

**Species:** *Aptenia cordifolia*

**Date:** 1/3/2017

**Initiation:**

Initial assessment of *Aptenia cordifolia* was conducted in 2006 using the Status Assessment. The conclusions resulted in the recommendation of weed risk assessment with the Predictive Tool. Because of the lag time between the two assessments, we queried the herbarium records in Florida (FLAS, USF, FTG, and FSU) to confirm that this species not escaped to natural areas. As of January 2017, there are only herbarium records in St. Lucie County. Therefore, we have determined that the PT is still the appropriate tool for this species.

**Results:**

Even though there is evidence of invasiveness elsewhere (question 3.02 & 3.04), this species received a score of 0, **low probability of invasion**. Questions regarding seed dispersal resulted in the overall reduction of the cumulative score (see full report).

Assessment date 3 January 2017

<i>Aptenia cordifolia</i> ALL ZONES		Answer	Score
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	2	
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	unk	
3.04	Environmental weed	y	4
3.05	Congeneric weed	n	0
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	unk	-1
4.05	Toxic to animals	unk	0
4.06	Host for recognised pests and pathogens	?	
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	unk	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0

6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	unk	-1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	unk	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	unk	-1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	unk	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production	unk	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	unk	-1
8.03	Well controlled by herbicides	unk	1
8.04	Tolerates, or benefits from, mutilation or cultivation	unk	-1
8.05		?	
<b>Total Score</b>			<b>0</b>
<b>Implemented Pacific Second Screening</b>			<b>no</b>
<b>Risk Assessment Results</b>			<b>Low</b>

section	# questions answered	satisfy minimum?
A		10 yes
B		5 yes
C		13 yes
total		28 yes

	Reference	Source data
1.01		Cultivated, but no evidence of selection for reduced weediness
1.02		Skip to 2.01
1.03		Skip to 2.01
2.01	<p>1. Global Plant Hardiness Zones for Phytosanitary Risk Analysis. <a href="http://naldc.nal.usda.gov/download/36586/PDF">http://naldc.nal.usda.gov/download/36586/PDF</a> (Accessed: 2 October 2016) 2. US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166</a> (Accessed: 2 October 2016) 3. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 2 October 2016) 4. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 2 October 2016) 5. Dave's Garden. <a href="http://davesgarden.com/guides/pf/go/1044/">http://davesgarden.com/guides/pf/go/1044/</a> (Accessed: 2 October 2016) 6. Desert Tropicals. <a href="http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html">http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html</a> (Accessed: 4 October 2016) 7. Plant Lust. <a href="http://plantlust.com/plants/30010/aptenia-cordifolia/">http://plantlust.com/plants/30010/aptenia-cordifolia/</a> (Accessed: 4 October 2016)</p>	<p>1. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10. 2. Native: South Africa (KwaZulu-Natal, Eastern Cape), Naturalized elsewhere. 3. "Native to the eastern coastal region of the Cape Province and Kruger National Park in the Transvaal, both in South Africa" 4. USDA Zones: 10 to 11 5. USDA Zones 10 and 11 6. "USDA: 9-11" 7. "Zones 9b-12"</p>
2.02		Native range is well known.
2.03	<p>1. The University of Melbourne. Köppen-Geiger Climate Map of the World. <a href="http://people.eng.unimelb.edu.au/mpeel/koppen.html">http://people.eng.unimelb.edu.au/mpeel/koppen.html</a> (Accessed: 2 October 2016) 2. US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166</a> (Accessed: 2 October 2016) 3. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 2 October 2016) 4. Naturalized in Portugal 5. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 6. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 7. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 8. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. Native or naturalized to Köppen-Geiger Climate Zones: Csa, Csb, Cwa, Cwb, Cfa, Cfb. 2. Native: South Africa (KwaZulu-Natal, Eastern Cape), Naturalized elsewhere. 3. "Native to the eastern coastal region of the Cape Province and Kruger National Park in the Transvaal, both in South Africa" 4. Naturalized in Portugal 5. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 6. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 7. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 8. "Naturalised in south-eastern and central Queensland, in many parts of eastern New South Wales, in some parts of Victoria and South Australia, in Tasmania and in the coastal districts of south-western Western Australia. Also naturalised overseas in some parts of southern USA (i.e. California, Oregon and Florida), in southern Europe (i.e. Spain), in New Zealand and on Hawaii."</p>

