

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Halogeton glomeratus
Synonyms:	Anabasis glomeratus
Common names:	Halogeton
Evaluation date (mm/dd/yy):	02/26/04
Evaluator #1 Name/Title:	Rob Wilson, Farm Advisor
Affiliation:	UCCE
Phone numbers:	530-251-8132
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Evaluator #2 Name/Title:	enter text here
Affiliation:	enter text here
Phone numbers:	enter text here
Email address:	enter text here
Address:	enter text here

Section below for list committee use—please leave blank

List committee members:	Carla Bossard, Cynthia Roye, Alison Stanton, Joe DiTomaso, Peter Warner
Committee review date:	May 14, 2004
List date:	enter text here
Re-evaluation date(s):	enter text here

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	B	Rev'd, Sci. Pub'n
1.2	Impact on plant community	B	Rev'd, Sci. Pub'n
1.3	Impact on higher trophic levels	B	Other Pub. Mat'l
1.4	Impact on genetic integrity	D	No Information

“Impact”
 Enter four characters from Q1.1-1.4 below:
BBBD
 Use matrix determine the score; enter below:
B

2.1	Role of anthropogenic and natural disturbance	B 2	Rev'd, Sci. Pub'n
2.2	Local rate of spread with no management	A 3	Rev'd, Sci. Pub'n
2.3	Recent trend in total area infested within state	B 2	Other Pub. Mat'l
2.4	Innate reproductive potential	A 3	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	A 3	Other Pub. Mat'l
2.6	Potential for natural long-distance dispersal	A 3	Other Pub. Mat'l
2.7	Other regions invaded	C 1	Other Pub. Mat'l

“Invasiveness”
 For questions at left, recall that an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Enter the sum total of all points for Q2.1-2.7 below:
17
 Use matrix to determine score and enter below:
A

“Plant Score”
 Using matrix, determine the Overall Score and Alert Status from the three section scores and enter them below:
Medium
No Alert

3.1	Ecological amplitude	B	Observational
3.2	Distribution	B	Observational

“Distribution”
 Use matrix determine the score; enter below:
B

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>
<p>Identify ecosystem processes impacted: Halogeton populations increase salinity levels at the soil surface (act as a salt pump). One study found increased nutrient levels (NO₃, P, K, Na) and soil bacteria diversity in an area heavily infested with halogeton for 20+ years compared to adjacent native winterfat communities.</p>
<p>Rationale: Halogeton concentrates salts into plant tissue and then deposit the salts on the soil surface as plant material decays. Leachates from halogeton mulch alter chemical and physical properties of soil and can inhibit the germination of other plant species.</p>
<p>Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis. Roundy, Bruce A. 1987. Seedbed salinity and the establishment of range plants. In: Frasier, Gary W.; Evans, Raymond A., eds. Proceedings of symposium: "Seed and seedbed ecology of rangeland plants"; 1987 April 21-23; Tucson, AZ. Washington, DC: U.S. Department of Agriculture, Agricultural Research Service: 68-81. [4062]</p> <p>Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.</p> <p>Duda, Jeffery J. et al. 2003. Differences in native soil ecology associated with invasion of the exotic annual chenopod, Halogeton glomeratus. <i>Biology & Fertility of Soils</i>. 38(2). July: 72-77</p>
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>
<p>Identify type of impact or alteration: Halogeton is well adapted to saline-alkaline soils in salt-desert shrubland and surrounding big sagebrush steppe. After disturbance, halogeton can become a dominant species in areas void of competing vegetation. Halogeton is problematic following disturbance from overgrazing, construction, agriculture, or fire. Halogeton usually does not become dominant in undisturbed saline-alkaline soils with vigorous competing vegetation.</p>
<p>Rationale: Halogeton can tolerate high saline-sodic soil conditions unlike most summer annual forbs. This adaptability allows halogeton to grow in areas few other plants can tolerate. Halogeton interacts with the regeneration ecology of valuable native perennial half-shrubs found in the Intermountain Region. Halogeton is not competitive with most established perennials (saltgrass, big sagebrush, greasewood, etc.) and aggressive winter annuals (cheatgrass, medusahead, etc.) since it does not produce a large shoot or root system early in the growing season to capitalize on available spring soil moisture (especially in low summer precipitation climates).</p>
<p>Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis. [Online] Halogeton, Encyloweedia description. Available: http://pi.cdffa.ca.gov/weedinfo/HALOGETO2.html Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.</p>
<p>Question 1.3 Impact on higher trophic levels</p>
<p>Identify type of impact or alteration: Since the early 1950's, reports have confirmed halogeton can poison sheep and cattle, but little information is available on halogeton's potential to poison brose animals such as deer</p>

and antelope. Since halogeton has poor palatability and produces toxic oxalates, it's pretty safe to assume large, dense, halogeton infestations reduce forage availability for browse animals.
Rationale: .Halogeton leaves and stems contain soluble oxalates at toxic levels.
Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553. [Online] Dewey, Steve. Halogeton glomeratus. Cal IPC red alert fact sheet. Available: http://ucce.ucdavis.edu/datastore/detailreport.cfm?usernumber=53&surveynumber=182
Question 1.4 Impact on genetic integrity
Identify impacts: Unlikely. I don't believe there are any native CA species in the Halogeton or Salsola genus.
Rationale: enter text here
Sources of information: enter text here
Question 2.1 Role of anthropogenic and natural disturbance in establishment
Describe role of disturbance: Halogeton primarily establishes in disturbed areas following overgrazing and mechanical soil disturbance. Halogeton can establish following natural disturbances such a fire.
Rationale: Since halogeton is well adapted to saline-sodic soils, it is often on the first ruderal species to establish on these sites following disturbance. Halogeton can also establish on saline-sodic soils that lack vegetation cover due to high soluble salt or sodium accumulation at the soil surface.
Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis . [Online] Halogeton, Encyloweedia description. Available: http://pi.cdfa.ca.gov/weedinfo/HALOGETO2.html
Question 2.2 Local rate of spread with no management
Describe rate of spread: In salt desert shrubland, halogeton can spread extremely fast. From a BLM survey conducted in 1957, Halogeton spread over 30,000 acres in CA, 4 million acres in Nevada, and 1 million acres in UT from 1954 to 1957.
Rationale: Halogeton grows well on disturbed sites in salt desert shrubland and spreads over long distances by wind and human transport. Since the majority of salt desert shrubland has been greatly disturbed by repeated grazing in the early 1900's, halogeton has a large opportunity for establishment.
Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.

