UF IFAS UNIVERSITY of FLORIDA

Assessment of Non-native Plants in Florida's Natural Areas

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Assessment date 2 August 2015

	***Vinca minor* North**	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)	1	
2.03	Broad climate suitability (environmental versatility)	y	1
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	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
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	y	1
4.05	Toxic to animals	?	
4.06	Host for recognised pests and pathogens	n	0
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	y	1
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	y	1
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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	?	

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	n	-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	n	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	?	
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	n	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	unk	-1
8.05		?	
	Total Score	**10**	
	Implemented Pacific Second Screening	**no**	
	Risk Assessment Results	**High**	

section	**# questions answered**	**satisfy minimum?**
A	11	yes
B	9	yes
C	15	yes
total	35	yes

UF IFAS UNIVERSITY of FLORIDA

Assessment of Non-native Plants in Florida's Natural Areas

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Assessment date 2 August 2015

	***Vinca minor* Central South**	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	0	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
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	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
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	y	1
4.05	Toxic to animals	?	
4.06	Host for recognised pests and pathogens	n	0
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	y	1
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	y	1
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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	?	

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	n	-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	n	-1
7.05	Propagules water dispersed	unk	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	?	
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	n	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	unk	-1
8.05		?	
	Total Score	**1**	
	Implemented Pacific Second Screening	**Yes**	
	Risk Assessment Results	**High/SS**	

section	**# questions answered**	**satisfy minimum?**
A	11	yes
B	9	yes
C	15	yes
total	35	yes

	Reference	Source data
1.01		Cultivated but no evidence of selection for reduced weediness
1.02		Skip to question 2.01
1.03		Skip to question 2.01
2.01	1. PERAL NAPPFAST Global Plant Hardiness. http://www.nappfast.org/Plant_hardiness/2012/PHZ%20update201230%20yr%20%20300dpi.tif (Accessed: 14 July 2015). 2. Missouri Botanical Garden. Plant Finder [Online Database]. St. Louis, Missouri. http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=276078&isprofile=1&basic=vinca (Accessed: 14 July 2015). 3. Dave's Garden. http://davesgarden.com/guides/pf/go/174/#b (Accessed: 14 July 2015) 4. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015)	No computer analysis was performed. 1. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10. 2&3. Present in Global Hardiness Zones 4 to 8. 4. Native to Turkey, Austria, Belgium, Czech Republic, Germany, Hungary, Netherlands, Poland, Slovakia, Switzerland, Latvia, Lithuania, Moldova, Russian Federation (Kaliningrad), Ukraine (Krym), Bulgaria, Croatia, Greece, Italy, Romania, Serbia, Slovenia, France, Portugal, Spain. Naturalized in China (Jiangsu), New Zealand, Ireland, Norway, Sweden, United Kingdom, Estonia, Bulgaria, Canada (New Brunswick, Nova Scotia, Ontario, Quebec, British Columbia), USA (Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois, Iowa, Kansas, Missouri, Nebraska, Wisconsin, Florida, Georgia, Maryland, North Carolina, Tennessee, Virginia, Texas)
2.02		No computer analysis was performed. Native range is well known. Hardiness zone 8 only accounts for part of the North Zone. Refer to 2.01 source data.
2.03	1. The University of Melbourne. Köppen-Geiger Climate Map of the World. http://people.eng.unimelb.edu.au/mpeel/koppen.html (Accessed: 14 July 2015) 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015)	1. Present in the following Köppen-Geiger Climate zones: Bsh, Bsk, Csa, Csb, Cwa, Cfa, Cfb, Dfa, Dfb, and Dfc. 2. Native to Turkey, Austria, Belgium, Czech Republic, Germany, Hungary, Netherlands, Poland, Slovakia, Switzerland, Latvia, Lithuania, Moldova, Russian Federation (Kaliningrad), Ukraine (Krym), Bulgaria, Croatia, Greece, Italy, Romania, Serbia, Slovenia, France, Portugal, Spain. Naturalized in China (Jiangsu), New Zealand, Ireland, Norway, Sweden, United Kingdom, Estonia, Bulgaria, Canada (New Brunswick, Nova Scotia, Ontario, Quebec, British Columbia), USA (Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois, Iowa, Kansas, Missouri, Nebraska, Wisconsin, Florida, Georgia, Maryland, North Carolina, Tennessee, Virginia, Texas)
2.04	1. Climate Charts. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html#rain (Accessed: 14 July 2015)	1. Native to areas with rainfall in this range.

