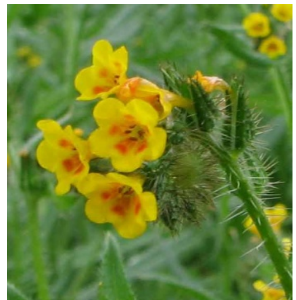
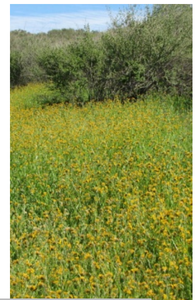
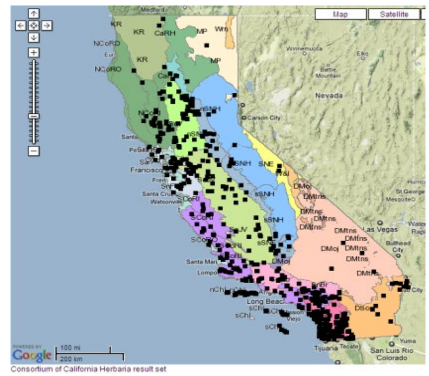
SPECIES	***Amsinckia intermedia*** **Fischer & C. A. Meyer [aka *Amsinckia menziesii* (Lehm.) A. Nelson & J.F. Macbr. var. *intermedia* (Fischer & C. Meyer) Ganders, ined.]**
NRCS CODE: AMIN3; [AMMEI2]	Family: **Boraginaceae** Order: **Lamiales** Subclass: **Asteridae** Class: **Magnoliopsida**  seedling, A. Montalvo   A. Montalvo 2009, *A. intermedia*  M. Bedalian 2009
Subspecific taxa	This profile is for a taxon that is recognized by some as *A. intermedia* Fischer & C. A. Meyer (Kelley & Ganders 2012) and by others as *A. menziesii* var. *intermedia* (USDA PLANTS). There are no subspecific taxa noted for *A. intermedia* in the current Jepson eFlora (2020).
Synonyms	Synonyms listed by Kelly & Ganders (2012): *A. intermedia* var. *echinata* (A. Gray) Wiggins, *A. menziesii* var. *intermedia.* Synonums listed in USDA PLANTS (2020) for *A. m.* var. *intermedia: A. arizonica* Suksd., *A. demissa* Suksd., *A. echinata* A. Gray*, A. intactilis* J.F. Macbr., *A. intermedia* Fisch & C.A. Mey. var. *echinata* (A. Gray) Wiggins, *A. microphylla* Suksd., *A. nana* Suksd., *A. rigida* Suksd. Additional synonyms listed in DiTomaso and Healy (2007): *A. attenuata* Eastw., *A. californica* Suksd., *A. campestris* Greene, *A. hanseni* Brand., A., *A. intermedia* Fisch & C.A. Mey., *A. irritans* Brand., *A. longituba* Brand., *A. obovallata* Greene, *A. valens* Macbr.
Common name	common fiddleneck; coast fiddleneck, coast buckthorn, fingerweed, fireweed fiddleneck, rancher's fireweed, tarweed, yellow burweed, yellow forget-me-not, yellow tarweed, zaccoto gordo, (DiTomaso & Healy 2007)
Taxonomic relationships	*A. menziesii* (Lehm.) Nels. & Macbr. var. *menziesii* (Menzies' fiddleneck) (DiTomaso & Healy 2007). Homostylous species such as *A. menziesii* and *A. intermedia,* which produce only one flower morph, have apparently evolved several times from heterostylous ancestors (Ray & Chisaki 1957c, Schoen et al. 1997). Based on molecular data, Shoen et al. (1997), placed *A. lunaris* as the closest heterostylous relative of *A. m.* var. *intermedia.*
Related taxa in region	*A. menziesii* (Lehm.) Nels. & Macbr. var. *menziesii* (Menzies' fiddleneck) occurs below 400 m in CA and *A. intermedia* can occur up to 1700 m (DiTomaso & Healy 2007). These two varieties sometimes occur in the same locations in California, but they can be distinguished by flower size and color. *A. m.* var. *menziesii* differs from *A. m.* var. *intermedia* in having smaller, pale yellow flowers that are 4-7 mm long and 2-3 mm wide at the top compared to more or less orange flowers, 7-11 mm long and 4-10 mm wide at the top in *A. intermedia* (Kelley & Ganders 2012). *A. m.* var. *menziesii* also lacks the reddish marks inside the corolla (see AMMEI2 description below).
Taxonomic issues	There is an editorial note on JepsonOnline (23 April 2010) that the 2nd edition may need to use the name *A. intermedia* because the name *A. menziesii* var. *intermedia* may not have been validly published. However, the new treatment (Kelly & Ganders 2012) states that the taxon may be best treated as a variety of *A. menziesii.*
Other	 This common, ruderal plant is highly variable in morphology over its extensive range. There are over 100 named and indistinguishable variants of *A. menziesii* and *A. intermedia* (Hickman 1993, Kelley & Ganders 2012). The variation among populations is likely due to its habit of selfing (self-pollination) which creates homogeneity within populations and notable difference among populations (e.g., Stebbins 1965). The species is recognized as a weed in agricultural fields in California and has federal weed status in Australia (DiTomaso & Healy 2007). It can dominate habitat restoration sites if seeds are used too freely.