2.04	<p>1. Climate Charts. World Climate Maps. <a href="http://www.climate-charts.com/World-Climate-Maps.html#rain">http://www.climate-charts.com/World-Climate-Maps.html#rain</a> (Accessed: 2 October 2016) 2. US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=101166</a> (Accessed: 2 October 2016) 3. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 2 October 2016) 4. Naturalized in Portugal 5. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 6. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 7. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 8. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. Native and naturalized in areas with rainfall within these ranges. 2. Native: South Africa (KwaZulu-Natal, Eastern Cape), Naturalized elsewhere. 3. "Native to the eastern coastal region of the Cape Province and Kruger National Park in the Transvaal, both in South Africa" 4. Naturalized in Portugal 5. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 6. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 7. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 8. "Naturalised in south-eastern and central Queensland, in many parts of eastern New South Wales, in some parts of Victoria and South Australia, in Tasmania and in the coastal districts of south-western Western Australia. Also naturalised overseas in some parts of southern USA (i.e. California, Oregon and Florida), in southern Europe (i.e. Spain), in New Zealand and on Hawaii."</p>
2.05	<p>1. Pacific Island Ecosystems at Risk. <a href="http://www.hear.org/pier/species/aptenia_cordifolia.htm">http://www.hear.org/pier/species/aptenia_cordifolia.htm</a> (Accessed: 2 October 2016) 2. Calflora. <a href="http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Aptenia+cordifolia">http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Aptenia+cordifolia</a> (Accessed: 2 October 2016) 3. California Invasive Plant Council. <a href="http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php">http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php</a> (Accessed: 2 October 2016) 4. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 5. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. Introduced to Ecuador, Micronesia, Hawaii, New Caledonia, New Zealand, and the United States. 2. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 3. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 4. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 5. "Naturalised in south-eastern and central Queensland, in many parts of eastern New South Wales, in some parts of Victoria and South Australia, in Tasmania and in the coastal districts of south-western Western Australia. Also naturalised overseas in some parts of southern USA (i.e. California, Oregon and Florida), in southern Europe (i.e. Spain), in New Zealand and on Hawaii."</p>
3.01	<p>1. Global Biodiversity Information Facility. <a href="http://www.gbif.org/species/5384309">http://www.gbif.org/species/5384309</a> (Accessed: 2 October 2016) 2. Calflora. <a href="http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Aptenia+cordifolia">http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Aptenia+cordifolia</a> (Accessed: 2 October 2016) 3. California Invasive Plant Council. <a href="http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php">http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php</a> (Accessed: 2 October 2016) 4. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 5. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. Naturalized in Portugal 2. "Aptenia cordifolia, a dicot, is a perennial herb that is not native to California; it was introduced from elsewhere and naturalized in the wild." 3. "It has naturalized also in Oregon, St. Lucie County, Florida, and along the southern coast of Europe." 4. "It has escaped gardens and naturalized in some parts of California, Oregon and Florida." 5. "Naturalised in south-eastern and central Queensland, in many parts of eastern New South Wales, in some parts of Victoria and South Australia, in Tasmania and in the coastal districts of south-western Western Australia. Also naturalised overseas in some parts of southern USA (i.e. California, Oregon and Florida), in southern Europe (i.e. Spain), in New Zealand and on Hawaii."</p>

