

Family: *Amaranthaceae*

Taxon: *Atriplex semibaccata*

Synonym: *Atriplex denticulata* Moq.

Atriplex flagellaris Wooton & Standl.

Atriplex neurivalvis Domin

Atriplex semibracteata Steud.

Atriplex stuckertii Gand.

Common Name: Australian saltbush

berry saltbush

creeping saltbush

diamond saltbush

half-berry saltbush

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Assessor
Data Entry Person: Assessor

Designation: H(Hawai'i)

WRA Score 13

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	y
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(Hawai'i)

WRA Score 13

Supporting Data:

101	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Is the species highly domesticated? No evidence]
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Species suited to tropical or subtropical climate(s) 2-High] " <i>Atriplex semibaccata</i> is widespread in the eastern and southern states with a separate population in Western Australia and scattered occurrences in central arid areas."
202	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Quality of climate match data 2-High]
203	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Broad climate suitability (environmental versatility)? No] "...now naturalized in dry to seasonally wet areas, 0-150 m, on all of the main islands." [Generally restricted to lower elevations and drier sites]
203	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Broad climate suitability (environmental versatility)? No] "Climate parameters Mean annual rainfall: 250-900 mm Rainfall distribution pattern: summer, uniform or winter Mean annual temperature: 10-23 °C Mean max. temperature of the hottest month: 27-36 °C Mean min. temperature of the coldest month: 0-10 °C Frosts (approx. no. per year): greater than 20 Frost intensity: light to moderate (0 to -5°C) Altitude: 0-750 metres"
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "in Hawaii said to have been introduced to Lanai about 1895 as an experimental forage plant for cattle (Pope, 1929), now naturalized in dry to seasonally wet areas, 0-150 m, on all of the main islands."
205	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Does the species have a history of repeated introductions outside its natural range? Yes] "in Hawaii said to have been introduced to Lanai about 1895 as an experimental forage plant for cattle (Pope, 1929), now naturalized in dry to seasonally wet areas, 0-150 m, on all of the main islands."
205	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Does the species have a history of repeated introductions outside its natural range? Yes] "Throughout California, except Modoc Plateau, Cascade Range, and northern and central Sierra Nevada, to 1000 m. Nevada, Arizona, New Mexico, Utah, and Texas."
301	1992. Halvorson, W.L.. Alien Plants at Channel Islands National Park. Pp 64-96 in Stone et al. (eds.). Alien Plant Invasions in Native Ecosystems of Hawai'i: Management and Research. Cooperative National Park Resources Studies Unit, Honolulu, HI	[Naturalized beyond native range? Yes] "Australian saltbush (<i>Atriplex semibaccata</i>) is a prostrate shrub, which is found in many habitats on the islands, especially disturbed areas and grasslands. In the grasslands it tends to produce a microhabitat that is favorable for grass species, causing a more lush growth around the perimeter of the shrub patch. This may be due to an amelioration of light and surface water conditions. The shrubs may be actually improving the moisture and nutrient content by bringing water and chemicals from deep in the soil profile. In any case, the species does have a dramatic affect on island grassland communities."
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "in Hawaii said to have been introduced to Lanai about 1895 as an experimental forage plant for cattle (Pope, 1929), now naturalized in dry to seasonally wet areas, 0-150 m, on all of the main islands. First collected on Molokai in 1910 (Rock s.n., BISH)."
301	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Naturalized beyond native range? Yes] "Throughout California, except Modoc Plateau, Cascade Range, and northern and central Sierra Nevada, to 1000 m. Nevada, Arizona, New Mexico, Utah, and Texas."
302	2007. Clarke, O.F.. Flora of the Santa Ana River and Environs: With References to World Botany. Heyday Books, Berkeley, CA	[Garden/amenity/disturbance weed? A disturbance adapted weed with negative environmental impacts. See 3.04] "...a common weed of roadsides and disturbed soils."
303	2013. Hook, J.. McLaren Vale Biodiversity ID Booklet for wine growers - Weeds. McLaren Vale Grape Wine and Tourism Association, McLaren Vale SA	[Agricultural/forestry/horticultural weed? No] "Generally not considered a weed. This plant can be a problem if it takes over headlands or forms large clumps in the vineyard midrow. It is very effective at smothering out grasses."
303	2013. WRA Specialist. Personal Communication.	[Agricultural/forestry/horticultural weed? No] A disturbance adapted weed with negative environmental impacts. Introduced as a source of fodder.

