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RUSSIAN-OLIVE MITIGATION RECOMMENDATIONS FOR BOULDER COUNTY PARKS AND OPEN SPACE

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INTRODUCTION

Resource managers, with few exceptions, widely accept that Russian-olives (Elaeganus angustifolia) are noxious weeds with little ecological value. Russian-olive stands show reduced biodiversity as compared to native riparian vegetation (Knopf and Olson, 1984.) Russian-olives will often out compete native vegetation in arid regions. Riparian zones in arid regions appear to be most effected (Knopf, et. al., 1988, Howe and Knopf, 1991.) Reduced biodiversity occurs as a result of Russian-olives displacing native vegetation. Russian-olives are still being promoted for landscaping today.

Some birds such as the European starling, American robin and cedar waxwing and mammals such as the fox squirrel consume olives . However, bird species generally do not depend on olives as a food source as much as has been promoted. Apparently, the fruit holds little if any nutritional value.

The characteristics that make Russian-olives pests were the same qualities that inspired their introduction to North America. Russian-olives are extremely hardy shrubs that can survive in almost any soil type. Olives grow at a fast rate and reproduce very quickly forming a dense thicket. Soil conservationists have long promoted olives for soil erosion prevention. Russian-olives were also promoted for use, in the 1970's, for land reclamation. At Walden Ponds olives were used to stabilize the soil and attract wildlife during the reclaiming of gravel pits into wetlands. Russian-olives acted as a quick fix to the huge problems of top soil erosion. Now established, the Russian-olive is doing what all living organisms do, they fight for survival. Survive and flourish is the legacy of the Russian-olive.

As with other introductions of nonnative species, such as the Norway rat to North America, green tree snake to Guam, and the rabbit to Australia, the Russian-olive will require the dedication of many resources. Millions of dollars have been spent fighting introduced species such as weeds and other pest species. If only, they were not introduced in the first place. Russian-olive mitigation must begin immediately before habitats are effected more and the costs of control increases.

PUBLIC EDUCATION

Public education must be a part of any effort to mitigate the impacts of the Russian-olive. A recent survey of all newspapers and trade magazines in the U.S. and Canada (Lexus/Nexus, 1994) showed in the past two years 78% of articles written about Russian-olives were promoting their use. Titles like "Russian-olive Adds Touch of Silver to Gardens" was very common. Some resource managers do not yet understand the ramifications of introducing nonnative species. The New York State Department of Environmental Conservation promoted, in a recent article in their publication ***Conservationist***, planting

Russian-olives for attracting wildlife in a newly reclaimed wetlands area. Indeed this was a common theme in newspaper articles, how to attract birds to your yard by planting the sweet smelling Russian-olive. Most of the articles warning against the use of Russian-olives came from Dallas and Denver newspapers. The Russian-olive evasion is more problematic in arid regions than in more wet areas of the U.S. so it is not surprising to see more education occurring in dryer regions. However, many articles promoting olives did come from the western states including Colorado, Texas, Arizona, and California. The word still needs to get out.

1994 BOULDER COUNTY PARKS AND OPEN SPACE RUSSIAN OLIVE PROGRAM

In 1994 Boulder County Parks and Open Space (BCPOS) continued to address the problem of Russian-olives on Open Space properties. A survey was conducted on properties looking for the areas of highest concern. Vegetation studies were conducted to identify any plant associations that occur with Russian-olives. Criteria were developed identifying which Russian-olives should be removed which ones should remain. Russian-olives were then cut using the aid of volunteers and jail crews. Effectiveness of different stump treatments was studied to understand what the most effective way of preventing plant regeneration was.

VEGETATION ASSOCIATION SURVEY

Introduction

Walden Ponds Wildlife Habitat is a gravel mine reclamation site consisting of five ponds surrounded by wetlands. The initial phases of reclamation that occurred in the mid 1970's include the use of Russian-olives for attracting wildlife, and reducing soil erosion. Russian-olives were used because of their resistance to environmental extremes and their quick growth. A few trees planted, resulted in hundreds of trees twenty years later. Most of the work done in 1994 on Russian-olives was done at Walden Ponds.

Methods

Fifty-one Russian-olives were surveyed at Walden Ponds. Russian-olives were categorized into three different height categories and three different locations found along shorelines. Trees at all heights and bank locations were surveyed. Russian-olives subcanopy vegetation compositions of forbs, weeds, grasses, shrubs, and trees were measured.

