Wildlife Considerations When Planning Plant Projects

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Abstract

Foraging wildlife can frustrate efforts to develop forest sites, exploit plantings of natural vegetation, or even disrupt attempts to establish wildlife habitat. Often plants targeted for restoration projects also are those species most desirable as wildlife forage. This paper summarizes potential wildlife concerns when planning a planting project, along with an overview of means to alleviate problems. Wildlife species common to the Pacific Northwest likely to consume plant projects are described. Barriers, repellents and habitat modification also are described as possible approaches to alleviate problems. The advantages and disadvantages of these techniques are presented, along with factors to consider when selecting techniques.

Keywords

barriers, foraging, habitat, repellents, wildlife

Introduction

Native plant projects are developed to achieve a variety of desirable goals. A project's directive may be to enhance forest diversity, improve riparian areas, re-vegetate disturbed sites, restore endangered or threatened plants, or to create wildlife habitat. Regardless of the objective of the project, wildlife generally benefit through improved cover or increased forage availability. It is often uncertain, however, whether the benefit will be long-term through established stands or merely a meal. Wildlife can be detrimental to a project particularly if animals make use of the plantings before they are well established or if the use is severe. Interspersed western red-cedar can add diversity to a forest stand or, when encountered by wildlife soon after planting, add diversity to an animal's diet. Seedlings planted to restore riparian habitat also serve well to fill the food cache of a beaver colony. A rare plant can easily become dessert for a goat. Habitat projects targeted to provide wildlife cover in ten years can be quickly converted to a meal supplement by a herd of migratory elk.

Several steps need to be considered to implement a successful program to reduce wildlife impacts on plant resources. First, determine whether there is likely to be a problem. Second, if a problem is likely to occur, evaluate possible approaches to alleviate the problem and select feasible options. Third, develop a strategy to incorporate the selected options into a program. The fourth step is to implement the program, and the fifth is to monitor the consequences of the program. This paper summarizes information provided in the manual "Materials and Supplies for Management of Wildlife Damage to Trees". The manual can be obtained by contacting the USDA Forest Service MTDC (406-329-3900) and requesting publication 2642-2808-MTDC. The complete citation for this publication and other related materials is provided in the bibliography.

Problem?

Do wildlife species pose a problem for plant projects? Not necessarily, however, the potential impacts of wildlife need to be considered when planning plant projects. The intensity or severity of impacts caused by wildlife will reflect the species and density of animals present, along with existing habitat. Whether these impacts create a problem depends on the objectives of the project and the resources available to complete it. Wildlife will not be a problem for projects with unlimited resources and time. The repeated plant and replant method will ultimately lead to success. However, wildlife can be devastating to projects with goals that require initial plantings to reach maturity.

Assessing the potential for a problem is simple if there is a history of similar projects in the area. Merely verifying past successes and reasons for failed projects ought to be adequate. Projects being established in new areas will require some knowledge of the species and habitat present and how the project will alter the dynamics of the current plant and animal interactions. Existing favorable habitat does not ensure that new plants will not be targeted by foraging wildlife. Foraging is relative and the desirability of planted species will dictate whether they are ignored or become lunch.

Visual sightings of most wildlife species is rather rare, thus species generally need to be identified through activity indicators. Activity indicators, such as tracks or fecal material, for a variety of species are described in numerous texts or field guides and are readily recognized after minimal experience in the field. For example, if traversing a clear cut is difficult because the surface keeps caving, then you are probably amongst mountain beaver. Fresh digging, or fresh vegetation and debris near burrow entrances, indicate an active system. The most conspicuous signs of snowshoe hares hare activity are their tracks and fecal pellets left throughout the damaged site. Pocket gophers leave mounds of dirt and their burrows also will collapse if stepped on, though not as deep as those of mountain beaver. Voles leave distinct trail through the grass, interspersed with small burrow openings. Areas with high populations of ungulates generally contain game trails. Although not s physical sign the migratory patterns of ungulates can usually be learned from people familiar with the area.

