New plant records from the Hawaiian Archipelago

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The following contributions include 10 new records of plants located on the islands of Maui and Moloka'i. The records are comprised of 3 new state records, 3 new naturalized records, 2 new island records, and 2 range extensions. Nine of the records are from Maui and 1 from Moloka'i. All of the records are for nonnatives. Images of most of the material examined can be seen at http://www.hear.org/starr/. Voucher specimens are housed in the Bishop Museum's *Herbarium Pacificum* (BISH), Honolulu, Hawai'i.

Boraginaceae

Myosotis azorica H.C. Watson **New naturalized record**

Myosotis azorica (Azores forget-me-not) was previously known from a single collection at a park residence within Hawai'i Volcanoes National Park on the island of Hawai'i (BISH 2006) and is now also known from upland East Maui, where it was wild collected in the dark, moist understory of an *Acacia mearnsii* (black wattle) forest in Kula. *Myosotis azorica*, native to the Azores, Canary Islands, and Algeria, is a perennial herb cultivated in beds and borders for its numerous small, attractive, 5-parted flowers, bright blue in color with white centers, in bractless, narrow clusters at stem tips. Some forms may have pink or white flowers. Stems below are prostrate and have white hairs that are bent backward. Stems above rise in height 30–46 cm (12–18 in). Basal leaves are 8–10 cm (3–4 in) long, broadest near rounded tips and tapering into their stems. Stem leaves are alternate, oblong, and stemless. Each flower has a small burlike calyx and a short tubular corolla 0.6 cm (0.25 in) in diameter (Neal 1965). This collection represents a new naturalized record for the state of Hawai'i from the island of Maui.

Material examined: **MAUI**: East Maui, Kula, Waiakoa Gulch, growing at a biocontrol release site in *Acacia mearnsii* (black wattle) and *Passiflora tarminiana* (banana poka) forest, collected by Mach Fukada, 1219 m (4200 ft), 9 May 2006, *Starr*, *Starr & Fukada 060509-01*.

Cupressaceae

Cupressus macrocarpa Gordon **New naturalized record**

Cupressus macrocarpa (Monterey cypress), native to a small area in coastal California, is widely cultivated throughout the world as a windbreak or hedge plant and in reforestation (Staples & Herbst 2005). On Maui, *C. macrocarpa* has been observed spreading in upland areas of East Maui near forestry plantings into nearby gulches and pastures. In Hawai'i, *C. macrocarpa* is said to be the most common cypress and is often observed as large trees at old homestead sites (Little & Skolmen 1989). It was also widely used as a forestry tree, with over 200,000 trees planted in forest reserves between 1910 and 1960 (Little & Skolmen 1989). *Cupressus macrocarpa* are medium to large-sized aromatic evergreen trees with small, scalelike leaves. The trunk is straight, to 34 m (110 ft) in height and typically 0.8 m (2.5 ft) in diameter. The crown is conical or spreading in shape. The bark is

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dark gray, rough, thick, and furrowed into flat ridges. The inner bark is light brown with an outer dark brown layer, slightly bitter and resinous. Twigs are slender and 4-angled. Leaves are paired, scalelike, overlapping in 4 rows against twigs, blunt-pointed, 1.5–3 mm (1/16–1/8 in) long, dark green, and without glands. Female (seed-bearing) cones are clustered on short stalks, rounded, 2.5–4 cm (1–1.5 in) in diameter, brownish, maturing in the second year and remaining attached. Cone-scales number 8–14, are shield-shaped, rounded at the edges, with a raised point in the center. Seeds number about 140 per cone, are 5 mm (3/16 in) long, light brown, angled, with several gland-dots and a narrow wing. Male (pollen) cones on same tree are oblong, 3 mm (1/8 in) long, and yellow (Little & Skolmen 1989). This collection represents a new naturalized record for the state of Hawai‘i from the island of Maui.

Material examined: **MAUI**: East Maui, Kahakapao Gulch, Haleakala Ranch, spreading in pastures and gulches from plantations, in association with *Pennisetum clandestinum* (kikuyu grass) 1219 m (4000 ft), 18 Aug 2005, *Starr & Starr 050818-01*.