3.02	<p>1. Missouri Botanical Garden.  <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 3. Global Compendium of Weeds.  <a href="http://www.hear.org/gcw/species/aptenia_cordifolia/">http://www.hear.org/gcw/species/aptenia_cordifolia/</a> (Accessed: 4 October 2016) 4. Plantz Africa.  <a href="http://www.plantzafrika.com/plantab/apteniacord.htm">http://www.plantzafrika.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 5. Queensland Government.  <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. "The California Invasive Plant Council has recently determined <i>Aptenia cordifolia</i> to be invasive in California and has listed it as a wildland weed red alert. In moist soils, this plant will grow rapidly to overwhelm nearby vegetation." 2. "In California, red apple is found in disturbed places and on margins of coastal wetlands, usually less than 100 feet (30 m) elevation." 3. Classified as a garden thug 4. "The plant can become weedy." 5. "Heartleaf ice plant (<i>Aptenia cordifolia</i>) is regarded as an environmental weed in Victoria, Tasmania, South Australia and Western Australia. This garden escape is mainly found as a weed of coastal sites near populated areas in the southern parts of Australia. For example, it has been reported from disturbed coastal heath vegetation in south-western Western Australia and is also known to be a serious coastal weed in South Australia. Heartleaf ice plant (<i>Aptenia cordifolia</i>) is also listed as a common invasive garden plant in the Greater Adelaide region. In Victoria, this species is also associated with saline soils and is seen as a potential threat to one or more vegetation formations. For example, it is listed as a high impact weed species in escarpment shrublands in the Dundas Tablelands bioregion. It occasionally also appears on local environmental weed lists (e.g. in Banyule City) and conservation areas (e.g. Yarra Bend Park) in this state. Heartleaf ice plant (<i>Aptenia cordifolia</i>) and several other weed species are also growing amongst populations of the threatened Bega wattle (<i>Acacia georgensis</i>) in rocky outcrop vegetation on the edge of Bournda National Park, along the southern coast of New South Wales. While these weed populations are currently low, they are seen as a potential threat as they could seriously impede the</p>
3.03		No evidence

3.04	<p>1. Missouri Botanical Garden.  <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 3. Global Compendium of Weeds.  <a href="http://www.hear.org/gcw/species/aptenia_cordifolia/">http://www.hear.org/gcw/species/aptenia_cordifolia/</a> (Accessed: 4 October 2016) 4. Queensland Government.  <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/aptenia_cordifolia.htm</a> (Accessed: 5 October 2016)</p>	<p>1. "The California Invasive Plant Council has recently determined <i>Aptenia cordifolia</i> to be invasive in California and has listed it as a wildland weed red alert. In moist soils, this plant will grow rapidly to overwhelm nearby vegetation." 2. "When watered, red apple overwhelms all neighboring vegetation, climbing over anything in its path." 3. Classified as an environmental weed and noxious weed 4. "Heartleaf ice plant (<i>Aptenia cordifolia</i>) is regarded as an environmental weed in Victoria, Tasmania, South Australia and Western Australia. This garden escape is mainly found as a weed of coastal sites near populated areas in the southern parts of Australia. For example, it has been reported from disturbed coastal heath vegetation in south-western Western Australia and is also known to be a serious coastal weed in South Australia. Heartleaf ice plant (<i>Aptenia cordifolia</i>) is also listed as a common invasive garden plant in the Greater Adelaide region. In Victoria, this species is also associated with saline soils and is seen as a potential threat to one or more vegetation formations. For example, it is listed as a high impact weed species in escarpment shrublands in the Dundas Tablelands bioregion. It occasionally also appears on local environmental weed lists (e.g. in Banyule City) and conservation areas (e.g. Yarra Bend Park) in this state. Heartleaf ice plant (<i>Aptenia cordifolia</i>) and several other weed species are also growing amongst populations of the threatened Bega wattle (<i>Acacia georgensis</i>) in rocky outcrop vegetation on the edge of Bournda National Park, along the southern coast of New South Wales. While these weed populations are currently low, they are seen as a potential threat as they could seriously impede the post-fire germination and establishment of Bega</p>
3.05	<p>1. Plantz Africa.  <a href="http://www.plantzafrica.com/plantab/apteniacord.htm">http://www.plantzafrica.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 2. Global Compendium of Weeds.  <a href="http://www.hear.org/gcw/scientificnames/scinamea.htm">http://www.hear.org/gcw/scientificnames/scinamea.htm</a> (Accessed: 4 October 2016)</p>	<p>1. "This genus is endemic to South Africa and consists of four species, <i>Aptenia geniculiflora</i>, <i>A. haeckeliana</i> and <i>A. lancifolia</i>. They all occur in the summer rainfall regions of South Africa." 2. None of these species are classified as weeds.</p>
4.01	<p>1. Missouri Botanical Garden.  <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 2. Plantz Africa.  <a href="http://www.plantzafrica.com/plantab/apteniacord.htm">http://www.plantzafrica.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 3. University of Florida Institute of Food and Agricultural Sciences EDIS. <a href="http://edis.ifas.ufl.edu/fp047">http://edis.ifas.ufl.edu/fp047</a> (Accessed: 4 October 2016)</p>	<p>No evidence of these features</p>
4.02		<p>No evidence</p>
4.03		<p>No evidence</p>
4.04		<p>No evidence</p>
4.05		<p>No evidence</p>

