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RECONSIDERING NORTHERN AND SOUTHERN TAXA OF ISLAND MALLOW (*MALVA ASSURGENTIFLORA*, MALVACEAE) AND THEIR CONSERVATION STATUS ON THE CALIFORNIA CHANNEL ISLANDS

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ABSTRACT

Phylogenetic analyses of molecular sequence data since the mid-1990s have demonstrated the non-monophyly of *Lavatera* and *Malva* (Malvaceae) as treated earlier and have resulted in the taxonomic rearrangement of these genera so that each is reciprocally monophyletic. During this recircumscription, four taxa from western North America previously recognized in *Lavatera* were transferred to *Malva*, but new combinations for the subspecies of *L. assurgentiflora* were not made. Here, based on the morphological distinctiveness of those infraspecific taxa, the new combination **Malva assurgentiflora** subsp. **glabra** (Philbrick) Guilliams, **comb. nov.**, is made for plants from San Clemente and Santa Catalina islands. Re-evaluation of the native and introduced distributions of subsp. *assurgentiflora* and subsp. *glabra* indicates that both taxa are exceedingly rare in native occurrences and warrant continued conservation attention.

Phylogenetic analyses of molecular sequence data often provide critical and decisive evidence for realignment of organismal classifications so that taxonomy reflects evolutionary history. This is especially true for difficult taxonomic groups with competing classification schemes based on morphological evidence, as is the case in the *Malva* alliance (Malvaceae, tribe Malveae; Bates 1968). Comprising the Linnean genera *Alcea*, *Althaea*, *Lavatera*, and *Malva*, the *Malva* alliance has been the subject of a number of molecular phylogenetic studies (Ray 1995; Fuertes-Aguilar et al. 2002; Escobar García et al. 2009). The first of these studies (Ray 1995) demonstrated the non-monophyly of both *Lavatera* and *Malva*, leading Ray (1998) to reassign subordinate taxa between these genera so that each is reciprocally monophyletic. Thorough discussions, including of the morphology of these plants, can be found in the studies cited above.

While the *Malva* alliance has a main center of diversity in western Europe and the Mediterranean region, a small, but intriguing cluster of taxa is native to the California Islands off the coast of western North America (Figs. 1, 2). In the USA, *M. assurgentiflora* (Kellogg) M.F. Ray [*Lavatera assurgentiflora* Kellogg] occurs naturally on four of the eight California Channel Islands at the present time. In México, three currently recognized taxa are considered native to the Baja California Pacific Islands, including *M. lindsayi* (Moran) M.F. Ray [*Lavatera lindsayi* Moran], *M. occidentalis* (S. Wats.) M.F. Ray [*Lavatera occidentalis* S. Wats.], and *M. pacifica* M.F. Ray [*Lavatera venosa* S. Wats.]. These native North American taxa are shrubby perennials, a life history feature that is convergent with a number of Old World *Malva* alliance taxa in both the Core Malvoid clade as well as the *Lavatera* clade. The shrub habit may have evolved from the herbaceous perennial habit up to six times in the *Malva* alliance (Escobar García et al. 2009).

The early phylogenetic work that resulted in the transfer of native North American *Malva* alliance taxa from *Lavatera* to *Malva* (Ray 1995, 1998) had an additional effect with respect to *Malva assurgentiflora*: the loss of available names for infraspecific taxa. Philbrick (1980) provided morphological evidence for the recognition of two subspecies in (then) *L. assurgentiflora* across its

range on the California Channel Islands. Philbrick observed that northern Channel Island plants from San Miguel and Anacapa islands differ from plants from the southern Channel Islands of San Clemente and Santa Catalina in having pubescent leaves with stellate trichomes, entire petal apices, and pubescent filament columns (Figs. 3, 4). Southern Channel Island plants, which he recognized as subsp. *glabra*, have glabrous leaves, erose petal apices, and glabrous filament columns.