2.05	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/174/#b (Accessed: 14 July 2015) 3. Plant Index. http://www.vincaminor.org (Accessed: 14 July 2015)	1. Naturalized in China (Jiangsu), New Zealand, Ireland, Norway, Sweden, United Kingdom, Estonia, Bulgaria, Canada (New Brunswick, Nova Scotia, Ontario, Quebec, British Columbia), USA (Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois, Iowa, Kansas, Missouri, Nebraska, Wisconsin, Florida, Georgia, Maryland, North Carolina, Tennessee, Virginia, Texas) 2. Reported to grow in Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin. 3. Sold online in the United States by Boyd Nursery Company.
3.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/174/#b (Accessed: 14 July 2015)	1. Naturalized in China (Jiangsu), New Zealand, Ireland, Norway, Sweden, United Kingdom, Estonia, Bulgaria, Canada (New Brunswick, Nova Scotia, Ontario, Quebec, British Columbia), USA (Connecticut, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Illinois, Iowa, Kansas, Missouri, Nebraska, Wisconsin, Florida, Georgia, Maryland, North Carolina, Tennessee, Virginia, Texas) 2. Reported to grow in Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin (The USA is not within the native range according to USDA GRIN)
3.02	1. A Geographical Atlas of World Weeds. Kreiger Publishing Company. (Holm, Pancho, Herberger, Plucknett, 1991) (Accessed: 14 July 2015) 2. Global Compendium of Weeds. http://www.hear.org/gcw/species/vinca_minor/ (Accessed: 14 July 2015)	1. Listed as present as a weed in Turkey and the USA. 2. Listed as an agricultural weed, casual alien, cultivation escape, environmental weed, garden thug, naturallised, and weed.
3.03	1. Global Compendium of Weeds. http://www.hear.org/gcw/species/vinca_minor/ (Accessed: 14 July 2015) 2. UC Berkeley. http://nature.berkeley.edu/xylella/control/hosts.htm (Accessed: 15 July 2015)	1. Listed as an agricultural weed. 2. Significant host of Pierce's Disease which affects California's vineyards.

3.04	1. Global Compendium of Weeds. http://www.hear.org/gcw/species/vinca_minor/ (Accessed: 14 July 2015) 2. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015)	1. Listed as an environmental weed. 2. "Common periwinkle may replace native species ([28,32], review by [25]). In mixed-hardwood dune successional forests in Michigan, sites with common periwinkle had significantly fewer native tree seedlings than paired sites without common periwinkle (P=0.0045). However, dense mats of common periwinkle formed at only one site despite its establishment in several locations [17]. In field tests where common periwinkle cover was removed, there was increased survival of native tree seedlings. Laboratory tests suggested that common periwinkle allelopathy limited native woody tree seedling growth but not seed germination. However, light competition from common periwinkle was thought to be more important than allelopathy in suppressing native woody tree seedlings [28]. In Michigan, the presence of common periwinkle was associated with reduced abundance of native spiders, as well as changes in spider guilds [17]."
3.05	1. A Geographical Atlas of World Weeds. Kreiger Publishing Company. (Holm, Pancho, Herberger, Plucknett, 1991) (Accessed: 14 July 2015)	1. Vinca herbacea is listed as present as a weed in Turkey. Vinca major is listed as present as a weed in Chile, New Zealand, and the USA. Vinca rosea is listed as present as a weed in Brazil and Jamaica.
4.01	1. Invasive Plant Species Assessment Working Group. http://www.in.gov/dnr/files/Periwinkle.pdf (Accessed: 14 July 2015) 2. The Ohio State University. http://hvp.osu.edu/pocketgardener/source/description/vi_minor.html (Accessed: 14 July 2015)	1&2. These features are not in the description of the species.
4.02	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 15 July 2015) 2. Bios. http://www.jstor.org/stable/4608646?seq=5#page_scan_tab_contents (Accessed: 15 July 2015)	1. "Laboratory tests suggested that common periwinkle allelopathy limited native woody tree seedling growth but not seed germination. However, light competition from common periwinkle was thought to be more important than allelopathy in suppressing native woody tree seedlings [28]." 2. Testing conducted in a laboratory setting using leaf extract.
4.03		No evidence
4.04	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. Invasive Plants: Guide to Identification and the Impacts and Control of Common North American Species. https://books.google.com/books?id=oKVDUWHVf-UC&pg=PA197&lpg=PA197&dq=%22Vinca+minor%22+enemy&source=bl&ots=MuaK8PCeK4&sig=YiDhhS8slFd_SWj8eAszRnWX9UI&hl=en&sa=X&ved=0CF0Q6AEwDWoVChMIyc7-hsPbxglVxKYeCh3ZXA_Q#v=onepage&q=%22Vinca%20minor%22%20enemy&f=false (Accessed: 14 July 2015)	1. "IMPORTANCE TO WILDLIFE AND LIVESTOCK: Palatability and/or nutritional value: Periwinkles are generally unpalatable and have little nutritional value... Common periwinkle was an infrequent food item of the volcano rabbit in Mexico [20] and white-tailed deer in Indiana [91]. Caged Canada geese would not feed on common periwinkle, even when it was the only forage available [23]." 2. "Leaves are toxic to most or all grazers"