304	1987. Sohmer, S.H./Gustafson, R.. Plants and Flowers of Hawaii. University of Hawaii Press, Honolulu, HI	[Environmental weed? Yes] "Strand communities in Hawaii are now mere remnants of their former selves, primarily because of intensive development of the shores for tourism... Many halophytic grasses, such as <i>Cynodon dactylon</i> , and herbs, such as <i>Atriplex semibaccata</i> , are now more common than the native species."
304	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Environmental weed? Yes] "A ground-spreading plant that displaces native species. In the native range, it is a pioneer species of eroded soils. Once established, it persists and may become dominant over large areas. Stands of this plant are species poor."
304	2009. Hildner, K.K.. Guide to Native and Invasive Plants of the Storke Ranch Vernal Pool Open Space: Managing Vernal Pools in the Greater Santa Barbara Area. The Coastal Fund of UC Santa Barbara, Santa Barbara, CA	[Environmental weed? Yes] "Ecological Damage: Displaces native plants. A single plant can form a mat up to 6 feet in diameter; creates a thick ground cover."
304	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - <i>Atriplex semibaccata</i> . http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Environmental weed? Yes] "As a ground-spreading plant, Australian saltbush displaces native plants."
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? Yes. Numerous species categorized as weeds]
401	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces spines, thorns or burrs? No] "Perennial herbs from an elongate taproot; stems prostrate, 6-15 dm long, many branched, forming spreading mats. Leaves elliptic, elliptic-oblong to spatulate, occasionally narrowly ovate, 1-3.5 cm long, 0.2-0.9 cm wide, upper surface sparsely mealy pubescent to glabrate, lower surface densely mealy pubescent, margins irregularly and remotely repand-dentate, sometimes upper ones entire."
402	1992. Halvorson, W.L.. Alien Plants at Channel Islands National Park. Pp 64-96 in Stone et al. (eds.). Alien Plant Invasions in Native Ecosystems of Hawai'i: Management and Research. Cooperative National Park Resources Studies Unit, Honolulu, HI	[Allelopathic? No evidence] "Australian saltbush (<i>Atriplex semibaccata</i>) is a prostrate shrub, which is found in many habitats on the islands, especially disturbed areas and grasslands. In the grasslands it tends to produce a microhabitat that is favorable for grass species, causing a more lush growth around the perimeter of the shrub patch. This may be due to an amelioration of light and surface water conditions. The shrubs may be actually improving the moisture and nutrient content by bringing water and chemicals from deep in the soil profile. In any case, the species does have a dramatic affect on island grassland communities."
403	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Parasitic? No] "Perennial herbs from an elongate taproot; stems prostrate, 6-15 dm long, many branched, forming spreading mats." [Amaranthaceae or Chenopodiaceae]
404	1984. Sampson, A.W./Jespersion, B.S.. California Range Brushlands and Browse Plants. University of California. Division of Agricultural Sciences, Oakland, CA	[Unpalatable to grazing animals? No] "Browse rating. Good to fair for goats; fair for sheep and deer, and poor to useless for cattle and horses."
404	2007. Clarke, O.F.. Flora of the Santa Ana River and Environs: With References to World Botany. Heyday Books, Berkeley, CA	[Unpalatable to grazing animals? No] "This is a very palatable forage plant. The "half-berry" (the meaning of <i>semibaccata</i>) fruit is conspicuously red, pleasantly sweet and salty, and highly attractive to sheep."
404	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Unpalatable to grazing animals? No] "Australian saltbush was first cultivated in the early 1920s in Tulare County as a livestock forage plant for alkaline and saline areas."
405	1984. Sampson, A.W./Jespersion, B.S.. California Range Brushlands and Browse Plants. University of California. Division of Agricultural Sciences, Oakland, CA	[Toxic to animals? No evidence] "Browse rating. Good to fair for goats; fair for sheep and deer, and poor to useless for cattle and horses."
405	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Toxic to animals? No evidence] "Australian saltbush was first cultivated in the early 1920s in Tulare County as a livestock forage plant for alkaline and saline areas."
406	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Host for recognized pests and pathogens? Yes] "Australian saltbush is susceptible to the beet western yellows virus, which can affect a variety of crop plants and is transmitted by aphids."
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No evidence]

