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2011 Exotic Plant Management

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Introduction

Invasive exotic plants threaten the integrity of natural ecosystems and diminish visitor experiences in NPS units of the Southeast Utah Group (SEUG). If allowed to spread and increase in abundance, exotic plant species have the potential to disrupt the functioning of natural ecosystems, displace native plant populations, alter habitat conditions for wildlife, promote wildland fire, and degrade visitor experiences. To mitigate these impacts, SEUG Division of Resource Stewardship and Science has an active exotic plant management program that is conducted in partnership with external volunteer and non-profit organizations, other state and federal agencies, and NPS staff from other SEUG divisions. This report summarizes exotic plant management actions that were undertaken in SEUG units during calendar year 2011.

SEUG Exotic Plant Management Overview

Exotic Plant Treatment

One hundred and sixty-nine acres of invasive exotic plants were treated in the parks of the Southeast Utah Group during 2011 (Table 1). This work was achieved through the collaborative efforts of employees of the Division of Resource Stewardship and Science (RSS), other SEUG staff such as park rangers, Student Conservation Association (SCA) interns, volunteers from the group Wilderness Volunteers, and volunteers from the Utah Valley University Service Council. All treatments were recorded in the Exotic Plant Activity Database (Appendix A).

New priorities were established, and new methods were used in the field during 2011. Increased emphasis was applied to managing tumbleweed (*Salsola* spp.) in high-value recreation areas (e.g., campsites and trails) and leach fields. This was partly in response to complaints of trails and roads being congested or impassable due to the accumulation of tumbleweed. Thirty-six acres were treated for tumbleweed in 2011; this was more than twice the area of any other species (see Figure 1). In 2010 only 3.63 acres of tumbleweed were treated.

Another plant that was given additional attention this year was sweetclover (*Melilotus* spp.). In some areas sweetclover had taken hold of roadside rights-of-way and had become the dominant species (50-100% foliar cover). Treatment areas for sweetclover include Arches roadsides near Wolfe Ranch, the roadsides of the Island in the Sky District of Canyonlands National Park, and the loop road of Hovenweep National Monument.

TABLE 1 Acres of exotic plants treated during 2011 by species.

Species	PARKS						Grand Total
	ARCH	CANY-ISKY	CANY-NEED	CANY-RIVR	HOVE	NABR	
Bull thistle (<i>Cirsium vulgare</i>)	-	-	-	-	20.75	-	20.75
Canada thistle (<i>Cirsium arvense</i>)	-	-	-	-	20.75	-	20.75
Cheatgrass (<i>Bromus tectorum</i>)	2.36	-	1	-	-	-	3.36
Crested wheatgrass (<i>Agropyron cristatum</i>)	-	-	2	-	-	-	2
Dalmatian Toadflax (<i>Linaria dalmatica</i>)	-	-	-	-	19.25	-	19.25
Diffuse knapweed (<i>Centaurea diffusa</i>)	-	1.81	-	-	-	-	1.81
Halogeton (<i>Halogeton glomeratus</i>)	0.001	1.1	-	-	-	-	1.101
Musk thistle (<i>Carduus nutans</i>)	-	-	-	-	20.75	-	20.75
Puncturevine (<i>Tribulus terrestris</i>)	5.701	-	1.95	-	-	-	7.651
Rabbit barley (<i>Hordeum murinum</i>)	0.001	0.1	0.01	-	-	-	0.111
Ripgut brome (<i>Bromus diandrus</i>)	0.01	-	0.1	-	-	-	0.11
Russian knapweed (<i>Centaurea repens</i>)	6.601	-	-	6	0.2	-	12.801
Russian olive (<i>Elaeagnus angustifolia</i>)	1.5	-	-	0.101	-	-	1.601
Russian thistle (<i>Salsola tragus</i>)	24.592	1.375	10.05	-	-	-	36.017
Sweetclover (<i>Melilotus</i> spp.)	7.66	9.052	-	-	2.01	1.951	20.673
Tamarisk (<i>Tamarix ramosissima</i>)	-	-	-	-	-	0.5	0.5
Tumble mustard (<i>Sisymbrium altissimum</i>)	2.47	-	-	-	2	4.51	8.98
White horehound (<i>Marrubium vulgare</i>)	-	-	-	-	3	8.72	11.72
Other - see notes	0.571	0.1	0.01	0.25	-	-	0.931
Acres Grand Total	51.467	13.537	15.12	6.351	88.71	15.681	190.866

