

**DRAFT WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
Proposed Class C Noxious Weed Listing**

Scientific Name: *Impatiens capensis* Meerb.

Common Name: spotted jewelweed; spotted touch-me-not, orange balsam

Synonyms: *Impatiens biflora* Walter, *Impatiens fulva* Nutt.

Family: Balsaminaceae

Legal Status: Proposed Class C noxious weed



Images: left, flowering plant growth, image Ben Legler, 2004; right, *Impatiens capensis* plant infestation in Clark County, image © Roger T. George, 2016.

Description and Variation:

Due to the recent research by Zika (2006b), determining that *Impatiens capensis* is not native in Washington, the native range in some floras, older literature and online information is incorrect. Also, in some older floras and references there are some errors with *Impatiens* descriptions and drawings (Zika 2009).

Overall habit:

Impatiens capensis is a glabrous annual with somewhat succulent growth. Plants bloom in late summer with two kinds of flowers--reduced self-fertilizing flowers and showy, open flowers. Flowers have recurved spurs, are typically spotted, and form capsules after pollination that have the ability to explosively open and propel seeds a short distance.

Roots:

Impatiens capensis has a small, shallow root system and can sometimes form roots at lower nodes.



Image: left, roots of *Impatiens capensis*, photo by S. A. Mori, <https://creativecommons.org/licenses/by-nc-nd/3.0/>; right, glabrous, branching stem of *I. capensis*, image by www.wildflowerlense.com, is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

Stems:

Stems are erect to ascending and often branched, glabrous, and often slightly glaucous (Brant 2006, Douglas et al. 1998). Height range estimates vary from up to 4.9 feet (1.5 meters), to 7.9 to 31.5 inches (20-80 cm) tall (Stace 1997, Douglas et al. 1998). Stems can be tinged red.

Leaves:

Leaves are alternately arranged and have petioles 0.8 to 1.6 inches (2-4 cm) long (WTU Herbarium 2017). Leaf blades are elliptic to ovate (egg-shaped) and 1.2 to 4.7 inches (3-12 cm) long (Douglas et al. 1998). Leaf margins have rounded, serrated teeth (look somewhat scalloped), with a sharp point (WTU Herbarium 2017).



Images: left, leaf with scalloped, toothed margins, image by Rob Routledge, Sault College, Bugwood.org; right, side view of flower showing spur, image by © Ben Legler, 2004.



Image: *Impatiens capensis* flower examples, displaying the variation of spot density and placement, image by Peter Zika (Zika 2009).

Flowers:

Flowers are arranged one to several in leaf axils (Douglas et al. 1998). Plants produce both chasmogamous (opening) and cleistogamous (self-fertilizing, non-opening) flowers. Cleistogamous flowers are green and do not have colored petals (Zika 2009). They also lack nectaries and the petals, anthers and sepals are much reduced in size. The sepals and anthers are united in a cap that encloses the stigma and is pushed off the capsule early in development (Bennett 1873 and Carrol 1919 in Schemske 1978).

Chasmogamous flowers are showy and are used to identify plants to species. These flowers are zygomorphic (bilaterally symmetrical), 0.8 to 1 inch (20 to 25 mm) long and have three sepals and five petals. Of the three sepals, one is enlarged, saccate, and forms a recurved spur while the other two are much smaller. The saccate sepal has an abrupt and convex taper to the spur and contains nectar (Zika 2009). Of the five petals, the upper petal is notched at the tip, while the other four (lateral) petals are fused to form two petals with bilobed tips (Burrows and Tyrl 2013, WTU Herbarium 2017). The flowers are deep orange to yellowish-orange and have orange to reddish-orange spotting that is concentrated on the ventral side of the spurred sepal as well as on the lateral petals (Zika 2006a). Flowers have 5 united stamens that initially cover the stigma when the flower opens (Schemske 1978).

There is a rare form of the plant, called *Impatiens capensis* Meerb. f. *immaculata* (Weath.) Fernald & B. G. Schub., where all of the flowers lack spots (Zika 2006a). In Washington plant populations, this rare spotless form grows among much larger numbers of the typical spotted species (Zika 2006a, Zika 2009). Also, occasionally odd color forms of *I. capensis* can be found, though they are rare in western Washington (Zika 2009). Corolla colors can be white, cream or pale yellow with red to bright pink spots (Zika 2009). These abnormally colored flower forms are found growing with typical plants (Zika 2009).