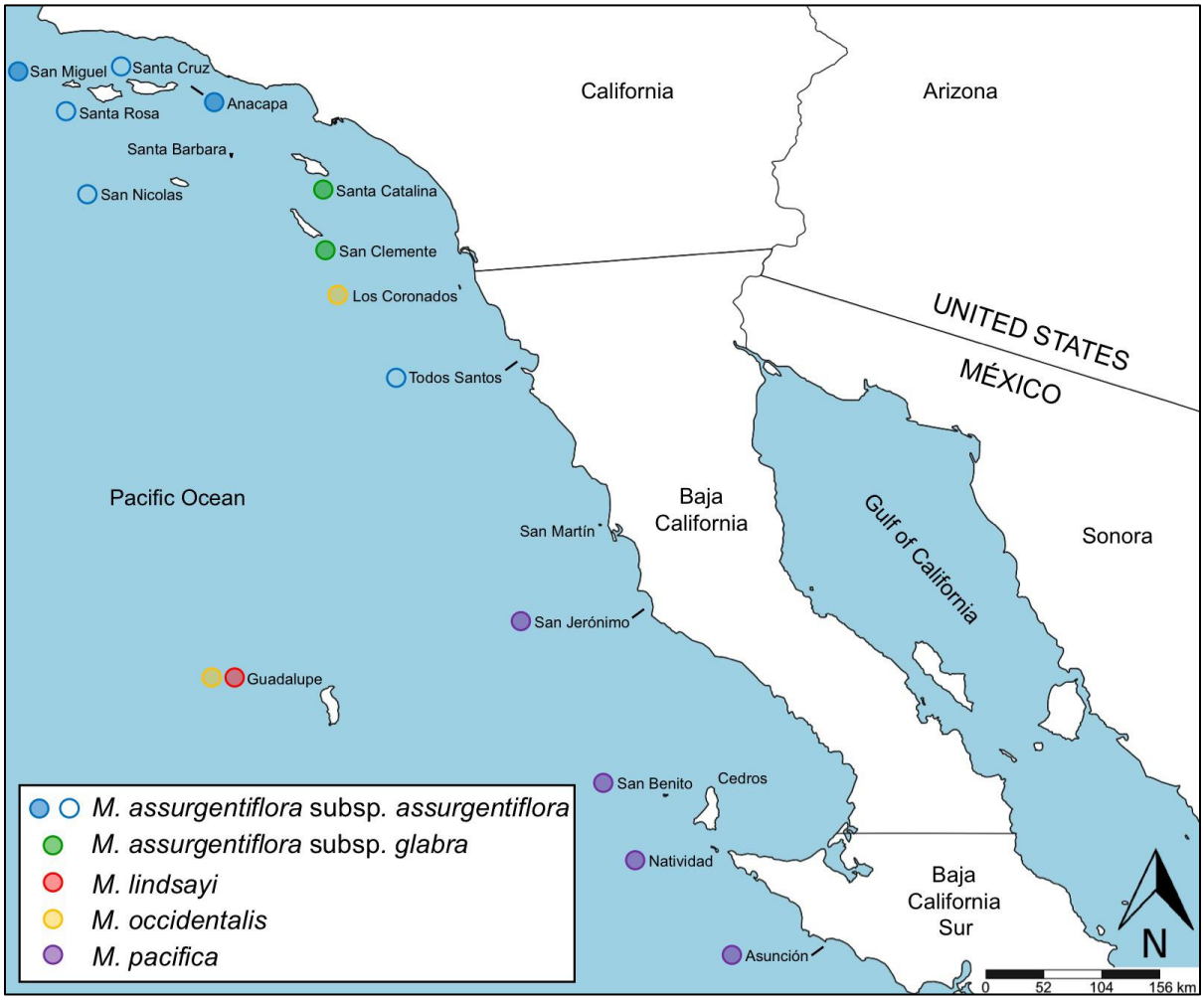

Figure 1. Map of the California Islands of the southwestern United States and northwestern México. Islands on which western North American *Malva* taxa occur are indicated with colored circles. Circles are filled when a taxon is considered naturally occurring on an island, and unfilled when considered introduced.

Despite the clear morphological differences between the *Lavatera assurgentiflora* subspecies, Philbrick's taxonomic distinction has not been broadly adopted beyond local botanical experts of the Channel Islands. His concept was not followed in the Jepson Manual treatment of *Lavatera* (Hill 1993), although the treatment author later suggested that further study might result in recognition of two taxa in *M. assurgentiflora* (Hill 2009). Similarly, Ray did not make new combinations for subsp. *assurgentiflora* and subsp. *glabra* in *Malva* in his 1998 paper. Ray did describe the morphological distinctiveness of the two subspecies, however, providing additional characters that distinguish them and noting that these features were maintained when plants are grown in a common garden (Ray 1998). Ostensibly due to the strength of the morphological evidence and its genetic basis, in 1996 Ray annotated the type specimens of both subspecies with new combinations in the genus *Malva*

(Figs. 5 and 6). Ultimately, however, Ray (1998) decided against validly publishing new combinations, indicating that a more thorough field investigation was necessary to determine the provenance of a plant collected on Santa Cruz Island (a northern Channel Island) that he considered to be morphologically consistent with the southern island subspecies (*Junak SR-1847*, SBBG).

