or the needle will come loose. Before attaching the canister to the top of the injector gun, inspect the threads for any debris. Rinse or clear anything in the threads. Do not tighten down the canister too hard, or you will crack the body of the injector and it will leak or fail to pressurize.
- **Pour** undiluted glyphosate into the injector canister. Try to measure out only the amount you plan to immediately use for treatment and no more. Close the lid to the herbicide container as soon as you have finished pouring. **ALWAYS AVOID POURING HERBICIDE BACK INTO THE ORIGINAL CONTAINER.**
- **Calibrate**, using the small plastic, measuring tube provided in the kit. It takes a couple of squirts to build up pressure. Make sure the tool is not delivering more than 5 ml. Turn the set screw in the handle (using the allen wrench provided in the kit) to adjust flow. Out-reduces flow, in-increases flow. After adjusting, recheck calibration. After you are satisfied, pour the herbicide generated from calibration into the injector's canister. Calibrate every time you fill the canister again.
- **Inject 3-5 mls of undiluted** glyphosate into the middle of the lowest node of each suitable cane. Short needles seem to work best, long ones tend to bend or break, but may be best when the plant is full of water. If you feel too much back pressure, poke a couple of holes higher up in the node to let out the pressure. Try slanting the needle down for canes that are smallish for this method. Older canes can be brittle and may crack when injected. Consider marking treated canes as you go. This will avoid "skips". We use a small dot of spray paint.
- **Rinse all** equipment that may be contaminated with herbicide three times (triple rinse). **There will be a cleaning fee charged for any loaned equipment that is returned without adequate cleaning.**
- **Dispose** of rinsate on undesirable plants on-site.
- **Repack** injector kit and **return** promptly along with any unused herbicide.
- **Fill out** knotweed control sheet and turn in with equipment. Let us know of any equipment problems.
- **Don't cut or disturb stems for at least a week to ten days after an application.**
- **Wash** before eating or drinking and after treatment.
- **Wash clothes** that may have been contaminated by herbicide separately from other laundry.

FOLIAR

- **FOLIAR:** Use on large patches, small diameter plants, or simply as desired. Several treatments will be necessary, but each treatment is generally faster and uses less herbicide than injection. Foliar applications can be used in conjunction with injection. When combining treatment methods, inject first, follow with spot foliar treatment. Consider shielding desirable plants.
- **HERBICIDE:** Many products are available but we are currently using glyphosate, (or a mix of glyphosate and imazapyr), surfactant, and marker dye.
- **EQUIPMENT:** Handheld backpack sprayer, (holds up to 4 gallons), measuring cup.
- **DIRECTIONS FOR APPLICATION:**
- **Measure** the area of infestation to determine how many gallons of spray to mix. A gallon of spray solution should treat approximately 1000 square feet, depending on plant size and infestation density.
- **Note** any vegetation or areas that you may want to protect from drift. Ask about techniques, such as waxed cardboard shields, that might help in your situation.
- **Write** down the amount of herbicide in the container just before you start; this makes it easy to know how much has been used by the end of the treatment.
- **Put on personal protection equipment**, including gloves and eye-protection. Wear long-sleeved shirt and pants, and closed-toe shoes. Consider wearing a hat to protect against potential drift or drips.
- **Protect** mixing site from possible spills by laying plastic under mixing area.
- **Fill** sprayer to approximately half the amount of herbicide spray you want to mix (4 gallons maximum). Leave the strainer at the top to keep things from falling in. You may have to put the lid on and pump up the sprayer to detect problems. Check to see that the sprayer is not leaking out the bottom, that the handle shuts off appropriately, and that the nozzle tip is not clogged. Fix any problems before adding herbicide or other ingredients, or get another sprayer.
- **Measure** herbicide according to how many gallons you want to mix (4 gallons maximum) then pour into sprayer. (see “**Treatment Recommendations and Rates Summary**”.) Replace the lid on the herbicide container as soon as you have finished pouring. Try to mix only the amount of herbicide solution you will need to use and no more. Next, add surfactant, if required. Finally, add a small amount of marker dye, if desired. **ALWAYS AVOID POURING HERBICIDE BACK INTO THE ORIGINAL CONTAINER.**
- **Rinse** measuring cup and empty into sprayer several times; finish filling sprayer with water. Avoid overfilling or the mixture may slosh out the vent hole in top. **NOTE: Marker dye gets on EVERYTHING!** The blue will wash out of clothes, but takes a while to fade from skin or shoes. The dye is non-toxic, and its presence does NOT necessarily mean you have been contaminated with herbicide! A good trick is to rinse the pack, especially the lid, and the dye container, until you don't see any more blue.
- **Attach and tighten** the sprayer lid, gently shake the sprayer side to side to mix solution.
- **Put on pack**, but avoid bending over with full pack because of potential sloshing and spillage.
- **Pump up pressure** with handle on the left side. Do not over pressurize.
- **Apply herbicide** to all the leaves as uniformly as possible, just until they are wet. Knotweed plants can be very tall. Position yourself so you are **not underneath** a spray stream. **For a very large site**, it is sometimes necessary to ring the infestation, and return after those initial plants have died back, moving inward with each treatment. **Or**, cut a path into the interior and spray on either side and back out as you go. **Or**, cut plants in May or June and return in August and September to treat the regrowth. You will have to determine what works best for each individual site.
- **Rinse all** equipment that may be contaminated with herbicide three times (triple rinse). **There will be a cleaning fee charged for any loaned equipment that is returned without adequate cleaning.**
- **Dispose** of rinsate on undesirable plants on-site.
- **Return** equipment promptly along with any unused herbicide.
- **Fill out** knotweed control sheet and turn in with equipment. Let us know of any equipment problems.
- **Don't cut or remove stems for at least a week to ten days after an application.**
- **Wash** before eating or drinking and after treatment.
- **Wash clothes** that may have been contaminated by herbicide separately from other laundry.



