

Oregon Department of Agriculture
Noxious Weed Pest Risk Assessment for
Ravennagrass
Saccharum ravennae
Poaceae
January 2015

Findings of Review and Assessment: Ravennagrass is native to the Mediterranean region of Africa and Eurasia. The plant has been sold for more than 90 years as a cold hardy ornamental grass with striking size. In spite of this history, it is a relatively recent addition to the list of invasive plants in the Western US. There are few known invaded sites to evaluate so evaluating biological potential and ecologic and economic risk are challenging. With the available information, Oregon Department of Agriculture (ODA) evaluated the risk of this plant to Oregon's resources using ODA's Qualitative Risk Assessment and the Noxious Weed Rating System. It scored 63 and 16 respectively for an A-rating.

Introduction: Ravennagrass is a large perennial grass with flowering stems near to 12 ft. tall at maturity and leaves that are distributed on the stem up to the base of the inflorescence. It forms clumps of basal leaves called tussocks (WSDA, 2014). Ravennagrass is similar in appearance to pampas grass and jubata grass. Ravennagrass is distinguished by having blade bases that are very densely covered with long, fuzzy, tawny hairs that typically hide the ligule and upper blade base surface.

The feather-like plumes or inflorescences are in a panicle up to 2 ft. long and often purplish-bronze turning to silver-gray in fall. Stems can be reddish or other colors as flowers mature. The tiny seeds are dispersed long distances by both wind and water. It is not known how long the seeds can survive in the soil, but because of their small size it is expected that they don't survive much more than 1-year (DiTomaso et al. 2013).

Ravennagrass is a native to the Mediterranean Northern Africa and Eurasia that has been used in the ornamental trade since the 1920's. It has escaped cultivation and persists in a variety of places across the continental US (Map 1). It has a very limited distribution in the West to date (Map 2). Until this year it was being grown in at least one nursery in Oregon (Tim Butler, Personal communication, 2015). Feral populations have recently been found on the shores of the Columbia River in Oregon and in Benton County Washington.

Ravennagrass has many scientific name synonyms including *Tripidium ravennae* (L.) H. Scholz, *Andropogon ravennae* L., *Erianthus elephantinus* Hook. F., *Erianthus purpurascens* Andersson, *Erianthus ravennae* (L.) P. Beauv. *Ripidium ravennae* (L.) Trin , and *Erianthus ravennae* (L.) P. Beauv. Var. *purpurascens* (Andersson) Hack. *Saccharum* is the sugar cane genus (USDA Plants Database). The name Ravenna refers to the Italian city of Ravenna that was temporarily the seat of the Roman Empire (Darke 2007).

Pampas grass (*Cortaderia selloana*) and jubata grass (*Cortaderia jubata*) are two ornamental grasses that roughly resemble *Saccharum ravennae*. Ravennagrass has even been marketed as a cold-hardy alternative to pampas grass due to its similar appearance and is called 'hardy pampas grass' as one of its common names (WSDA, 2014). Ravennagrass is distinguished by having blade bases and also plants that were observed blooming in Benton County, Washington and at the McNary Wildlife Refuge in Oregon had red coloring on their flowering stems. Though not all Ravennagrass plants may have this trait, *C. selloana* and *C. jubata* stems do not have this color on their flowering stems (WSDA, 2014).

Reproduction: Ravennagrass reproduces by seed and not by root fragments or rhizomes. Some literature mentions that rhizomes and roots need to be removed for successful manual treatment (WSDA 2014 and DiTomaso et al. 2013) this is believed to be an editing error. Large numbers of seeds are produced and introduced to the wind at great heights; this along with the small seed size allows them to disperse easily on the wind. The small seed size also likely to allows them to float on the surface tension of water. Seed viability is unknown but thought to be short due to the small size of the seed itself (WSDA 2014).

Commercial trade and subsequent escapement from horticultural environments are likely its largest potential sources of introduction. It is currently recommended for planting by several state extension services and botanic gardens. The invasion in the Grand Canyon resulted from deliberate planting as it considered at the time to be a recommended, safe plant (Firestone, 2015).

Factors Effecting Establishment: Ravennagrass is relatively unknown as an invasive to date, but those who know it seem to show great concern. Populations appear to be either stable or expansive, not generally intermediate. This has been noted in California, as well as Arizona and elsewhere. Those triggers are unknown, but when released, it really goes. Managers in the Southwest who know it are concerned, but it hasn't had the history to provide documentation of risk. This is an interesting case of weed manager's ability to assess new problems, rather than known risk (Firestone 2007).