408	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Creates a fire hazard in natural ecosystems? No] "More recently it has been promoted as a fire-resistant plant tolerant of drought, salt and alkali conditions, to be used for groundcover or erosion control and as a component of reclamation vegetation for the restoration of mined sites in the southwestern states."
409	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Is a shade tolerant plant at some stage of its life cycle? No] "Shade tolerance: grows best in full sunlight"
410	2004. Nicholas, P.R./Porter, R./Sanderson, G.. Cover crops. In: P. Nicholas (ed.). Soil, Irrigation and Nutrition. Winetitles, Broadview, South Australia	[Tolerates a wide range of soil conditions? Yes] "Native plants such as saltbushes, e.g. <i>Atriplex semibaccata</i> and grasses, e.g. <i>Danthonia</i> spp. (wallaby grasses) and <i>Chloris</i> spp. (windmill grasses) are recognised as having cover cropping potential. These perennials are adapted to a wide range of soil types, are drought hardy and will add to the biodiversity of the vineyard floor."
410	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Tolerates a wide range of soil conditions? Yes] " <i>Atriplex semibaccata</i> is usually found in clay, clay loams and loam soils but also occurs on sandy loams (sometimes slightly saline), in woodland, saline flats and edges of salt lakes, and is a coloniser of disturbed areas" ... "Soil factors - Texture: clay loam, light to medium clay (35 50% clay) or loam, sandy loam, sandy clay loam"
411	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Climbing or smothering growth habit? No] "Perennial herbs from an elongate taproot; stems prostrate, 6-15 dm long, many branched, forming spreading mats."
412	2000. Zedler, J.B.. Handbook for Restoring Tidal Wetlands. CRC Press, Boca Raton, FL	[Forms dense thickets? Yes] "The only nonnative perennial species in southern California salt marshes that is tolerant of higher salinity. May form locally dense clonal mats. Very widespread."
412	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Forms dense thickets? Yes] "A ground-spreading plant that displaces native species. In the native range, it is a pioneer species of eroded soils. Once established, it persists and may become dominant over large areas. Stands of this plant are species poor." [May exclude other vegetation]
501	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Aquatic? No] "now naturalized in dry to seasonally wet areas, 0-150 m" [Seasonally wet, not fully aquatic]
502	2013. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Grass? No] Amaranthaceae or Chenopodiaceae
503	2013. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Nitrogen fixing woody plant? No] Amaranthaceae or Chenopodiaceae
504	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? Yes] "Root system: lignotuberous or forms a tuber"
601	20113. Florabank. <i>Atriplex semibaccata</i> . http://www.florabank.org.au/lucid/key/species%20navigator/media/html/Atriplex_semibaccata.htm [Accessed 19 Sep 2013]	[Evidence of substantial reproductive failure in native habitat? No] " <i>Atriplex semibaccata</i> is widespread in the eastern and southern states with a separate population in Western Australia and scattered occurrences in central arid areas."
602	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Produces viable seed? Yes] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
603	2013. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown. Other species of <i>Atriplex</i> reported to hybridize]
604	1993. Kubitzki, K./Rohwer, J.G./Bittrich, V. (eds.). The families and genera of vascular plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families. Springer-Verlag, Berlin, Heidelberg, New York	[Self-compatible or apomictic? Unknown] "Possibly various degrees of balance between anemophily and self-pollination can be found in the family."
604	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - <i>Atriplex semibaccata</i> . http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Self-compatible or apomictic? Possibly] "Other similar <i>Atriplex</i> species are self compatible and wind-pollinated, suggesting this also may be true of this plant."