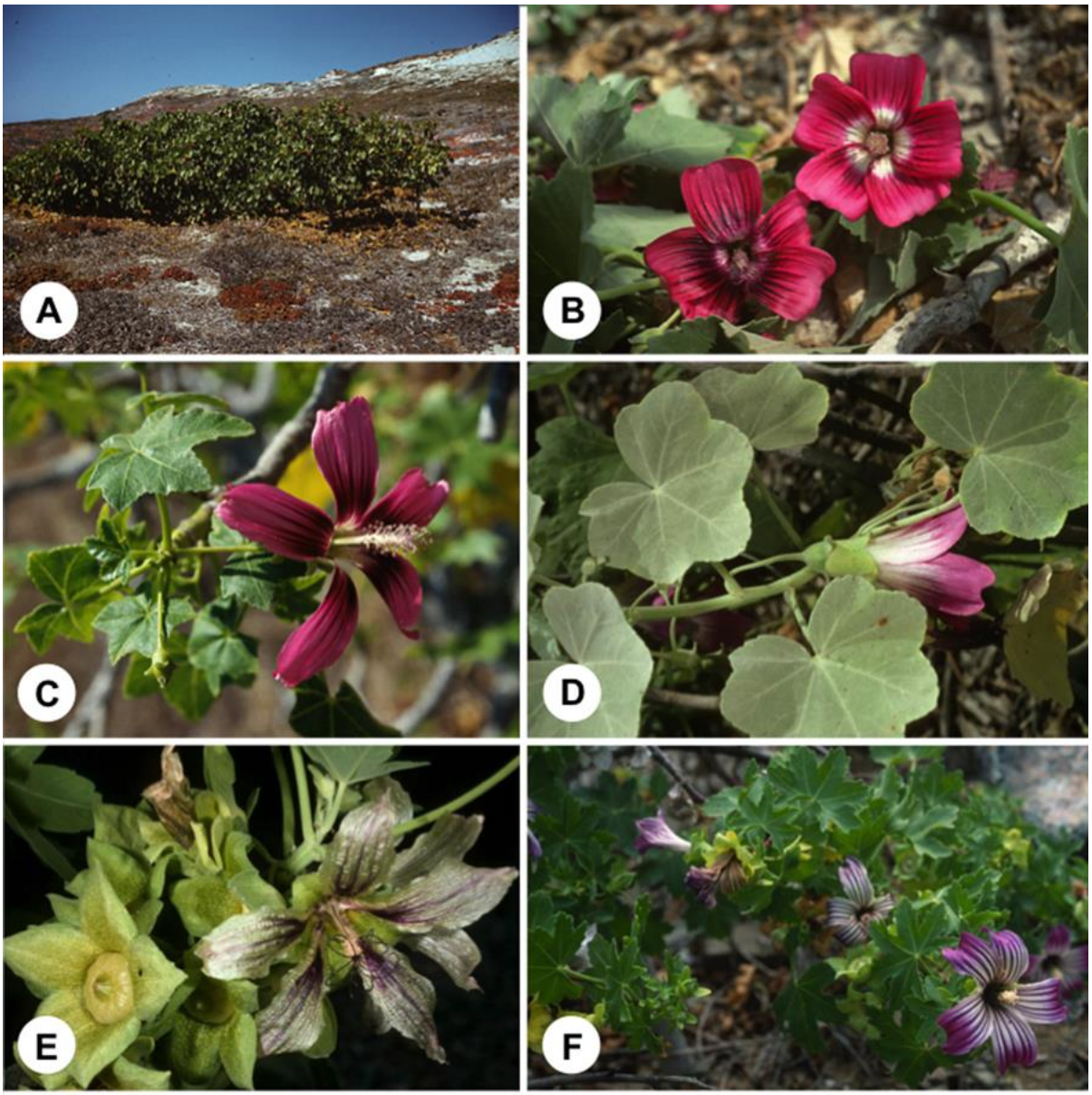

Figure 2A-F. Photographs of island endemic *Malva* taxa of western North America. A. *Malva assurgentiflora* subsp. *assurgentiflora* [*Lavatera assurgentiflora* subsp. *assurgentiflora*], showing plant habit, photograph by E.R. Blakley. B. *Malva assurgentiflora* subsp. *assurgentiflora*, leaves and flowers, photograph by Ralph N. Philbrick. C. *Malva assurgentiflora* subsp. *glabra* [*Lavatera assurgentiflora* subsp. *glabra*], leaves and flowers, photograph by Dieter H. Wilken. D. *Malva lindsayi* [*Lavatera lindsayi*], leaves and flowers, photograph by Steven Junak. E. *Malva occidentalis* [*Lavatera occidentalis*], flowers and fruits, photograph by Steven Junak. F. *Malva pacifica* [*Lavatera venosa*], leaves and flowers, photograph by Steven Junak.