Ericaceae

Erica lusitanica Rudolphi **New state record**

Erica lusitanica (Portuguese or Spanish heath), native to southwestern Europe (Weeds Australia 2007), is a garden escape in Australia in lowland grassland, grassy woodland, dry and wet forest, and streamside vegetation of New South Wales, South Australia, Tasmania, and the Australian Capitol Territory, and in California in disturbed open sandy areas of north coastal Humboldt County (Weeds Australia 2007; Jepson Flora Project 1993). According to Richardson & Richardson (2007), in Australia this species is highly invasive and able to completely dominate the shrub canopy of native ecosystems. On Maui, *E. lusitanica*, which looks similar to *Leptecophylla tameiameiae* (pukiawe), was found as scattered plants in Haleakala Ranch pastures below Crater Road, just above a large eucalyptus grove. *Erica lusitanica* is an erect evergreen woody shrub up to 200 cm (79 in) tall. The leaves are crowded in rings of 3 or 4 on brittle, woody stems that are densely covered with simple hairs. The flowers are white to pink in pendulous clusters of 3–4 on the ends of short side branches. The fruit is a capsule about 3 mm (0.1 in) long, containing numerous dustlike seeds that are spread by wind, water, and on the coats of animals. Seeds remain viable in the soil for several years and it is reported that a single plant may produce nine million seeds each year. Fire appears to create suitable conditions for germination and seeding establishment (Weeds Australia 2007). This collection represents a new state record for Hawai‘i from the island of Maui.

Material examined: **MAUI**: East Maui, Wai‘ale Gulch, Haleakala Ranch, scattered plants in pasture, in association with *Eucalyptus* sp. and *Leptecophylla tameiameiae* (pukiawe), 1767 m (5800 ft), 16 Aug 2005, *Starr & Starr 050816-01*.

Fabaceae

Leucaena diversifolia (Schltdl.) Benth. **New naturalized record**

Leucaena diversifolia (upland koa haole, red leucaena) is native from eastern and central Mexico (Veracruz and Puebla) south through Guatemala, Honduras, and into Nicaragua (Bray & Sorensson 1992), where it prefers frost-free, submontane habitats with high cloud cover (Cook *et al.* 2005). This nitrogen-fixing tree has been extensively grown in places such as Hawai‘i, Australia, the Caribbean, Africa, and Southeast Asia for agronomic and animal production trials and is commonly used as a forage tree, shade tree for coffee, and

timber tree (Bray & Sorensson 1992; Cook *et al.* 2005). Unlike the more commonly known *L. leucocephala* in Hawai‘i, *L. diversifolia* prefers cooler, wetter, and higher elevations ranging from 700–2500 m (2297–8202 ft). *Leucaena diversifolia* was observed on the south slope of East Maui at approximately 792 m (2600 ft), where it was planted in a row next to a strawberry and green onion farm in a pastoral setting on Ulupalakua Ranch. Seedlings and saplings were observed nearby in disturbed soils. This species can be distinguished from *L. leucocephala* by having leaves with a high number of small leaflets and styles that extend past the anther halo (Bray & Sorensson 1992). *Leucaena diversifolia* is a small to medium-sized tree 5–20 m (16–66 ft) tall with an open, spreading crown rising from a single stem 20–50 cm (8–20 in) in diameter. Leaves are bipinnate with 16–24 (occasionally 14–28) pairs of pinnae, each pinna with 48–58 pairs of leaflets 4.5–7.0 mm (0.15–0.30 in) long, linear-oblong in shape, and hairless except at the margins; petioles (pinnular rachis) are covered with white hairs. Petiole gland is highly variable in size and shape. Flower heads vary in color from pale pink to bright pink, or occasionally bright scarlet, and are 11–15 mm (0.4–0.6 in) in diameter, in groups of 1–5, developing in the leaf axils of actively growing, intermediate shoots. Pods are narrowly linear-oblong and flat, 10–13 cm (4–5 in) long, 13–16 mm (0.5–0.6 in) wide. There are 1–6 pods per flower head, each containing 6–20 seeds. Pods are papery in texture, dark brown or reddish brown, and are sometimes lustrous. Pods may be hairless or covered in dense velvety hairs, opening along both sides. Seeds are small, 4.3–5.5 mm (0.17–0.22 in) wide and 2.7–3.4 mm (0.11–0.13 in) long (Cook *et al.* 2005). This collection represents a new naturalized record for the state of Hawai‘i from the island of Maui.