GENERAL	
Map	Data provided by the participants of the Consortium of California Herbaria represent 736 records with coordinate data out of 1193 total records retrieved for AMMEI2; data accessed 3/6/10. See Berkeley Mapper: http://ucjeps.berkeley.edu/consortium 
Geographic range	Widespread native of North America from Alaska and western Canadian provenances, south to California, Arizona, and Mexico, and east to Idaho, Utah, and Arizona. Also occurs in Hawaii, Texas and some central and northeastern states (Hickman 1993, DiTomaso & Healy 2007, JepsonOnline 2010) where it may be naturalizing (Calflora 2009: http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=327).
Distribution in California; Ecological section and subsection	Widespread and common throughout CA below 1,700 m in many ecological regions (Munz & Keck 1968, Hickman 1993, DiTomaso & Healy 2007). Primarily in the Inner North Coast Ranges, Central Western CA., Southwestern CA, Sierra Nevada Foothills, and the Great Valley.
Life history, life form	Winter annual herb (Munz & Keck 1968, DiTomaso & Healy 2007)
Distinguishing traits	Erect, usually < 0.6 m tall, fast growing annual with stiff, bristly hairs on stems, leaves, and calyx. The sessile, alternate leaves are first produced in a rosette. They become entire and separated along the stem at maturity once the central stem elongates and produces the inflorescence. Inflorescences bear yellow to orange tubular flowers (often with red-orange markings on the inside of the corolla) in one-sided coiled cymes, reminiscent of the end of a fiddle, hence the common name "fiddleneck". Unlike several other species of *Amsinckia* , the flowers have five calyx lobes, radial symmetry, and are homostylous, that is, all flowers in a population have similar style lengths (Hickman 1993). Each flower produces up to four small nutlets.
Root system, rhizomes, stolons, etc.	Taproot (DiTomaso & Healy 2007).
Rooting depth	Taproot generally less than 0.5 m deep.
HABITAT	
Plant alliances, associations, groups	Common understory component of blue oak-coast live oak woodlands in northern California (Vreeland & Tietje 2004). Common in openings of many vegetation types from coast to desert, including grassland, chaparral, coastal sage scrub, creosote bush scrub, yellow pine forest (Calflora). One of the dominant herbaceous plants in coastal sage scrub and adjacent forblands, especially in years with copious early rainfall.
Habitat affinity and breadth of habitat	Abundant in open, disturbed, dry habitats, within grasslands, openings in shrublands, agricultural areas, roadsides, pastures, and vineyards (Hickman 1993, DiTomaso & Healy 2007). Cox and Allen (2008) found many more seedlings per unit area in grassland plots than in shrubland plots.
Elevation range	Below 1700m (Hickman 1993)
Soil: texture, chemicals, depth	*A. m.* var. *intermedia* tends to occur in shallower and drier soils of hillsides than *A. m.* var. *menziesii* (DiTomaso & Healy 2007). The latter variety has more of an affinity for old fields and crops. Plants can be common in soil types and textures derived from a variety of parent materials, such as granite and gabbro (A. Montalvo, pers. obs.).
Drought tolerance	Plants are drought tolerant, but are drought avoiders in that they finish their life cycle and mature seeds before summer drought. In low rainfall years and in porous soils, plants are smaller and produce fewer flowers and seeds than in high rainfall years and in finer textured soils (A. Montalvo, pers. obs.).
Precipitation	Tolerant of a wide range in precipitation; occurs in areas with less than 10 in. to more than 25 in normal rainfall.
Flooding or high water tolerance	Not likely tolerant of flooding.
Wetland indicator status for California	None.
Shade tolerance	Plants require full sun (Hickman 1993).