Ravennagrass' habitat generally is wetland edge, flood plain above the high-water mark, and other places with moisture and a micro-site of bare soil, sand or rock. It primarily establishes on the margins of riparian zones, although growth on gravel bars in mid-channel is also common. It can increase to monoculture under these conditions. However, Ravennagrass can establish with relatively little disturbance, and natural disturbance is more than ample (e.g. natural seep on inaccessible cliffs, natural stream bank erosion). It can form impenetrable stands of one species, and can grow out from under other vegetation. It will exclude native communities through competition, although not consistently (Firestone, 2015).

As long as it has sun, it tolerates a wide range of conditions (Greenlee 1992). Plants may also grow in light or partial shade as well (Oakes 1990), though may not produce seed heads if shaded (Burgess 2006). Ravennagrass can survive in drought conditions and still produce tall flowering stems but may produce fewer of them (Hattori et al. 2010) (WSDA 2104).

Probability of Detection: Ravennagrass is a member of such a conspicuous group of large ornamental grasses that its overall probability of detection is high. The public is likely to be able to spot the grass as something unusual and professionals should have little trouble making the proper identification. It could potentially hide in tall and thick vegetation on the westside of the Oregon for a time before discovery.

Distribution in Oregon: Prior to the recent discovery of escaped Ravennagrass in Benton County, there were no known sites in Washington. There is one herbarium specimen of *S. ravennae* in Washington, collected in 1898 by Wilhelm N. Suksdorf from his garden in Klickitat County (WSU Marion Ownbey Herbarium #148311). No other herbarium records of Ravennagrass in exist in UW Herbarium's online database or in the Consortium of PNW herbaria for Washington, Oregon or British Columbia. There is also mention of one plant being found in Grant County in 1982, in a document at the WSNWCB's office. It was noted that the identification was not confirmed but did warrant further research (WSDA 2104).

In 2012, Benton County Noxious Weed Control Board discovered naturalizing plants growing in a number of areas and habitats around the county including: around Richland, near the Columbia River, near the Yakima River, growing in cracks in the asphalt, cracks along concrete walls, rocky hillsides, grassy banks, gravel roadsides, and escaped from yards. Since their discovery, a couple other locations of *S. ravennae* have been found. A few escaping plants have been located in Franklin County, in the Pasco area near Benton County as well as some ornamental plantings. In Yakima County, the county noxious weed control board found some escaped plants along I-82 and over 20 sites of ornamental plantings (Susan Bird, pers. comm.). These are the only escaped plants known in the state, though *S. ravennae* may occur elsewhere if they were/are ornamentally planted.

Staff from Portland State University's Center for Lakes and Reservoirs found Ravenna grass this last summer for the first time in Oregon while surveying for aquatic noxious weeds along the shores of the Columbia River near Hermiston.

Environmental Impacts: There is speculation that Ravennagrass will have higher water use than some of the riparian or wetland species it replaces in more arid environs scenarios due to its large amount of surface area of the plant although cooler climates may make this less likely. It appears to specialize in moist areas in the arid southwest and may pose threats to rare species in those limited habitats (Firestone, 2015). This may also be true for the eastern part of Oregon.

It can form impenetrable stands of one species, and can grow out from under other vegetation and will exclude native communities through competition, although not consistently. It produces copious biomass in areas that generally have relatively little, especially by growing on harsh substrate like gravel banks, and being much taller than surrounding vegetation. This would change the shade profile, plant competition and flammability of the community. Older stands of Ravennagrass may be able to carry fire that would not normally burn in riparian vegetation. It can anchor soils normally more subject to shifting (e.g. mid-channel) and act as a physical barrier to stream flow through its biomass and accumulation of flotsam, thatch and sediment. This may shift erosion locations.

Economic Impacts: Extensive wild populations of Ravennagrass have the potential to change riparian vegetation character and stream morphology in wetland habitats and spawning habitat for salmonids. With Oregon's investment in healthy populations of salmonids this could call for very costly control measures. Ravennagrass is also a potential threat to agricultural irrigation – especially where open ditches with soil bottoms are still used.