* Notes on other species are found in the Exotic Plant Activity Database (Appendix A).

SEUG exotic plant management uses Integrated Pest Management (IPM) in its exotic plant treatment efforts.

“IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment (United States Environmental Protection Agency, 2011).”

For SEUG, this meant weighing the environmental impacts of treatment methods and the staffing and financial resources available to provide treatments. Coupled with IPM considerations is the high visitor use in some treatment areas. Because some treatments occur in high visitor use areas, hand pulling is often utilized in order to avoid conflict and impact to visitor experience. Figures 1 and 2 show the treatment methods and herbicides used in 2011.

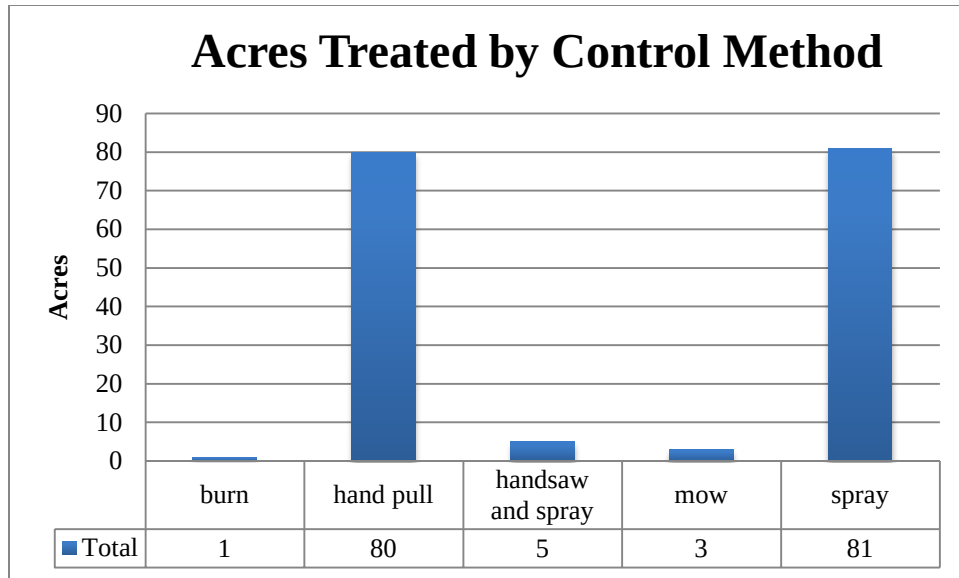


FIGURE 1 Acres treated by treatment methods used in 2011.

