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INTEGRATED WEED MANAGEMENT

A. Impacts and Importance of Management of Noxious and Invasive Plant Species

Exotic invasive weeds are moving across the western United States like wildfire and are creating significant negative impacts on rangelands, riparian zones, wildlife habitat, recreation sites and entire watersheds. Most of the weeds which are invading U.S. rangelands originated in Europe and Asia. Many were introduced to the United States during the nineteenth century and are spreading rapidly. When these plants were in their ecosystems of origin they were not a problem because they evolved with natural controls, such as plant pathogens, fungi, insect predators or other competing plants and grazing. Plant species that arrived in North America without those natural control agents have invaded and thrived. The exotic, invasive plant species out compete the native plant communities, creating monocultures that can reduce biological diversity, increase wind and water erosion, decrease capture, storage and proper release of precipitation, reduce or even totally alter the grazing capacity of the rangelands, negatively affect recreational opportunities, alter the soil composition, and ultimately affect entire ecosystems.

Weeds prefer highly disturbed sites such as pipeline and linear disturbances, roadsides, trails and trailheads, building sites and new developments, river and stream banks, overgrazed areas and recreation areas. The disturbance opens a niche (bare soils) for the weed seed distribution. The weeds are spread by many vectors, including vehicles, equipment, wind, recreationists, waterways, animals, and weed contaminated gravel. Ultimately, well managed land with healthy vegetation is the best defense against the spread of weeds. However, even well managed land is susceptible to exotic, invasive weed invasion when natural disturbances (such as flooding, drought, wind erosion or even wildlife impacts) open niches in the plant community and distribute weed parts and seeds.

B. Legal Requirements

Legally, a noxious weed is any plant designated by a federal, state, or county government to be injurious to public health, agriculture, recreation, wildlife or any private or public property. In this text,

"noxious" refers only to those exotic and invasive weeds that have been designated by a governing legal entity as "noxious", and require some form of management. This Integrated Weed Management Plan (IWMP) will address those invasive plant species which have been identified by applicable governing authorities as well as discussing other species of concern which are not currently designated as "noxious".

At this time there is a pyramid of federal, state, local laws and governmental regulations that address invasive and noxious weed species. Federal law often provides only a regulatory "base" to which state, local and other entities add further requirements. Colorado's state laws regarding noxious weed control fill the gaps and supplement the federal law. However, if there is a conflict between state and federal law, the federal law will supersede state laws. Las Animas County follows federal and state laws that are in place.

B.1. Federal Authority

President William J. Clinton signed the "Invasive Species" Executive Order on February 3, 1999. It along with the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), Lacey Act, as amended (18, U.S.C. 42), Federal Plant Pest Act (7 U.W.C. 150aa et seq.), Federal Noxious Weed Act of 1974, as amended (7 U.S.C.2801 et seq.), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) intends to prevent the introduction of invasive species and provide for their control and to minimize the economic and human health impacts that invasive species cause.

The order further stipulates that each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law and subject to the availability of appropriations, use relevant programs and authorities to:

- Prevent the introduction of invasive species
- Detect and respond rapidly to and control populations of such species in cost effective and environmentally sound matter
- Monitor invasive species populations accurately and reliably
- Provide for restoration of native species and habitat conditions in ecosystems that have been invaded
- Conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species
- Promote public education on invasive species and the means to address them

An Invasive Species Council was established, whose duties are to provide national leadership regarding invasive species and to prepare and issue a National Invasive Species Management Plan.

B.2. State Authority

The Colorado Noxious Weed Act CRS Title 35 Article 5.5, "declares that there is a need to ensure that all the lands of the state of Colorado, whether in private or public ownership, are protected by and subject to the jurisdiction of a local government empowered to manage undesirable plants as

designated by the state of Colorado and the local governing body. In making such determination the general assembly hereby finds and declares that certain undesirable plants constitute a present threat to the continued economic and environmental value of the lands of the state and if present in any area of the state must be managed." The Act further directs that each county in the state shall adopt a Noxious Weed Management Plan for all unincorporated land within the county.

Colorado's Noxious Weed List is classified into four divisions: Class A, Class B, Class C and Watch List weeds, all of which are non-native to Colorado. This is discussed in detail in Section I.D.1 "State of Colorado Noxious Weed Species".

B.3. County Authority

The Board of County Commissioners of Las Animas County, State of Colorado has appointed, Bob Lucero, as weed coordinator of the county. Currently they are trying to follow the Colorado Noxious Weed Act CRS Title 35 Article 5.5.

C. Integrated Weed Management Philosophy and Principles

C.1. General Weed Management Philosophy

Noxious and invasive weed control is a necessary part of any restoration and management plan, in order to restore and maintain native species and communities of the environmental system. There is no silver bullet solution, nor is there one right way to solve our noxious and invasive weed problems. The general weed management philosophy of this plan is based on restoring a healthy plant community within the project site, rather than on simply eliminating weeds.