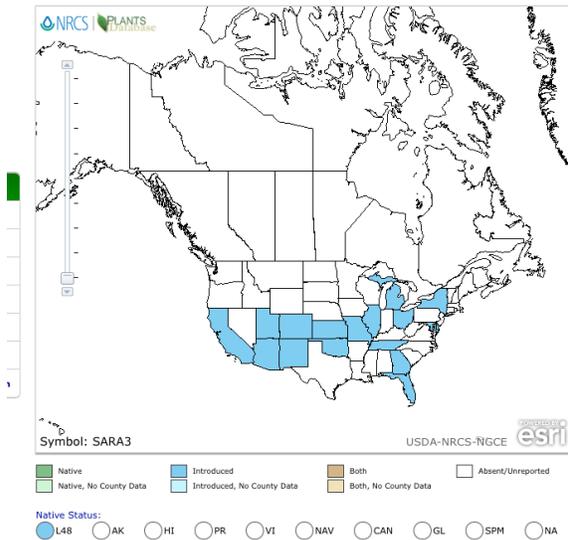
Nursery production of Ravennagrass is apparently very limited in Oregon (Tim Butler, personal communications) so the opportunity cost of not selling the plant commercially is likely to be small or negligible.

Control: Manual control of Ravennagrass is possible but labor intensive. Removing plumes prior to fertility will stop the spread of the population but clipping may have to be done several times a year as plants may resprout and seed. Mechanical means of removal must get the entire root to be certain of control. Disposal of plant material should make certain it is not possible for the plant to regrow. Skin protection (i.e. gloves and long sleeves) should be used as the mildly serrated leaves and hairs may be irritating. National Park Service staff and volunteers report the successful removal of over 25,000 plants in the Grand Canyon using mechanical methods such as digging up plants (DiTomaso et al. 2013), using shovels and come-along (Stevens n.d.). Prevent the introduction of the plant by substituting non-invasive plants in its place. Healthy desirable plant communities should provide competition to Ravennagrass seedlings (WSDA 2014).

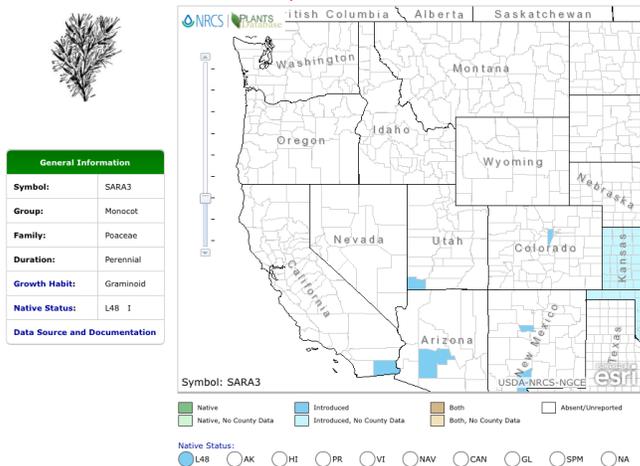
Control efforts of Ravennagrass use spot treatments of 5% glyphosate v/v solution of Rodeo or Aquamaster (2.5% a.e.), applying it to plants that are fully mature but before flowers produce viable seed. This likely occurs during the early summer months. There have also been reports that a 5% glyphosate solution mixed with 1% imazapyr (Habitat) will give very effective control (DiTomaso et al. 2013).

Catanzaro et al. (1993) tested a number of ornamental grasses' susceptibility to graminicides (fenoxaprop, fluazifop-P, quizalofop, and sethoxydim, collectively called POST grass herbicides). They found *S. ravennae* to exhibit severe (>70%) phytotoxicity from all the herbicides at 69 days after treatment, with a mortality of 96%.

Map 1: Known distribution of Ravennagrass in North America as of 2014 from the Plants Database.



Map 2: Known distribution of known Ravenna grass in the West as of 2014.



Noxious Weed Qualitative Risk Assessment 3.8
Oregon Department of Agriculture

Common Name: Ravennagrass
Scientific Name: *Saccharum ravennae*
Family: Poaceae

For use with plant species that occur or may occur in Oregon to determine their potential to become serious noxious weeds. For each of the following categories, select the number that best applies. Numerical values are weighted to increase priority categories over less important ones. Choose the best number that applies, intermediate scores can be used.

Total Score: **63** Risk Category: **A**

GEOGRAPHICAL INFORMATION

- 1) **4** **Invasive in Other Areas**
- 0 Low- not known to be invasive elsewhere.
 - 2 Known to be invasive in climates dissimilar to Oregon's current climates.
 - 6 Known to be invasive in geographically similar areas.