4.05	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. Invasive Plants: Giode to Identification and the Impacts and Control of Common North American Species. https://books.google.com/books?id=oKVDUWHVf-UC&pg=PA197&lpg=PA197&dq=%22Vinca+minor%22+enemy&source=bl&ots=MuaK8PCeK4&sig=YiDhhS8slFd_SWj8eAszRnWX9UI&hl=en&sa=X&ved=0CF0Q6AEwDWoVChMIyc7-hsPbxgIVxKYeCh3ZXA_Q#v=onepage&q=%22Vinca%20minor%22%20enemy&f=false (Accessed: 14 July 2015)	1. "IMPORTANCE TO WILDLIFE AND LIVESTOCK: Palatability and/or nutritional value: Periwinkles are generally unpalatable and have little nutritional value... Common periwinkle was an infrequent food item of the volcano rabbit in Mexico [20] and white-tailed deer in Indiana [91]. Caged Canada geese would not feed on common periwinkle, even when it was the only forage available [23]." 2. "Leaves are toxic to most or all grazers"
4.06	1. Integrated Pest Management. http://ipm.illinois.edu/diseases/series600/rpd640/ 2. UC Berkeley. http://nature.berkeley.edu/xylella/control/hosts.htm (Accessed: 15 July 2015)(Accessed: 15 July 2015)	1. "Stem blight is a serious disease of Vinca minor, commonly known as periwinkle or ground myrtle. The disease is widespread and potentially destructive wherever this popular ground cover is grown in the United States and Europe." However, this disease also affects the rest of the periwinkle plants. 2. One of many hosts of Pierce's Disease.--- No evidence that Vinca minor is a significant primary of alternate host.
4.07	1. Dayton Nurseries. http://www.daytonnursery.com/encyclopedia/Perennials/Vinca.htm (Accessed: 15 July 2015)	1. "This plant is considered mostly allergy free and causes little or no allergy problems in most people."
4.08	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015)	1. "Fuels: As of this writing (2009), there was no information available regarding the flammability of periwinkles. Some evidence suggests that periwinkles may alter local fuel characteristics by changing community structure, litter dynamics, fuel arrangement, and understory temperatures. In Michigan, understory structure in a mixed-hardwood dune successional forest was changed when mats of common periwinkle replaced canopy tree seedlings and herbaceous understory plants [17]. Common periwinkle also greatly reduced the overall accumulation of leaf litter in this area (Bultman personal observation cited in [17]). In mature oak-hickory forest in southwestern Illinois, common periwinkle in the understory led to an increase in the amount of vegetated surface area [88]... The impact of these altered fuel characteristics likely varies based on departure from historical conditions and the dynamics of local fire regimes."
4.09	1. The Ohio State University. http://hvp.osu.edu/pocketgardener/source/description/vi_minor.html (Accessed: 14 July 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/174/#b (Accessed: 14 July 2015) 3. Invasive Plant Species Assessment Working Group. http://www.in.gov/dnr/files/Periwinkle.pdf (Accessed: 14 July 2015)	1. "Culture: partial sun to full shade" 2. "Sun Exposure: Full Sun, Sun to Partial Shade, Light Shade, Partial to Full Shade" 3. "It grows most vigorously in moist soil with only partial sun, but it can grow in the deepest shade and even in poor soil."
4.10	1. Plant Index. http://www.vincaminor.org (Accessed: 14 July 2015) 2. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 3. SFGate. http://homeguides.sfgate.com/vinca-minor-grow-shade-65830.html (Accessed: 16 July 2015) 4. Royal Horticultural Society. https://www.rhs.org.uk/Plants/96889/Vinca-minor-Atropurpurea/Details (Accessed: 16 July 2015)	1. "Soil Preference: Will grow in moist, well-drained, loamy, sandy or clay soils. Vinca minor is not picky." 2. "common periwinkle tolerates soils of low fertility [68]. In the oak-beech forest region of France, common periwinkle occurred on shallow soils ranging from 5.7 to 8.7 inches (14.4-22.1 cm) deep [35]" "Soils: Periwinkles are found on soils with a range of characteristics." 3. "Periwinkle tolerates drought, poor soil, rocky soil and even deer." 4. Soil: Moisture (Well-drained, Moist but well-drained, Poorly-drained), Soil (Chalk, Clay, Sand, Loam), pH (Acid, Alkaline, Neutral)