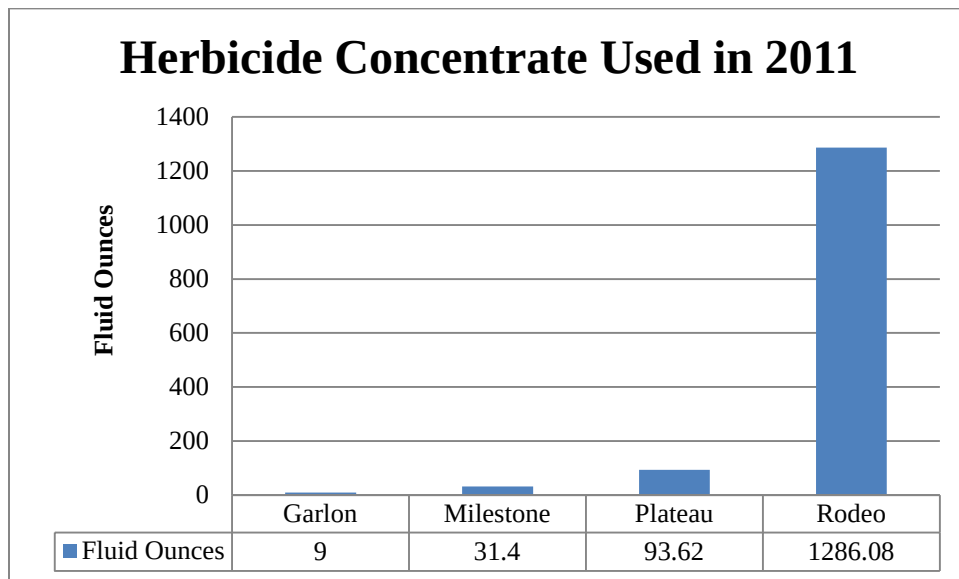


FIGURE 2 Total herbicide (concentrate) used in SEUG during 2011.

Exotic Plant Inventory

Twenty-three acres of exotic plants were inventoried throughout SEUG in 2011 using Utah State University protocols. This method is the standard in SEUG and has been used in exotic plant inventories since 2003. The most common plant inventoried was tumbleweed. Table 2 contains the inventory overview for SEUG during 2011.

TABLE 2 Acres of exotic plants inventoried during 2011 by species.

Species	Parks						Grand Total
	ARCH	CANY-ISKY	CANY-MAZE	CANY-NEED	HOVE	NABR	
Canada thistle (<i>Cirsium arvense</i>)	-	-	-	0.01	-	-	0.01
Cheatgrass (<i>Bromus tectorum</i>)	-	-	-	-	-	-	-
Crested wheatgrass (<i>Agropyron cristatum</i>)	0.1	1	-	0.001	-	-	1.101
Halogeton (<i>Halogeton glomeratus</i>)	0.01	2.01	0.01	-	-	-	2.03
Musk thistle (<i>Carduus nutans</i>)	-	-	-	0.1	-	-	0.1
Puncturevine (<i>Tribulus terrestris</i>)	-	-	-	0.001	-	-	0.001
Rabbit barley (<i>Hordeum murinum</i>)	-	-	-	0.11	-	-	0.11
Ripgut brome (<i>Bromus diandrus</i>)	11	-	-	5	-	-	16
Russian knapweed (<i>Centaurea repens</i>)	0.011	-	-	-	-	-	0.011
Russian thistle (<i>Salsola tragus</i>)	0.01	0.251	-	0.2	-	-	0.461
Sweetclover (<i>Melilotus</i> spp.)	0.001	0.1	-	0.01	-	0.01	0.121
Tumble mustard (<i>Sisymbrium altissimum</i>)	0.01	-	-	0.01	-	1.01	1.03
White horehound (<i>Marrubium vulgare</i>)	-	-	-	-	-	0.01	0.01
Other - see notes	0.013	2.01	-	0.04	0.011	-	2.074
Acres Grand Total	11.155	5.371	0.01	5.482	0.011	1.03	23.059

* Notes on other species are found in the Exotic Plant Activity Database (Appendix A).

Park and District Field Notes

Arches National Park

The biggest change to the exotic plant team in 2011 was the appointment of a seasonal employee, Clay Kark, to manage the vegetation surrounding the visitor center and leachfield. He worked tirelessly to control exotic species in those highly disturbed areas. This included many treatments of tumbleweed, puncturevine, and cheatgrass around the Arches Visitor Center and the adjacent leachfield. Also, in October many native plants were planted around the Visitor Center, and native seeds were raked into the soil around the Visitor Center and leachfield (see 2011 Restoration Reports).