Question 2.3 Recent trend in total area infested within state
Describe trend: Halogeton has likely spread to most of its potential CA ecotypes. One problem with estimating halogeton population trends is its fluctuation in population between year to year. Halogeton establishment is related to disturbance and climate regimes. During drought periods, halogeton populations often increase, and during wet periods, halogeton sites become invaded by cheatgrass.
Rationale: Halogeton infestations can vary in size due to disturbance levels, and halogeton is susceptible to invasion by Russian thistle and cheatgrass.
Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.
Question 2.4 Innate reproductive potential
Describe key reproductive characteristics: 6 points; Halogeton is an annual that reproduces exclusively by seed. Halogeton can produce over 110,000 seeds per plant. Seeds are black or brown. Most black seeds germinate the year after production, and brown seeds often are viable but dormant for 2-10 years.
Rationale: Halogeton's production of brown seeds allows a population to persist for several years even if short term environmental conditions are unsuitable.
Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.
Question 2.5 Potential for human-caused dispersal
Identify dispersal mechanisms: Halogeton seed is often spread by attaching to vehicles and equipment. Road construction and graders spread halogeton. Halogeton can also be spread with livestock.
Rationale: enter text here
Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis . [Online] Halogeton, Encyclopedica description. Available: http://pi.cdffa.ca.gov/weedinfo/HALOGETO2.html
Question 2.6 Potential for natural long-distance dispersal
Identify dispersal mechanisms: Halogeton can spread over long distances by wind (tumbleweed). Whirlwinds can transport stems up to 2 miles. Halogeton is also spread by rabbits and western harvester ants.
Rationale: enter text here

<p>Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis. Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.</p>
<p>Question 2.7 Other regions invaded</p>
<p>Identify other regions: Halogeton exists in several other states, but only in ecological types that it has already invaded in CA.</p>
<p>Rationale: enter text here</p>
<p>Sources of information: Pavek, Diane S. 1992. Halogeton glomeratus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis. Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553.</p>
<p>Question 3.1 Ecological amplitude</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Halogeton was first identified in CA in 1949 in eastern Lassen County along the Nevada Border. The infestation was primarily confined to the Sierra Army Depot at Herlong. From 1954-1980, Halogeton spread to Inyo, Kern, Lassen, Los Angeles, Modoc, Mono, and Nevada Counties. From 1980, Halogeton spread to San Bernardino, Placer, and Siskiyou counties. Specific ecological types in Worksheet C were not confirmed with ecological maps.</p>
<p>Rationale: enter text here</p>
<p>Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553. Halogeton, Encyloweedia description. Available: http://pi.cdfa.ca.gov/weedinfo/HALOGETO2.html Calflora database</p>
<p>Question 3.2 Distribution</p>
<p>Describe distribution: Abundance and distribution varies with yearly rainfall. Most infestation occur in Great Basin portions of CA, either in the trans Sierra Nevada or the Mojave Desert portion of southern California. In 1957, BLM estimated 90,250 acres were infested in CA, but acreage has likely increased significantly.</p>
<p>Rationale: enter text here</p>
<p>Sources of information: Young, James; Martinelli, Philip; Eckert, Richard; and Evans, Raymond. 1999. Halogeton: A History of Mid-20th Century Range Conservation in the Intermountain Area. USDA-ARS Misc. Publication 1553. Halogeton, Encyloweedia description. Available:</p>

<http://pi.cdfa.ca.gov/weedinfo/HALOGETO2.html> Calflora database

Worksheet A

Complete this worksheet to answer Question 2.4.

Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	Yes: 2 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	No: 0 pt
Seeds remain viable in soil for three or more years	Yes: 2 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Yes/No?
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	No: 0 pt
	6 pts 1 unknown
	A (6+ pts)

Note any related traits: enter text here

Worksheet C - California Ecological Types

(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	score
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	score
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	C. 5-20%
	Great Basin scrub	B. 21-50%
	chenopod scrub	C. 5-20%
	montane dwarf scrub	score
Upper Sonoran subshrub scrub	score	
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	score
	valley and foothill grassland	Unknown
	Great Basin grassland	C. 5-20%
	vernal pool	score
	meadow and seep	score
	alkali playa	Unknown
Bog and Marsh	pebble plain	score
	bog and fen	score
Riparian and Bottomland	marsh and swamp	score
	riparian forest	score
	riparian woodland	score
Woodland	riparian scrub (incl. desert washes)	Unknown
	cismontane woodland	score
	piñon and juniper woodland	D. present
Forest	Sonoran thorn woodland	score
	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
Alpine Habitats	upper montane coniferous forest	score
	subalpine coniferous forest	score
	alpine boulder and rock field	score
	alpine dwarf scrub	score

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).