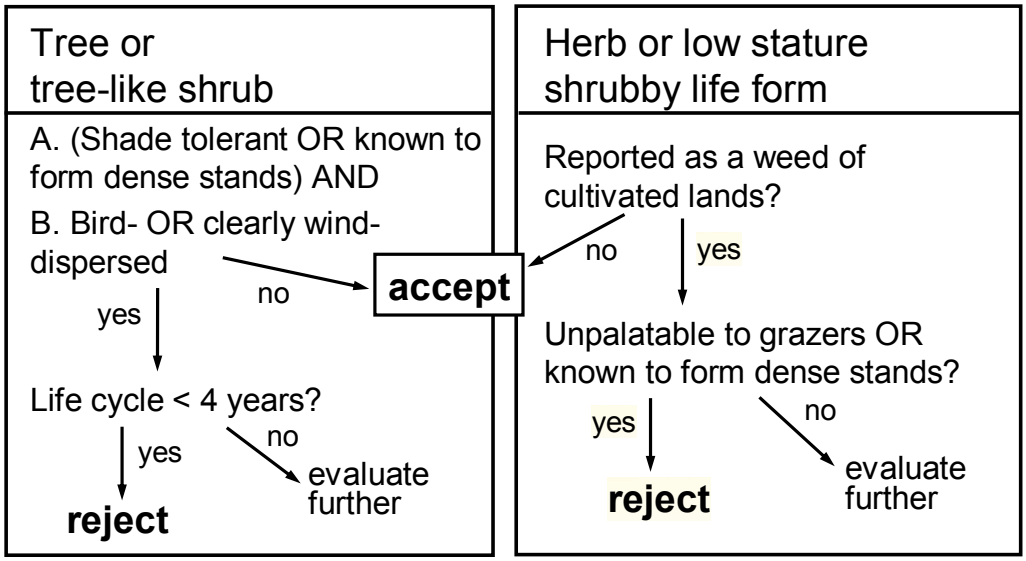
4.11	1. University of Michigan. http://climbers.lsa.umich.edu/?p=170 (Accessed: 14 July 2015) 2. University of Michigan. http://climbers.lsa.umich.edu/wp-content/uploads/2013/07/VincminoAPOCFINAL.pdf (Accessed: 15 July 2015)	1. "Climbing Mechanism: Two sources mention Vinca twining (3, 12), but not in detail. Gardeners suggest that it only weakly climbs with apical shoots, if at all." 2. "It chokes natural vegetation by matting densely"
4.12	1. A New London Flora. https://books.google.com/books?id=9VwDAAAAQAAJ&pg=PA140&lpg=PA140&dq=%22Vinca+minor%22+thicket&source=bl&ots=E6CJxczTcg&sig=qC4mE7PqAjOi0oq4nd-Oyytzk44&hl=en&sa=X&ved=0CCMQ6AEwAWoVChMIn5SstIrexgIVwnYeCh2V4w3L#v=onepage&q=%22Vinca%20minor%22%20thicket&f=false (Accessed: 15 July 2015) 2. University of Michigan. http://climbers.lsa.umich.edu/wp-content/uploads/2013/07/VincminoAPOCFINAL.pdf (Accessed: 15 July 2015)	1. "Vinca minor (thicket)" 2. "It chokes natural vegetation by matting densely"
5.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015)	1. "Family: Apocynaceae"
5.02	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015)	1. "Family: Apocynaceae"
5.03	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?41680 (Accessed: 14 July 2015)	1. "Family: Apocynaceae"
5.04		No evidence of specialized organs
6.01		No evidence of substantial reproductive failure
6.02	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. National Parks Service. http://www.nps.gov/plants/alien/pubs/midatlantic/vimi.htm (Accessed: 14 July 2015) 3. Invasive.org. http://www.invasive.org/browse/subinfo.cfm?sub=3081 (Accessed: 14 July 2015)	1. "Common periwinkle rarely produces seeds [45,113]." "Seedling establishment and plant growth: Documentation of periwinkle establishment by seed is rare... Documentation of common periwinkle seedlings was not found in the literature as of 2009." 2. "no fruits or seeds typically" 3. "No fruits or seeds typically. Spreads vegetatively through rhizomes."
6.03		Evidence of somatic hybridization, but no evidence of natural hybridization.
6.04	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. learn2grow. http://www.learn2grow.com/plants/vinca-minor-alba-variegata/ (Accessed: 15 July 2015)	1. "Pollination and breeding system: Periwinkles are cross-pollinating plants [38]." 2. "Self-Sowing: No"
6.05	1. Plants for a Future. http://www.pfaf.org/user/plant.aspx?latinname=Vinca+minor (Accessed: 15 July 2015) 2. University of Michigan. http://climbers.lsa.umich.edu/wp-content/uploads/2013/07/VincminoAPOCFINAL.pdf (Accessed: 15 July 2015)	1&2. pollinated by bees