An ecosystem with an invasive species infestation can be the result of many underlying causes of plant succession in disrepair. Using a modified EBIPM Model (Ecologically-Based Invasive Plant Management), this IWMP will focus on understanding how plant communities work and change, and then will develop the management plans based on that understanding. The following steps are the basis for the EBIPM:

Step 1: Complete a Rangeland Health Assessment through a Weed Inventory

Step 2: Identify the Cause of the Invasion and the Associated Ecological Processes Not Functioning

Step 3: Use Principles to Guide Decision Making and Prepare Plan

Step 4: Choose Appropriate Treatments and Strategies

Step 5: Evaluate the Success of the Plan and utilize Adaptive Management in altering and updating the Treatments and Strategies

C.2. General Integrated Weed Management Treatments and Strategies

An abundance of weeds is often symptomatic of certain environmental conditions. This IWMP realizes the importance in understanding and dealing with the underlying causes of weed infestation, and will take steps to counter them. A single control technique is rarely sufficient to control a particular noxious weed species and therefore this plan will use an integrated weed management strategy. As used in this IWMP, Integrated Weed Management (IWM) is the process by which one selects and applies a combination of management techniques that, together, will control a particular weed species or infestation efficiently and effectively.

The choice between eradication, suppression, or no action after detecting an invading plant species depends on the plant's potential impact. If the plant is listed on federal, state, or county noxious weed lists, then established management plans may dictate the appropriate action. If the plant is unlisted, then other criteria may have to be used to determine treatment strategy.

The following are general descriptions of integrated weed management treatments and strategies. Specific treatments and strategies for this area will be discussed in Section VI, "Weed Management Recommendations"

Prevention

Prevention the introduction of noxious weeds is the most practical and cost-effective method for their management. New weed introductions can be minimized by adopting as many prevention practices as possible. Some strategies for preventing noxious weeds from spreading include:

- Implementing and educational awareness program
- Limiting weed seed dispersal
- Containing neighboring weed infestations
- Minimizing soil disturbances
- Detecting and eradicating weed introductions early
- Establishing competitive grasses and vegetation
- Properly managing desirable vegetation

Revegetation

Most weeds are opportunistic and become established following a disturbance or opening in the canopy. Thus, it is very important to cover the soil with dense, vigorous vegetation to prevent the establishment of noxious weeds. Since weed treatments often disturb the soil, open the canopy, or leave bare soil, revegetation after treatments is crucial in suppressing weed seedlings and preventing weed infestations from reoccurring. In some situations it may be possible to encourage desirable vegetation that is already in place, but because of the aggressive nature of most noxious weeds, it is more likely that it will be necessary to thickly sow seeds of desirable, competitive plants.

Weed Management Controls

Integrated Weed Management is a process by which one selects and applies a combination of management techniques or controls, including biological, mechanical, cultural, and chemical. Together, and over time, these techniques can control a particular weed species or infestation efficiently and effectively, with minimal adverse impacts to non-target organisms or other components of the ecosystem.

Biological Control

Biological control aims to keep the weeds at a low, manageable level. Usually, biocontrol alone will not eradicate an infestation. After their introduction, biocontrol agents can take time to become established and increase to numbers large enough to cause damage. Once established, biological controls provide an inexpensive, long-term, and non-toxic means to control weed populations.

Grazing

Grazing is a biological alternative to mowing. Continual grazing of the tops of young plants can retard development and seed formation and can gradually deplete root reserves. Unfortunately, animals might prefer to eat nearby grasses in lieu of the target weeds. Enclosing the grazer in a fenced-off weed infested area, or strictly managing the placement and timing of the herd is very important to the success of the treatment. Goats, sheep and cattle are economical and they do not pose the environmental dangers of applying chemicals.

The use of animals to control weeds can be effective. If the grazing program is not managed by trained professionals, knowledgeable in weed identification and intensive grazing techniques, the grazing strategy can be compromised and even become detrimental.

Physical Controls

Pulling weeds by hand is practical and efficient on small, isolated patches of weeds and is most effective on annuals and biennials that do not resprout from root fragments. Since perennial weeds can resprout from extensive root systems, hand pulling is not practical.

Mechanical strategies, such as mowing help control weeds by preventing seed production by gradually depleting root reserves with repeated treatments. Mowing is less effective on prostrate or low growing weeds that can simply grow beneath the mowing height. Mowing cuts the tops of plants, which may lead to additional bud growth and stem production. Continuous mowing when plant reserves are low gradually depletes root reserves and can be an important component in an IWMP. If flower-feeding biocontrols are used, weeds can still be mowed at times when natural enemies are not feeding. Mowing can also be very advantageous on areas where previous weed growth is extremely dense. This exposes the actively growing portion of the weed, allowing the herbicide more surface area to contact.

Tilling and disking mechanically removes weeds from the soil, slices through roots, or buries weeds. Deep tillage of taprooted plants in late fall exposes roots to deadly winter frosts and interferes

with the translocation of nutrients to roots for storage. Keep in mind, however, that in many areas the disturbance caused by cultivation creates a niche for new weeds to become established.

