

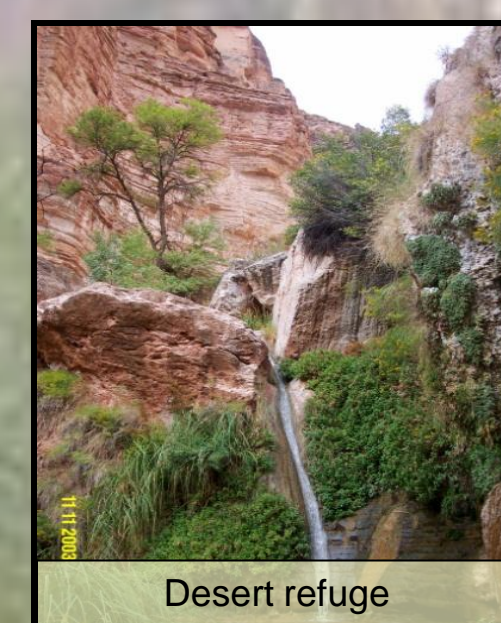
Beware of the ravenous Ravenna: Management of the highly invasive exotic Ravenna grass (*Saccharum ravennae*) in Colorado River Parks

WHY IS THIS PLANT RAVENOUS?

Floral diversity and desert riparian habitat

The incredible floral diversity combined with unique and prized riparian areas make preservation of ecological communities in these two parks a high priority. In Grand Canyon National Park alone, there are over 1750 plant species with 9 locally endemic species, and an additional 23 endemic species that extend just outside of park boundaries. Glen Canyon NRA has over 850 plant species with the unique hanging gardens containing 10 Colorado Plateau endemics.

These two Colorado river parks contain some of the nation's best remaining examples of desert riparian habitats ranging from lush hanging gardens, to trickling side streams and raging rivers. These areas harbor diverse and productive ecosystems, which typically account for less than 2% of the land, but they provide critical shade, water, and food in desert landscapes, with up to 90% of all bird species and 80% of all mammal species routinely using these areas.



Desert refuge



Desert riparian area

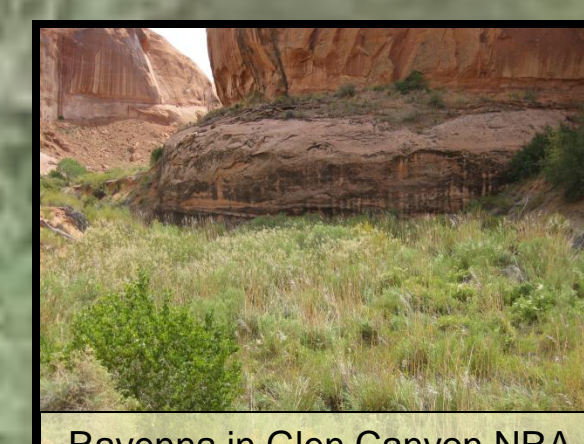


Mimulus eastwoodiae

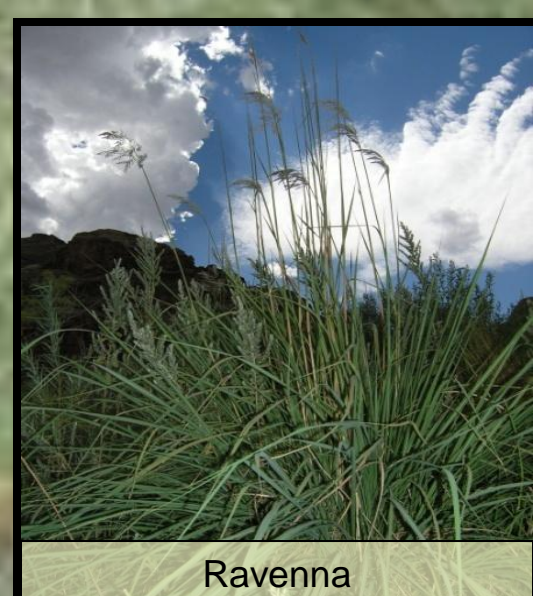
The dirty details of the plant

Ravenna grass (*Saccharum ravennae*) is a large, exotic bunchgrass originally from southern Europe and western Asia. This grass is similar in form and function to pampas grass (*Cortaderia* spp.) from South America which has invaded coastal California and been the target of large-scale control efforts. Often grown as an ornamental, ravenna escapes easily with lightweight seeds that disperse via wind and water.