6.06	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 15 July 2015) 2. Invasive.org. http://www.invasive.org/browse/subinfo.cfm?sub=3081 (Accessed: 15 July 2015)	1. "Most periwinkle reproduction occurs through vegetative spread." 2. "No fruits or seeds typically. Spreads vegetatively through rhizomes."
6.07		No evidence
7.01	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015)	1. "Common periwinkle is found along roadsides [3,18,42,47,48,78,94,97,100,115] or trail edges [47], at homesites ([12,35,50,74,84,85,94,103], review by [72]), in gardens [55] or yards [94], cemeteries [57,97], "waste" places [3,55,78,115], and in other disturbed sites [8,55,101,117]." --- However, it is unlikely that seeds spread in this manor lead to an increase of the presence of Vinca minor because the plat rarely sets seed and primarily reproduces through vegetative spread of an established plant.
7.02	1. Plant Index. http://www.vincaminor.org (Accessed: 14 July 2015) 2. Invasive.org. http://www.invasive.org/browse/subinfo.cfm?sub=3081 (Accessed: 14 July 2015)	1. Sold online in the United States by Boyd Nursery Company. 2. "It is still commonly sold as an ornamental ground cover."
7.03		No positive evidence.
7.04	1. USDA Natural Resources Conservation Service. http://plants.usda.gov/core/profile?symbol=VIMI2 (Accessed: 15 July 2015)	1. See photo. No features present that suggest adaptation to wind dispersal.
7.05		No information, but unlikely considering seeds are produced infrequently.
7.06	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015)	1. "Caged Canada geese would not feed on common periwinkle, even when it was the only forage available [23]."
7.07	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. Invaisve Plants: Guide to Identification and the Impacts and Control of Common North American Species. https://books.google.com/books?id=oKVDUWHVf-UC&pg=PA197&lpg=PA197&dq=%22Vinca+minor%22+enemy&source=bl&ots=MuaK8PCeK4&sig=YiDhhS8slFd_SWj8eAszRnWX9UI&hl=en&sa=X&ved=0CF0Q6AEwDWoVChMIyc7-hsPbxgIVxKYeCh3ZXA_Q#v=onepage&q=%22Vinca%20minor%22%20enemy&f=false (Accessed: 14 July 2015)	1. "Common periwinkle seeds are dispersed by ants in its native range [54,56]. Some authors suggest that common periwinkle has no active dispersal mechanism [44]" 2. "seeds are too small for birds"
7.08		No evidence. There is conflicting information about whether or not animals eat Vinca minor at all.
8.01	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. National Parks Service. http://www.nps.gov/plants/alien/pubs/midatlantic/vimi.htm (Accessed: 14 July 2015) 3. Invasive.org. http://www.invasive.org/browse/subinfo.cfm?sub=3081 (Accessed: 14 July 2015)	1. "Common periwinkle rarely produces seeds [45,113]." "Seedling establishment and plant growth: Documentation of periwinkle establishment by seed is rare... Documentation of common periwinkle seedlings was not found in the literature as of 2009." 2. "no fruits or seeds typically" 3. "No fruits or seeds typically. Spreads vegetatively through rhizomes."