WIPE

- **WIPE:** For small patches, small plants, or areas requiring very selective treatment. In 2007, we are recommending wipe as a trial treatment on previously treated plants, that are small, but showing signs of herbicide damage.
- **HERBICIDE:** Many herbicide products are available but we are currently using glyphosate, (or a mix of glyphosate and imazapyr), surfactant, and marker dye. Dilute from concentrated product.
- **EQUIPMENT:** Foam brush, container-additional container carrier and loppers to cut canes before wiping are optional.



- **DIRECTIONS FOR APPLICATION:**
- **Write** down the amount of herbicide in the container just before you start; this makes it easy to know how much has been used by the end of the treatment.
- **Estimate** the amount of solution needed.
- **Put on personal protection equipment**, including gloves and eye-protection. Wear long-sleeved shirt and pants, and closed-toe shoes.
- **Protect** mixing site from possible spills by laying plastic under mixing area.
- **Measure** One part full strength AquaNeat into container, add two parts water. The goal is to mix a 33% solution. Be sure to leave room in the container for surfactant. Add up to 10% surfactant.
- **Close** bottle tightly, shake to mix (**see “Treatment Recommendations and Rates Summary”**). Replace the lid to the herbicide container as soon as you have finished pouring. Try to mix only the amount of herbicide solution you will need to use. Finally, add a small amount of marker dye, if desired. Try to measure out only the amount you plan to immediately use for treatment and no more. **ALWAYS AVOID POURING HERBICIDE BACK INTO THE ORIGINAL CONTAINER.**
- **NOTE:** Marker dye gets on EVERYTHING! The blue will wash out of clothes, but takes a while to fade from skin or shoes. The dye is non-toxic, and its presence does NOT necessarily mean you have been contaminated with herbicide! Rinse the dye container, especially the lid, until you don't see any more blue.
- **Consider** placing container into a small bucket with a handle to prevent container from spilling, and to hold the foam brush between applications. Or, consider placing brush in an extra glove between uses. This is especially useful if you have to travel any distance.
- **Dip brush** into solution-**For large canes**-lop to a three foot height, and paint all sides of the stem thoroughly. Stack the portion that is removed where it will dry out and not be allowed to root. **For small plants**, paint as much of the exposed surface as possible.
- **Rinse all** equipment that may be contaminated with herbicide three times (triple rinse). Foam brushes should be rinsed, then deposited along with used gloves in a garbage bag. **There will be a cleaning fee charged for any loaned equipment that is returned without adequate cleaning.**
- **Dispose** of rinsate on undesirable plants on-site.
- **Return** equipment promptly along with any unused herbicide.
- **Fill out** knotweed control sheet and turn in with equipment. Let us know of any equipment problems.
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