Ravenna grass readily establishes in or near riparian areas with natural disturbances (e.g. open, rocky sand bars, seeps and springs on steep cliffs). It has the ability to grow in the canopy of other native riparian species, thus potentially out-competing native vegetation. Endemic and relict invertebrates and plant species such as *Mimulus eastwoodiae*, *Anticlea vaginata*, and *Yucca toftiae* are of particular concern in these unique riparian ecosystems.



Ravenna in Glen Canyon NRA



Ravenna



Seed heads glisten in the light

How to get rid of it?

The most challenging aspect of invasive plant management is accessing vast landscapes and while **early detection** is the most important factor in controlling ravenna, it can also be the most limiting factor.

Physical Control: Digging up the plants and fully removing the roots from the soil is a very effective method. The plants must be placed high and dry so there is no contact with moist soil, thus preventing re-establishment.

Chemical Control: The Lake Mead Exotic Plant Mgmt. Team (EPMT) has had success using Rodeo[®] (5%) and Polaris[®] AQ (1%) herbicide to control ravenna. Foliar spot applications are made with care to get the entire plant to prevent re-sprouting.

Collecting seed heads: If seed heads can be clipped and carefully bagged for disposal this will greatly reduce re-infestation in subsequent years.



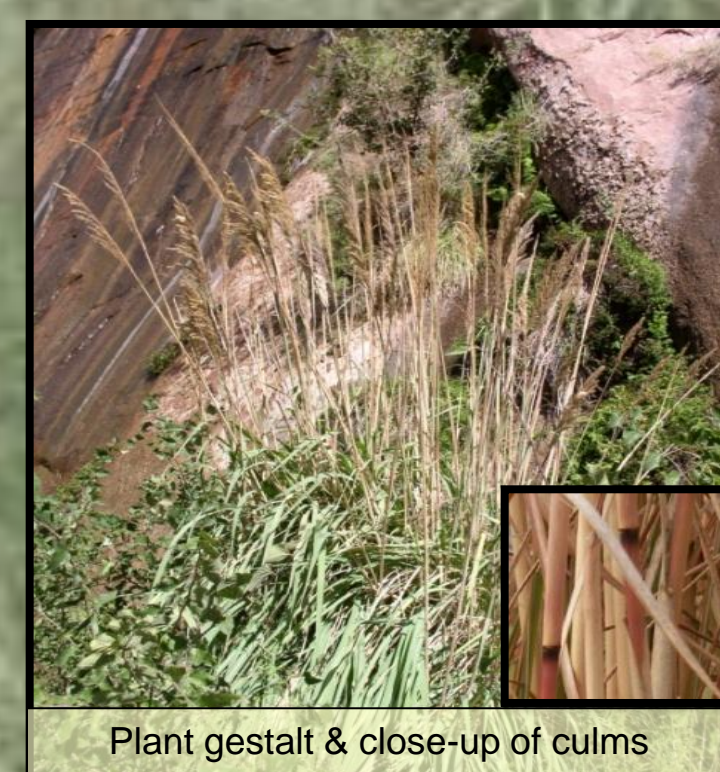
Digging up the roots



Herbicide application



Bagging seed heads



Plant gestalt & close-up of culms