Other (e.g., fuels)	Brooks (1999) found that the standing dried up stems of the related weedy forb, *A. tessellata* in the Mojave Desert were intermediate in ability (rated similarly to *Hirshfeldia incana* and *Brassica tournefortii*) to carry fire between scattered shrubs and causing ignition. Weedy *Bromus madritensis* carried fire more easily than these large forbs and small annual forbs.
GROWTH AND REPRODUCTION	
Seedling emergence relevant to general ecology	Seedlings emerge from fall through early spring depending on the pattern of rainfall (DiTomaso & Healy 2007, A. Montalvo, pers. obs.).
Growth pattern (phenology)	In southern California, inflorescences begin to bolt from the rosettes in late January-March; open flowers can be found as early as late February on east-facing slopes; most flowering occurs March-April, but can extend into June at higher latitudes and elevations, or cooler otherwise more moist conditions; most fruits are mature May- June. (A. Montalvo, pers obs., Hickman 1993). Connor (1965) found that growth and flower production were controlled by changes in day length.
Vegetative propagation	None.
Regeneration after fire or other disturbance	Plants can be abundant after mechanical soil disturbance (DiTomaso & Healy 2007). They come up in dry, disturbed, open sites, including highly disturbed agricultural lands, roadsides and frequently disked empty lots in urban areas. Cox and Allen (2008) found more than twice as many seedlings in burned compared to unburned experimental plots in western Riverside Co., CA.
Pollination	The genus *Amsinckia* is visited especially by Bombyliid flies and bees in the genera *Anthophora, Osmia Bombus,* and *Synhalonia* ; butterflies also visit flowers (Moldenke 1976).
Seed dispersal	AMIN3 is used as an example of a species that has seeds without adaptations to long distance dispersal (van Rheede et al. 2007). Seeds are relatively heavy for their size and fall to the ground when detached from the plant. They may be secondarily dispersed by animals, human clothing, and agricultural equipment (DiTomaso & Healy 2007).
Breeding system, mating system	Self-compatible (Ray and Chisaki 1957a). Unlike some other *Amsinckia,* this species is homostylous rather than heterostylous. Moldenke (1976), and DiTomaso & Healy (2007) say plants self-pollinate. Johnson and Schoen (1996) found much variation in outcrossing rates among species of *Amsinckia* and sometimes among populations within species. *A. menziesii* has high variability in flower size within *var. intermedia* , which could influence visitation by bees and potentially result in variable outcrossing rates (A. Montalvo, pers. obs.).
Hybridization potential	There is no evidence of hybridization among the two varieties of *A. menziesii* (DiTomaso & Healy 2007) but they are known to hybridize with *A. lycopsoides* (Hickman 1993). Plants are highly selfing, so hybridization potential is likely low, but Emparan (1971) reported natural hybridization and hybrid swarms.
Inbreeding and outbreeding effects	Experimental hybridizations between strains with different numbers of chromosomes resulted in fertile progeny (Ray & Chiaski 1957c). Johnston and Schoen (1996) studied the effects of self-pollination and inbreeding in four heterostylous and four homostylous species of *Amsinckia* . Inbreeding depression was not significant for seedling emergence or survival to flowering, but it was significant for number of flowers produced and for the number of selfed seeds produced. Inbreeding depression was lower for the four highly selfing populations than for the five moderately selfing populations. Given that *A. menziesii* is homostylous and self pollinated, it is likely that inbreeding depression will also be low in this species.
BIOLOGICAL INTERACTIONS	
Competitiveness	Plants are highly competitive. AMIN3 is a serious agricultural weed that can cause decreases in crop yields (Meadly 1968). Plants emerge early in the cool rainy season (autumn-early spring), occupy space, and obtain a competitive advantage (Connor 1965). In restoration of coastal sage scrub, this fast growing, cool season annual can overtake and shade out the slower emerging and slower growing shrubs (A. Montalvo, pers. obs.). Gillespie and Allen (2008) found that AMIN3 had a very negative effect on seed production of the rare native annual *Erodium macrophyllum* . In direct competition, *A. grandiflora* and *A. menziesii* var. *intermedia* showed equal ability to capture resources, as measured by increase in biomass, but *A. menziesii* var. *intermedia* produced many more seeds than *A. grandiflora* (Pantone et al. 1995). In the self-fertilizing *A. menziesii* var. *intermedia* , almost all flowers produce the maximum number of seeds (four per flower), so the most important determinant of fitness is the number of inflorescences per plant. This has been shown to be influenced by competition with exotic grasses (Pantone et al. 1989).
Herbivory, seed predation, disease	Plants on north-facing slopes often develop mildew late in the rainy season (A. Montalvo, pers. obs.). The fly *Schizomyia macrofila* lays eggs in the developing flower buds and forms galls (Clarke et al. 2007). The nematode, *Anguina amsinckia* , also produces flower and leave galls on AMIN3 and has been considered as a biological control agent (Nagamine & Maggenti 1980).