Results

No differences occurred in vegetation density or composition under the canopies of Russian-olives when compared to the surrounding area. All vegetation that occurred under the canopies of olives was part of a larger vegetational community made up of the same plant composition. Sandbar willow (Salix exigua) occurred under 37% (n=51) of Russian-olive canopies (see table 1.) An even distribution of willows was found under all sizes and bank locations of Russian-olives. Plains cottonwood (Populus sargentii), Chinese Elm (Ulmus pumila), and Russian-olives were found growing subcanopy to 47% (n=51) of Russian-olives (see table 1.) All plains cottonwood and Chinese elm trees were found under Russian-olives less than 14 feet in height. Russian-olives taller than 13 feet had no subcanopy trees other than other Russian-olives. Plains cottonwood occurring under olives was evenly distributed throughout all bank locations (see table 2.)

Table 1. Russian-olive subcanopy summary.

Species	Found subcanopy to Russian-olives (N=51)
Tree (Cottonwood, Elm or Russian-olive)	47.1%
> 1 Tree	15.7%
Salix spp. (Sandbar or Coyote Willow)	37.3%

Species	*Occurence (n=51) Under Russian-olives	Occurence (n=32) of trees found	Russian-olive Height Range
Plains Cottonwood	27.5%	50.0%	100% (n=16) < 14'
Russian-olive	21.6%	34.4%	81.8% (n=11) > 10'
Elm spp.	7.8%	15.6%	found throughout

*Includes multiple subcanopy trees.

Table 2. Bank level and Russian-olive height comparison for plains cottonwood locations.

Bank Location	Russian-olive Heights < 14'	Cottonwood Found Per Bank Location
Edge	68.4% (n=19)	36.8% (n=19)
Mid	86.7% (n=15)	46.7% (n=15)
Upper	33.3% (n=9)	22.2% (n=9)

Discussion

It appears that Russian-olives do not affect the surrounding forb, weed, and grass vegetation communities. The plant community surrounding the trees was also found underneath the Russian-olive canopy. Neither Russian-olive size nor bank locations altered the forb, weed or grass community composition as compared to the surrounding area. Willows occurred underneath all different sizes and bank locations of olives. Sandbar willows are generally considered shade tolerant shrubs thus better competing with the larger Russian-olive for sunlight. It appears that Russian-olives have no obvious effects on subcanopy willows.

Russian-olives appear to have an effect on native tree species. Plains cottonwoods only occurred subcanopy to Russian-olives under 14 feet in height. It appears that mature Russian-olives out compete the plains cottonwood for sunlight as the Russian-olive tree's canopy becomes increasingly denser. It has been observed in many other sites (Knopf, et. al., 1988, Howe, Knopf, 1991) that Russian-olives do out compete plains cottonwood.

Interestingly, the young cottonwoods are more shade tolerant than more mature cottonwoods. This is expected because young cottonwoods must often initially compete with shrubs and tall grasses as it becomes established.

RUSSIAN-OLIVE MANAGEMENT RECOMMENDATIONS

The long term goal is to remove all Russian-olives off Open Space lands. Mature olives should be made into snags to add to wildlife habitat. Russian-olives still provide benefits of reducing soil erosion and providing cover for wildlife. It is recommended that all Russian-olives be removed by the criteria listed below. Removal should be done gradually allowing native species to replace cut trees.

Removal of Russian-olives (by priority) that:
1. Occur along ditches or streams that facilitate the spread of Russian-olives downstream.
2. Occur in wetland areas.
3. Girdle/cut all trees greater than 13 feet.
4. Competing with native species.
5. All others.

Allow Russian-olives to remain temporally until replaced by natives if they:
1. Provide benefit to park user by providing shade at picnic sites, benches etc.
2. Block views of buildings/parking lots etc. increasing aesthetics for park visitors.
3. Are the only source of cover for wildlife in the area.

All Russian-olives that do not benefit wildlife or park users should be removed. Native vegetation should be planted where Russian-olives are removed. All olives remaining should have native trees planted around them to eventually take their place. It is recommended that by the year 2000 all Russian-olives should be removed from Boulder County Parks and Open Space properties.

1994 CUTTING RESULTS

In 1994 over 400 Russian-olives were cut at Walden Ponds and the Fairgrounds following the criteria stated above. Volunteers as well as jail crews were used to cut and girdle the trees. Many cut trees were used to improve fish habitat in the lakes at Walden Ponds. The remaining trees were mulched.

A similar removal effort should occur next year. Hopefully in 1995, the resource crew can be used in a concentrated effort for removing Russian-olives. The scope of tree removal should extend beyond Walden Ponds onto all properties. A prioritized list of properties for tree removal should be made.

Table 3. Regeneration rates from stump-treated Russian-olives.