8.02	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. National Parks Service. http://www.nps.gov/plants/alien/pubs/midatlantic/vimi.htm (Accessed: 14 July 2015) 3. Invasive.org. http://www.invasive.org/browse/subinfo.cfm?sub=3081 (Accessed: 14 July 2015)	1. "Common periwinkle rarely produces seeds [45,113]." "Seedling establishment and plant growth: Documentation of periwinkle establishment by seed is rare... Documentation of common periwinkle seedlings was not found in the literature as of 2009." 2. "no fruits or seeds typically" 3. "No fruits or seeds typically. Spreads vegetatively through rhizomes."
8.03	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015) 2. Invaisve Plants: Giode to Identification and the Impacts and Control of Common North American Species. https://books.google.com/books?id=oKVDUWHVf-UC&pg=PA197&lpg=PA197&dq=%22Vinca+minor%22+enemy&source=bl&ots=MuaK8PCeK4&sig=YiDhhS8slFd_SWj8eAszRnWX9UI&hl=en&sa=X&ved=0CF0Q6AEwDWoVChMIyc7-hsPbxgIVxKYeCh3ZXA_Q#v=onepage&q=%22Vinca%20minor%22%20enemy&f=false (Accessed: 14 July 2015)	1. "Chemical control: Herbicides are effective in gaining initial control of a new invasion or a severe infestation, but they are rarely a complete or long-term solution to weed management [19]. See the Weed control methods handbook [102] for considerations on the use of herbicides in natural areas and detailed information on specific chemicals. Both bigleaf ([39,114], review by [7]) and common [98] periwinkle are damaged by some herbicides... Spot treatment with herbicides may be effective on isolated periwinkle plants (review by [81])."
8.04	1. USDA Forest Service. http://www.fs.fed.us/database/feis/plants/vine/vinspp/all.html (Accessed: 14 July 2015)	1. "Fire adaptations: As of this writing (2009), there was no published information pertaining to periwinkle adaptations to fire. Poor seed reproduction (see Regeneration Processes) and vulnerability of stolons to fire and suggest that periwinkles are not well-adapted fire." 2. "Herbicides with glyphosate are the most effective control. Tricopyr also works but not as effectively." --- direct evidence is lacking
8.05	1. Integrated Pest Management. http://ipm.illinois.edu/diseases/series600/rpd640/ (Accessed: 15 July 2015)	1. "Stem blight is a serious disease of Vinca minor, commonly known as periwinkle or ground myrtle. The disease is widespread and potentially destructive wherever this popular ground cover is grown in the United States and Europe." --- Insufficient evidence.

Pacific second screening: decision rules for species with WRA scores between 1 and 6

(from Daehler *et al*. 2004)



Vines must pass both tests