Draft

1997 VEGETATION MAINTENANCE PLAN

for

ST. JOHNS LANDFILL

prepared for

Metro Department of Regional Environmental Management

prepared by

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January 1997

ST. JOHNS LANDFILL VEGETATION MAINTENANCE PLAN - 1997

TASK 3:

Prepare a management plan for areas of the landfill deemed suitable for grazing by sheep.

Sheep grazing guidelines will be developed in order to prevent overgrazing and erosion and manage the native and non-native grasslands on the landfill. Guideline objectives are as follows:

A. Specify the timing and duration of grazing events. Determine if timely sheep grazing can limit the seed production of non-native grasses and invasive weeds **[see TASK 1 above]**.

B. Determine the palatability of *Bromus carinatus* (California brome-grass) to sheep. Determine if timely sheep grazing can be used to reduce short term accumulations of *Bromus* biomass and increase seed production.

C. Prepare a fencing/cross fencing plan.

Task 3A: Draft Field Study Text

Specify the timing and duration of grazing events. Determine if timely sheep grazing can limit the seed production of non-native grasses and invasive weeds.

Background: Review of 1996 Grazing Practices

Sheep grazing was initiated on the landfill during the 1996 growing season in order to assist with the management of the tall growing, largely non-native, grassland. In previous years, large areas of the landfill, particularly steep slopes with perpendicular gas lines, were unable to be mowed with tractor drawn equipment. This encouraged the spread of undesirable and noxious weeds and hindered the maintenance of gas lines and other landfill cover structures and equipment. The goals of the 1996 grazing program were to: lower the height (and reduce the flowering and seed set) of mixed grasses and weeds in areas inaccessible to mowing equipment; and reduce the amount of staff labor and equipment time devoted to grassland mowing.

Grazing management practices on the landfill during the 1996 season consisted of turning out approximately 1,000 sheep on the large grassland areas of Subareas 1, 3 and a portion of 2 and allowing them to pick and choose and eat what and when they wanted. As animals tend to eat plants and parts of plants they like best, leaving the rest to mature, set seed and multiply, many of the less palatable and unpalatable plants proliferated. Clover and ryegrass seemed to be most favored by the sheep, but they were eaten very inefficiently. Many areas of the landfill were undergrazed and large stands of aggressive non-native grass species [such as *Phalaris* spp. (reed canary grass) and *Bromus* spp.

(cheatgrass, etc.) and state listed noxious plants (such as *Cirsium* spp. (thistles) and *Cytisus scoparius* (Scot's Broom)], grew and multiplied.

Erosion caused by sheep trailing and trampling was evident in areas immediately adjacent to the watering tanks, and in partly shaded sheep resting and bedding areas such as beside concrete vaults and methane gas lines, alongside roadways and under the power towers. To date, many of these eroded areas are still bare ground, supporting little or no vegetation.

Much Metro staff time was spent on tasks related to sheep watering. Water tanks required checking daily seven days a week for the duration of the grazing period. During hot weather refilling of the water tanks was necessary twice a day.

Proposed 1997 Grazing Management Objectives

The proposed objectives for a 1997 sheep grazing program at SJL are as follows:

- provide high quality forage for a specified number of sheep during the 1997 grazing season.
- change from an unmanaged "open range" sheep grazing practice to a managed intensive grazing program using high stocking densities of sheep.
- avoid overgrazing of grasslands resulting in erosion and soil compaction (due to excessive trampling). Avoid inefficient undergrazing.
- keep ryegrass and non-native clovers in a vegetative state, preventing flowering and seed set.
- prevent the spread of non-native pest plants and State of Oregon listed noxious weeds [see attached plant list].

A discussion of each of these objectives follows:

Provide a sufficient quantity of high quality forage

In order to gain the interest of perspective sheep ranchers, the forage on the landfill should be of sufficient quantity and of reasonably high quality. During the 1996 grazing season, approximately 150 acres of landfill grasslands supported approximately 1,000 head of sheep. Because an even greater number of acres could be made be available for grazing the same number of sheep during the 1997 season, there is no anticipated shortage of forage. As the majority of these 150 + acres of grasslands have a primary cover of highly palatable ryegrass, forage quality is also not a problem.