605	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Requires specialist pollinators? No evidence from morphology] "Flowers unisexual (and the plants monoecious), in axillary clusters. Fruiting bracts thick and fleshy, reddish-tinged to red, connate ca. 1/2 their length, rhombic, 4-6 mm long, apex with a large triangular tooth, sometimes also with a few smaller lateral teeth."
605	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - <i>Atriplex semibaccata</i> . http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Requires specialist pollinators? No evidence] "Other similar <i>Atriplex</i> species are self compatible and wind-pollinated, suggesting this also may be true of this plant."
606	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - <i>Atriplex semibaccata</i> . http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Reproduction by vegetative fragmentation? No] "Australian saltbush reproduces by seed only."
607	2011. Farrell, C./Szota, C./Hobbs, R.J./Colmer, T.D.. Microsite and litter cover effects on soil conditions and seedling recruitment in a saline agricultural system. <i>Plant and soil</i> . 348(1-2): 397-409.	[Minimum generative time (years)? 2+] "... <i>A. semibaccata</i> is a sprawling biannual and triannual undershrub (Le Houerou 1992)."
701	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
702	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Propagules dispersed intentionally by people? No. Intentionally introduced and dispersed in the past] "in Hawaii said to have been introduced to Lanai about 1895 as an experimental forage plant for cattle (Pope, 1929), now naturalized in dry to seasonally wet areas, 0-150 m, on all of the main islands. First collected on Molokai in 1910 (Rock s.n., BISH)."
703	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules likely to disperse as a produce contaminant? No evidence] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
704	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules adapted to wind dispersal? No] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
705	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules water dispersed? Yes] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
706	1951. Schwartz, C.W./Schwartz, E.R.. <i>Food Habits of the Barred Dove in Hawaii</i> . <i>The Wilson Bulletin</i> . 63(3): 149-156.	[Propagules bird dispersed? Yes] "Table 1 Foods of the Barred Dove in Hawaii" [Includes <i>Atriplex semibaccata</i>]
706	2003. Weber, E.. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Propagules bird dispersed? Yes] "Seeds are produced in large numbers and are dispersed by birds."
706	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules bird dispersed? Yes] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds."
706	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - <i>Atriplex semibaccata</i> . http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Propagules bird dispersed? Yes] "Australian saltbush was promoted as a groundcover in arid landscapes, for erosion control, and to attract birds. Birds eat the red, berry-like fruits and may act as a means of dispersal (Sanders, pers. comm.). The plant escaped cultivation and has become a common weed. "
707	2007. DiTomaso, J.. <i>Weeds of California and Other Western States</i> , Volume 1. UCANR Publications, Oakland, CA	[Propagules dispersed by other animals (externally)? Possibly] "Reproduce by seed. Fruits persist on the parent plant, fall near it, and disperse to greater distances with water, mud, soil movement, human activities, and animals including birds." [Seeds might adhere to mud on animals]
708	2000. Richardson, D.M./Allsopp, N./D'Antonio, C.M./Milton, S.J./Rejmanek, M.. Plant invasions - the role of mutualisms. <i>Biological Reviews</i> . 75: 65-93.	[Propagules survive passage through the gut? Yes] "Seeds of Australian saltbushes (<i>Atriplex lindleyi</i> and <i>A. semibaccata</i>) germinate from dung of sheep, native antelope, ostriches and tortoises (Milton, 1992; Milton et al., 1995; S. J. Milton, unpublished data)."