Palatability, attractiveness to animals; response to grazing	Seeds and herbage toxic to livestock. Alkaloids in fruits can be toxic to horses and cows (DiTomaso & Healy 2007). Plants can cause decreases in the yield of livestock (Meadly 1968). The herbage and seeds contain hepatotoxic alkaloids, which are toxic to livestock when eaten as forage or when seeds contaminate grain (Culvenor and Smith 1966, Fuller and McClintock 1986). Cases of liver damage from eating *Amsinckia* have been reported in pigs, horses and cattle in California (Culvenor & Smith 1966). Wild burros are known to eat Amsinckia sp. throughout the year (Woodward & Ohmart 1976).
Mycorrhizal? Nitrogen fixing nodules?	Two thirds of species in Boraginaceae are probably mycorrhizal, but less than half had been examined as of 1987 (Harley & Harley 1987).
ECOLOGICAL GENETICS	
Ploidy	2n=30, 34, 38. Chromosome numbers tend to be highly variable, with diploid counts of 2n=30, 34, and 38 (Ray & Chisaki 1957c, Hickman 1993).
Plasticity	Size of plants varies with growing conditions and rainfall. Conner (1965) found a highly significant relationship between plant size and flower number for *A. m.* var. *menziesii* (= *A. hispida*).
Geographic variation (morphological/ physiological traits)	Local populations are sometimes very uniform in appearance, while in other locations distinct forms appear to be mixed without intermediates, although intermediate forms may be found in yet other populations (Ray & Chisaki 1957c).
Genetic variation and population structure	Progeny traits seen from crosses made by Ray and Chiaski (1957b), suggest that self-pollination retains particular traits within populations and that most variation is among populations.
Variation in interactions with other organisms	No information found.
Local adaptation	No information, however, plants have broad tolerances.
Translocation risks	This is a weedy, highly selfing colonizing species that appears to have broad tolerances. Consider if the species can become more aggressive with mixing of many populations or if it is more aggressive in some parts of its range. Risks to populations of the same species following translocation within ecoregions are likely low.
SEEDS	 Rancho Santa Ana Botanic Garden Seed Program images by John Macdonald: http://www.hazmac.biz/081201/081201AmsinckiaIntermedia.html
General	The 2-3 mm long and somewhat triangular nutlets (single seeded, indehiscent fruits) with obvious attachment scar are covered with tubercles (photograph in DiTomaso & Healy 2007 and link above). Seeds are toxic and can cause liver cirrhosis (McCulloch 1940).
Seed longevity	Seeds store in soil seed banks, so they are expected to have a long shelf life.
Seed dormancy	Seeds may have physiological dormancy (Baskin & Baskin 1998) based on the report of cold stratification improving seed germination in Australian study by Connor (1965).
Seed maturation	Seeds tend to mature in mid spring to early summer. The nutlets sometimes stay on the erect, dry plants into the next winter (DiTomaso & Healy 2007).
Seed collecting	Whole inflorescences can be collected into open containers or breathable bags when seeds are mature.
Seed processing	Information on another species, *Amsinckia vernicosa* var. *furcata* , suggests rubbing flower material over sieves (#12 and #25) and then using a blower (Oregon Blower unit) at speed 1.75+ (Wall & MacDonald 2009).
Seed storage	No data found. These seeds are expected hold viability under cold dry conditions.
Seed germination	In studies of *A. hispida* (a synonym of *A. mensiesii* var. *menziesii*) in Australia, Connor (1965) found optimum temperature for germination was 12-13ºC; most seeds overwintered, and germination was increased significantly by cold stratification.
Seeds/lb	230,000 seeds/lb (S&S Seeds 2010, http://www.ssseeds.com/database/db_testvv.php3?uid=28). 310,000 seeds/lb (Stover Seed Company 2010, http://www.stoverseed.com/itemsheet.cfm?ic=AMMENI).