Implement a managed intensive grazing program that avoids overgrazing and undergrazing and keeps ryegrass and non-native clovers in a vegetative state.

A well managed intensive grazing program rations out the forage according to the needs of the livestock, protects the landscape from the effects of overgrazing, and achieves a high level of forage use. Key parts of an intensive grazing program involve a resting or recovery period for the pastures between grazing events, and regulating the length of time that animals are in a paddock (a fenced area within a larger field)(Murphy 1995). Such a program applied to SJL would consist of dividing each subarea, using electric fence, into

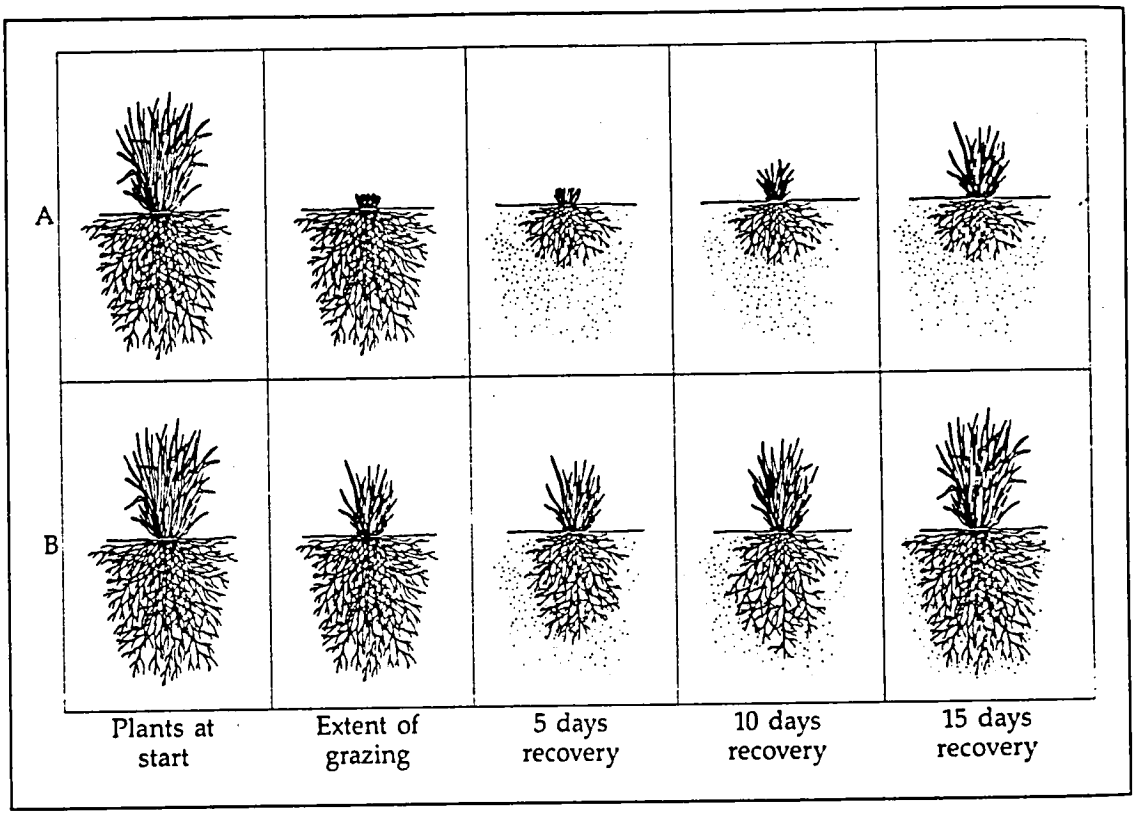
smaller paddocks. Each paddock would then be grazed for a short duration of time using high stocking densities (high numbers of sheep per acre of pasture). These short, but intense, grazing events would be followed by a specific plant recovery period during which time the sheep would be moved to another paddock. Following plant recovery, the sheep would be allowed to re-graze the beginning paddock and so on. A summary of an intensive grazing management program follows.