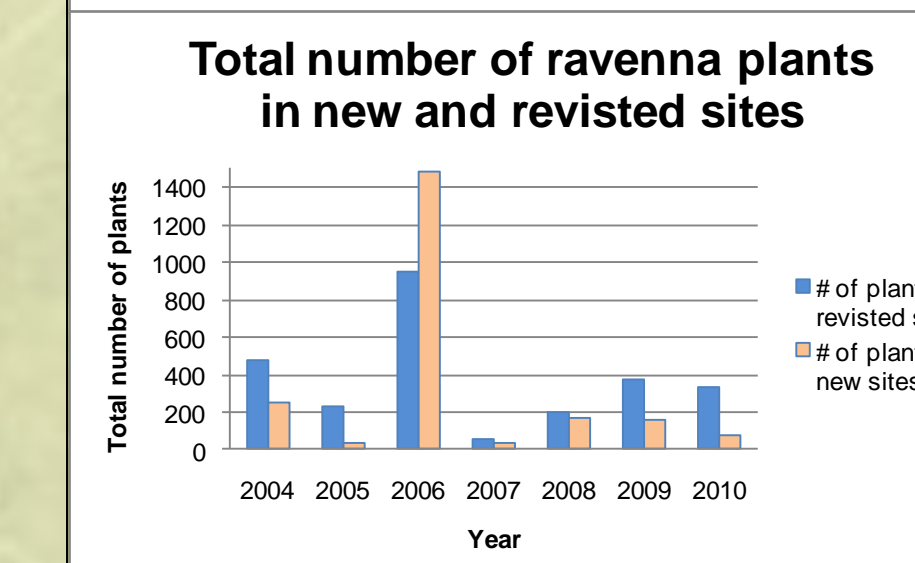
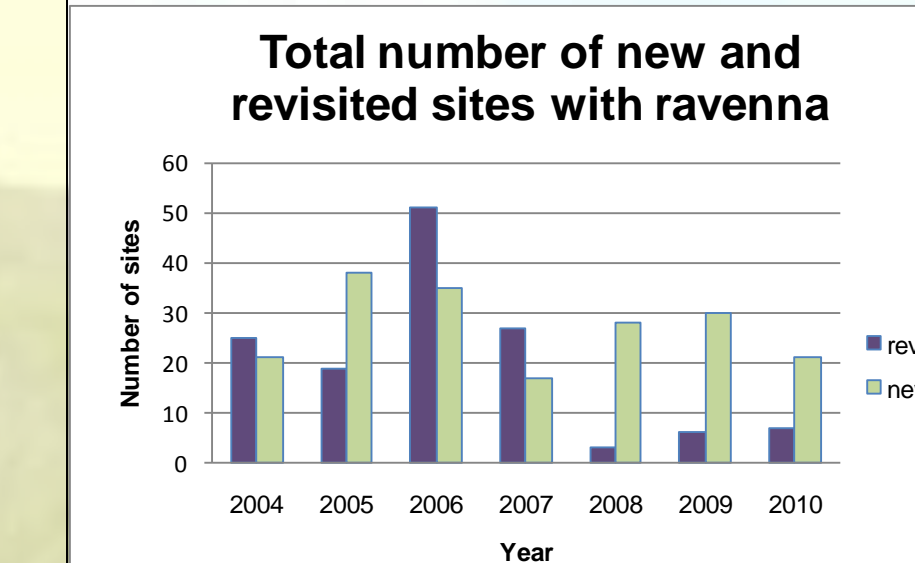
Volunteer!

GLEN CANYON

Ravenna was likely first planted in Glen Canyon National Recreation Area in the 1970's at landscaped sites associated with marinas. Since then, the plant has spread below the dam, to other developed areas, into various side canyons, and dramatically altered the ecosystem in Lewellyn and Cottonwood Gulches.

Removal was isolated and limited to developed areas until a large scale effort on behalf of the EPMT's. Through their hard work, **32.53 acres** of ravenna were treated in 2009 and 2010 with **2.6 acres** retreated in 2010. Treatment is done predominately with herbicide and results are excellent with **95% mortality**. At this point distribution is patchy and the greatest concern is for the protection of the unique hanging gardens.

MOVING DOWN RIVER



GRAND CANYON

Ravenna grass was first documented near Lees Ferry in 1981 and the first plant recorded in the park in 1989. We have been hand digging ravenna since the early 1990's and to date have removed more than **30,000 plants!**

Since 2004, we have conducted ravenna control on over 18 river trips, a few of which were solely focused on this one invasive species. More often than not, we rely on trained field crew members and commercial and park boatmen to help spot the grass in the river corridor. In 2010, we revisited 118 previously recorded ravenna sites and found only **21 sites** with plants and an additional **7 new sites**.