Comments: Limited information at this time but invasions in Columbia Basin, Northern California, and riparian areas of arid southwest indicate a wide amplitude as long as there is perennial water present.

- 2) **6** **Habitat Availability:** Are there susceptible habitats for this species and how common or widespread are they in Oregon?
- 1 *Low* – Habitat is very limited, usually restricted to a small watershed or part of a watershed (e.g., tree fern in southern Curry County).
 - 3 *Medium* – Habitat encompasses 1/4 or less of Oregon (e.g., oak woodlands, coastal dunes, eastern Oregon wetlands, Columbia Gorge).
 - 6 *High* – Habitat covers large regions or multiple counties, or is limited to a few locations of high economic or ecological value (e.g., threatened and endangered species habitat).

Comments: Likely limited by the presence of perennial moisture but should find potential habitat across Oregon.

- 3) **5** **Proximity to Oregon:** What is the current distribution of the species?
- 0 *Present* – Occurs within Oregon.
 - 1 *Distant* – Occurs only in distant US regions or foreign countries.
 - 3 *Regional* – Occurs in Western regions of US but not adjacent to Oregon border.
 - 6 *Adjacent* – Weedy populations occur adjacent (<50 miles) to Oregon border.

Comments: Washington site close.

- 4) **8** **Current Distribution:** What is the current distribution of escaped populations in Oregon?
- 0 *Not present* – Not known to occur in Oregon.
 - 1 *Widespread* – Throughout much of Oregon (e.g., cheatgrass).
 - 5 *Regional* – Abundant (i.e., occurs in eastern, western, central, coastal, areas of Oregon) (e.g., gorse, tansy ragwort).
 - 10 *Limited* – Limited to one or a few infestations in state (e.g., kudzu).

Comments: Very limited to date but if listed more sites are likely to be found as the plant becomes familiar to mangers.

BIOLOGICAL INFORMATION

- 5) **3** **Environmental Factors:** Do abiotic (non-living) factors in the environment effect establishment and spread of the species? (e.g., precipitation, drought, temperature, nutrient availability, soil type, slope, aspect, soil moisture, standing or moving water).
- 1 *Low* – Severely confined by abiotic factors.
 - 2 *Medium* – Moderately confined by environmental factors
 - 4 *High* – Highly adapted to a variety of environmental conditions (e.g., tansy ragwort, Scotch broom).

Comments: Likely limited by perennial water supply.

- 6) **4** **Reproductive Traits:** How does this species reproduce? Traits that may allow rapid population increase both on and off site.
- 0 *Negligible* – Not self-fertile, or is dioecious and opposite sex not present.
 - 1 *Low* – Reproduction is only by seed, produces few seeds, or seed viability and longevity are low.
 - 3 *Medium* – Reproduction is vegetative (e.g., by root fragments, rhizomes, bulbs, stolons).
 - 3 *Medium* – Produces many seeds, and/or seeds of short longevity (< 5 years).
 - 5 *High* – Produces many seeds and/or seeds of moderate longevity (5-10 years) (e.g., tansy ragwort).
 - 6 *Very high* – Has two or more reproductive traits (e.g., seeds are long-lived >10 years and spreads by rhizomes).

Comments: Plant reproduction is largely from seed and those should be short lived but can root, can be divided early in the year. No regrowth from root fragments – no rhizomes.

- 7) **3** **Biological Factors:** Do biotic (living) factors restrict or aid establishment and spread of the species? (What is the interaction of plant competition, natural enemies, native herbivores, pollinators, and pathogens with species?)
- 0 *Negligible* – Host plant not present for parasitic species.
 - 1 *Low* – Biotic factors highly suppress reproduction or heavily damage plant for an extended period (e.g., biocontrol agent on tansy ragwort).
 - 2 *Medium* – Biotic factors partially restrict or moderately impact growth and reproduction, impacts sporadic or short-lived.
 - 4 *High* – Few biotic interactions restrict growth and reproduction. Species expresses full growth and reproductive potential.

Comments: Competition with seedlings can be significant.

- 8) **3** **Reproductive Potential and Spread After Establishment - Non-human Factors:** How well can the species spread by natural means?
- 0 *Negligible* – No potential for natural spread in Oregon (e.g., ornamental plants outside of climate zone).
 - 1 *Low* – Low potential for local spread within a year, has moderate reproductive potential or some mobility of propagules (e.g., propagules transported locally by animals, water movement in lakes or ponds, not wind blown).

