WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
(1998, Updated April 2008)

Scientific name: *Heracleum mantegazzianum* Sommier & Levier

Synonyms:

Common name: giant hogweed

Family: Apiaceae (Umbelliferae)

Legal Status: Class A

Description and Variation:

Overall Habit: Giant hogweed is a member of the parsley or carrot family, Apiaceae (Umbelliferae). As its name indicates it is characterized by its size and may grow to 15 to 20 feet in height. Except for size, it closely resembles cow parsnip, *Heracleum lanatum*, a plant that is native to Washington. It is further distinguished by a stout dark reddish-purple stem and spotted leaf stalks.

Roots/Rhizomes: Giant hogweed is a perennial with tuberous root stalks. It may form perennating buds each year (Tiley et al. 1996; Shumova 1972; Morton 1978; Tiley and Phelp 1997; *in* Pergle et al. 2006), although this finding has been disputed in the literature (Pergle et al. 2006; Pysek et al. 2006 *in* Pergle et al. 2006).

Stem: Stalks and stem produce sturdy pustulate bristles. The stem and stalks are hollow, and stems vary from 2 to 4 inches in diameter.

Leaves: The compound leaves of giant hogweed may expand to five feet in breadth. Each leaflet is deeply incised.

Flowers: The inflorescence is a broad flat-topped umbel composed of many small white florets. Each inflorescence may attain a diameter of 2-1/2 feet.

Fruits and Seeds: The florets produce large elliptic winged fruits marked with brown swollen resin canals up to 1 mm in diameter. The dried fruits split into two winged mericarps, which are 6-18 mm long and 4-10 mm wide (Martin, 1946 *in* Moravcova et al., 2005), and produce a strong resinous smell.

Habitat: Giant hogweed may colonize a wide variety of habitats but is most common along roadsides, other rights-of-way, vacant lots, streams and rivers. In the Czech Republic, where this plant has invaded, 84.7% of the infestation is in pastures and fields, 13.7% is in forest and scrub and 1.6% is in human settlements (Mullerova et al., 2005). Although it is found on the margins of

forests, research indicates that the interior is a barrier for this species (Pysek & Pysek, 1995 *in* Mullerova et al., 2005). Climate is only a limiting factor in the extremes, so this plant has the potential to spread to higher elevations if introduced via human transport (S.G. Willis & P.E. Hulme, 2002).

Geographic Distribution: Giant hogweed has been introduced to the European continent, the United Kingdom, Ontario, Vancouver Island (Canada) and parts of the United States.

Native Distribution: Giant hogweed is native to the Caucasus mountains and southwestern Asia.

Distribution in North America: It has been introduced in New York State as a garden ornamental.

History and Distribution in Washington: Personal communication between J.K. Morton and C. Leo Hitchcock indicates Hitchcock knew of at least one population in the Seattle area during the early 1950's. This would be the earliest documented record of this species in Washington. It has been reported from Thurston, Kitsap, Mason, King, Island, and Clark counties. Escaped populations in the Seattle area are known from Lake Washington Boulevard, West Seattle, the University of Washington campus and the Wallingford area. Individuals have recently been noted along I-5 in Seattle and Rainier Avenue south near Renton.

Biology:

Growth and Development: Giant hogweed is a perennial that takes at least three years under field conditions to produce the first flowering stalk. If it is growing in a pasture, flowering is delayed, possibly as a result of trampling or soil compaction. Plants growing in higher altitudes respond by accelerating the life cycle (Pergle et al. 2006). It is believed to be monocarpic, dieing after first flowering and seed set. Individual plants may produce additional crowns that continue to flower and set seed (Tiley et al. 1996; Shumova 1972; Morton 1978; Tiley and Phelp 1997; *in* Pergle et al. 2006), although this finding has been disputed in the literature (Pergle et al. 2006; Pysek et al. 2006 *in* Pergle et al. 2006). The insect-pollinated flowers are hermaphroditic and protandrous, meaning that pollen is released before the stigma is receptive. Self-fertilization is possible, though, as the staminate and pistillate phases overlap to some degree (Steward and Grace 1984 *in* Moravcova et al. 2005). Seeds require a period of cold stratification in order to germinate (Nikolaeva et al. 1985; Tiley et al. 1996; Otte and Franke 1998; *in* Moravcova et al. 2005) and have been reported to germinate exclusively in the spring (Moravcova et al. 2005). A high percentage of seeds germinate, ranging from 80% to 91%. Seeds that don't germinate in the spring may either re-enter or retain dormancy during the summer. They may take several years to break dormancy. In a study that took place in various locales in the Czech Republic, 8.8% of buried seeds survived 1 year, 2.7 % survived 2 years and 1.2% of buried seeds were still dormant and viable after 3 years (Moravcova et al. 2006). Seed longevity is known to be greater than seven years (Tiley et al. 1996). Seed production is prolific; estimates range from 1500 to greater than 100,000 seeds per plant (Pysek et al. 1995; Tiley et al. 1996 *in* Pysek et al. 2007), with an average of 20,500 seeds per plant (Perglova et al. 2006 *in* Nehrbass et al. 2006). Krinke et al. (2005) investigated the seed banks of various sites in the Czech Republic and determined that the average number of living seeds was 3759 (+/- SD 2906) in the autumn, 2044 (+/- SD 1198) in the spring and 192 (+/- SD 165) in the summer. The percentage of living seeds that were not dormant was 0.3% in the