Plants browsed or chewed by wildlife generally contain marks indicative of the culprit. A diagonal cut is typical of rodents. Girdling by mountain beaver is generally low on the bole; they leave horizontal tooth marks and irregular claw marks. The species can sometimes be identified by the size of the clipped stem or tooth indentations. Snowshoe hares tend to prefer feeding on seedlings less than 1/4 inch in diameter. Conical-shaped stumps and large wood chips at the base of stumps are good indicators of beaver damage. Peeled sticks with uniform horizontal tooth-marks are also generally found in the vicinity of beaver activity. Prime indicators of porcupine activity are bark chips, clipped needles, quills, and fecal materials at the base of damaged trees. Pointed stems on clipped seedlings, and small whorled or circular marks on girdled seedlings are characteristic of seedlings clipped and girdled by voles. Pocket gophers clip small seedlings at or near ground level; damage to roots, however, may go unnoticed until seedlings tip over or become discolored. Deer and elk often splinter woody stems and the bark is stripped from twigs. Elk may pull newly planted seedlings or seedlings without well-established root systems out of the ground.

Preventive Measures

The most appropriate approach to reduce animal foraging needs to reflect the overall objectives of the manager, as well as the conditions of the specific problem. All techniques are not feasible or appropriate for all situations. No action may be the appropriate action if the problem is relatively minor. A few preliminary considerations will increase the success of a program. Check on the legal ramifications for any action selected, and ascertain that the action will not be potentially hazardous to non-target species, in particular to endangered or threatened species. An effective approach will require familiarity with the behavioral traits and biology of the target species. Assess how the environmental conditions of the site will effect the selected method and the consequences of the action to the environment. Determine whether the selected methods will achieve an acceptable degree of protection, and whether the situation warrants the anticipated expense. Public attitudes also need to be considered when selecting an approach.

Physical Deterrents

Physical deterrents can be installed to prevent animal entry to general project areas or to impede access to specific plants. The species and behavioral attributes of the animal(s) inflicting the problem will dictate the design of a barrier. For example, a short compact barrier may protect a seedling from pocket gopher damage but provide no protection against deer browsing or antler rubbing. Conversely, an extensive fence may deter deer, yet fail to reduce damage by pocket gophers.

Exclosures

Fences to keep out elk and deer should be a minimum of 8 feet and preferably 10 feet tall. Woven wires are much more effective at deterring ungulates than are strands of smooth or barbed wire. A combination of woven wire with strand wire installed immediately above it to provide additional height can be effective. An electrified fence provides much better protection than a similar non-electrified fence. Building a double or slanted fence adds depth making the fence more difficult for ungulates to jump over. Flagging should be attached to make wire fences more visible to animals. A series of small intermittent exclosures (10 x 10-m) may be more effective for ungulates than an extended barrier. The smaller exclosures will not block access to resources or impede the migratory movements of animals as severely as the large exclosures.

Woven wire or solid fences are necessary to restrict rodent movements. The effective size of weave is dependent on the species of rodent. The bottom of the fence should be buried or fastened tightly to the ground to stop non-burrowing rodents. For burrowing rodents, such as pocket gophers and mountain beavers, the fence needs to be buried at least one meter below the soil surface. At the bottom the wire should be bent outward and upward, like a "J". The cup of the "J" needs to be approximately 15-cm wide with a minimum of a 7-cm lip. The "J" is installed because burrowing animals may dig downward along the outside of the buried fence. When they encounter the "J", it prevents them from continuing down and under the fence. An electrical wire or a slick sheet of metal (20-cm) fastened along the top will prevent most rodents from climbing over a fence.

Netting can be used to construct temporary exclosures. Supports do not need to be as durable or as strong as those used for conventional fences. Netting can be hung from metal fence poles to create a barrier for deer and elk. Ungulate and bird depredation of seed beds can be restricted by hanging nets over supports to create tent-like structures. A series of inverted U's constructed out of plastic pipe work well to support nets.

A primary benefit of exclosures is that they protect resources for extended periods and are generally not dangerous to the physical well-being of wildlife or humans. However, some wildlife species can injure themselves if they run into or become entangled in wire or netting. The cost and labor required to construct and maintain exclosures are the major disadvantages. Netting is less expensive and easier to install than conventional fencing.