- 3 *Medium* - Moderate potential for natural spread with either high reproductive potential or highly mobile propagules (e.g., propagules spread by moving water, or dispersed over longer distances by animals) (e.g., perennial pepperweed).
- 5 *High* – Potential for rapid natural spread throughout the susceptible range, high reproductive capacity and highly mobile propagules. Seeds are wind dispersed over large areas (e.g., rush skeletonweed).

Comments: Seed movement with wind and water and human movement but not long distance dispersal.

- 9) **3** **Potential of Species to be Spread by Humans.** What human activities contribute to spread of species? Examples include: interstate or international commerce; contaminated commodities; packing materials or products; vehicles, boats, or equipment movement; logging or farming; road maintenance; intentional introductions of ornamental and horticultural species, or biofuel production.
- 1 *Low* – Potential for introduction or movement minimal (e.g., species not traded or sold, or species not found in agricultural commodities, gravel or other commercial products).
 - 3 *Medium* – Potential for introduction or off-site movement moderate (e.g., not widely propagated, not highly popular, with limited market potential; may be a localized contaminant of gravel, landscape products, or other commercial products) (e.g., lesser celandine, Canada thistle).
 - 5 *High* – Potential to be introduced or moved within state high (e.g., species widely propagated and sold; propagules common contaminant of agricultural commodities or commercial products; high potential for movement by contaminated vehicles and equipment, or by recreational activities) (e.g., butterfly bush, spotted knapweed, Eurasian watermilfoil).

Comments: Not much commercial traffic known now and listing would prevent legal import and sale.

IMPACT INFORMATION

- 10) **5** **Economic Impact:** What impact does/can the species have on Oregon’s agriculture and economy?
- 0 *Negligible* – Causes few, if any, economic impacts.
 - 1 *Low* - Potential to, or causes low economic impact to agriculture; may impact urban areas (e.g., puncture vine, pokeweed).
 - 5 *Medium* – Potential to, or causes moderate impacts to urban areas, right-of-way maintenance, property values, recreational activities, reduces rangeland productivity (e.g., English ivy, Himalayan blackberry, cheatgrass).
 - 10 *High* – Potential to, or causes high impacts in agricultural, livestock, fisheries, or timber production by reducing yield, commodity value, or increasing production costs (e.g., gorse, rush skeleton weed, leafy spurge).

Comments: Potential clogging of open irrigation and detrimental to recreation when populations are high.

- 11) **6** **Environmental Impact:** What risks or harm to the environment does this species pose? Plant may cause negative impacts on ecosystem function, structure, and biodiversity of plant or fish and wildlife habitat; may put desired species at risk.
- 0 *Negligible* – None of the above impacts probable.
 - 1 *Low* – Can or does cause few or minor environmental impacts, or impacts occur in degraded or highly disturbed habitats.
 - 4 *Medium* – Species can or does cause moderate impacts in less critical habitats (e.g., urban areas, sagebrush/ juniper stands).

- 6 *High* – Species can or does cause significant impacts in several of the above categories. Plant causes severe impacts to limited or priority habitats (e.g., aquatic, riparian zones, salt marsh; or T&E species sites).

Comments: Potential impact to wetlands and riparian areas potentially including salmon habitats.

- 12) **1** **Impact on Health:** What is the impact of this species on human, animal, and livestock health? (e.g., poisonous if ingested, contact dermatitis, acute and chronic toxicity to livestock, toxic sap, injurious spines or prickles, causes allergy symptoms).

- 0 *Negligible* – Has no impact on human or animal health.
- 2 *Low* – May cause minor health problems of short duration, minor allergy symptoms (e.g., leafy spurge).
- 4 *Medium* – May cause severe allergy problems, death or severe health problems through chronic toxicity, spines or toxic sap may cause significant injury. (e.g., giant hogweed, tansy ragwort).
- 6 *High* – Causes death from ingestion of small amounts, acute toxicity (e.g. poison hemlock).

Comments: Causes moderate irritation.

CONTROL INFORMATION

- 13) **6** **Probability of Detection at Point of Introduction:** How likely is detection of species after introduction and naturalization in Oregon?

- 1 *Low* – Grows where probability of early detection is high, showy and easily recognized by public; access to habitat not restricted (e.g., giant hogweed).
- 5 *Medium* – Easily identified by weed professionals, ranchers, botanists; some survey and detection infrastructure in place. General public may not recognize or report species (e.g., leafy spurge).
- 10 *High* – Probability of initial detection by weed professionals low. Plant shape and form obscure, not showy for much of growing season, introduction probable at remote locations with limited access (e.g., weedy grasses, hawkweeds, skeletonweed).

