IPM PROFILE
Hairy willow-herb (*Epilobium hirsutum*)
November 2007
(Updated February 2010)

Plant Characteristics: Hairy willow-herb is a semi-aquatic, softly-hairy herb that ranges in height from 3 feet to 6 feet tall. The overall plant is covered with fine soft hairs. The leaf arrangement is mostly opposite, and the toothed leaves are much longer than wide, and widest below the middle (lanceolate). The showy rose-purple flowers extend from leaf axils near the top of the plant. Flowers are approximately ¾ inch across. Each flower has four sepals, four notched petals and eight stamens. Flowers occur in July and August.

Taxonomically, hairy willow-herb is closely related to the native fireweed (*Epilobium angustifolium*), and with a casual look, they share characteristics. Both species are about the same height, they both have purple flowers at the top of plants and they can share habitat along roadsides. However, it is easy to tell them apart. The individual hairy willow-herb flowers are much larger than fireweed, the white stamens are prominent even from a distance, and each plant prefers different habitat. Fireweed prefers dry road sides and hairy willow-herb likes its feet wet.


Hairy willow-herb flower, photo B. Simon


L-fireweed; R-hairy willow-herb, B. Simon

Growth Habit: This semi aquatic, perennial herb is found in a wide range of moist soils, including wetlands, ditch and stream banks, low fields, pastures, and meadows. In its native range hairy willow-herb is found in damp lands and waste places to an elevation of 8100 feet, and it is intolerant of shade. Once established, hairy willow-herb is somewhat shade tolerant. In England (and WA), hairy willow-herb co-exists with purple loosestrife, where both species colonize gaps along riparian areas created by erosion. Hairy willow-herb outcompetes and grows faster than purple loosestrife in the shorter days and colder temperatures of autumn. In the spring, this relationship is reversed, with purple loosestrife having a faster growth rate. Hairy willow-herb requires habitat with a pH of 5.5 or higher for seed germination.

Hairy willow-herb in Island Co. – S. Horton

Reproduction: Hairy willow-herb is a perennial that spreads by seeds and by rhizomes. Flower buds develop after 10 to 12 weeks of growth. Side shoots also produce flowering stems, and the whole plant is flowering by mid-summer (July–August). Self-pollination is possible, but this reduces seed production. Seeds are ripe and begin to disperse 4 to 6 weeks after flowering. Each seed is oblong and flattened with tufts of long white hairs that serve to facilitate dispersal by air.

Axillary buds, found at the base of the stem, produce stolons. These stolons develop adventitious roots, which pull the stolons into the ground, where they develop into fleshy, soft rhizomes. These rhizomes branch repeatedly, and spread to new areas. When the axillary buds produce stolons that spread along the soil surface, the stolons root and produce a pseudo-rosette of leaves. If this rosette gets separated from the parent plant, it produces an aerial shoot and develops much the same way as an autumn seedling. The aerial shoots die back each autumn, but the rhizome system remains. These rhizomes can reach almost 2 feet in length from the time of initial development to aerial shoot production. Hairy willow-herb adapts to its growing conditions. The rhizomes growing in submerged water or water-saturated mud, develops arenchyma tissue. Rhizomes not submerged are mostly cork.

Hairy willow-herb roots, S. Horton

hairy willow-herb roots B. Simon

Distribution and Impacts:
The earliest collection records from Washington are from 1965 from the Bellingham area of Whatcom County, where hairy willow-herb was found growing along wet railroad ground. Another specimen was recorded from Whatcom in 1991. In 1966 and 1984 specimens were collected from the Bingen area of Klickitat County, and in 1990 a specimen was collected from the Lyle area of Klickitat County. A 1999 survey of southern Whatcom County reported 115 sites, covering an estimated 9.25 acres. A large Whidbey Island (Island County) wetland site was identified in 1999.

The following distribution, by county, was reported in 2009:

Adams:	less than 10 acres
Benton:	less than 10 acres
Clallam:	less than 10 acres
Franklin:	10 – 100 acres
Grant:	less than 10 acres
Island:	10 – 100 acres
King:	less than 10 acres
Klickitat:	10 – 100 acres
Skagit:	less than 10 acres
Whatcom:	10 – 100 acres
Whitman:	less than 10 acres

The following counties reported no known sites:

Asotin, Chelan, Clark, Grays Harbor, Jefferson, Kitsap, Lincoln, Lewis, Okanogan, Pend Oreille, San Juan, Skamania, Snohomish, Spokane, Stevens, Walla Walla, Whitman and Yakima.

