Revegetation Plan - Methods

Revegetation Plan continued:

A successful revegetation program must ameliorate the environmental problems created by loss of plant cover, correct land management practices that adversely affect plant establishment, test different methods under varying conditions, and remain flexible to alter plans based on results at the site or from other sites. Time must be spent on careful planning that considers soil conditions, plant species, and past experiences.

Environmental changes caused by loss of plant cover include: increased exposure of soils to wind and solar radiation; increased soil erosion; decreases in water infiltration and organic matter; loss of soil structure, topsoil, soil microflora and faunae, and microsites for germination and seedling establishment; and invasion of non-desirable species which may exclude native plants.

The revegetation plan must address land uses that affect plant establishment. Uses such as grazing and off-road vehicles can inhibit natural recruitment and eliminate plants that have naturally established on the site. Where groundwater pumping has caused increases in depth to water from historic levels, it may be necessary to introduce different plant species from those that previously grew on the site.

Testing revegetation methods is an important part of beginning the revegetation program. For example, because soil in the Owens Valley is commonly described by the Natural Resources Conservation Service (NRCS – formerly the Soil Conservation Service) as highly susceptible to wind erosion (SCS unpublished), it will be important to determine the best methods for preparing a seedbed with minimal disturbance. Seedbed test plots will be done before implementing this practice on a large scale.

Revegetation methods range from very passive (wait and see) to very intensive (landscaping). This plan takes an intermediate approach; it is designed to protect sites from disturbance and to then intensively plant or seed small areas within the larger site. It is assumed that these planted areas will “jump start” natural recruitment by providing a constant seed source and amelioration of adverse environmental conditions in their vicinity. Monitoring will determine whether this approach is working at a particular site or needs to be revised. Thus, the following methods may be modified over time based on results of projects in the Owens Valley and in other semiarid environments.

The following is a list of methods and studies that are referred to under the site evaluations.

Eliminate disturbances

The elimination of disturbances is the primary action prescribed for all sites. It is expected that ceasing disturbance will greatly benefit some sites and, in some cases, will be the only method initially employed. However, this is expected to provide only limited success for the majority of sites because they have failed to recover for over 20 years. At these sites, a more proactive approach will be necessary to achieve the revegetation goals of the EIR and MOU.

Decreased disturbance will maintain existing plant cover, provide protection for natural recruitment, and allow for litter accumulation. These sites will be monitored biennially. Monitoring will focus on detecting and identifying populations of weedy and native species. After five years, a statistical analysis will be performed on monitoring results to determine if any detectable change has occurred. If no site improvement is observed, then additional plans will be developed and implemented.

Sites will remain protected until there is evidence that disturbance will not be detrimental to the long-term rehabilitation and stability of the site.

Characterize soil

The NRCS general soil descriptions were used to characterize soils and develop site species lists for this plan. However, site specific soil characterization will be necessary at some sites to reveal potential problems that should be addressed before revegetation work. Soil characterization may include texture, salinity, sodicity, or fertility. This information will be used to further refine species selected for sites, interpret survival results, and develop effective irrigation methods.

Use a variety of plant species for seed mixes and transplants

Transplants and seed mixes will include a large variety of plant species. Variable terrain and small differences in environmental conditions will be better utilized by a mix of species that require a variety of conditions to germinate and survive.

Locally collected plant material will be emphasized for use at all sites to reduce the probability of planting non-locally adapted stock or introducing non-local genes into the Owens Valley. However, commercial seed may need to be purchased because projects may require larger volumes of seed than can be feasibly collected by hand.

A protocol for seed collection will be developed. It will include maximizing the number of same species plants for each collection, noting location, and checking seed for maturity before collection. If seed of a species is difficult to collect, vegetative propagation will be considered. Seed will be hand collected unless other methods become available.

Transplant container plants

Container plants are more labor intensive and expensive than seeding, but may prove to be the only reliable technique to establish vegetation at some sites, as we have seen at the Laws revegetation site (Yamashita and Manning 1997). If site conditions permit, container plants can be used in combination with seeding to speed revegetation. When container plants are used, they should be planted to form a windbreak to facilitate natural recruitment and reduce wind erosion.

Size of test plots for nursery stock will vary. Plot size will depend on parameters being tested, equipment needed for site preparation, adequate number of plants for statistical analysis, and plant availability.

Seeding

Seeding is the least expensive method of revegetation, and possibly, the least likely to succeed. Seeding will be performed by broadcasting or with a drill seeder. Broadcasting is the simplest method, however, it may not be the most effective because seeds are not planted at optimal depths and it requires large quantities of seed. Drill seeding uses seed more efficiently, plants them at optimal depths, and may or may not be used on prepared seedbeds; however, it requires cleaned seeds. Seeding will be performed in autumn to take advantage of winter precipitation and natural stratification.

Seeding will also be attempted on areas used for water spreading. These areas will be difficult to rehabilitate because of continued disturbance. Plants must survive soil ripping or scarification, water saturation, and desiccation. Seeding grasses onto ripped moist soil may provide a mulch cover during spreading and non-spreading years and thereby prevent blowing dust. Having a vegetative cover on these barren soils may potentially reduce the likelihood of weed invasions. Alkali sacaton will be used for this project because it is native, can germinate under saturated conditions and can withstand some flooding during growth. Other species that can meet these specification will also be considered.