Image: left, uncommon form of *Impatiens capensis* lacking spots, photo by © Ben Legler, 2005; right, atypical flower color of *Impatiens capensis*, photo by © Ben Legler, 2005

Fruit:

The fruit of *Impatiens capensis* is a capsule. Capsules are 1 inch (2.5 cm) long, have 5 chambers, and contain seeds (Douglas et al. 1998). The pod contains a central axial columella to which the seeds are loosely attached as they develop (Hayashi et al. 2009). Both types of flowers produce capsules with seeds. In their native range, capsules from outcrossing (chasmogamous) flowers have been found to ripen 2 to 5 seeds while capsules from self-fertilizing, non-opening (cleistogamous) flowers usually contain 1 to 3 seeds (Waller 1979). Capsules have 5 outer valves that coil rapidly during dehiscence, causing seeds in the capsule to be ejected (Schmitt et al. 1985, Caris et al. 2006 both in Hayashi et al. 2009). See the reproduction section for further information.



Image: Mature capsule pre-dehiscing (right) and capsule post dehiscing (left), showing the coiled valves and pale columella (image by Katy Chayka, Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License, <https://www.minnesotawildflowers.info/flower/spotted-touch-me-not>)




Similar Species:




Impatiens capensis hybridizes with the native species *Impatiens ecornuta* (syn. *I. ecalcarata*) spurless touch-me-not to produce *Impatiens x pacifica* Zika.


The following abridged description of *Impatiens x pacifica* is taken from Zika (2006a):

- Annual with stems up to 214 cm tall.
- Leaves alternately arranged, narrowly ovate, ovate, to nearly elliptic, 2.7-10.2 cm long by 1.5 to 4.7 cm wide, coarsely serrate to crenate, with mucronate teeth. Leaf base cuneate and petioles 2 to 4.8 cm long.
- Inflorescence axillary. Chasmogamous flowers 1 to 4 in open corymb. Saccate sepal enlarged. Chasmogamous flowers in two forms, but never on the same plant.
 - Spurless floral form: yellow-orange, saccate sepal pouch-like, lacks a spur, with dark orange spots or blotches, sparse to dense on corolla lip, typically with more spots on ventral surface. Length of tube from pedicel to distal end of saccate sepal 7-18 mm.
 - Spurred floral form: yellow-orange, spotless, saccate sepal abruptly tapered to almost essentially linear recurved spur, length of tube from pedicel to base of spur 14-18 mm.
- Cleistogamous flowers are inconspicuous, about 2mm long, whitish-green on short pedicels in shaded lower axils or at tips of late season shoots.
- Capsules similar in appearance to *I. capensis*, 2.5 to 3.2 cm long (dried), seeds 1 to 7, explosively released.
- Stands with *Impatiens x pacifica* always had a mix of plants with and without spurred flowers, while in stands that had the unspotted form of *I. capensis* f. *immaculata*, all plants had spurred flowers (no unspurred-flowering plants were present) (Zika 2009).

Impatiens x pacifica was found at 52 localities west of the Cascade Mountains during surveys conducted between 2002 and 2005 (Zika 2006b).

Name	Location, other	Flower	Image
<i>Impatiens capensis</i> ; non-native to WA	West side of Cascade Mountains	Flowers with spots (though there is a rare spotless form); abrupt and convex taper to spur, spots primarily ventral, coarse and dense	 <p>Image by, Karan A. Rawlins, University of Georgia, Bugwood.org</p>
<i>Impatiens ecornuta</i> (syn. <i>I. ecalcarata</i>); native to WA	Both sides of Cascade Mountains	Flowers without a spur or spots	 <p>Image © 2005, Ben Legler</p>
<i>Impatiens x pacifica</i> ; hybrid between native and non-native species	West of the Cascade mountains	Some plants with spurred flowers and no spots; some spurless with spots	 <p>©2016 Ryan Batten, Creative Commons Attribution-NonCommercial-ShareAlike 3.0 (CC BY-NC-SA 3.0) license</p>