Planting	In experiments, Pantone et al. (1995) scarified seeds with sandpaper and planted them 1 cm deep in December at a density of five seeds/m^2. Plants with mature seeds were harvested in May. Detailed data on seed yield and weight were collected and analyzed, but data were not reported.
Seed increase activities or potential	Plants are so common in disturbed locations that seed farming is not likely needed.
USES	
Revegetation and erosion control	Seeds are sometimes added to seed mixtures used for erosion control and restoration. Recommended for stabilizing soil (Hickman 1993).
Habitat restoration	Seeds are sometimes added to seed mixtures for restoration of shrubland and grassland habitats.
Horticulture or agriculture	Sometimes included in commercial wildflower seed mixes. This may be one of the sources of the species' range extensions.
Wildlife value	Food item for California quail in Eastern WA (Crispens et al. 1960) and pheasant (Einarsen 1945).
Plant material releases by NRCS and cooperators	None.
Ethnobotanical	The hairs on mature or dead plants can be very irritating. No indingeous uses were found.
Recommendations	In revegetation projects, seeds should be used at low density in seed mixtures so that plants do not outcompete other desirable plants. Due to toxicity, avoid use in areas frequented by livestock and horses.
ACKNOWLEDGMENTS	Partial funding for production of this plant profile was provided by the U.S. Department of Agriculture, Forest Service, Pacific Southwest Region Native Plant Materials Program.
CITATION	Montalvo, A. M., L. K. Goode, and J. L. Beyers. 2010. Plant Profile for *Amsinckia menziesii* var. *intermedia.* Native Plant Recommendations for Southern California Ecoregions. Riverside-Corona Resource Conservation District and U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Riverside, CA. Online: https://www.rcrcd.org/plant-profiles.
LINKS TO REVIEWED DATABASES & PLANT PROFILES (last updated March 2020)	
Fire Effects Information System (FEIS)	No matches: https://feis-crs.org/feis/
Jepson Flora, Interchange (JepsonOnline)	https://ucjeps.berkeley.edu/cgi-bin/get_cpn.pl?Amsinckia+intermedia
Jepson eFlora (JepsonOnline, 2nd. Ed.)	https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=13131
USDA PLANTS	https://plants.usda.gov/core/profile?symbol=AMMEI2
Native Plant Network Propagation Protocol Database (NPNPP)	No matches: https://npn.rngr.net/propagation/protocols
Native Seed Network	https://nativeseednetwork.org/
GRIN	https://npgsweb.ars-grin.gov/gringlobal/search.aspx
Calflora	https://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=11324
Calscape	https://www.calscape.org/Amsinckia-intermedia-(Common-Fiddleneck)?srchcr=sc5e6841d158446
Flora of North America (FNA) (online version)	No matches: http://www.efloras.org/flora_page.aspx?flora_id=1
Native American Ethnobotany (NAE)	No matches: http://naeb.brit.org/uses/search/?string=amsinckia
Rancho Santa Ana Botanic Garden Seed Program	http://www.hazmac.biz/rsabghome.html
IMAGES	Seed images by John Macdonald used with permission from Rancho Santa Ana Botanic Garden Seed Program (RSABG Seed Program), with rights reserved by RSABG. Images may not be used for commercial purposes. Images by A. Montalvo or M. Bedalian (copyright 2010) may be used freely for non-commercial purposes with author recognition.