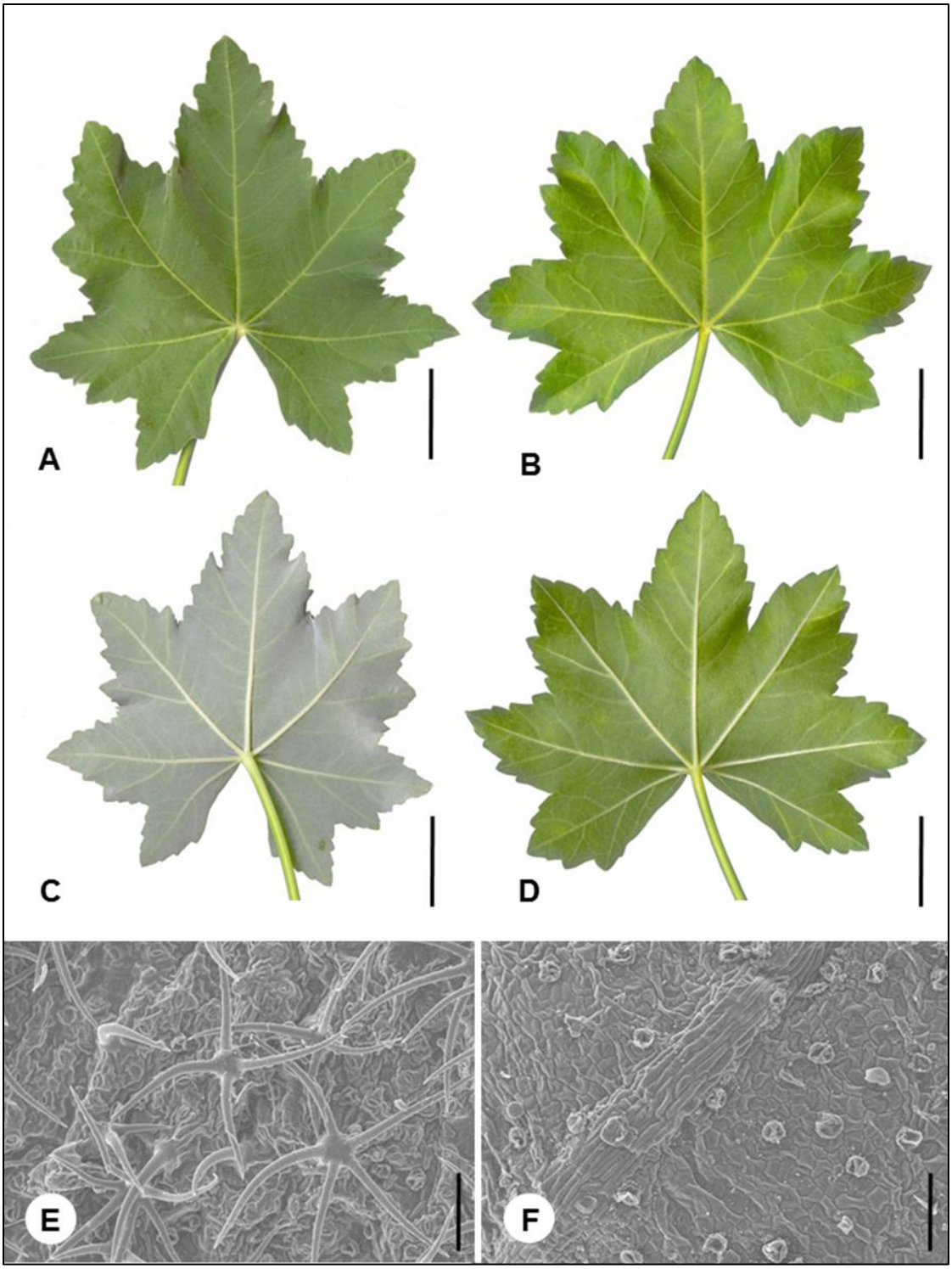

Figure 3A-F. Photographs and scanning electron microscope images of leaves of *Malva assurgentiflora*. A. *M. assurgentiflora* subsp. *assurgentiflora*, adaxial leaf surface, scale bar = 3 cm. B. *M. assurgentiflora* subsp. *glabra*, adaxial leaf surface, scale bar = 3 cm. C. *M. assurgentiflora* subsp. *assurgentiflora*, abaxial leaf surface, scale bar = 3 cm. D. *M. assurgentiflora* subsp. *glabra*, abaxial leaf surface, scale bar = 3 cm. E. Scanning electron microscope image of *M. assurgentiflora* subsp. *assurgentiflora*, adaxial leaf surface, scale bar = 100 µM. F. Scanning electron microscope image of *M. assurgentiflora* subsp. *glabra*, adaxial leaf surface, scale bar = 100 µM.