The treatment of roadside sweetclover (*Melilotus* spp.) is another activity of note that occurred in 2011. Sweetclover had become the dominant species over much of the roadsides between the main road and Wolfe Ranch. Given our field observations of sweetclover in 2011, sweetclover should be treated more than once in a year due to its long germination period. One application in the spring and one application in the summer may be the most effective. The application of Milestone to sweetclover appeared to be highly effective this year.



FIGURE 3 Sweetclover treated with Milestone, spring 2011.

In addition to these treatment efforts, work continued in Courthouse Wash according to the Courthouse Wash Project Description. While the bulk of this project will be fulfilled in future years, 2011 labors included continued planning and a volunteer project. The Wilderness

Volunteers worked for four days in lower Courthouse Wash near Highway 191. During their time in Arches, the Wilderness Volunteers helped move and pile existing slash piles for future burning.



FIGURE 4 Wilderness Volunteers making slash piles for future burning project in lower Courthouse Wash.

Another ongoing project is the treatment of Russian knapweed (*Centaurea repens*) downstream of Freshwater Canyon in Salt Wash. Russian knapweed grows extensively throughout the entire Salt Wash drainage, with the largest populations being above Freshwater Canyon. Russian knapweed was inventoried in this drainage below Wolfe Ranch in 2011. Two new populations in that area were located and treated. Efforts to control Russian knapweed below Freshwater Canyon are being done with the intent that knapweed will be contained within the



FIGURE 5 A population of Russian knapweed inventoried and treated in 2011.

upper reaches of the drainage. These new knapweed populations were treated with Milestone (aminopyralid), which current research shows as the most effective herbicide for Russian knapweed control (Enloe, Kyser, Dewey, Peterson, & DiTomaso, 2008).

Canyonlands National Park – Island in the Sky District

The Island in the Sky was similar to Arches in that a seasonal employee, Clay Kark, was appointed to manage the vegetation surrounding the Visitor Center. Treatment of roadside sweetclover started in 2011 as well. While sweetclover had the highest density near the park entrance, it was found and treated throughout the park on roadsides (see title page photo). Given our field observations of sweetclover in 2011, sweetclover should be treated more than once in a year due to its long germination period. One application in the spring and one application in the summer may be most effective.

Canyonlands National Park – Maze District

During 2011 only one RSS employee was able to visit this district. There were no exotic plant treatments. One acre of *Halogeton glomeratus* was inventoried.

Canyonlands National Park – Needles District

In the spring of 2011 crested wheatgrass (*Agropyron cristatum*) along the Needles roadsides was treated with a ¾% solution of Rodeo (glyphosate). This treatment was only

partially successful and may be repeated using a 2-4% solution. The increased concentration of herbicide will likely control crested wheatgrass.

Utah Valley University Service Council led two expeditions to the Needles this year. Both trips were organized and overseen by Clay Allred. The focus of both trips was to create firebreaks under mature cottonwood trees in the Salt Creek drainage near the north end.



FIGURE 6 Dead tumbleweed removal in the Needles campground. intention of future burning upon completion of a burn plan.

Many acres of tumbleweed were treated with herbicide in the Needles this year. This is in large part due to a backcountry ranger, Brad Donaldson, obtaining a herbicide applicator's license. Brad and other Needles staff were able to treat many backcountry trails and roads

Tumbleweed, both dead and alive, was a major focus of exotic plant treatments this year. Clay Kark led a volunteer crew for one week removing large volumes of dead tumbleweed from the campground and leachfield area. The biomass from this project was moved to the maintenance bone yard with the

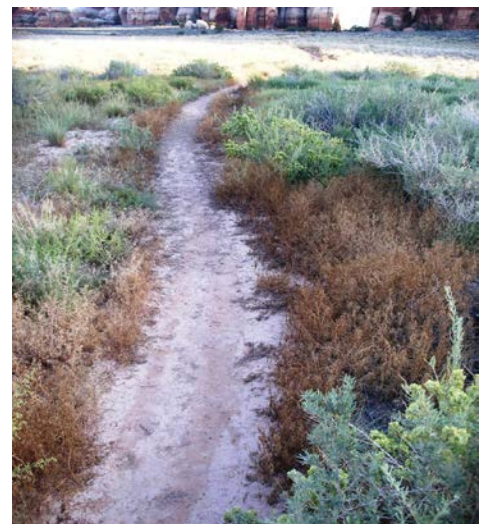


FIGURE 7 Chesler Park trailside tumbleweed treated in 2011.