Hairy willow-herb is sometimes sold and planted as a garden ornamental, and it had been reported in a number of gardens in the Bellingham area. This plant was used as a replacement for purple loosestrife, a state-listed noxious weed. However, hairy willow-herb is also a noxious weed in Washington. Both purple loosestrife and hairy willow-herb are on the WSDA quarantine list. It is prohibited to transport, buy, sell, offer for sale, or to distribute plants or plant parts of these regulated plants, into or within the state of Washington. It is further prohibited to intentionally transplant wild plants and/or plant parts of these species within the state of Washington, according to WAC 16-752-505

World-wide distribution: hairy willow-herb is considered a common weed in Belgium, Egypt, Turkey, and the U.S. It is reported as a nursery weed in Norway, and it is an introduced ornamental in Australia. In 1990 it was reported in southern Australia, and this species is prohibited from entering Western Australia. Hairy willow-herb is established in the northeastern US, with initial sites reported 140 years ago. Hairy willow-herb escaped cultivation and traveled inland, where it established in a wide range of wetland habitats. It continues to travel westward.

Impacts:
Hairy willow-herb is a tall, attractive plant capable of escaping cultivation to form monotypic stands in natural wetland areas, where aggressive and dense growth can crowd out native or beneficial species. While initially found along ditch-banks and roadsides, hairy willow-herb is capable of spreading to undisturbed meadows. Records indicate this species is considered established throughout most of the northeastern United States, and the distribution continues to spread westward.

Hairy willow-herb shares habitat, and the northeast to westward movement and establishment history, with purple loosestrife. These two exotic species co-exist and establish in riparian areas. Purple loosestrife has the ability to take advantage of early spring growing conditions, and hairy willow-herb takes advantage of increased growth in autumn growing conditions. Hairy willow-herb is aggressive and capable of spreading by wind dispersed seeds, and by a large root system that produces rhizomes which facilitate vegetative spread. Hairy willow-herb is another exotic, aquatic species capable of disrupting the ecology of our wetlands by altering food chains, hydrologic cycles and floral composition. These factors all determine the succession or long term management plans of these wetland areas.

MANAGEMENT PLANS

Integrated Pest Management, as defined by RCW 17.15, is a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet programmatic pest control objectives. When following this IPM plan, be sure that site-appropriate control methods are used.

CONTROL METHODS

There was little information available on control of hairy willow-herb. Several field trials were initiated in 2006 and 2007 to assess various control methods. This included herbicide trials in Whatcom County, and manual control plots in Klickitat and Island Counties. The Klickitat Co. plots had water levels up to knee deep. The Island Co. plots were in a low, damp pasture, but no visible standing water when plots were set up or monitored.

Listed below are a range of options, or a combination of options, that may be suitable for site specific control of hairy willow-herb. These control methods are listed in the following order, and include: Prevention, Mechanical, Chemical and Biological Controls.

EARLY DETECTION, PREVENTION, FOLLOW-UP

Learn to identify hairy willow-herb, and be able to distinguish it from other wetland plants or garden ornamentals.

Post cards were produced in 2009 to help with identification. They will be distributed statewide to county noxious weed control boards and to the nursery industry. Contact your local county weed board or WSDA for postcards.

Hairy willow-herb is sometimes offered for sale as a garden ornamental on the internet. As mentioned above, this species is a quarantine species in Washington State, and it is on the WSDA Prohibited Plant List.

It is prohibited to transport, buy, sell, offer for sale or distribute plants or plant parts of the regulated species within the state of Washington, or to sell, offer for sale, or distribute seed packets of the seed, flower seed blends or "wildflower mixes" of this species within the state.

For more information on plant id:
http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds/weed-identification/hairy-willowherb.aspx
For more information on quarantine laws:
http://www.nwcb.wa.gov/
For postcards:
http://www.nwcb.wa.gov

MECHANICAL CONTROL

Hand pulling: Small sites or young plants can be hand-pulled. Be sure to remove all plant parts and all roots and rhizomes. Any flowers or seed heads need to be bagged.

Covering: Manual control plots were established in Klickitat County in June, 2007, and in Island County in August 2007. The Klickitat Co. site had water levels up to knee deep. The Island Co. site was an idle, damp pasture, with no visible standing water.