Number and Size of Paddocks In practice, the more paddocks, the better the distribution of grazing on the plants, the fewer severely grazed plants, and the greater proportion of plants are able to recover quickly from grazing (Savory 1988). Paddocks must be small enough so that all forage is grazed completely and uniformly within each occupation period. The size of each paddock is dependent on the quality of forage within; poorer quality pasture areas should be divided into larger paddocks and higher quality areas divided into smaller paddocks. A field survey of all SJL subareas proposed for grazing should be made to determine forage quality and quantity prior to the division of each subarea into smaller paddocks.

Plant Recovery Periods

During the February to October growing season the unirrigated grasses at SJL grow at approximately three rates: mid-February to mid-March is an early period of slow growth; mid-March through the beginning of June is a middle period of rapid growth; and from the beginning of June through mid July is a final period of slow growth. Generally, during normal rainfall years at the SJL site, grass vegetative growth ceases and plants ripen seed by mid-July to early August. The suggested plant recovery period during periods of slow growth is approximately 30-40 days; during periods of fast growth the recovery period would be approximately 15-20 days. It is important to note, however, that an exact determination of recovery period should be based on daily observations of plant re-growth within each paddock. No single recovery period will suit all conditions at SJL because the daily growth rate of plants changes continuously during the growing season (in response to differing microclimates, slopes, landscape positions, soil fertility and moisture regimes, etc.) (Savory 1988). See **Figure 1** for a graphic comparison of a plant recovery period.

FIGURE 1



Rate of immediate regrowth as affected by amount of leaf removed by grazing.

Figure 1 shows two grass plants that began growth as equals during the growing season. Early in the season an animal severely defoliates "A" removing some 90% of the leaf but takes only 40% of "B". The two plants then recover at very different rates: "A" is very slow to recover and re-grow. "B" starts re-growth immediately and quickly produces much more volume of leafy forage than "A". (adapted from Savory 1988)

Grazing Time (Periods of Stay and Occupation) Overgrazing is unrelated to the number of animals in a pasture and highly related to the time period (how long and when) during which plants are exposed to the animals (Murphy 1995). If animals remain in any one area for too long and graze re-growth, or if they return to an area before previously grazed plants have recovered, they overgraze plants. Overgrazing will decrease the percent cover of highly palatable grasses (like ryegrass) and result in an increased cover of less desirable, more aggressive grasses and noxious weeds. Prolonged overgrazing will increase the percent cover of bare ground resulting in increased erosion. Undergrazing, on the other hand, is the of a low stocking density. A laxly grazed pasture changes quickly from a field of predominantly vegetative plants to one of mostly reproductive plants. Flowering and seeding plants have a higher fiber content and a lower nutritional value to sheep.

Prevent the spread of non-native pest plants and noxious weeds
During the 1997 grazing season at SJL an Integrated Vegetation Management (IVM) Plan will be developed by the consultant (see the attached **1997 Vegetation Maintenance Scope of Work)**. This plan will propose control measures for specific invasive species of concern in all landfill areas. The first step in this process will be to identify potential invasive species and determine the determine the size of the infestation. As time allows, the consultant will be available to assist the Metro staff person assigned to grazing management with invasive plant identification, mapping and control within the grazing areas.

Summary
If a managed intensive grazing program and an improved stock watering system is developed at SJL during the 1997 grazing season, in all probabability, fewer total acres will be grazed and the forage quality should improve. If the predominant cover of ryegrass is intensely grazed and mowed in a timely fashion seed production should be reduced.