<p><i>Impatiens noli-tangere</i>; native; critically Imperiled species in WA</p>	<p>West side of Cascade mountains</p>	<p>Yellow flowers with gradual concave taper to recurved spur; flowers spotted, primarily dorsal, small and sparse</p>	 <p>Image: Frank Vincentz, https://commons.wikimedia.org/wiki/File:Impatiens_noli-tangere_05_ies.jpg</p>
<p><i>Impatiens glandulifera</i>; non-native; Class B noxious weed in WA</p>	<p>West of the Cascade mountains</p>	<p>Flowers range in color, purple, pink or white; short spur, hooked or curved.</p>	 <p>Angelica Velazquez, Cowlitz County Noxious Weed Control Board</p>
<p><i>Impatiens aurella</i>; Native to WA</p>	<p>Eastern Washington</p>	<p>Flowers yellow to orange, with or without spots, spur strongly curved</p>	 <p>Image © Richard Old</p>

<i>Impatiens parviflora</i> ; non-native to WA	Western Washington, only known in King County	Small pale yellow flowers, short straight spur	 <p>Image by Alex Wright</p>
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(Zika 2009, WTU Herbarium 2017)

Habitat:

Impatiens capensis grows on moist soils at low elevations and is found in forests, lake and pond edges, riverbanks, sloughs, disturbed wetlands and sunny roadside ditches or canals (Douglas et al. 1998, Zika 2006a). On the east coast it is commonly found in tidal freshwater marshes (Hopfensperger and Engelhardt 2007). Recently, it has been observed in a number of western Washington counties growing along riverbanks where knotweed control occurred (WSNWC 2017).

Geographical Distribution:

Impatiens capensis is native to eastern Canada and the United States, ranging west to North and South Dakota, Oklahoma and Alberta (McGregor and Barkley 1977 and Moss and Packer 1983 in Zika 2006b). The USDA GRIN database (USDA ARS 2017) specifically lists *I. capensis* native in:

- Canada: New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Quebec, Northwest Territory, Alberta, Manitoba, Saskatchewan.
- United States: Connecticut, Indiana, Maine Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin, Texas, Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee Virginia

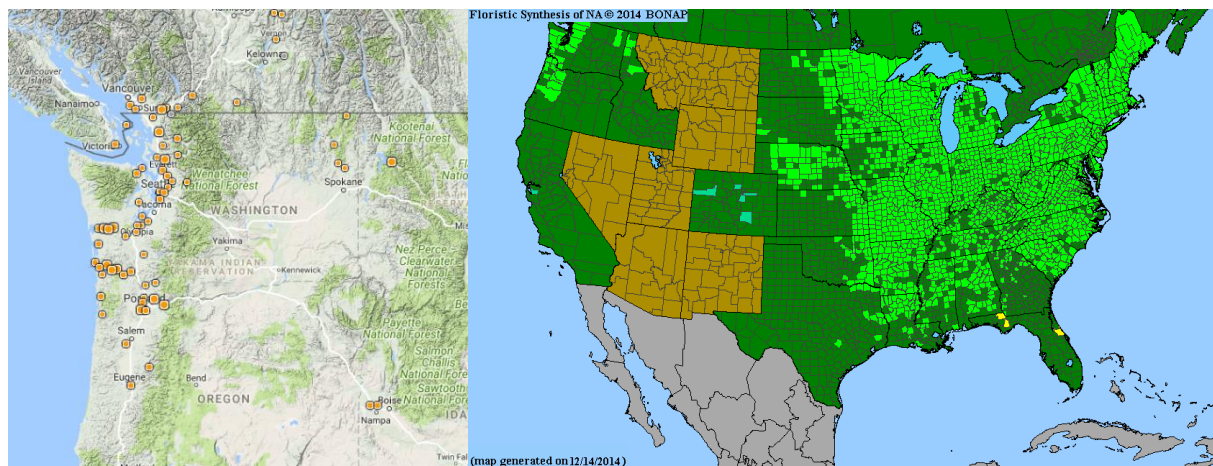
Impatiens capensis is listed as naturalized or adventive in:

- Japan (USDA ARS 2017)
- Germany, Poland, Finland, United Kingdom, France, Denmark (USDA ARS 2017, Zika 2006b)
- United States—Washington, Oregon, California (Zika 2006b)
- Canada—British Columbia (Zika 2006b)

History:

An in depth history of *Impatiens capensis* has been written by Peter Zika (2006b). He studied more than 100 *Impatiens capensis* populations in western Washington and nearby areas as well as herbarium records and literature to determine that *I. capensis* is not native west of the Rocky Mountains. Verified records of *I. capensis* began in 1950, in previously botanically documented areas, and 80-100 years after the beginning of collections of our other native *Impatiens* species (Zika 2006b, Zika 2009). Zika (2006b) also points out that *I. capensis* has a history of successfully establishing in areas outside of its range, first in England and then in France (Burt 1938, Clapham et al. 1952, Tutin et al. 1968 all in Zika 2006). Since the 1950's, *I. capensis* has spread in northwest Oregon, western Washington and southwest British

Columbia. In many areas it is spreading rapidly and is now the most common spurred *Impatiens* species west of the Cascade Mountains (Zika 2009).



Maps: left, herbarium records of *Impatiens capensis* in Washington and parts of Oregon, Idaho and British Columbia, Canada (Consortium of Pacific Northwest Herbaria 2017); right, map of counties (light green) having *I. capensis* in the United States (Kartesz 2015).

Washington:

The first herbarium record of *I. capensis* in Washington is from 1950 in Pierce County (Huntley 464) (Zika 2006b, Consortium of Pacific Northwest Herbaria 2017). *Impatiens capensis* is documented by herbarium records in every county in western Washington except for Island, Kitsap, San Juan, and Clallam County (Consortium of Pacific Northwest Herbaria 2017). A survey of County Noxious Weed Coordinators in July of 2017, did find that there is one known population of *I. capensis* in Clallam County on the Lower Elwha River in the Olympic National Park (Cathy Lucero pers. comm.) and three sites along Chico Creek in Kitsap County (Dana Coggon pers. comm.).

In the survey and other distribution information received by the WSNWCB, *Impatiens capensis* populations have been noted as increasing. In Jefferson County, Snow Creek and the Little Quilcene River are both badly infested (Jill Silver pers. comm.). In Mason County, populations are increasing along the Union River, with overall size likely in the 10's of acres (Pat Grover pers. comm., Tamara Cowles pers. comm.). Populations in Whatcom County appear to be increasing at a moderate rate, with populations found along roadsides, ditches, and lake and pond edges (Laurel Baldwin pers. comm.). A few counties, (Snohomish, Kitsap, and Mason), have also observed *I. capensis* plants colonizing knotweed control sites (Gerry Saw, Dana Coggon, and Tamara Cowles pers. comm.).

While *Impatiens capensis* grows primarily western Washington, there are also a couple documented populations in eastern Washington. There is a site in Stevens County that so far does not appear to be spreading from the one location (Cindy Jennings pers. comm.). There is also a documented population at the northern end of Pend Oreille County growing on the edge of beaver ponds (WTU 400528) (WTU Herbarium 2017).

Impatiens capensis was added to the State Noxious Weed Monitor list in 2011 after it was proposed as a Class C noxious weed.

Listings:

Impatiens capensis is not quarantined or listed as a noxious weed anywhere in the United States (National Plant Board 2017).

Growth and Development:

Impatiens capensis seeds germinate in the spring after undergoing a cold stratification period (Hopfensperger and Engelhardt 2007). In Virginia, seedlings begin to emerge from late March to early April (Hopfensperger and Engelhardt 2007).