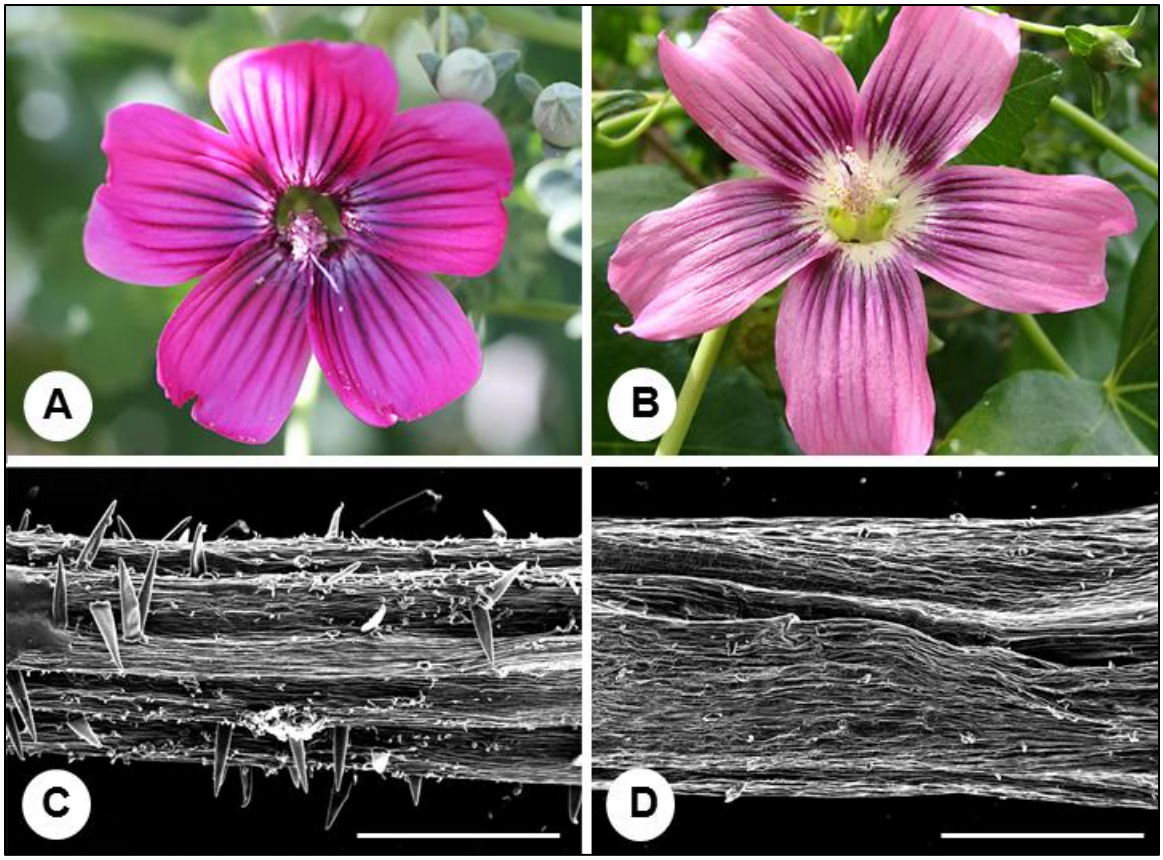

Figure 4A-B. Photographs of flowers and scanning electron microscope images of filament columns of *Malva assurgentiflora*. A. *M. assurgentiflora* subsp. *assurgentiflora*, flower, photograph by Sally Isaacson. B. *M. assurgentiflora* subsp. *glabra*, flower, photograph by Tricia Wardlaw. C. *M. assurgentiflora* subsp. *assurgentiflora*, filament column, scale bar = 500 µM. D. *M. assurgentiflora* subsp. *glabra*, filament column, scale bar = 500 µM.

Current floristic work across the California Channel Islands has permitted an evaluation of Philbrick's taxonomic treatment of *Malva assurgentiflora*. Study of the species across its natural and introduced range was performed. Strong morphological patterns consistent with Philbrick's taxonomy are clear, and therefore nomenclature must be updated so that plant diversity across the California Channel Islands can be adequately described in upcoming regional floras. Here, a new combination is provided for *Lavatera assurgentiflora* subsp. *glabra* in the genus *Malva*. Also given is a summary of the distribution of the northern subspecies of *M. assurgentiflora* [*L. assurgentiflora* subsp. *assurgentiflora*], which has a broad, introduced range owing to its widespread usage in horticulture. Finally, a brief section on implications for conservation is provided.

Methods

This paper is based upon the analysis of *Malva assurgentiflora* [*Lavatera assurgentiflora*] by Philbrick (1980), the careful description of the species by Ray (1998), and recent examination of *M. assurgentiflora* in the field and herbarium. Fieldwork for this project was performed in 2015–2017. A list of herbarium specimens examined is provided. Living, wild-collected plants in cultivation and digital images available online were examined. Critical to establishing an accurate understanding of the present-day distribution of the species were direct conversations with island experts Michael Benedict, Sarah Chaney, Elizabeth Collins, Dr. Robert DeLong, Peter Dixon, Steven Junak, John Knapp, Julie Lambert, Dr. Ralph Philbrick (now deceased), Dirk Rodriguez, and Ian Williams.

MALVA ASSURGENTIFLORA Kellogg **subsp. GLABRA** (Philbrick) Guilliams, **comb. nov. Basionym:** *Lavatera assurgentiflora* subsp. *glabra* Philbrick, The California Islands: Proceedings of a Multidisciplinary Symposium, 177. 1980. **TYPE: USA. California.** Los Angeles Co.: Santa Catalina Island, Bird Rock, 23 Sep 1961, *E.R. Blakley 4739* (holotype: SBBG!; isotype: CAS). Figure 5.

Figure 5. Holotype of *Malva assurgentiflora* subsp. *glabra* (*Blakley 4739*; current catalog number SBBG150066; old catalog number 12937).

Figure 6. Neotype of *Malva assurgentiflora* subsp. *assurgentiflora* (*Timbrook & Philbrick 652*; current catalog number SBBG150065, old catalog number 87733). Material from Kellogg unequivocally corresponding to holotype of *Lavatera assurgentiflora* could not be located by Ray (1998), thus this neotype was designated by Ray (1995).

Malva assurgentiflora subsp. *glabra* is morphologically distinctive. With its green, shiny, glabrous leaves, subsp. *glabra* can be confidently distinguished at a distance from subsp. *assurgentiflora*, with gray-green, dull, stellate pubescent leaves. The subspecies also differ strongly in floral features. In all material examined, subsp. *glabra* has oblong or oblanceolate to narrowly obtriangular petals with an erose apex; subsp. *assurgentiflora* has obovate to obtriangular petals with an entire apex. As noted by Philbrick, the filament column of subsp. *glabra* is also usually glabrous, while in subsp. *assurgentiflora* it is usually pubescent. In these features, the specimen of putative subsp. *glabra* collected on Santa Cruz Island (*Junak SR-1847*) is more consistent with subsp. *assurgentiflora*, although the leaves are less pubescent than is typical for the subspecies.