Treatment	% Trees Regenerated OR No Signs of Dying
CUT-DIESEL	90 (n=29)
CUT-RODEO	58 (n=36)
CUT-CONTROL	100 (n=5)
CUT-DIESEL then regeneration CUT-RODEO	0 (n=5)
GIRDLED-DIESEL	50 (n=2)
GIRDLED-RODEO	0 (n=4)
GIRDLED-CONTROL	100 (n=1)

REGENERATION RATES COMPARING DIFFERENT STUMP TREATMENTS

Introduction

Russian-olives are notoriously vigorous plants. If cut down the plant will often regenerate into a large bush with vertical limbs emerging from the trunk or from the root base. Obviously, if so much effort has been put into cutting the tree down then it should be killed. BCPOS experimented with applying common diesel fuel or full strength Rodeo to cut stumps or girdles.

Methods

Eighty-four of the trees that where cut/girdled at Walden Ponds had diesel, Rodeo or nothing applied to cut areas. At least two months after the application the trees were examined for signs of regeneration. Treatments were applied directly to all of the cut/girdled areas of the tree. Rodeo was applied by spray bottle, enough to completely cover the cut area. Diesel was directly applied to the cut area and then spread around by a rag, enough to cover area cut. All treatments were applied immediately following the cut. Girdles were made less than six inches above the ground.

Results

All Russian-olives (100%) cut in the control group (no treatment applied) regenerated. No trees girdled in the control group appeared to be affected by the girdling. Of those Russian-olives in the diesel treatment group, 10% (n=29) did not regenerate (see table 3.) Regeneration did not occur with 42% (n=36) of trees in the Rodeo treatment group. There was a 100% (n=5) non-regeneration rate with an application of diesel after the initial cut and then a Rodeo application after the regeneration was cut.

One hundred percent (n=4) of Russian-olives that were girdled and treated with Rodeo showed signs of dying, i.e., leaves and fruit wilting and prematurely falling (see table 3.) Girdled Russian-olives with diesel applications showed no signs of dying in 50% (n=2) of trees.

Discussion

It appears conclusive that Rodeo treatments are more effective than diesel treatments at stopping regeneration from occurring. Data supporting girdling treatments is less conclusive due to the sample size. All trees should be revisited the following growing season to see if they are truly dead or if they begin to regenerate.

Of the two treatments Rodeo, being rated for wetland areas, is the logical choice. Petroleum products do not degrade and will always remain in the area applied even thought the quantities used are very small. City of Boulder Open Space and Real Estate and the City of Boulder Mountain Parks are studying regeneration rates on olives also. Similar results were found with Rodeo applications on cut trees (Dieter, pers. comm.) with a 40% non-regeneration rate. However, the City found diesel to be effective about the same rate as with Rodeo, a much higher non-regeneration rate than what was found in this study. City Open Space is also looking at other herbicide treatments. The City of Boulder Mountain Parks is looking at a magnesium salt application for Russian-olive treatments (Armstrong, pers. comm.) The results should be interesting.

The City also was having success at preventing regeneration by first girdling, with a treatment, the Russian-olive and then coming back the second year and cutting the tree down. Different combinations need to be explored. A 40% kill rate is not acceptable when looking at the sheer volume of trees that need to be removed.

Pulling the tree out by the roots proved to be the most successful method of Russian-olive removal without regeneration. Weed wrenches worked well for this project. Due to their size, trees greater than the diameter of a soda can must be removed by another method other than weed wrench. Larger trees can be removed by tractor but in wetland areas this proves to be impractical. Pulling trees has the added benefit of not introducing any chemical or petroleum products into the environment. This method should be used when ever possible.

CONCLUSION

A concentrated effort needs to be made to reduce the negative impacts Russian-olives have on the environment. Trees that serve no wildlife or park user needs should be removed. Native tree should be planted in their place. All trees should be removed by pulling if possible. Otherwise some type of treatment that will not allow regeneration to occur should be used. Combinations of girdling and multiple cutting should be explored to find out the most economical and efficient way of permanently removing olives. Public education must be an integral part of any Russian-olive mitigation program. Tree eradication will only be successful if all tress on both private and public lands are removed and no new Russian-olives are planted for landscaping purposes. Russian-olive removal is a long term project but by beginning now the long term costs will decrease.

REFERENCES

Howe, W.H., and Knopf, F.L. 1991. On the Imminent Decline of Rio Grande Cottonwoods in Central New Mexico. The Southwestern Naturalist 36(2):218-224

Knopf, F.L., and Olson, T.E. 1984. Naturalization of Russian-olive: Implications to Rocky Mountain Wildlife. Wildl. Soc. Bull. 12:289-298

----------, et. al. 1988. Conservation of Riparian Ecosystems in the United States. Wilson Bull.,100(2),pp.272-284