In a study from Wisconsin, the cleistogamous (non-opening, self-fertilizing) flowers emerged in June, while the chasmogamous (opening) flowers started blooming in July or August (Lu 2002). The flowering period continued until the first frost in early October (Lu 2002). Flowers of *I. capensis* in Washington tend to flower from mid-August to early November (Zika 2006a). In its native range, chasmogamous flower production can cease in early fall, but cleistogamous flowers are produced until plant's death from frost (Schemske 1978). Chasmogamous flowers are protandrous, meaning that the stamens come to maturity before the pistil so that these flowers should not be able to self-pollinate. The joined filaments of stamens cover the stigma until they fall off as a unit. After the stamens are past maturity, the stigmas are then receptive to being fertilized. Individual flowers of *I. capensis* bloom for one to two days (Rust 1977). *Impatiens capensis* flowers were first in a male phase (had mature stamens) for an average of 23.3 hours and female phase (stamens had fallen off and the stigmas were receptive) for an average of 4.9 hours (Schemske 1978).

Pollinators are attracted to *Impatiens capensis* by the nectar in its flower spur. Major pollinators for *I. capensis* in its native range are the ruby-throated hummingbird (*Archilochus colubris*) and worker bumblebees (*Bombus vagans* and *B. impatiens*) (Rust 1977, Schemske 1978). The primary pollinator observed over 6 hours foraging on plants at Kelsey Creek in Washington was the introduced honey bee (*Apis mellifera*) (Zika 2006b). Flowers appear to need multiple visits by pollinators to ensure cross-pollination; the covering of the stigma by the stamens until they shed further requires repeated visits (Rust 1977). Schemske (1978) found that total development time from bud to pod maturation is variable, with averages of 28 to 38 days for self-fertilizing, cleistogamous flowers and 37 to 48 days for chasmogamous (opening for cross-pollination) flowers.



Image: seedlings with just cotyledons of *Impatiens capensis*, (image by Katy Chayka, <https://www.minnesotawildflowers.info/flower/spotted-touch-me-not>).

Reproduction:

Impatiens capensis is an annual that reproduces by seed. Plants produce capsules that are formed by both flower types. Hayashi et al. (2009) studied how the capsules explosively dehisce to ballistically disperse seeds. When the pod dehisces, there is a rapid coiling of the pod's valves that shorten the pod longitudinally, which collapses the columella (the center axial in the pod) and ejects the seeds. Dehiscence, from the initial splitting of the capsule wall to the complete coiling of the valve, takes an average of 4.2 milliseconds. They found the upper range of seed dispersal is about 2 meters. Long-distance seed

dispersal of *I. capensis* is achieved by secondary dispersal via water (Trewick and Wade 1986, Perrins et al. 1993, Tabak and von Wettberg 2008 all in Hayashi et al. 2009). Seeds have a high lipid content, which lowers their density and increases their buoyancy, allowing them to float (Nozzolillo and Thie 1984 in Hayashi et al. 2009).

Economic Importance:

Detrimental:

Impatiens species in general can survive in tough, variable conditions, including their ability to survive in dense stands of reed canary grass (*Phalaris arundinaceae*) (Zika 2006a). *Impatiens capensis* has spread rapidly since it was first documented in Washington (Zika 2006b). Plants are widespread in certain lowland areas and appear to still be increasing. *Impatiens capensis* seedlings can form dense carpets that can compete with native species and are difficult to control.

A major concern regarding the spread of *Impatiens capensis* is where it is co-occurring with *Impatiens ecorruta*, a native plant of limited distribution in western Washington. In British Columbia, *I. ecorruta* is on the blue list of special concern, and Montana considers it as a species of limited abundance or distribution in Montana, but not presently considered at risk list (Pearson and Healey 2012; Montana natural Heritage Program 2003 in Zika 2006a). Zika (2006a) found during his surveys of *I. capensis* populations that *I. ecorruta* was uncommon and theorized it may be genetically threatened by the introduction of and hybridization with *I. capensis*. Besides being a potential threat to *I. ecorruta*'s genetic integrity, *Impatiens capensis* may also be competing with it and other native *Impatiens* species for pollinators. Hybrids flower simultaneously with parent species, and in a mixed population it was observed that pollinators visited *I. capensis* 77% of the time, hybrids 18% of the time and the native *I. ecorruta* only 4% of the time (Zika 2006b).