Although an attractive plant, subsp. *glabra* is not widely used in the horticultural trade at the present time, perhaps owing to the early introduction of subsp. *assurgentiflora*, described below. Both subspecies grow vigorously in cultivation, however, and all plants observed of both subspecies grown at the Santa Barbara Botanic Garden maintain the diagnostic morphological features described by Philbrick (1980), Ray (1998), and above (Guilliams, personal observation).

The global distribution of *Malva assurgentiflora* subsp. *assurgentiflora*

Malva assurgentiflora subsp. *assurgentiflora*, originally collected from Anacapa Island, is widely used in the horticultural trade. One early reference to the horticultural use of subsp. *assurgentiflora* was made by Behr (1891), who observed the plant in a garden setting in San Francisco, California in September 1850. By 1854, Behr (1891) observed the plant increasingly in use as a garden hedge, and Kellogg (1854) wrote in the protologue (for *Lavatera assurgentiflora*) that it was "now to some extent cultivated." Philbrick (1980) noted that the plant was cultivated as far south as Ecuador by 1918. Today, in the Western Hemisphere, subsp. *assurgentiflora* has been planted in Bolivia, Chile, Columbia, Ecuador, Mexico, Peru, and the United States. The subspecies has also potentially naturalized in Australia and New Zealand (Barker 1977; Allan Herbarium 2000).

Malva assurgentiflora subsp. *assurgentiflora* has also been planted in horticultural settings on the California Channel Islands. An overview of the current distribution of subsp. *assurgentiflora* on each California Channel Island is given below. For information on historical observations of subsp. *assurgentiflora* on the Channel Islands, see Philbrick (1980). Islands are discussed in order, from the northwest to the southeast.

San Miguel Island is the northwestern-most island in the archipelago, and one of two islands on which subsp. *assurgentiflora* is known to be naturally occurring at the present time. Three or four individuals of a larger historical occurrence grow in a natural setting near Point Bennett, the westernmost point of the island. Other individuals from this population were transplanted to two higher positions nearby, where an unknown number (10s) of plants remain today (R. DeLong, personal communication). One potentially naturally occurring plant was observed on the east end of the island, in a natural setting, near Willow Canyon. The National Park Service also has planted 15 individuals on the mesa, grown from seed collected on-island.

On Santa Rosa Island, two plants of subsp. *assurgentiflora* occur together near the bunkhouse at the former Vail Ranch, at Bechers Bay. Island biologists Michael Benedict, Steven Junak, Ken Niessen, and Ralph Philbrick, each with long histories on the northern Channel Islands, corroborate the location of these plants and their presumed status as planted in this location in a human settlement. Where these two plants came from originally is unclear, but there is no record of collections of *M. assurgentiflora* from a natural setting on Santa Rosa Island. Therefore, lacking other information, it must be concluded that the species does not occur there naturally at the present time.

On Santa Cruz Island, plants of subsp. *assurgentiflora* were known to occur in only a few regions. A single, large plant grew in the fenced front yard of the ranch house at Christy Ranch on the west end of the island (Michael Benedict, personal communication). This plant was already fully mature when Benedict first observed it in 1964, so he concluded that it must have been planted some years prior. Its original source is unknown. Plants are also known to be planted in the garden and nearby environs of the Main Ranch in the Central Valley, sometimes referred to as the Stanton Ranch. Benedict believes that they were given to former ranch owner, Carey Stanton, from material obtained from Vail Ranch on Santa Rosa Island. Some plants from the Main Ranch were planted at the nearby University of California Field Station. All of these locations are within or adjacent to human settlements. Junak's collection (*SR-1847*) occurs along a road in the Central Valley, presumably recruited from seed of individuals planted elsewhere in the valley. No plants of subsp. *assurgentiflora* are unequivocally known to be naturally occurring on Santa Cruz Island at the present time.

On Anacapa Island, technically a small island group of three main islets, subsp. *assurgentiflora* has been documented from naturally occurring plants on the West Anacapa and Middle Anacapa islets. Recent searches have failed to relocate these plants, however, and the subspecies is presumed extirpated from these two islands at this time. Prior to its extirpation on Middle Anacapa Island, however, seed was gathered by Junak and National Park Service staff. This seed was used to create a new population of subsp. *assurgentiflora* on East Anacapa Island, where plants are currently tended by the Park and are reported to be thriving.