Implementation of an intensive grazing management program and pest plant identification, mapping and control grass will require the assistance of one full time Metro R.E.M. staff person from February through July, 1997. Proposed 1997 work tasks for this position are as follows:

February

- Submit comments and corrections for draft grazing management plan to consultant.
- Attend meeting with Metro staff, sheep rancher, and weed and grazing specialists.
- Assist sheep rancher with determination of: sheep herd size, animal units/acre, paddock size.
- Assist as needed with construction of native testplot exclosures and paddock fencing.

March through July

- Check sheep water. Move water tanks as required to avoid trailing and erosion.
- Monitor exclosure fencing and paddock fencing daily and repair as required.
- Monitor paddocks daily to determine: if paddock size needs readjustment, need for herd rotation, pasture recovery time.
- Identify and map locations of invasive pest plants (see attached list). Note if sheep grazing is providing a measure of control. Implement pest plant control measures as specified by the consultant.

Task 3B: Draft Field Study Text

Determine the palatability of *Bromus carinatus* (California brome-grass) to sheep. Determine if timely sheep grazing can be used to reduce short term accumulations of *Bromus* biomass (thatch), and increase seed production.

Background

In California, sheep are used seasonally by several native grass seed growers to graze out non-native plants, reduce thatch, and increase native seed production (Anderson 1997 and Meinke 1997). The California Nature Conservancy has also used sheep grazing to manage established native grasslands in their Carizo and Santa Rosa Plateau preserves (Amme 1995). In the Hedgerow Farms seed production fields, approximately 100 sheep are rotated through a series of four 30 acre paddocks over a period of 4-7 days in the early spring after the non-native grasses and weeds begin rapid growth but prior to the total green-up of the native grasses. Sheep grazing resumes in the early fall after warm rains have stimulated a sprouting of additional non-native grasses (Anderson 1997). In the Pacific Northwest, no known research has been undertaken to determine if timely sheep grazing can improve the quality and seed production of native grassland stands.

***Bromus carinatus* (California brome-grass) Test Plots at SJL**

In September 1994, approximately 5 total acres of Subareas 1 and 2 were no-till drilled with two species of native bunchgrasses. Equal mixtures of *Bromus carinatus* (California brome-grass) and *Festuca idahoensis* (Idaho fescue) were seeded at two different densities on six testplots that had been prepared using several different techniques. By the end of the first growing season (in fall of 1995), it was apparent that all seedings of the fescue had failed to establish.

To date, two Subarea 1 testplots: the Solarization plot and the Herbicide/No till plot exhibit the highest percent cover of the brome-grass. The other Subarea 1 testplots: Till Only, Acid pH (Sulfur), and the Herbicide/Till plots all have mixed covers of brome, and non-native grasses and forbs. The Native Seeding with No Site Preparation plot in Subarea 2 failed. During the 1996 grazing season, an electric exclosure fence was placed

around the Solarization plot and the Herbicide/No till plot to prevent grazing. Both plots bore heavy seed crops in the fall of 1996; but the seed was not harvested. In the late summer of 1996 the two exclosed plots were flail mowed.

Sheep Grazing of *Bromus*: A Proposed Study

In order to determine if timely sheep grazing can reduce thatch and enhance seed production in all Subarea 1 testplots of *Bromus carinatus* (California brome-grass) a field study is proposed for the 1997 and 1998 grazing seasons. A summary of proposed study tasks follows:

1997

February-March (prior to beginning of grazing season)

- Evaluate the quality of *Bromus* cover in all Subarea 1 testplots. Determine which plots have a *Bromus* cover >50% and erect exclosure fencing. Allow sheep to free graze plots with Bromus cover <50%.

March-May

- Monitor all testplots. Using a tractor drawn sickle bar, high mow testplots with significant cover of non-native grasses no lower than 6". Repeat as necessary.
- Flail mow one tractor width around all exclosed plots. Repeat as necessary.
- Check electric wire and posts in exclosed plots daily. Repair as necessary.