Bibliography for *Amsinckia intermedia*

Baskin, C. C., and J. M. Baskin. 1998. Seeds: Ecology, Biogeography and Evolution of Dormancy and Germination. Academic Press, San Diego, CA.

Brooks, M. L. 1999. Alien annual grasses and fire in the Mojave desert. Madroño **46**:13-19.

Clarke, O. F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. Flora of the Santa Ana River and Environs with References to World Botany. Heyday Books, Berkeley, CA.

Connor, D. J. 1965. Seed production and seed germination of *Amsinckia hispida*. Australian Journal of Experimental Agriculture **5**:495-499.

Cox, R. D., and E. B. Allen. 2008. Composition of soil seed banks in southern California coastal sage scrub and adjacent exotic grassland. Plant Ecology **198**:37-46.

Crispens, C. G., Jr., I. O. Buss, and C. F. Yocom. 1960. Food habits of the California quail in eastern Washington. The Condor **62**:473-477.

Culvenor, C. C. J., and L. W. Smith. 1966. The alkaloids of *Amsinckia* species: *A. intermedia* Fisch. & Mey., *A. hispida* (Ruiz. & Pav.) Johnst. and *A. lycopsiodes* Lehm. Austrailian Journal of Chemistry **19**:1955-1964.

DiTomaso, J. M. 2000. Invasive weeds in rangelands: Species, impacts, and management. Weed Science **48**:255-265.

DiTomaso, J. M., and E. A. Healy. 2007. Weeds of California and Other Western States. Vol. 1. University of California, Agriculture and Natural Resources, Oakland, CA.

Einarsen, A. S. 1945. Some factors affecting ring-necked pheasant population density. The Murrelet **26**:3-9.

Emparan, P. R. 1971. Hybrid swarm analysis in *Amsinckia*: A study of a naturally occurring hybrid swarm involving *Amsinckia intermedia* F.O.M. and *A. eastwoodae* MacBride. Masters thesis. California State University, Fresno.

Fuller, T. C., and E. McClintock. 1986. Poisonous Plants of California. University of California Press, Berkeley, CA.

Gillespie, I., and E. Allen. 2008. Restoring the rare forb *Erodium macrophyllum* to exotic grassland in southern California. Endangered Species Research **5**:65-72.

Harley, J., and E. Harley. 1987. A check-list of mycorrhiza in the British flora. New Phytologist **105**:1-102.

Hickman, J. C. 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley, CA.