Individual Barriers

Individual seedlings or portions of their root system, stems or foliage can be covered to prevent chewing by wildlife. Currently, tubes are produced from a variety of materials, including cardboard, metal, paper, plastics.

Cone-shaped wire will reduce bird and rodent access to newly planted seeds and young seedings. Bud-caps placed over terminal buds will reduce browsing damage by ungulates. Metal or plastic collars wrapped around the base of a tree will discourage rodents from climbing. Seedlings or seed beds also can be covered with existing debris, such as tree limbs.

Advantages or disadvantages of individual barriers depends largely on specific circumstances. Properly installed individual barriers can protect most plants. They are generally not hazardous to humans or wildlife and they do not restrict wildlife access to other forage. Some barriers are relatively inexpensive and require minimum skill to apply, others are quite expensive. Reduced competition is good for plant growth, but the altered microclimate induced by some barriers will have varied impacts. The high humidity in some tubes may increase problems with foliage diseases. Improperly selected or poorly installed barriers can cause seedling deformities or increase seedling mortality. Conical protectors need to be removed as the seedlings grow or they will interfere with growth and cause deformities. Debris can effectively deter ungulates, but also provides protective cover for small mammals and may inadvertently increase damage by rodents.

Repellents

The likelihood of a particular plant to being eaten by foraging animals depends on its own palatability, along with the availability and relative desirability of alternative foods. Repellents can be applied to plants to render them less attractive than the alternative foods. In theory, animals then select for plants or foraging areas other than those protected with repellents.

The avoidance of repellents by wildlife may be innate or acquired through a conditioned food aversion. Repellents that elicit initial avoidance are generally either irritants or those that evoke a "fear" response. These repellents require no prior encounters to elicit avoidance behavior. Irritants stimulate trigeminal pain receptors. Fear-inducing repellents are usually animal waste products or predator scents. Degrading waste products and most predator urine emit sulfurous odors.

Conditioned food aversions occur when ingestion of a novel food is paired with nausea or gastrointestinal distress. Thus, any flavor paired with gastrointestinal distress can become an effective repellent. Efficacy of repellents based on conditioned aversions, however, is generally limited because animals must be trained to avoid these materials. Further, the stimulus must be novel for animals to form a strong aversion. Damage inflicted to seedlings during training or subsequent sampling can be extensive. The use of conditioned-based repellents is especially problematic if the damage is inflicted by a transitory or migratory species (i.e., elk moving from summer to winter ranges).

Wildlife responses to repellents vary among individuals, as well as among species. Obviously, responses to repellents that require training will reflect each animal's prior experience. Less obvious, however, are response differences that occur because some species are more responsive to certain stimuli than others. Sensitivity to "irritating" agents varies among species. For example, mammals tend to avoid capsaicin, while birds are indifferent to it. Conversely, low concentrations of anthranilates are irritating to birds while similar concentrations are not offensive to mammals. Response differences among wildlife species to chemical stimuli also reflect their foraging strategies. Omnivores (e.g., bears, humans) avoid bittering agents, while most herbivores (e.g., deer, pocket gophers) are indifferent to them, unless the agents have been previously paired with nausea. Likewise, carnivores, such as coyotes and bears, are attracted to sulfurous odors, while most herbivores tend to avoid substances with those odors.

Textural repellents may provide an alternative to chemicals. Beaver greatly reduced their gnawing on tree segments painted with textural repellents during a pen study. Textural repellents used in the study were simple mixtures of sand and alkyd paint (140g/l). Untreated stems or stems painted with untreated paint were severely damaged during a two-week trial, but treated stems received minor damage. Eight of 10 beavers completely avoided stems painted with a mixture of paint and 30 mil sand, and gnawing by the other two beaver was very limited.

An effective program to reduce wildlife foraging through repellents depends on

the relative desirability of the resource to be protected and the availability of alternative forage. Preferred plants (e.g., western red-cedar) are more difficult to protect than plants that are not preferred (e.g., foxglove). An abundance of alternative forage permits animals to readily direct their consumptive behavior towards other plants. After treatment, an animal's foraging choices will depend on the size of the protected area relative to its territorial boundaries. Species with vague or extensive territories, such as deer, can more easily move to new areas to forage than can species (e.g., pocket gopher) with small and more rigid territorial boundaries. Foraging pressure on protected plants also depends on the presence and densities of wildlife species. Competition among species may cause animals to be less selective. Likewise, high population densities may limit foraging alternatives, rendering repellents less effective.