Seeding was primarily chosen for experimentation at sites that already have been leveled (ABAG) because most seedbed preparation methods alter soil horizons and reduce microtopography. However, the drill seeder may be an option for areas of undisturbed topography.

Wind erosion potential and the ability to ameliorate blowing dust will be a factor in choosing sites for ripping. Ripping will be the preferred seedbed option because soil disturbance can be minimized by limiting the number of furrows. The deep narrow furrows created by ripping increase water infiltration, root penetration, and drainage. This technique will have limited application if the furrows fill in quickly or cause dust problems.

Seedbed furrows should be designed to lie perpendicular to prevailing winds. Shrubs grown with this technique have effectively reduced wind-borne dust problems on ABAG fields in Southern Arizona by forming a windbreak (SCS 1985). Once plants in furrows become established, calmer conditions at the soil surface may encourage natural recruitment by allowing accumulation of litter and organic matter, and thus providing additional microsites for seed germination.

Test plots for seedbeds and seeding will be, at a minimum, 50m x 50m unless equipment restrictions or data analysis requires a change of plot size.

Protect natural recruitment, seedlings, and transplants

Protection of transplants is a commonly used technique to increase plant establishment. Plant shelters could also be used for new recruits to protect them from wind and solar radiation. There is an indication that protection can aid growth and establishment of some species of seedlings in the Owens Valley (Yamashita 1997).

Use wood chip mulch to assist plant establishment

Wood chip mulch is being recommended because it is inexpensive, it degrades slowly, and it is too heavy to blow away. Wood chip mulch can be used as windrows to catch windblown soil, seed and microorganisms, or spread lightly over the soil surface to lower soil temperatures for enhanced germination. It also protects the soil surface from sun and wind, reduces weeds, slows moisture loss, and increases water infiltration.

Incorporate soil amendments into the soil

Loss of topsoil and disturbance of soil horizons may be ameliorated by the use of soil amendments. This may involve organic sources such as topsoil from areas that will be disturbed by construction, composted material, or other products. Inorganic sources such as gypsum may also be considered if their application can be limited to one to two years.

Wood chips may also be incorporated into the soil as an organic amendment. It will be tested for its effects on seed germination and seedling survival. The potential negative effect of mulch binding with available nitrogen can be circumvented by the addition of a slow release fertilizer. However, because native plants may better compete with weeds in low nitrogen soils, fertilization may not be beneficial.

Inoculate the soil with microorganisms

If both seeding and transplants continue to fail at a site, then soil inoculum will be tested. Inoculum could be obtained from undisturbed sites or can be purchased from commercial sources.

Site maintenance

Site maintenance includes irrigation, weed control, and maintaining plant shelters. These periodic visits will also provide a visual check on any necessary management changes, such as fence repair, increased irrigation regimes, or the need for replacement plantings.

The EIR states that short-term irrigation may be necessary for establishing plants, but long-term survival should be independent of supplemental water. This revegetation plan requires that all sites receiving seeds and transplants be irrigated for a minimum of two years during the spring and summer months.

Heavy summer precipitation may obviate the need for irrigation; however, winter precipitation does not appear to increase survival through the summer (Yamashita and Manning 1997). Irrigation needs for germinated seedlings have not been investigated, thus it is not known how long seedlings may require irrigation. It is possible that irrigation will be necessary for more than two years for optimal survival. However, irrigation is extremely labor intensive and alternative methods to deliver water should be investigated.

Weeds will be controlled around seedlings and transplanted container plants if visual or quantitative monitoring demonstrates they are suppressing survival and growth of favored species. Results from a revegetation study indicate that weeding transplanted shrubs can increase growth and survival for at least 2 years, especially if unirrigated (Yamashita and Manning 1997). Removal of Russian thistle around plants is necessary only once a year and can be accomplished when weeds are still small.

Monitoring

Monitoring will be used to assess whether sites are proceeding towards the stated goals, to observe whether management changes are necessary, and to allow comparisons between projects to enhance learning from documented successes and failures.

Cover and composition will be measured using permanent line-point transects (see Appendix III for protocol). Photos will be taken during transects at permanently established photopoints. To assess rehabilitation progress, line-point transects will be run prior to revegetation activities to document baseline conditions.

Areas that are seeded or planted with containerized plants will have two phases of monitoring. Initially sites will be checked for germination and survival of seeded species or survival of transplanted material. This monitoring will alert planners if there is a need for remedial action, for example, additional plantings, wind protection, and/or weed control. This monitoring will occur annually for five years.

After the initial annual survival and maintenance monitoring, sites will be monitored once every five years for vegetation cover and composition. Data collection will attempt to track planted versus naturally occurring individuals to determine whether mitigation is proceeding towards the site goals.

An annual written report describing the work completed and monitoring results will be presented to the Inyo/Los Angeles Technical Group and Standing Committee.

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