May-June

- Monitor to determine flowering date of *Bromus* (Seed harvest date is usually within 3 weeks after flowering) Harvest seed by hand.

July

- After completion of seed harvest, select a minimum of two testplots of comparable size and stand quality. Pick an equal number of plots to remain ungrazed and grazed. Open one side of the exclosure fence around the graze plot(s) and allow a select number of sheep to free feed and trample *Bromus* thatch for an amount of time (to be determined in the field). Remove sheep from exclosure. Secure fencing.

1998

February-March

- Monitor 1997 exclosed plots. Compare grazed to ungrazed. Evaluate program.
- Before the spring green-up of *Bromus*, select a minimum of two testplots of comparable size and stand quality. Pick an equal number of plots to remain ungrazed and grazed. Open one side of the exclosure fence around the graze plot(s) and allow a select number of sheep to free feed on *Bromus* and non-native grasses for an amount of time (to be determined in the field). Remove sheep from exclosure. Secure fencing.

May-June

- Monitor to determine flowering date of *Bromus* (Seed harvest date is usually within 3 weeks after flowering) Hand collect all seed from an equal number of randomly selected quadrats in each testplot. Weigh dry seed and compare weights collected from each quadrat. Harvest all remaining seed by hand.

July

- After harvest. Repeat sheep trampling as in 1997.

- Prepare report of findings

Task 3C: Draft Field Map

Prepare a fencing/cross fencing plan.

A fencing/cross fencing map will be prepared on or about February 7, 1997 after completion of the following:

- Upon approval of the Task 3 Draft Report.
- SJL site meeting with: Metro staff, sheep rancher, weed control specialist, intensive grazing specialist
- SJL site meeting with Metro staff, sheep rancher, a weed control specialist and an intensive grazing specialist
- Identification of Subarea 1 acreage to be seeded with native grasses

REFERENCES

Amme, David. The nuts and bolts of putting together a grazing lease for the benefit of native grasslands. A presentation at the 1995 California Native Grass Association annual meeting, Sacramento, California.

Anderson, John. Principal: Hedgerow Farms Native Grass Seed Nursery, Winters, California. Personal Communication. January 1997.

Meinke, John. Siskiyou National Forest [range management]. Personal Communication. January 1997.

Murphy, Bill. Pasture Management to Sustain Agriculture. In: Agroecology: The Science of Sustainable Agriculture. Westview Press. 1995.

Savory, Allen. Holistic Resource Management. Part VI: The Guidelines. Island Press, Covelo, California. 1988.

Noxious Weeds in Oregon and Washington

Table 1. "A" Designated Weeds as Determined by ODA.

Common Name	*Scientific Name*
Bearded creeper (Common crupina)	*Crupina vulgaris*
Camelthorn	*Alhagicamelorum*
Creeping yellow cress	*Rorippa sylvestris*
Hydrilla	*Hydrilla verticillata*
Iberian starthistle	*Centaurea iberica*
Maltgrass	*Nardus stricta*
Purple starthistle	*Centaurea calcitrapa*
Silverleaf nightshade	*Solanum eleagnifolium*
Smooth cordgrass	*Spartina alterniflora*
Smooth distaff thistle	*Carthamus baeticus*
Squarrose knapweed	*Centaurea virgata*
Whitestem distaff thistle	*Carthamus leucocaulos*
Woolly distaff thistle	*Carthamus lanatus*

Table 2. "B" Designated Weeds as Determined by ODA.