An advantage to using repellents is that they are generally not harmful to wildlife or to humans. Depending on the cost of the repellent and the need for repeated applications, this approach can be expensive and labor intensive. Animals tend to habituate to most products fairly quickly. Some repellents may be hazardous to humans if not handled carefully, or detrimental to the environment if not applied correctly.

Habitat Modification

Habitat modification to reduce damage generally requires a reduction in resources to encourage animals to move out of an area, or an increase in resources to limit the use of the planted crop. Valuable habitat resources for a given species include food quality and quantity, and desirable cover to provide nesting material, thermal regulation, and hiding or escape routes from predators.

Over time, animal populations will decline with a reduction in favorable habitat. However, if the target plant is established too soon after habitat depletion it will likely be a limited, thus valuable, resource and probably consumed. Another factor that needs to be considered is the fate of the displaced animal. This approach works well if the animal is transitory and can easily locate suitable alternatives. Less mobile species or species with strict habitat requirements are less likely to re-locate successfully. Abrupt habitat changes for these species probably becomes lethal removal, and more humane methods should be considered if population reduction is the objective.

Providing wildlife with viable alternative foraging options can alleviate foraging pressure. Desirable foods can be distributed across problem areas or on adjacent sites to encourage animals away from the protected resource. For example, alfalfa distributed along migratory trials may reduce ungulate browsing of seedlings. Another approach is to plant or encourage the establishment of natural forages preferred by wildlife species. Some plants, such as cat's ear, are ingested by most herbivorous rodents and ungulates. Animals also can be provided food supplement in semipermanent structures strategically placed adjacent to or within sites that are vulnerable to damage.

Before implementing a feeding program to reduce damage, the long-term consequences need to be considered. Alternative forages can increase or prolong the presence of wildlife on selected sites. Increased resources may encourage additional animals to frequent the area, or an improved nutritional status may enhance reproductive success. Further, resource-dependent territorial boundaries may shrink with improved resource availability, which in turn permits more individuals to exist within a given area. Big-game herds may suspend or delay migratory movements. A feeding program, therefore, might actually increase wildlife pressure on resources if the program is not sustained or fails to met the increasing demands. A successful program needs to be specific in targeting a problem. In addition, a means to continue the program indefinitely or a means to wean the supplemented animal from the program needs to identified prior to implementing the program. The potential for animals to later revert to protected resources also needs to be anticipated and avoided.

Strategy

Project personnel need to develop a strategy to implement selected approaches to reduce wildlife impacts. This strategy may incorporate several methods at once, or utilize one method to stop the damage and another to limit future problems. Inquire among experts within the field if you need additional information or are unsure of specific requirements. Acquire training or expertise in handling equipment

or chemicals. Identify and obtain any required equipment, personnel, resources, and safety equipment necessary for the program.

Implementation

Though it may require time and effort, implementing the program should be straightforward, provided the prior steps were thoroughly covered. However, unanticipated problems or concerns may require modified or alternative strategies. In that case, repeat the decision process incorporating the new information.

Monitoring Consequences

Continued monitoring of the program is a particularly important activity. Determine whether the desired goals are being achieved and whether there are any unexpected negative consequences. Continue to evaluate the program until the resource is no longer vulnerable, or conditions warrant terminating the program.

Literature Cited

Black, H.C. 1992. Silvicultural approaches to animal damage management in Pacific Northwest Forests. Gen. Tech. Rep. PNW-GTR-287. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 422 pp.

Black, H.C. 1994. Animal Damage Management Handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 236 pp.

Hygnstrom, S.E., R.M. Timm, and G.E. Larson. Prevention and Control of Wildlife Damage. University of Nebraska Cooperative Extension. Lincoln, Nebraska.

Nolte, D.L., and I.J. Otto. 1996. Materials and supplies for management of wildlife damage to trees. Tech. Rep. 9624-2808-MTDC. Missoula, MY: USDA Forest Service, Missoula Technology and Development Center. 48 pp.