4.06	<p>1. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 2. University of Florida Institute of Food and Agricultural Sciences EDIS. <a href="http://edis.ifas.ufl.edu/fp047">http://edis.ifas.ufl.edu/fp047</a> (Accessed: 4 October 2016) 3. The San Diego Union Tribune. <a href="http://www.sandiegouniontribune.com/lifestyle/home-and-garden/sdut-disease-taking-toll-on-ice-plant-2016feb19-story.html">http://www.sandiegouniontribune.com/lifestyle/home-and-garden/sdut-disease-taking-toll-on-ice-plant-2016feb19-story.html</a> (Accessed: 5 October 2016) 4. Master Gardeners San Diego. <a href="http://www.mastergardenerssandiego.org/faq/item.php?ID=6">http://www.mastergardenerssandiego.org/faq/item.php?ID=6</a> (Accessed: 11 October 2016)</p>	<p>1. "No serious insect or disease problems." 2. "Pest resistance: long-term health usually not affected by pests" 3. "USDA later identified the downy mildew as <i>Peronospora mesembryanthemi</i>, a species previously reported in South Africa and New Zealand. It may have been brought here when a person traveling abroad unknowingly collected an infected plant cutting and brought it home with them. This is the first time the disease has been found in the Americas. So far, the invasive downy mildew only seems to attack red apple ice plant. "I have not seen it on anything else," Nolan said. "The downy mildew thrives on the young tissue and causes tip dieback. Then the secondary decayers move in and turn the tissue to slime." When the plants die, a casual observer may think their red apple was damaged by frost rather than a disease." 4. "Certain water-mold fungi can infect and kill the roots of ice plant. This usually occurs on poorly drained soil after a prolonged period of heavy rain or excess irrigation. The disease frequently damages the small-leafed ice plants like Disneyland and rosea (<i>Delosperma</i> and <i>Drosanthemum</i> sp.). Red apple ice plant (<i>Aptenia cordifolia</i>) and Freeway ice plant (<i>Carpobrotus edulis</i>) seem to be more resistant to soil pathogens."</p>
4.07	<p>1. The Allergy-Fighting Garden: Stop Asthma and Allergies with Smart Landscaping. <a href="https://books.google.com/books?id=lploBAAAQBAJ&amp;pg=PT117&amp;pg=PT117&amp;dq=%22Aptenia+cordifolia%22+allergy&amp;source=bl&amp;ots=FVQL0Tzq3b&amp;sig=c4nR8hoWa7714OGTzneaTBV8EnY&amp;hl=en&amp;sa=X&amp;ved=0ahUKEwiiu_bmjpojQAhVX52MKHWGMCTwQ6AEIHDAA#v=onepage&amp;q=%22Aptenia%20cordifolia%22&amp;f=false">https://books.google.com/books?id=lploBAAAQBAJ&amp;pg=PT117&amp;pg=PT117&amp;dq=%22Aptenia+cordifolia%22+allergy&amp;source=bl&amp;ots=FVQL0Tzq3b&amp;sig=c4nR8hoWa7714OGTzneaTBV8EnY&amp;hl=en&amp;sa=X&amp;ved=0ahUKEwiiu_bmjpojQAhVX52MKHWGMCTwQ6AEIHDAA#v=onepage&amp;q=%22Aptenia%20cordifolia%22&amp;f=false</a> (Accessed: 11 October 2016) 2. California Poison Control. <a href="http://www.calpoison.org/hcp/KNOW%20YOUR%20PLANTS-plant%20list%20for%20PCS%2009B.pdf">http://www.calpoison.org/hcp/KNOW%20YOUR%20PLANTS-plant%20list%20for%20PCS%2009B.pdf</a> (Accessed: 11 October 2016)</p>	<p>1. Marked as a smart plant for asthma and allergy friendly gardens. 2. Listed as a non-toxic plant to humans.</p>
4.08		No evidence
4.09	<p>1. Dave's Garden. <a href="http://davesgarden.com/guides/pf/go/1044/">http://davesgarden.com/guides/pf/go/1044/</a> (Accessed: 2 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 3. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 4. Plant Lust. <a href="http://plantlust.com/plants/30010/aptenia-cordifolia/">http://plantlust.com/plants/30010/aptenia-cordifolia/</a> (Accessed: 4 October 2016) 5. Desert Tropicals. <a href="http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html">http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html</a> (Accessed: 4 October 2016)</p>	<p>1. Light shade to full sun 2. Grows well in full sun 3. "full sun" 4. "SUN EXPOSURE: Sun" 5. "Sun Exposure: Full sun to light shade"</p>
4.10	<p>1. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 2. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 3. Plant Lust. <a href="http://plantlust.com/plants/30010/aptenia-cordifolia/">http://plantlust.com/plants/30010/aptenia-cordifolia/</a> (Accessed: 4 October 2016) 4. University of Florida Institute of Food and Agricultural Sciences EDIS. <a href="http://edis.ifas.ufl.edu/fp047">http://edis.ifas.ufl.edu/fp047</a> (Accessed: 4 October 2016)</p>	<p>1. "It can tolerate some soil salinity" 2. "performs well in dry to medium, well-drained sandy loams" 3. "SOIL NEEDS: Average, Well-Drained" 4. "Soil tolerances: acidic; slightly alkaline; sand; loam"; Insufficient evidence</p>