The hybrid *Impatiens x pacifica*, described by Zika (2006a), is known to have occurred as far back as 1957, from Clatsop County, Oregon. The frequency of hybrid production and the extent of backcrossing is not known. The hybrid can be found growing with both parent species, *I. capensis* and *I. ecorruta* in habitats including shady floodplain forests, sloughs, pond edges, riverbanks, and sunny roadside ditches. Zika (2006a) found the largest populations so far are on intertidal marshes along the lower Columbia River. As all three plants grow together, *Impatiens capensis*, *I. ecorruta*, and *I. x pacifica*, species identification can be difficult and should be done when the plants are in bloom (Zika 2006a). It is important to properly identify plants to avoid removing native species. Also, removal of the *I. capensis*, when growing with the *I. ecorruta*, will need to be done with care and by hand as all plants grow intermixed.

Burrows and Tyrl (2013) provide general information for the genus of *Impatiens* in North America noting that although crushed leaves and stems of several *Impatiens* are reputed to help prevent a reaction to poison ivy and to promote healing of minor burns, they, and the flowers, contain naphthoquinone lawsone (naphthalenic acid). Naphthoquinone may cause mild to moderate irritation of the digestive track (Thomson 1971 in Burrows and Tyrl 2013).

Beneficial:

As noted above, *Impatiens capensis* may help reduce the reaction to poison ivy and promote healing of minor burns and other skin ailments (Burrows and Tyrl 2013).

It is sold as native wildflower seed, available online at various retailers, for example at American Meadows, <http://www.americanmeadows.com/wildflower-seeds/native-rare-wildflower-seeds/touch-me-not-seeds> .

Control methods:

There is limited information available on control methods of *Impatiens capensis*. Control methods used for *Impatiens glandulifera*, a Class B noxious weed in Washington, can be adapted for *I. capensis*.

Removing invasive species can open up a habitat to reinvasion if follow up management does not occur. By planting a variety of desirable species, a community will be present to provide competition and shade weed seedlings and to also provide a food source for pollinators. When possible, carry out control methods when pollinators are not active on plants. Also, make sure to clean shoes, clothing, and equipment when leaving infestations to prevent spreading seeds to new locations.

Mechanical methods:

Impatiens capensis has a shallow root system and can easily be hand-pulled when growing in damp soils. Make sure to remove the roots. If the plants do not have seed capsules, they can be crushed and left on site in a dry place to compost (KCNWCB 2016). If plants have seed capsules, make sure to bag and put in the trash (KCNWCB 2016). It is important to properly identify *I. capensis* plants before removal to avoid accidentally removing native *Impatiens* species. Plants will need to be identified while in bloom and care needs to be taken as native *Impatiens* may grow among *I. capensis* plants.

Peter Zika's 2009 article in the Botanical Electronic News "Jewelweeds and touch-me-nots (*Impatiens*, Balsaminaceae) in the Pacific Northwest of North America" provides a key along with a set of color images that can be used to identify *Impatiens* species <http://www.ou.edu/cas/botany-micro/ben/ben408.html>.

Cultural Methods:

Provide competition to *Impatiens capensis* plants by planting, seeding and promoting native plants in areas after control has taken place.

Biological Control:

There is currently no biological control agent used to control *Impatiens capensis*.

In its native range east of the Rocky Mountains, herbivory is common on *Impatiens capensis* plants by a number of insects (Steets 2005 in Steets and Ashman 2010). Given the number of native *Impatiens* species in Washington, it is unlikely there will be a biological control agent developed and released for *I. capensis*.

Response to Herbicides:

Large populations of *Impatiens capensis* may need chemical control for management. Make sure to survey populations of *I. capensis* before herbicide use to avoid treating native *Impatiens* species. *Impatiens capensis* is not currently included in The Pacific Northwest Weed Management Handbook, but check back as this resource is continually updated: <https://pnwhandbooks.org/> . For questions about specific herbicide use, please contact your county noxious weed control board.

Please note: Use of pesticides in water is regulated in Washington. All applicators must have an aquatic endorsement on their pesticide applicators' license, which is issued by the Washington State

Department of Agriculture. In addition, coverage under a permit issued by the Department of Ecology is required. See <http://www.ecy.wa.gov/programs> for details.

In general, use herbicide control in combination with other control methods to reduce usage when possible. When using a foliar spray, treat plants when pollinators are not present or are the least active.

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