Cutting is used primarily for woody plants. It minimizes soil disturbance and involves tools such as brush cutters, chainsaws, axes, machetes, hand pruning tools, loppers, and clippers. Smaller shrubs can be cut with power mowers, string cutters, machetes, scythes, or weed whips. When plants are cut, roots remain intact and are helpful in stabilizing soil on steep terrain.

Cultural Controls

Cultural Controls include and management and farming practices that inhibit weed growth and prevent conditions that lead to weed establishment. Cultural controls also seek to control weed problems by establishing desired plant species.

Herbicide Controls

Herbicide use is an integral part of a management system. Properly used herbicides are a key to the long-term success of rangeland and weed management and will decrease the population of undesired plant species. Even if target weeds are not killed by herbicide applications, their vigor, seed production, and vegetative reproduction will usually be reduced. Selective herbicide control targets a particular type of vegetation, such as broadleaf plants. Nonselective herbicide application targets all types of vegetation, but has no soil residual effects. Total vegetation management is a type of herbicide treatment that is not selective and also inhibits seed germination, which is known as “bareground”.

D. Priority Weed Management Plan and Identified Species on Wapiti Operating, LLC Field:

Wapiti Operating, LLC will be using Southeast Colorado Environmental Service to do annual spraying of the Class B, Class C and a few nuisance weeds that have been identified, sprayed and GPS locations given throughout the Wapiti Operating, LLC gas field operations in the Raton gas field locations. Southeast Colorado Environmental Service also recommends a fall application on Canada Thistle and Diffuse Knapweed to get a better control on these two species.

1. Overview of Approach to Weed Management
   Weed control is part of property management. This plan is based on the desired plant species and communities, rather than on simply eliminating weeds. Preventive programs are implemented to keep the management area free of species that are not yet established, but which are known to be pests elsewhere in the area. Priorities are set to reduce or eradicate weeds that have already established on the property, according to their actual and potential impacts on the land management goals for the property, and according to the ability to control them now versus later. Actions will be taken only when careful consideration indicates leaving the weed unchecked would result in more damage than controlling it with best available methods.

The plan follows the adaptive management approach. First, weed species are identified through inventory of the property and by gathering information from other sources. Second, land management goals and weed management objectives are established and recorded for the property. Third, priorities are assigned to the weed species and weed patches based on the severity of their impacts, while considering the ability to control them. Fourth, methods are considered for controlling them or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fifth, Integrated Weed Management (IVM) plans are developed based on this information. Sixth, the IWM plans are implemented. Seventh, the results of management actions are monitored and evaluated in light of weed management objectives for the management area. Finally, this information is used to modify and improve weed management objectives, control priorities, and IWM plans, thereby starting the cycle again. The premise behind a weed management plan is that structured, logical approach to weed management, based on the best available information, is cheaper and more effective than an ad-hoc approach where one deals with weed problems as they arise.

- Noxious Weeds List B that will be sprayed on road ways, pipelines and pads:
    a. Bull thistle (Cirsium vulgare)
    b. Canada thistle (Cirsium arvense)
    c. Diffuse knapweed (Centaurea diffusa)
    d. Hoary cress (Cardaria draba)
    e. Houndstongue (cynoglossum officinale)
    f. Musk thistle (Carduus nutans)
    g. Plumeless thistle (Carduus acanthoides)
    h. Russian knapweed (Acroptilon repens)
    i. Salt cedar (Tamarix chinensis)
    j. Scotch thistle (Onopordum acanthium)
    k. Yellow toadflax (Linaria vulgaris)

These 11 species have been identified and will be sprayed within the Wapiti Operating, LLC gas field by Southeast Colorado Environmental Services LLC (SCES).

- Noxious Weeds List C that have been identified and sprayed within the Wapiti Operating, LLC gas field:
    a. Common burdock (Arctium minus)
    b. Common mullein (Verbascum Thapsus)

- Nuisance weeds that have been identified and sprayed within the WAPITI OPERATING, LLC gas field
    a. Russian thistle common name tumbleweed
    b. Koshia

2. Controlling above weeds with chemical compounds.
   All of the above weeds can be eradicated or controlled by using specific chemicals depending on specific weed species. SCES realizes we have an extensive problem with biannual noxious weeds and perennials that are not being controlled on a four-year rotation within the Vermejo Park gas field areas in Colorado. We fill that we need to spray these species in May and June before they bolt up and produce more seeds. The species that have been overlooked in prior years to SCES becoming the weed sprayer and manager. We fill the best possible mix for the variety of noxious weeds is a mixture of Milestone, Trumpcard, Escort, Telar XP and Dyne-mic depending on weeds that are being sprayed.

Southeast Colorado will be there to advise and control these weeds to keep Wapiti Operating, LLC within compliance of Colorado weed laws, Colorado Oil and Gas Commission, Division of Wildlife, and private landowners.