4.11	1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Llifile. <a href="http://www.llifile.com/Encyclopedia/SUCCULENTS/Family/Aizoaceae/28876/Aptenia_cordifolia">http://www.llifile.com/Encyclopedia/SUCCULENTS/Family/Aizoaceae/28876/Aptenia_cordifolia</a> (Accessed: 11 October 2016) 3. San Marcos Growers. <a href="http://www.smgrowers.com/products/plants/plantdisplay.asp?plant_id=3808">http://www.smgrowers.com/products/plants/plantdisplay.asp?plant_id=3808</a> (Accessed: 11 October 2016)	1. "Growth Form: Creeping succulent perennial." 2. "With ample water availability it overwhelms all neighboring vegetation, climbing over anything in its path, so it can easily spread into and dominate more natural riparian and wetland areas." 3. "Will smother weeds with a dense carpet, climb up chain link and drape over retaining walls"
4.12	1. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016)	1. "mat-forming" 2. "Will smother weeds with a dense carpet"
5.01	1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016)	1. "Native Habitat : Terrestrial (Desert / Semi-Desert)"
5.02	1. USDA Plants Database. <a href="http://plants.usda.gov/core/profile?symbol=APCO">http://plants.usda.gov/core/profile?symbol=APCO</a> (Accessed: 6 October 2016)	1. "Growth habit: Forb/herb, Subshrub"
5.03	1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016)	1. "Stem Type & Modification : Herbaceous"
5.04	1. Missouri Botanical Garden. <a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=275438&amp;isprofile=0&amp;</a> (Accessed: 4 October 2016) 2. Plantz Africa. <a href="http://www.plantzafrika.com/plantab/apteniacord.htm">http://www.plantzafrika.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 3. University of Florida Institute of Food and Agricultural Sciences EDIS. <a href="http://edis.ifas.ufl.edu/fp047">http://edis.ifas.ufl.edu/fp047</a> (Accessed: 4 October 2016)	No evidence of these special structures
6.01		No evidence
6.02	1. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 2. Plantz Africa. <a href="http://www.plantzafrika.com/plantab/apteniacord.htm">http://www.plantzafrika.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 3. Desert Tropicals. <a href="http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html">http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html</a> (Accessed: 6 October 2016)	1. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal." 2. "Sow seed in summer." 3. "Propagation: Seeds, cuttings"
6.03		No evidence
6.04		No evidence
6.05	1. Plantz Africa. <a href="http://www.plantzafrika.com/plantab/apteniacord.htm">http://www.plantzafrika.com/plantab/apteniacord.htm</a> (Accessed: 4 October 2016) 2. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 3. Plant Book. <a href="http://www.plantbook.co.za/aptenia-cordifolia/">http://www.plantbook.co.za/aptenia-cordifolia/</a> (Accessed: 6 October 2016)	1. "The shiny, bright flowers attract butterflies, bees and other insects." 2. "Pollination Method(s) : Biotic (Fauna) (Insects (Bee))" 3. "ECOLOGICAL BENEFITS: Aptenia attracts bees and other beneficial insects."
6.06	1. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016) 2. Desert Tropicals. <a href="http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html">http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html</a> (Accessed: 6 October 2016)	1. "It is known to spread vegetatively by rooting of branches." 2. "Propagation: Seeds, cuttings"
6.07		No evidence
7.01		No evidence