Material examined: **MAUI**: East Maui, ‘Ulupalakua, Ulupalakua Ranch, strawberry farm, spreading from plantings into nearby disturbed soils along 4WD road, in association with *Acacia koa* (koa) and *Amaranthus spinosus* (spiny amaranth), 743 m (2600 ft), 25 Sep 2004, *Starr* & *Starr 040925-02*.

Geraniaceae

Pelargonium capitatum (L.) L’Hér. ex Aiton **New state record**

Pelargonium capitatum (rose-scented geranium) is native to South Africa, where it grows in coastal dunes and sandy hills from the southwestern Cape to southern Natal (PlantNet 2007; Plants for a Future 2000). It is cultivated for its rose-scented oil used in perfumes, for use in aromatherapy and potpourri, as a remedy for digestive disorders, and as an emollient for skin rashes (Plant for a Future 2000). *Pelargonium capitatum* is naturalized in coastal areas of California and Western Australia (PLANTS 2007; FloraBase 1996). It is also naturalized in Spain, where it is included in a list of plant invaders (Dana *et al.* 2001) and is included in the highest (most dangerous) of the invasive categories. This fragrant shrub is now also known from Maui, where it is naturalized, being found on the walls of Wai‘ale Gulch and in many other nearby pastoral locations. *Pelargonium capitatum* is a shrubby perennial to 100 cm (39 in) in height. Stems are villous with non-glandular hairs. Roots are not tuberous. Leaves are alternate or opposite, with ovate to cordate laminae 2–8 cm (0.8–3 in) long and wide, deeply 3–7-lobed, lobes toothed, surfaces villous; petioles are 2–6 cm (0.8–2.4 in) long. Umbels are 7–12-flowered; peduncles are 3–12 cm (1–5 in) long; and pedicels are up to 4 mm (0.16 in) long. Calyx lobes are 5–6 mm (0.2–0.24 in) long, and sepal spurs are 3–4 mm (0.12–0.16 in) long. Petals are about 10 mm (0.39 in) long, pink, with deeper markings on the posterior petals. There are usually 7 fertile stamens. Fruit are about 7 mm (0.28 in) long; with mericarps villous and

about 5 mm (0.2 in) long (PlantNet 2007). This collection represents a new state record for Hawai‘i from the island of Maui.

Material examined: **MAUI**: East Maui, Aapueo, Wai‘ale Gulch, scattered on gulch wall and in pastures, in association with *Melinis minutiflora* and *Ulex europaeus*, 1341 m (4400 ft), 16 Aug 2005, *Starr, Starr, Bio & Javar 050816-3*; side tributary of Wai‘ale Gulch, Haleakala Ranch, wild in this area, in association with *Pennisetum clandestinum* (kikuyu grass), 1341 m (4400 ft), 22 Nov 2005, *Starr & Starr 051122-01*; tributary of Kalialinui Gulch, Haleakala Ranch, wild in this area, in association with *Lantana camara* (lantana) and *Opuntia ficus-indica* (panini), 975 m (3200 ft), 22 Nov 2005, *Starr & Starr 051122-02*.

Malvaceae

Malvastrum americanum (L.) Torr. **New island record**

Malvastrum americanum (Indian Valley false mallow) was previously known from coastal O‘ahu (Wagner *et al.* 1999), and is now known from the island of Moloka‘i, where it was found scattered in the upland sand dunes of Mo‘omomi. This collection represents a new island record for the island of Moloka‘i.

Material examined: **MOLOKA‘I**: Mo‘omomi, here and there in the sand dunes, in association with *Prosopis pallida* (kiawe) and *Sporobolus virginicus* (‘aki‘aki), 182 m (600 ft), 19 May 2005, *Starr, Starr & Naeole 050519-02*.