Another unfortunate instigator, *Cortaderia selloana* (pampas grass) has been spotted in a few isolated areas. This nasty invader has many of the same qualities as ravenna and is a high priority for control.

PLANT IDENTIFICATION

Whole plant characteristics

Ravenna grass is a tall, dramatic bunchgrass with long leaf blades that extend from the base and arc outwards. The culms extend from the center of the leaf mass and are topped with flowering plumes. Plants usually grow near water and in groups of 1-3.



Plant gestalt

Seed head characteristics

- The flower heads are **pale, silvery, feathery plumes** at the tips of tall flower stalks reaching **2-4 m** and appearing in late summer and early fall.
- Each plant can support 1-20 (but can be over 120!) seed heads that produce thousands of seeds.
- The seed heads can be confused with other common grasses such as **bushy beardgrass** (*Andropogon glomeratus*), **satin tail** (*Imperata brevifolia*) and **phragmites** (*Phragmites australis*). But careful examination reveals seeds that appear to be linked in continuous chain-like strands in ravenna while the seed heads of the other grasses appear to be diffuse and loose.



Seed heads in the sky



Ravenna leaves



Close-up of seed head



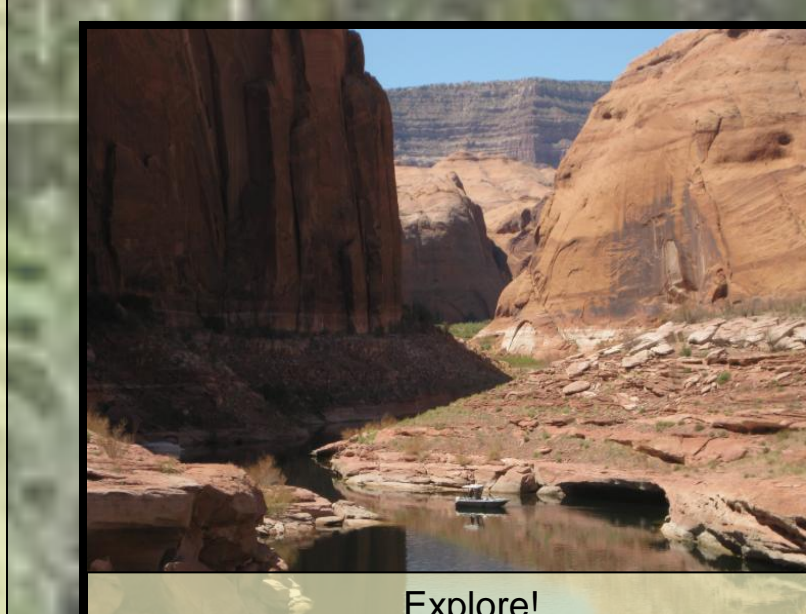
Close-up white mid-vein

Leaf characteristics

- An immature ravenna grass can be difficult to identify and can be confused with cane bluestem (*Bothriochloa barbinodis*) or phragmites. Also, without seed-heads to lure you in, the small tufts may be missed.
- The bottom of the leaf has the most distinguishing feature with a **prominent white vein** running the length. If the leaf is snapped in half the vein often produces a **milky-white cross section** that may bleed white liquid.
- The leaves are **bilaterally serrated** on the edge by minute teeth that will grab skin if rubbed towards the main stalk.
- Also, near the base of the plant and where the blade meets the culm, there are long, readily **visible hairs**.

WHAT CAN YOU DO?

- Go explore!** Ravenna grass removal is difficult and time consuming. In both parks, the grass is often found in remote locations that require long backpacking, river or lake trips to access the sites.
- Learn the plant!** The first step in controlling this species is identification. If you see a suspicious grass, record detailed information about the location, size, number and access. If you have a camera, take a picture! And send this information to the local vegetation manager.
- Visit your local nursery!** Many nurseries still sell ravenna grass and we need to discourage this practice and offer alternatives such as *Sporobolus airoides*, *Bothriochloa* spp., or *Andropogon* spp.
- Volunteer** at one of the parks! www.gcvolunteers.org



Explore!