autumn, 87.5% in the spring, and 3% in the summer.

Umbels with larger diameters have heavier seeds, and heavier seeds have higher germination rates. Seed size trumps site characteristics in determining the vigor and subsequent seed production of a plant, so a site that is less hospitable to giant hogweed is still capable of producing plants with large, highly germinable seeds. Because of this, it is also able to contribute to the spread of the plant (Moravcova et al. 2005). Patches of giant hogweed increase with the aid of wind dispersal, which moves the seeds up to 10 meters from the mother plant. Seeds travel longer distances by way of linear corridors, primarily waterways and roads. Seeds have been estimated to travel as far as 10 kilometers through water (Wadsworth et al. 2000). People disperse the seed by planting giant hogweed and moving contaminated soil.

Giant hogweed grows in dense central stands, with more open patches on the periphery. Plants in the central stand tend to be taller and take longer to mature. Plants in the open stands are shorter, but larger, and reach maturity more quickly (Huls et al. 2007).

Reproduction: Reproduction is through seed and possibly through perennating buds formed on the crown and tuberous root stalk. Abundant seed production, staggered seed production (terminal umbels mature before branch umbels (Moravcova et al. 2005)), a persistent root stalk, and vegetative reproduction from perennating buds are cited as reasons for its capability to colonize rapidly and expand populations.

Control:

Response to Herbicide: 2,4-D, TBA, MCPA and dicamba will kill above ground parts but are reportedly not particularly effective on persistent root stalks. Glyphosate is considered the most effective herbicide and should be used cautiously around desirable species since it is nonselective. Application during bud stage and while the plant is actively growing is recommended by New York Cooperative Extension. In Great Britain, Wright recommends application during the early growing stages, which is late March to early April. In Washington, 100% top kill of single plants was achieved with early spring applications of glyphosate, 97% top kill with imazapic plus methylated seed oil, and 80% top kill with triclopyr plus 2,4-D (Miller and Lucero 1999) In Ireland, repeated glyphosate treatments on a large population over a 4-year period almost completely eliminated *H. mantegazzianum* (Caffrey 2001). A four-year eradication protocol for *H. mantegazzianum* populations within a single drainage catchment using glyphosate was outlined by Caffrey (in Page et al. 2006)

Response to Cultural Methods: Sanh (2003) suggested use of the Waipuna system (combination of hot water and foam) to control giant hogweed. In this technique, hot water and foam are injected at various locations into the giant hogweed crown. This has been tried with variable results in British Columbia (Page et al. 2006).

Response to Mechanical Methods: Plants may be dug out, but care should be taken to remove much of the root stalk to prevent re-sprouting (Pysek et al. 2007). This can be difficult and unpleasant. Mowing serves to stimulate budding on the perennating root stalk, but might be

successful if done consistently enough to starve the rootstalk. Removing all of the leaves of a plant when the flowers are in full bloom nearly halves the seed production, and results in seeds with 70% of the weight of plants that did not have any leaf removal. Seed germination rate, which is typically lower for lighter giant hogweed seeds (Moravcova et al. 2005), is not affected. When only half of the leaves are removed, plants produce seeds with a much higher germination rate, and neither seed production nor seed weight differs from plants that did not have any leaves removed. Removing the umbel decreases seed production, but timing impacts results. If the umbel is removed at the beginning of fruit development, 80% of the plants respond by growing new umbels. These regenerated inflorescences produce an average of 450 seeds with 60% germination. If removed umbels with unripe seeds are left on site, seeds can mature and then contribute to the seed bank. 85% of umbels with unripe seeds that are cut and left on site can produce viable seed, although seed count was reduced by 81% fewer and seed was 44% lighter than seeds from uncut umbels. For the best results, remove the umbels when the terminal inflorescence has mature seeds and the axillary inflorescences are in full bloom. At this stage, care must be taken to capture the seeds so that they are not released in the removal process.