Comments: Obvious invasive, will stand out in Oregon sites but may not be properly identified (versus other large grasses).

- 14) **6** **Control Efficacy:** What level of control of this species can be expected with proper timing, herbicides, equipment, and biological control agents?

- 1 *Negligible* – Easily controlled by common non-chemical control measures (e.g., mowing, tillage, pulling, and cutting; biocontrol is very effective at reducing seed production and plant density) (e.g., tansy ragwort).
- 2 *Low* – Somewhat difficult to control, generally requires herbicide treatment (e.g., mechanical control measures effective at preventing flowering and but not reducing plant density; herbicide applications provide a high rate of control in a single application; biocontrol provides partial control).
- 4 *Medium* – Treatment options marginally effective or costly. Tillage and mowing increase plant density (e.g., causes tillering, rapid regrowth, spread from root fragments). Chemical control is marginally effective. Crop damage occurs or significant non-target impacts result from maximum control rates. Biocontrol agents ineffective.
- 6 *High* – No effective treatments known or control costs very expensive. Species may occur in large water bodies or river systems where containment and complete control are not achievable. Political or legal issues may prevent effective control.

Comments: Control is likely to be very effective.

Category Scores:

23 Geographic score (Add scores 1-4)

16 Biological Score (Add lines 5-9)

12 Impact Score (Add lines 10-12)

12 Control Score (Add Lines 13-14)

63 Total Score (Add scores 1-14 and list on front of form)

Risk Category: 55-89 = A 24-54 = B < 24 = unlisted.

This Risk Assessment was modified by ODA from the USDA-APHIS Risk Assessment for the introduction of new plant species.

V3.8 2/19/2016

Oregon Department of Agriculture
Noxious Weed Rating System

Common Name: Ravennagrass

Scientific Name: *Saccharum ravennae*

Point Total: **16**

Rating: **A**

1) Detrimental Effects: Check all that apply, add number of checks

- 1. *Health*: causes poisoning or injury to humans or animals
- 2. *Competition*: strongly competitive with crops, forage, or native flora
- 3. *Host*: host of pathogens and/or pests of crops or forage
- 4. *Contamination*: causes economic loss as a contaminate in seeds and/or feeds
- 5. *Interference*: interferes with recreation, transportation, harvest, land value, or wildlife and livestock movement

2) Reproduction & Capacity for Spread: Check the number that best describes, enter that number

- 1. Few seeds, not wind blown, spreads slowly
- 2. Many seeds, slow spread
- 3. Many seeds, spreads quickly by vehicles or animals
- 4. Windblown seed, or spreading rhizomes, or water borne
- 5. Many wind-blown seeds, high seed longevity, spreading rhizomes, perennials

3) Difficulty to Control: Check the number that best describes, enter that number

- 1. Easily controlled with tillage or by competitive plants
- 2. Requires moderate control, tillage, competition or herbicides
- 3. Herbicides generally required, or intensive management practices
- 4. Intensive management generally gives marginal control
- 5. No management works well, spreading out of control

4) Distribution: Check the number that best describes, enter that number

- 1. Widely distributed throughout the state in susceptible habitat
- 2. Regionally abundant, 5 or more counties, more than 1/2 of a county
- 3. Abundant throughout 1- 4 counties, or 1/4 of a county, or several watersheds
- 4. Contained in only 1 watershed, or less than 5 square miles gross infestation
- 5. Isolated infestation less than 640 acres, more than 10 acres

5) Ecological Impact: Check the number that best describes, enter that number

- 1. Occurs in most disturbed habitats with little competition
- 2. Occurs in disturbed habitats with competition
- 3. Invades undisturbed habitats and crowds out native species
- 4. Invades restricted habitats (i.e. riparian) and crowds out native species

16

TOTAL POINTS

Note: Noxious weeds are non-native plants with scores of 11 points or higher. Any plants in 4.1, 4.2, and 4.3 should not be classified as “A” rated weeds. Ratings: 16 + = A, 15 – 11 = B
ODA Weed Rating System 2/22/16 V3.8

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Reported by: Mark Porter, Oregon Department of Agriculture, 2015



Ravennagrass, Photo by TNC, Bugwood.org