and limited the growth and success of tumbleweed in high value recreation areas. In coordination with exotic plant management staff, much of the Chesler Park trailside and campsites were treated. Needles staff kept thorough records using the Exotic Plant Activity Database (Appendix A).

In addition to backcountry areas and the Needles campground, tumbleweed was treated in the Visitor Center leachfield. This one-acre treatment was designed as an experiment with 12 plots, each randomly treated with either Milestone or Rodeo. Photo quadrates were established using stakes in the center of each of the 12 plots for future monitoring. Two weeks after the treatment a slight difference was seen and photos were taken. Six weeks after the treatment the leach field was almost entirely overgrown with tumbleweed again, possibly due to the added moisture. Our efforts to take photos and follow through with this experiment were abandoned to pursue more pressing issues.



FIGURE 8 Needles Visitor Center leach field, one week after experimental design established.

Canyonlands National Park – River District

Exotic plants were treated on both the Colorado and Green Rivers in 2011 during one four day river trip. The trip started at Mineral Bottom, went as far downstream on the Colorado as Spanish Bottom, and concluded at the Potash boat ramp. Due to the unusually high water this year many populations and individuals were inaccessible or under water. However, Russian knapweed was treated at upper Anderson Bottom, the western side of the Loop, and the roadside near the mouth of Lathrop Canyon.



FIGURE 9 Russian knapweed population on the Loop, Colorado River, effectively controlled in 2010 with one treatment of Milestone.

Hovenweep National Monument

In 2011 fourteen acres of exotic plants were treated throughout Hovenweep National Monument. The majority of these treatments took place at the Goodman Point Unit, which seems to have the highest abundance of exotic plants in the disjunct units. In the spring and early summer Canada thistle (*Cirsium arvense*) and musk thistle (*Carduus nutans*) were identified using Weeds of the West (Whitson, 2009). These species were treated throughout the unit, with the highest concentrations being in the wash on the eastern half of the unit. In addition to Goodman Point treatments, clasping pepperweed (*Lepidium perfoliatum*) was pulled in the Square Tower Unit, tumble mustard (*Sisymbrium altissimum*) pulled in the campground, and white horehound (*Marrubium vulgare*) was sprayed on the roadside.



FIGURE 10 Musk thistle before and three months after being treated with Milestone.

Natural Bridges National Monument

The main treatment in Natural Bridges during 2011 was the application of herbicide to white horehound (*Marrubium vulgare*). White horehound occurs predominantly around the maintenance and housing area, with a population in the solar array field, and a population at the intersection of the main road and the loop drive. Horehound and tumbleweed were also treated near the treatment ponds.

Also, an interesting observation this year was the lack of tumbleweed. Where there was about a half acre with 25% foliar cover in 2010 around the maintenance yard, it was absent in 2011. Finally, one area of concern for 2012 is just after the entrance sign on the north side of the road (37°36'31.78"N 109°58'01.06"W) where approximately one acre of tumble mustard (*Sisymbrium altissimum*) occurs which may need to be treated in the spring and summer.

In addition to these treatments of herbaceous species, tamarisk (*Tamarix ramosissima*) was removed in Armstrong Canyon. The total area treated was less than a half acre, but this tamarisk was some of the last in Natural Bridges NM. Stumps were treated with Garlon (see Figures 10 and 11).



FIGURE 12 Tamarisk in Armstrong Canyon before treatment.



FIGURE 13 Armstrong Canyon after tamarisk treatment.

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Appendices

Appendix A – Exotic Plant Activity Database