On San Nicolas Island, subsp. *assurgentiflora* grows near several buildings on the island, as well as in one location in a natural setting to which it has apparently spread since its initial introduction. Most plants occur in "Nicktown", a center of military activity on San Nicolas Island, where many individuals grow among buildings in landscaping beds (Junak 2008; Guilliams, personal observation). Some plants grow nearby (e.g., within meters), outside of planters, and have presumably recruited from seed. Away from Nicktown, plants have been observed near Building 189, off Tufts Road, near Building 182 (the Telemetry Building), and at Hill 819 near an old dwelling. Finally, a small stand of subsp. *assurgentiflora* plants has been observed growing in relatively intact native habitat away from but close to Nicktown, leading Junak (2008) to speculate on their provenance. These plants from the base of the north island escarpment have been included in a recent population genetics study that has shown them to be nearly genetically identical to the Nicktown plants (Guilliams et al. 2018), and are likely derived from seed of the introduced northern island plants at Nicktown.

On San Clemente Island, subsp. *assurgentiflora* individuals were planted near the galley and barracks in the town at Wilson Cove. These northern island plants have reportedly been removed and replaced with plants of subsp. *glabra* grown on San Clemente Island using local seed (Julie Lambert, personal communication).

On Santa Catalina Island, subsp. *assurgentiflora* has been planted in Avalon Canyon (Thorne 1967; Guilliams, personal observation). These landscaping plants are morphologically consistent with plants widely available in the horticultural trade, and individuals grow with other landscaping plants in the town center. Millspaugh and Nuttall (1923) reported that material of subsp. *glabra* from Bird Rock (the type locality of subsp. *glabra*) was planted in Avalon, but no individuals of subsp. *glabra* were observed during fieldwork for this project.

Summary of the geographic distribution of *Malva assurgentiflora* subspecies

At the present time and as described by Philbrick (1980), *Malva assurgentiflora* subsp. *assurgentiflora* appears to grow naturally on San Miguel and Anacapa islands. Observations of this subspecies on other islands are nearly all within or adjacent to human settlements and clearly

represent horticultural plantings in historical times. The only exceptions are (1) on Santa Cruz Island, in the Central Valley (*Junak SR-1847*) and (2) on San Nicolas Island, where one small group of plants grows in a natural setting. On Santa Cruz Island, the plant in question occurs along a roadside in the Central Valley, a region in which subsp. *assurgentiflora* is used horticulturally. On San Nicolas Island, the plants in question have been shown to be nearly genetically identical to individuals deliberately planted within the human settlement there.

Naturally occurring plants of *Malva assurgentiflora* subsp. *glabra* are exclusively found on San Clemente and Santa Catalina islands, where they have a long history of documentation by botanists (Raven 1963; Thorne 1967; Philbrick 1980, and references therein). The plant is rarely used in the horticultural trade and the global distribution of subsp. *glabra* is essentially limited to the California Channel Islands.

Conservation implications

Because of the broad use of *M. assurgentiflora* subsp. *assurgentiflora* in horticulture worldwide, some may have the impression that the native Channel Islands malvas are common. In truth, each subspecies is exceedingly rare in nature.

Malva assurgentiflora subsp. *assurgentiflora* is known from only four or five original, naturally occurring plants in total, all growing on San Miguel Island. On Anacapa, the last observation of naturally occurring subsp. *assurgentiflora* was made in 1994 (Junak, personal communication). These islands, both managed by the National Park Service as part of Channel Islands National Park, have each supported activities designed to create new populations and increase the overall number of plants on each island. On San Miguel Island, three new populations of five individuals each of *M. assurgentiflora* have been established using plants grown from seed collected on-island (Dirk Rodriguez, personal communication). Of these, 10 plants persist today and some are relatively large. Although there are no naturally occurring plants remaining on Anacapa Island and as stated previously, seed from Middle Anacapa Island was used to grow individuals of *M. assurgentiflora* that were then planted on East Anacapa Island (Sarah Chaney, personal communication).

Malva assurgentiflora subsp. *glabra* is known from four naturally occurring populations on San Clemente Island and two naturally occurring populations on Santa Catalina Island. San Clemente Island, owned and operated by the US Navy, has a restoration program targeting subsp. *glabra*. Seed from the small, naturally occurring populations has been used to grow a large number of plants that have been installed in several new populations on the island (Julie Lambert, personal communication). This restoration program has been successful, demonstrating that aggressive restoration activities can bring the taxon back from the brink of extirpation, at least locally. On Santa Catalina Island, two naturally occurring populations grow on small, off-shore islets on the channel (north) side of the island: Bird Rock and Indian Rock. Although the Bird Rock population of between 100 and 150 individuals may be stable, protected within a large patch of cactus, this low elevation station is vulnerable to stochastic events, a risk that will only increase with rising sea levels due to climate change. The population on Indian Rock appears to be declining, with only five or so plants observed from the water in 2016 (Guilliams, personal observation). The Catalina Island Conservancy has created a number of populations across Catalina Island using seeds gathered from both of these populations.

The situation described above warrants continued or even increased action on the part of the land owners/managers on the Channel Islands and their conservation partners. With the removal of introduced ungulates across most of the Channel Islands (McEachern et al. 2016), on-the-ground restoration may be the best hope for the survival of these species on the Channel Islands, especially when augmented by conservation seed banking (Cohen et al. 1991; Maunder et al. 2004) and *ex-situ*

plantings in botanic gardens (Fant et al., 2016) as long-term insurance. The current focus on island mallows and other rare plants across the California Islands on the part of island owner/managers and other partners is encouraging. The current momentum should increasingly shift the Channel Islands rare plant narrative from "species on the edge of extinction" to "back from the brink".