Onagraceae

Oenothera biennis L. **New state record**

Oenothera biennis (common evening primrose) is grown as a wildflower, in herb gardens, and for medicinal purposes. It is believed to be native to parts of Canada and North America and is commonly naturalized in temperate and subtropical areas of the world in disturbed sites, roadsides, and fields. *Oenothera biennis*, previously unknown from Hawai‘i, was observed by Patti Welton in June 2005 along Crater Road, on the mauka side of the road near the 1097 m (3600 ft) elevation area. A small patch 5 x 5 m (16 x 16 ft) with about a dozen plants of all size classes was observed. *Oenothera biennis* is a biennial herbaceous forb 3–25 dm (12–98 in) tall. Stems are erect, sometimes branching near the top, and can be covered with hairs. The stem has alternate, lanceolate leaves 2.5–15 cm (1–6 in) long, shallowly toothed with wavy edges. Basal leaves form a rosette, are usually hairy, and are 10–30 cm (4–12 in) long. Flowers have a bright yellow to gold corolla, which are 2–5 cm (5–13 in) wide, and 4 petals (Immel 2003). Flowers are fragrant and last about 1–2 days. The family is so-named because the flowers are partially to fully closed during the day and open in the evening (Immel 2003). This collection represents a new state record for Hawai‘i from the island of Maui.

Material examined: **MAUI**: East Maui, Kula, Crater Road, about a dozen plants of all size classes on side of road showing vigorous growth, in association with *Pyracantha* sp. (firethorn) and *Bocconia frutescens* (tree poppy), 1097 m (3600 ft), 15 Jun 2005, *Starr & Starr 050615-01*.

Poaceae

Ehrharta erecta Lam. **Range extension**

Ehrharta erecta (panic veldtgrass) was previously collected at 488 m (1600 ft) in the vicinity of Makawao, Maui by R. Hobdy in 1979. This collection was reported as a new state record by Herbst & Clayton (1998). *Ehrharta erecta* has recently been collected near the summit of Haleakalā at 3048 m (10000 ft) elevation, representing a range extension and high elevation record for this species on Maui.

Material examined: **MAUI**: East Maui, summit, Haleakalā National Park, Red Hill, by trail near parking area, scattered plants, in association with the *Argyroxiphium sandwicense* subsp. *macrocephalum* (Haleakalā silversword), 3048 m (10000 ft), 13 Aug 2004, *Starr & Starr 040813-01*.

Rosaceae

Pyracantha angustifolia (Franch.) C.K. Schneid. **New island record**

Pyracantha angustifolia (firethorn) was previously known from Kaua‘i (Wagner *et al.* 1999), and is now also known from upland East Maui, where scattered plants were found in pastures above residential Kula. This collection represents a new island record for the island of Maui.

Material examined: **MAUI**: East Maui, Kula, Keāhuaiwi Gulch, scattered plants in pasture, in association with *Pennisetum clandestinum* (kikuyu grass), *Senecio madagascariensis* (fireweed), and *Cotoneaster pannosus* (cotoneaster), 1219 m (4000 ft), 17 Aug 2005, *Starr, Starr, Chimera & Spencer 050817-01*.

Sapindaceae

Koelreuteria elegans (Seem.) A.C. Sm.

subsp. ***formosana*** (Hayata) F.G. Meyers **Range extension**

Koelreuteria elegans subsp. *formosana* (golden rain tree) was previously known from West Maui (Oppenheimer 2003), and is now also known from East Maui, where it has begun spreading from planted trees in multiple areas around the town of Makawao. This collection represents a range extension to East Maui.

Material examined: **MAUI**: East Maui, Makawao, Baldwin Ave, spreading from parent trees into nearby scrub and pineapple fields, in association with *Panicum maximum* (Guinea grass), 484 m [1590 ft), 14 Aug 2006, *Starr & Starr 060814-01*; Makawao Ave, St. Joseph Church, in scrub near parking lot, coming up under hedges and in lot across street, in association with *Podranea ricasoliana* (podranea), *Schefflera arboricola* (miniature octopus tree), and *Passiflora suberosa* (huehue haole), 487 m [1600 ft), 14 Aug 2006, *Starr & Starr 060814-03*.

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