7.02	1. Desert Tropicals. <a href="http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html">http://www.desert-tropicals.com/Plants/Aizoaceae/Aptenia_cordifolia.html</a> (Accessed: 4 October 2016) 2. University of Florida Institute of Food and Agricultural Sciences EDIS. <a href="http://edis.ifas.ufl.edu/fp047">http://edis.ifas.ufl.edu/fp047</a> (Accessed: 5 October 2016)	1. "Aptenias have become one of the most planted ice-plant in Phoenix. They are very tough, look clean most of the time, and bloom from spring to fall. They grow in light shade, but bloom a lot less. They grow well on retaining walls and hanging baskets." 2. "More often grown in a hanging basket in well drained media, its small stature and slow growth make it suited for a ground cover in a small landscape or rock garden."
7.03		No evidence
7.04	1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016) 3. Microscopy-UK. <a href="http://www.microscopy-uk.org.uk/mag/indexmag.html?http://w">http://www.microscopy-uk.org.uk/mag/indexmag.html?http://w</a>	1. "Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)" 2. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal." 3. See photos.
7.05	1. 1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016)	1. "Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)" 2. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
7.06	1. 1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016)	1. "Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)" 2. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
7.07	1. 1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016)	1. "Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)" 2. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
7.08	1. 1. Singapore Government National Parks. <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1682</a> (Accessed: 6 October 2016) 2. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016)	1. "Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)" 2. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
8.01	1. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 5 October 2016)	1. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
8.02	1. Bossard, Carla C./Randall, John M./Hoshovsky, Marc C., eds. 2000. Invasive plants of California's wildlands. University of California Press. 360 pp. (Accessed: 4 October 2016)	1. "Seeds grow well in sandy, well drained soil and germinate at 60-65 degrees F. More information is needed on seed viability and potential for seed dispersal."
8.03	1. California Invasive Plant Council. <a href="http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=6&amp;surveynumber=182.php">http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm?usernumber=6&amp;surveynumber=182.php</a> (Accessed: 5 October 2016)	1. "How can I get rid of it? Little is known about control, but red apple should respond to the same methods as the related sea fig (Carpobrotus edulis) and New Zealand spinach (Tetragonia tetragonoides)... Chemical control: The herbicide glyphosate (as Roundup ®) has been effectively used to kill related sea fig clones at label-recommended concentrations of 2 percent or higher. The addition of 1 percent surfactant to allow penetration of the cuticle on the leaves should improve effectiveness."

8.04	1. California Invasive Plant Council. <a href="http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php">http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=6&amp;surveynumber=182.php</a> (Accessed: 2 October 2016)	1. "Physical control: Manual methods: Red apple can be easily removed by hand pulling. However, because of the ability of this plant to grow roots and shoots from any node, all live shoot segments must be removed from contact with the soil to prevent resprouting. If complete removal is not possible, mulching with the removed plant material is adequate to prevent most resprouting, but requires at least one follow-up treatment to remove resprouts."
8.05		No evidence