Representative specimens (arranged by collection locality, from NW to SE; **indicates type material).

Malva assurgentiflora subsp. **assurgentiflora. USA. California.** San Miguel Island: *Blakley 4238*; *Philbrick B66-131*; *Philbrick B66-132*; *Philbrick B66-133*; *Philbrick, Greaves, & Junak B78-376*; *Greaves s.n.*, 29 Jun 1978; *Junak 5974*; *Smith 6913*. Santa Rosa Island: *Daily SR240, Dunkle 8529*; *Junak SR-210*; *Philbrick & Haller B65-221*; *Philbrick B65-222*; *Smith 10386*; *Turner s.n.*, 25 Oct 1952. Santa Cruz Island: *Hochberg 716*; *Junak SC-1074*; *Junak SC-1565*; *Junak SC-1847*. Anacapa Island: *Hoffmann, s.n.*, 22 Sep 1930; *Junak & Amick MA-36*; *Junak MA-197*; *Junak & Halvorson MA-221*; *Junak MA-247*; *Timbrook & Philbrick 652***; *Timbrook & Philbrick 653*. San Nicolas Island: *Daily 86*; *Daily SNI94*; *Garoutte & Knapp CSG-2*; *Garoutte & Knapp CSG-3*; *Garoutte & Knapp CSG-4*; *Garoutte & Knapp CSG-5; Garoutte & Knapp CSG-6*; *Garoutte & Knapp CSG-7*; *Garoutte & Knapp CSG-8*; *Garoutte & Knapp CSG-9*; *Garoutte & Knapp CSG-10*; *Garoutte & Knapp CSG-11*; *Guilliams 2801*; *Junak SN-422*; *Junak SN-424*; *Junak SN-842*; *Junak SN-1041*; *Junak SN-1288*; *Junak SN1290*; *Junak SN-1291*; *Junak SN-1292*; *Newman 116*; *Vanderwier s.n.*, 6 Mar 1985. San Clemente Island: *Simpson 2212*. Santa Catalina Island: *Blakley 5395*; *Philbrick & Thorne B67-322*; *Ratay & Davis 131*; *Guilliams 3368*. California Mainland: *Benedict s.n.*, 17 Nov 1967; *Benedict s.n.*, 2 Mar 1969; *Bornstein s.n.*, 1 Mar 1992; *Burgess & Munro 4200*; *Dearing 2299*; *Halvorson 84-01*; *Hoffmann s.n.*, 15 Sep 1927; *Junak s.n.*, 7 Mar 1978; *Junak s.n.*, 9 Apr 1978; *Kuizenga s.n.*, 15 Jul 1979; *Kuizenga s.n.*, 1 Mar 1980; *Kuizenga s.n.*, 26 Jun 1987; *Murphey s.n.*, 3 Dec 1981; *Pollard s.n.*, 6 Oct 1945; *Pollard s.n.*, 19 Oct 1962; *Pollard s.n.*, 10 Jul 1964; *Pollard s.n.*, 21 Dec 1967; *Pollard s.n.*, 10 Nov 1971; *Pollard s.n.*, 11 Feb 1972; *Rose 69093*; *Secrest s.n.*, 28 Nov 1948; *Smith 2580*; *Twisselmann 9195*; *Yates s.n.*, Sep 1895. **MÉXICO.** Todos Santos Island: *Guilliams 2902*; *Philbrick & Benedict B65-1554*; *Philbrick & Benedict B68-502*.

Malva assurgentiflora subsp. **glabra. USA. California.** Santa Catalina Island: *Blakley 4739***; *Blakley 5415*; *Daily SCat-7*; *Dunkle 1858*; *Fosberg 7167*; *Guilliams 3279*; *Guilliams 3280*; *Guilliams 3281*; *Guilliams 3282*; *Guilliams 3283*; *Guilliams 3284*; *Guilliams 3285*; *Guilliams 3286*; *Guilliams 3287*; *Guilliams 3288*; *Guilliams 3289*; *Guilliams 3290*; *Guilliams 3291*; *Guilliams 3292*; *Guilliams 3293*; *Guilliams 3294*; *Guilliams 3295*; *Guilliams 3296*; *Guilliams 3297*; *Guilliams 3298*; *Guilliams 3310*; *Hoefs and Phelps 2282*; *Moran 625*; *Thorne 35794*. San Clemente Island: *Beauchamp & Douglas 3208*; *Beauchamp 4152*; *Benedict s.n.*, 27 Jun 1971; *Blakley 6414*; *Boutin 1623*; *Junak, Hochberg, Ferguson SCl-9*; *Guilliams 2710*; *Guilliams 2711*; *Guilliams 2712*; *Guilliams 2715*; *Guilliams 2716*; *Guilliams 2719*; *Guilliams 2720*; *Guilliams & Lambert 2729*; *Junak SCl-277*; *Junak & Stubler SCl-620*; *Raven 17303*; *Raven 17579*; *Ross 5437*.

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