708	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Propagules survive passage through the gut? Yes] "These fleshy bracts are attractive to fruit eaters, which may help disperse the seeds. Seeds have been found in the stomach contents of foxes and lizards on Santa Cruz Island (Valido and Nogales 1994, Crooks 1994)."
801	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Prolific seed production (>1000/m ²)? Potentially Yes] "Seeds are produced in large numbers and are surrounded by fleshy bracts when mature (Sanders, pers. comm. 1997)."
802	2008. Bonner, F.T./Karrfalt, R.P. (eds.). The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown] "The complex dormancy mechanisms shown by many saltbush species function both to time germination appropriately within a given year and to ensure carryover of a persistent seedbank between years (Garvin and others 1996). Seed pretreatments to circumvent these mechanisms have limited application in field plantings but may be useful in seed quality evaluation and in nursery propagation."
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown. Possibly] "Storage Conditions: Long-term storage under IPGRI preferred conditions at RBG Kew, WP. Oldest collection 2 years"
802	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown] "Degree of persistence of seeds in soil and germination conditions are unknown."
803	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Well controlled by herbicides?] "Chemical control for closely related taxa (<i>Kochia scoparia</i> , <i>Salsola tragus</i>) includes 2,4-D, dicamba, or picloram plus 2,4-D."
803	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Well controlled by herbicides?] "Chemical control of Australian saltbush has not been reported, although chemicals that control similar species, such as <i>kochia</i> (<i>Kochia scoparia</i>) and Russian thistle (<i>Salsola tragus</i>), likely will work on this saltbush. Russian thistle can be controlled with dicamba, 2,4-D, and picloram plus 2,4-D at 1 1.5 fl oz/acre + 0.75 pt/acre. Picloram is currently not registered in California. <i>Kochia</i> can also be controlled with dicamba plus MCPA amine at label strengths. 2,4-D at 1.0 pt/acre gives good <i>kochia</i> control, but good spray coverage is essential because 2,4-D does not translocate readily in <i>kochia</i> . Treatment should be to plants less than three inches tall or large spray volumes should be used to penetrate the <i>kochia</i> foliage. The esters of 2,4-D generally are more effective than the amines for both weeds. MCPA is not as effective as 2,4-D in controlling either weed. However, MCPA at 1.0 pt/acre will control small <i>kochia</i> plants. Picloram is not effective on <i>kochia</i> ; but control is good when combined with 2,4-D ester at 0.75 pt/acre (North Dakota State University Extension Service 1998). "
803	2013. DiTomaso, J.M./Kyser, G.B. et al.. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	[Well controlled by herbicides? Presumably Yes] "Rate: 3 to 4 pt product/acre (1.5 to 2 lb a.e./acre) Timing: Postemergence to seedlings or to mature plants that are growing rapidly. Remarks: Dicamba has provided between 80 and 90% control of other Atriplex species in Canada. Dicamba has also been used to control <i>Bassia scoparia</i> , which is also related to Australian saltbush." ... "Rate: 1 to 2 qt product (Roundup ProMax)/acre (1.1 to 2.25 lb a.e./acre). Larger plants may require higher rates. Timing: Postemergence to seedlings or to mature plants that are growing rapidly. Remarks: Glyphosate is a nonselective herbicide that can damage other non target species. It has been shown to give good to excellent control of other Atriplex species, but most of these are annuals. Glyphosate can also be mixed with 2,4-D ester or dicamba to increased efficacy. This combination should be applied during cooler weather to prevent volatilization of 2,4-D ester." ... "Rate: 0.5 to 1 oz product/acre (0.375 to 0.75 oz a.i./acre). Apply with surfactant. Timing: Postemergence in late spring or early summer. Remarks: Chlorsulfuron has been shown to be more effective than metsulfuron in western rangelands. There is no direct information on the effect of chlorsulfuron on Australian saltbush, but it has been shown to damage a related native, Nuttall's saltbush (<i>Atriplex nuttallii</i>). Thus, it is likely that it would also provide control of Australian saltbush."
804	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Tolerates, or benefits from, mutilation, cultivation, or fire? Possibly Yes] "Both species have a taproot with fibrous lateral roots." ... "Crown and upper root ± woody. Root system typically deep."

804	2009. Hildner, K.K.. Guide to Native and Invasive Plants of the Storke Ranch Vernal Pool Open Space: Managing Vernal Pools in the Greater Santa Barbara Area. The Coastal Fund of UC Santa Barabara, Santa Barbara, CA	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Resprouts when cut. It establishes well in areas that have been heavily grazed or disturbed."
804	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown] "Manual methods: Australian saltbush is easy to control by hand pulling because of its diminutive size. If it is pulled before it bears seeds, it can be effectively controlled, but any residual seed pool will remain to propagate the local population. Prescribed burning: The effectiveness of burning as a control method is not known."
804	2013. Hook, J.. McLaren Vale Biodiversity ID Booklet for wine growers - Weeds. McLaren Vale Grape Wine and Tourism Association, McLaren Vale SA	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Physical Control: Hand removal must be complete or the plants can spread from root sections left over in the soil. Cultivation can spread creeping salt bush so is not recommended."
805	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Effective natural enemies present locally (e.g. introduced biocontrol agents) No evidence in Hawaiian Islands]
805	2013. California Invasive Plant Council. Invasive Plants of California's Wildland - Atriplex semibaccata. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=9&surveynumber=182.php [Accessed 18 Sep 2013]	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] "Although the subject has not been researched in detail, it has been observed that the larvae from pygmy blue butterflies (<i>Brephidium exile</i>) feed on the foliage (Sanders, pers. comm.). "

Summary of Risk Traits

High Risk / Undesirable Traits

- Widely naturalized
- An environmental weed that can exclude native vegetation
- Related Atriplex species have become invasive
- Toxic to cattle and other animals
- Sap can cause dermatitis and may be poisonous if ingested
- Tolerates many soil types
- Can form dense monocultures that exclude other vegetation
- Produces abundant seeds
- Seeds dispersed by water, mud, soil movement, human activities, and animals including birds
- Can resprout from roots

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Fodder plant palatable to many animals
- Requires full sun
- Not known to spread vegetatively
- Herbicides may provide effective control