JepsonOnline. 2010. The Jepson Manual Higher Plants of California; Online Version with 2nd edition notes. http://ucjeps.berkeley.edu/jepman.html.

Johnston, M. O., and D. J. Schoen. 1996. Correlated evolution of self-fertilization and inbreeding depression: An experimental study of nine populations of *Amsinckia* (Boraginaceae). Evolution **50**:1478-1491.

Kelley, R. B., and F. R. Ganders. 2012. *Amsinckia intermedia*, in Jepson Flora Project (eds.) Jepson eFora. https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=13131 [Accessed 10 March 2020]

McCulloch, E. C. 1940. The experimental production of hepatic cirrhosis by the seed of *Amsinckia intermedia*. Science **91**:95.

Meadly, G. R. W. 1968. *Amsinckia* or yellow burr-weed. Agriculture of Western Australia **9**:124-129.

Moldenke, A. R. 1976. California pollination ecology and vegetation types. Phytologia **34**:305-361.

Munz, P. A. 1974. A Flora of Southern California. University of California Press, Berkeley, CA.

Munz, P. A., and D. D. Keck. 1968. A California Flora with Supplement. University of California Press, Berkeley, CA.

Nagamine, C., and A. R. Maggenti. 1980. "Blinding" of shoots and a leaf gall in *Amsinckia intermedia* induced by *Anguina amsinckia* (Steiner and Scott, 1934) (Nemata, Tylenchidae), with a note on the absence of a rachis in *A. amsinckia*. Journal of Nematology **12**:129-132.

Pantone, D. J., B. M. Pavlik, and R. B. Kelley. 1995. The reproductive attributes of an endangered plant as compared to a weedy congener. Biological Conservation **71**:305-311.

Pantone, D. J., W. A. Williams, and A. R. Maggenti. 1989. An alternative approach for evaluating the efficacy of potential biocontrol agents of weeds. 1. Inverse linear model. Weed Science **37**:771-777.

Ray, P. M., and H. F. Chisaki. 1957a. Studies on *Amsinckia*. I. A synopsis of the genus with a study of heterostyly in it. American Journal of Botany **44**:529-536.

Ray, P. M., and H. F. Chisaki. 1957b. Studies on *Amsinckia*. II. Relationships among the primitive species. American Journal of Botany **44**:537-544.

Ray, P. M., and H. F. Chisaki. 1957c. Studies on *Amsinckia*. III. Aneuploid diversification in the Muricatae. American Journal of Botany **44**:545-554.

S&S Seeds. 2010. S & S Seeds Inc. Plant database: http://www.ssseeds.com/database/index.html.

Schoen, D. J., M. O. Johnston, A.-M. L'Heureux, and J. V. Marsolais. 1997. Evolutionary history of the mating system in *Amsinckia* (Boraginaceae). Evolution **51**:1090-1099.

Stebbins, G. L. 1965. Colonizing species of the native California flora. Pages 173-195 *in* H. G. Baker and G. L. Stebbins, editors. The Genetics of Colonizing Species. Academic Press, New York, NY.

Stover Seed Company. 2010. Species List. Online database: http://www.stoverseed.com/websearch/specieslist.cfm.

van Rheede van Oudtshoorn, K., and M. W. van Rooyen. 1999. Dispersal Biology of Desert Plants. Springer-Verlag New York, LLC, New York, NY.

Vreeland, J. K., and W. D. Tietje. 2004. Vegetative structure of woodland-grassland edges in coastal central California. The Southwestern Naturalist **49**:305-310.

Wall, M., and J. Macdonald. 2009. Processing Seeds of California Native Plants for Conservation, Storage, and Restoration. Rancho Santa Ana Botanic Garden Seed Program, Claremont, CA. Available online: http://www.hazmac.biz/seedhome.html.

Woodward, S. L., and R. D. Ohmart. 1976. Habitat use and fecal analysis of feral burros (*Equus asinus*), Chemehuevi Mountains, California, 1974. Journal of Range Management **29**:482-485.