

**WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD**

(April, 2006)

Scientific Name: *Buddleja(Buddleia) davidii* Franch.
SY = *Buddleja davidii* var. *nanhoesnsis* (Chitt.) Rehder
SY = *Buddlej adavidii* var. *superba* (de Corte) Rehder & E.H. Wilson
SY = *Buddleja davidii* var. *veitchiana* (J.H. Veitch) Rehder
SY = *Buddleja variabilis* Hemsl.
SY = *Buddleja variabilis* var. *nanhoensis* Chitt.
SY = *Buddleja variabilis* var. *superba* de Corte
SY = *Buddleja variabilis* var. *veitchiana* J.H. Veitch

Common Name: Butterfly bush, summer lilac, orange-eye

Family: Buddlejaceae (USDA, NRCS, 2006); also placed in Scrophulariaceae and Loganiaceae (ARS-GRIN, 2006)

Legal Status: Class B Noxious Weed in 2008 (originally listed as Class C in 2005)

Description and variation: *Buddleja davidii* is a large, deciduous shrub with arching branches that can reach a height of fifteen feet and fragrant, cone-shaped flower spikes. The leaves are oppositely arranged, lance-shaped or egg-shaped, and are usually between 4-10 inches long and 1-3 inches wide. Leaf margins are either crenate or dentate. Although upper leaf surface is dark green or blue-gray, the lower surface appears whitish, due to the dense covering of small, branched hairs or round-tipped glandular hairs. Petioles are short and hairy, or the leaves may be sessile. In some instances, the basal edge of the leaf is fused and forms a cone around the petiole. Stipules are leaf-like or linear. Flowers are arranged in a paniculate cyme, in which the flowers at the tip open before those at the base. Flowers are 4-merous and bell-shaped, and are either radially or bilaterally symmetrical. The cup-, funnel-, or flared tube-shaped corolla is 9-12 mm long. While typically purple with an orange center (hence its common name "orange eye"), at least fourteen produce different flower colors, including red, orange, yellow, blue, lavender, magenta, maroon, and white (Dole, 1998).

Economic Importance:

Detrimental: *Buddleja davidii* is a problematic, noxious weed in several countries worldwide. *B. davidii* produces copious, viable seeds (Aniško and Im, 2001) that are easily dispersed into both disturbed and natural areas. A study by Smale (1990) in the Te Urewera National Park, New Zealand, found that *B. davidii* rapidly colonized the gravelly sand edges along streambeds, thereby disrupting natural succession by native herbaceous and shrub pioneer species. The earlier maturation time of *Buddleja* populations (ca. fifteen years), as compared to the native pioneer shrubs that it rapidly displaces (Williams, 1979, as cited in Smale, 1990), such as kanuka, would suggest that conversion of streambed habitat to high forest would be accelerated (Smale, 1990). Colonization by *B. davidii* may also alter soil nutrient concentrations, as the invasive utilizes and accumulates nitrogen and phosphorus differently from the native shrubs it outcompetes, such as

the nitrogen-fixing shrub *Coriaria arborea* (Bellingham et al., 2005). The dense thickets restrict human access to river edges (Timmins and Mackenzie, 1995).

B. davidii is also a problem of forest plantations, as the seedlings compete with those of the timber crop *Pinus radiata*. Estimates of the cost *B. davidii* has on the New Zealand forestry industry ranges between \$0.5 and \$2.9 million, based on control and lost crop (ERMA New Zealand, >2005).

Botanist and amateur lepidopterist Stewart Wechsler (pers. comm., 2004) also notes that *B. davidii* may detrimentally affect butterfly-plant interactions in Washington State in three ways. First, although *B. davidii* acts as a nectar source for many insects, it does not provide a food source for the larval stages of native butterflies here (Townsend, 2004). Second, the non-native shrub may be displacing native nectar sources, such as *Apocynum androsaemifolium*, spreading dogbane, which requires a similar habitat and is in decline. A similar phenomenon is occurring in Oregon, where *B. davidii* is displacing native willows, upon which some native butterfly species rely (Townsend, 2004). Third, *B. davidii* may be so effective at attracting butterflies and other insects, that it might be outcompeting native plants for pollinators.

Beneficial: *Buddleja* is a popular garden ornamental, valued for its brightly colored, fragrant flowers, which attract butterflies, and its ease of cultivating. In addition to providing nectar for butterflies, a survey of associated fauna in Britain found that eleven species of Lepidoptera caterpillars fed on the *B. davidii* leaves, six of which are from China (Owen and Whiteway, 1980, but see above). This publication noted that *B. davidii* should not be considered a weed or ecological threat, because the shrub did not spread into colonized natural areas. However, this view has since changed (see [History](#)), as *B. davidii* has since spread throughout Britain.

Habitat: *Buddleja davidii* is cultivated as a garden ornamental; however, it is able to colonize disturbed and natural areas including roadsides, riverbanks, gravel bars, recently logged and/or burned forests. It is capable of growing in low-nutrient substrate, such as the gravelly substrate of streambeds (Bellingham, et al., 2005). A vegetation survey conducted through Oregon State University found that *B. davidii* populations occurred in many natural area habitats in Oregon, and that seedling density was quadrupled in riparian sites, as compared to other natural and disturbed sites (Ream and Altland, (2005?). The study also found that *B. davidii* colonies were densest in burn sites in reforested regions.

Geographic distribution: *Buddleja davidii* is native to the temperate regions of China, including Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang (USDA, ARS, 2006).