All measured and staked plots had 100% cover with hairy willow-herb. In each plot the plants were either: trampled down, then tarped; plants were cut and tarped; or plants were cut and removed and tarped. All plots were monitored over the course of 2 years. The results appeared to be the same for both the Klickitat and Island Co. sites.

All plants were down, dead and decomposed under the tarps. No plants appeared to be growing up from under the tarps. All tarped areas had white roots, or stolons, encroaching in from all sides from the larger hairy willow-herb infestations. It was not clear, at either site, if there were any live roots from the tarped plants.

This could be an effective control for smaller sites. The plants under the tarp died back. There was no seed production.

Mowing: No research was conducted for this method. The Island Co. control site had portions mowed by the landowner. This prevented the hairy willow-herb from spreading further, and it apparently reduced seed production. Due to the extensive root system of this plant, mowing would not eliminate the plants from a site and would not be recommended in wet sites. Mowing equipment could potentially spread the seeds to uninfested areas.

CHEMICAL CONTROL

Herbicide Treatment:

Hairy willow-herb herbicide plots and trials were conducted in Whatcom County beginning in 2006. The following data was provided by Timothy W. Miller, PhD, WSU, Mount Vernon.

The plants were treated in mid-July, at early bloom when they were easy to distinguish. Plants were about five feet tall, the foliage was dry and the temperature was about 75 F. The solution was applied with a back pack sprayer. All treatments were mixed with 0.25% DyneAmic surfactant, resulting in an application rate of 76 gallons per acre.

The following results are reported after one year of field tests. However, it appears that all of these herbicides can provide excellent control of this noxious weed species. Milestone and Clearcast are not registered for aquatic use in Washington.

The following data shows percent control at 3 weeks, 2 months, and 13 months after treatment (AT)

Product	Active Ingredient	Rate	3 wks AT	2 mos AT	13 mos AT
Aquamaster	Glyphosate	(5%)	65%	100%	100%
Habitat	Imazapyr	(0.05%)	15%	99%	100%
Habitat	Imazapyr	(1%)	20%	95%	100%
Clearcast	Imazamox	(0.5%)	15%	89%	100%
Clearcast	Imazamox	(1%)	35%	90%	100%
Renovate	Triclopyr	(1%)	70%	96%	100%
Renovate	Triclopyr	(1.5%)	75%	98%	100%
Aquamaster + Habitat	Glyphosate + Imazapyr	(3% + 0.5%)	60%	95%	100%
Aquamaster + Clearcast	Glyphosate + Imazamox	(3% + 0.5%)	50%	99%	99%

Aquamaster + Renovate	Glyphosate + Triclopyr	(3% + 1%)	65%	93%	97%
Habitat + Renovate	Imazapyr + Triclopyr	(0.5% + 1%)	75%	91%	95%
Clearcast + Renovate	Imazamox + Triclopyr	(0.5% + 1%)	70%	94%	97%
Milestone	Aminopyralid	(0.5%)	50%	91%	100%

BIOLOGICAL CONTROL

Biological controls are used as a control option for large, established populations of noxious weeds, when immediate weed control is not possible on a site. Since it can take 4 to 5 years before there are any visible signs of weed control, this is a tool used for long term control plans.

There are no known biological controls for hairy willow-herb.

In June 2005, the moth *Mompha epilobiella* was collected in a hairy willow-herb population in Island County by Jennifer Andreas, the Director of the Integrated Weed Control Project at Washington State University. This was the first known North American record. Since that time, the moth has been found in all Western Washington hairy willow-herb sites, and the distribution may be more widespread than originally thought.

The adult moths are commonly noticed in July and August. The larval stage of this moth is destructive to hairy willow-herb. The larvae, probably not true leaf rollers, are found in the terminal bud of the auxiliary stems. Other leaf material is used for protection, as part of its home. The impact by the larva damages the flower buds and fresh new growth all the way up the stem. There is damage later in the year to the flowers.

More research is needed.

For photographs of the moth, please go to the following website:
http://ukmoths.org.uk/show.php?id=3226

References:

2009/2010 WSDA Interim and Final Reports to Department of Ecology, Re: *Epilobium hirsutum* Control and Education project, Aquatic Weeds Management Fund, Grant No. G0600349, FY 06 Funding Cycle.

2003. Written Findings of the Washington State Noxious Weed Control Board. *Epilobium hirsutum* L., hairy willow-herb

2000. Proposed Aquatic Quarantine Species Fact Sheet. Washington State Noxious Weed Control Board.