Biological Control Potential: Cattle and pigs are cited as possible biocontrol agents. Both eat giant hogweed without apparent harm. Trampling also damages the plant. In pasture settings, where the plants suffer from trampling and soil compaction, flowering is delayed by one or two years. A study in Denmark found that 5-10 sheep per hectare eradicated the plant after 7 years of grazing (Andersen and Calov 1996). Endophagous insects browse on giant hogweed in the plant's native habitat, but the plants are tolerant of insect damage; the researchers suggest that the potential for biocontrol using those insects is limited to seedlings and young plants (Hattendorf et al. 2006).

The fungus *Sclerotinia sclerotiorum* (Lib.) de Bary has been investigated by several researchers (Erneberg et al. 2003; de Voogd et al. 2003 *in* Page et al. 2006) for use as a bioherbicide against giant hogweed. Three fungus species that attack giant hogweed it its native lands, *Phloeospora heraclei* (Lib.) Petr., *Ramulariopsis* sp. and *Septoria heracleicola* Kabat & Bubak, also have biocontrol potential (Seier 2003; Seier 2005 *in* Page et al. 2006).

Economic Importance:

Detrimental: Giant hogweed has been introduced to Europe, the United Kingdom, Canada and the United States as a garden curiosity. Because of its tenacious and invasive nature it soon becomes a pest within the ornamental garden and readily escapes. It has naturalized in many of the places where it was first introduced. Growing along streams in Ontario, on Vancouver Island, and in Great Britain, it forms a dense canopy. It outcompetes native riparian species and results in an increase in soil erosion along the stream banks where it occurs. The plant exudes a clear watery sap containing furanocoumarins (Camm et al. 1976; Towers et al. 1980 *in* Page and Wall 2003) that sensitizes human skin to ultraviolet radiation. The chemical is at its highest concentration in the leaves and roots in the early part of the growing season (Knudsen 1983 *in* Page and Wall 2003). Contact with the furanocoumarins, which are also present in the roots, flowers and seeds can result in severe burns to the affected areas that can turn into blistering and painful dermatitis. Scars can last for as long as 6 years (Tiley et al. 1996 *in* Page and Wall 2003) and sensitivity to sunlight can continue beyond that (Page and Wall 2003). Proliferating populations of the plant in urban and suburban areas represents an increasing public health hazard.

Beneficial:
The dried fruits of the plant are used as a spice in Iranian cooking. The colloquial name of the dried fruits in Farsi is 'golpar' (Westbrooks 1991).

Rationale for Listing: Giant hogweed is currently on the federal noxious weed list. Its placement on this list was due to its potential menace as a public health hazard. It is also considered a noxious weed and/or prohibited/quarantined species in Alabama, California, Connecticut, Florida, Massachusetts, Minnesota, New Hampshire, North Carolina, Oregon, Pennsylvania, South Carolina, and Vermont (The number and size of populations in the Seattle area, where it has been observed over the past four years, continue to grow annually. Literature reviewed indicates it naturalizes readily once it escapes from ornamental gardens where it is often cultivated as a garden curiosity. This is likely how populations throughout Europe, the United Kingdom, Ontario, Vancouver Island, and in New York State were started. Once established, it crowds out other native plant species and increases soil erosion along streambanks. Giant hogweed is a tenacious perennial that is difficult to eradicate. Targeting all known populations for control will prevent the further spread of giant hogweed in Washington.

References:

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* References available from the Washington State Noxious Weed Control Board office

Notes:
Giant hogweed, *Heracleum mantegazzianum*, is on the federal noxious weed list. Introduction through imports into the United States is illegal; interstate and intrastate movement of this species

is illegal.

Russel Hahn, Weed Scientist, Cornell University, 3-7-90, 607-255-1759, (personal communication). Noted giant hogweed is an escaped ornamental in New York State where it is found along roadsides and in vacant lots. Spread appears to be slow but steady. Concern in New York centers around the ability of this plant to cause photodermatitis in people. Children are particularly prone because of its occurrence in vacant lots and its use as a make-shift weapon. Glyphosate and dicamba are effective according to Dr. Hahn.