History: *Buddlejadavidii* has naturalized in Europe, Australia, New Zealand (USDA, ARS, 2006). In New Zealand, *B. davidii* is considered a serious weed for radiate pine (*Pinus radiata* D) plantations (TNRPMS, 2001), as *B. davidii* competes with pine seedlings, affecting diameter and height of the trees (Richardson et al., 1999). According to the Tasman-Nelson Regional Pest Management Strategy, *Buddleja* is ranked as a “7 on the infestation curve” and boundary control, such that “all adult and juvenile forms of [*Buddleja*] located 50 meters or less from the boundary of the land that he or she occupies when the adjacent property is clear or being cleared of [*Buddleja*]”. Furthermore, *Buddleja* plants cannot be propagated, released, displayed, or sold (TNRPMS, 2001).

First introduced into Great Britain in 1890 from Russian seeds (Owen and Whiteway, 1980), *B. davidii* was establishing in wastelands of southern England and spreading northward about fifty years later, eventually becoming one of the “top 20 invasive weeds” of Great Britain (Aniško and Im, 2001). In Ireland, it is considered an alien plant that colonizes “artificial” habitats, as opposed to natural areas (Stokes et al., 2006).

It has also naturalized in British Columbia. Although a 1994 report did not deem it invasive (Klinkenberg, 2004), other reports now suggest otherwise (Garry Oak Ecosystems Recovery Team, 2005).

In the United States, it has established in California, Oregon, and Washington in the West, and about fifteen New England, Great Lakes, mid-Atlantic, southeastern, and Midwestern states (USDA, NRCS, 2006). *B. davidii* is listed as a Category 3 invasive plant in the New York metropolitan area, meaning that while not invasive in that region, its invasiveness elsewhere warrants close watch (Brooklyn Botanic Gardens, 2006). *B. davidii* was listed as a Class B Noxious Weed in Oregon in 2004.

In Washington State, *Buddleja* has escaped cultivation in at least Clallam, Jefferson, Whatcom, Skagit, Snohomish, King, Kitsap, Mason, Pierce, Thurston, Lewis, Cowlitz, Skamania, and Clark counties. Hitchcock and Cronquist had noted that *B. davidii* was a common garden escapee along roadsides and railroad tracks in western Washington in 1973.

Growth and Development: Seedlings are drought-tolerant and can grow on nitrogen-poor substrate (Smale, 1999), although they do require full sun (New Zealand Plant Conservation Network, 2006). Fast-growing seedlings can increase 0.5 meters in height annually (T-NRPMS, 2001) and seedling stem diameter can increase annually by 1 cm/year (Timmins and Mackenzie, 1995). Individual shrubs typically do not live for more than twenty years, as they succumb to stem rot (TNRPMS, 2001). Not only are individual shrubs short-lived, but so, too, are stands of *B. davidii*. Smale (1999) studied butterfly bush colonization in the Te Urewera National Park streambeds and found that seedling density of *B. davidii* is initially high during the first year of establishment, with millions of seedlings occurring within one hectare. Stem density then decreased through self-thinning, until *B. davidii* stands matured after about ten years, with 2,500 shrubs per hectare.

Reproduction: Winged seeds, up to three million per plant (ISSG, 2005), can easily be dispersed via wind or water; machinery and transportation of seed-laden gravel can also facilitate its spread (TNRPMS, 2001). Seeds can remain dormant for many years (Townsend, 2004). Adapted to survive along streambeds, where disturbance by sediment deposition is common, *B. davidii* stems can sprout adventitious roots if they are knocked down and/or covered with sediment (Smale, 1991). Seedlings can also be washed downstream during disturbance events, where they can establish (ISSG, 2005).

Response to Herbicide: A preliminary study by Altland and Ream (?) from Oregon State University found that glyphosate herbicides without surfactants were effective against small shrubs. They also noted that shrubs with greater pubescence were somewhat less vulnerable to foliar application. Treatment with triclopyr or imazapyr did not appear to be effective.

Response to Mechanical Methods: *B. davidii* will quickly resprout when cut at the base (Timmins and Mackenzie, 1995). Young shrubs can be dug up, although this is not recommended for well-

established populations (ISSG, 2005). Because *B. davidii* is adapted to survive in disturbed areas, seed germination may be facilitated by when soil is turned, areas where *B. davidii* shrubs are removed should be monitored; revegetation of the area with desired plants is also recommended (ISSG, 2005).

Biocontrol Potentials:

Laboratory testing of *Cleopus japonicus* indicated that grazing by this weevil had a substantial negative effect on *B. davidii* growth (Brockerhoff et al., 1999). A study evaluating potential non-target effects by the parasitoid wasp *Microctonus aethiopoies* Loan on *C. japonicus* indicates that the wasp should not pose a threat to the biocontrol populations in New Zealand (McNeill et al., 2005). Approval by the Environmental Risk Management Authority to release the weevil in New Zealand was granted in late 2005, and the use of this biocontrol may occur in February, 2006 (Landcare Research New Zealand, Ltd., 2006).

Rationale for Listing:

Buddleja davidii is considered a serious invasive plant in many parts of the world, and was listed as a noxious weed by the Oregon Department of Agriculture in 2004. Although this shrub has been used as an ornamental for many years in Washington, it is currently experiencing explosive growth that warrants attention. Initially thought to only invade disturbed, degraded wastelands, *B. davidii* has now formed dense thickets in riparian areas such as along the Dungeness River and along Evey Slough, which provides habitat for Chinook salmon and bull trout. It has also been observed expanding in potential salmon spawning habitat in the Nisqually River (Rod Gilbert, pers. comm., 2004). Because it is already widespread, at least in western Washington, it has been listed as a Class C Noxious Weed. This listing will allow the State and counties to educate the nurseries and the general public about this invasive, non-native shrub.

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