Common Name	*Scientific Name*
Austrian peaweed (Swainsonpea)	*Sphaerophysa salsula*
Buffalo burr	*Solanum rostratum*
Bull thistle	*Cirsium vulgare*
Canada thistle	*Cirsium aryense*
Dalmation toadflax	*Linaria dalmatica*
Diffuse knapweed	*Centaurea diffusa*
Dodder	*Cuscuta spp.*
Dyer's woad	*Isatis tinctoria*
Eurasian watermilfoil	*Myriophyllum spicatum*
Field bindweed	*Convulvulus arvensis*
French broom	*Cytisus monspessulanus*
Giant horsetail	*Equisetum telmatela*
Gorse	*Ulex europaeus*
Halogeton	*Haloteton glomeratus*
Italian thistle	*Carduus pycnocephalus*
Japanese knotweed (Fleece flower)	*Polygonum cuspidatum*
Johnsongrass	*Sorghum halepense*
Jointed goatgrass	*Aegilops cylindrica*
Kochia	*Kochia scoparia*
Leafy spurge	*Euphorbia esula*
Meadow knapweed	*Centaurea jacea x nigra*
Mediterranean sage	*Salvia aethiopis*
Medusahead rye	*Taeniatherum caputmedusa*
Milk thistle	*Silybum marianum*
Musk thistle	*Carduus nutans*
Perennial pepperweed	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*
Puncturevine	*Tribulus terrestris*
Purple loosestrife	*Lythrum salicaria*
Quackgrass	*Agropyron repens*
Ragweed	*Ambrosia artemisiifolia*
Rush skeletonweed	*Chondrilla juncea*
Russian knapweed	*Acroptilon repens*
Scotch broom	*Cytisus scoparius*
Scotch thistle	*Onopordum acanthium*
Slender-flowered thistle	*Carduus tenuiflorus*
South American waterweed (Elodea)	*Elodea densa*
Spikeweed	*Hemizonia pungens*
Spiny cocklebur	*Xanthium spinosum*
Spotted knapweed	*Centaurea maculosa*
St. Johnswort (Klamath weed)	*Hypericum perforatum*
Tansy ragwort	*Senecio jacobaea*
Western horsetail	*Equisetum arvense*
White top (Hoary cress)	*Cardaria spp.*
Wild proso millet	*Panicum miliaceum*
Yellow nutsedge	*Cyperus esculentus*
Yellow starthistle	*Centaurea solstitialis*
Yellow toadflax	*Linaria vulgaris*

Table 3. "T" or Target List, Determined by ODA.

The Oregon Department of Agriculture annually develops a target list of weed species that will be the focus of control by the Weed Control Program, sanctioned by the Oregon State Weed Board. Because of the economic threat to the state of Oregon, action against these weeds will receive priority.

Common Name	*Scientific Name*
Beared creeper (Common Crupina)	*Crupina vulgaris*
Gorse	*Ulex europaeus*
Leafy spurge	*Euphorbia esula*
Rush skeletonweed	*Chondrilla juncea*
Squarrose knapweed	*Centaurea virgata*
Tansy ragwort	*Senecio jacobaea*
Woolly distaff thistle	*Carthumus lanatus*
Yellow starthistle	*Centaurea solstitial*

SCOPE OF WORK
ST. JOHNS LANDFILL VEGETATION MAINTENANCE PLAN - 1997

TASK 1:

Prepare an integrated vegetation management plan that specifies control measures for invasive weeds of concern at the St. Johns Landfill.

Invasive, non-native weeds will be identified by line drawing and photographed in flower. Control measures, developed in compliance with Metro Executive Order No. 60: Developing an IPM Plan for Metro facilities, will be prepared. The IVM Plan will identify naturally occurring weed control measures such as biological diversity, plant competition and succession and specify how they may be integrated with various mechanical, cultural and chemical controls and habitat modification techniques.

Submittal dates: March 1, 1997 (text and line drawings)
June 1, 1997 (photos)

TASK 2:

Develop a management plan for the native grassland plots in Subareas 1, 4, and 5A.

The goals of the native grassland plan will be to maintain a high cover of natives within the plots and maximize native seed production. In order to meet those goals, specific field management guidelines will be developed for weed control, fertilization, and seed harvest and storage.

Submittal dates: February 1, 1997 (draft text)
February 15, 1997 (final)

TASK 3:

Prepare a management plan for areas of the landfill deemed suitable for grazing by sheep.

Sheep grazing guidelines will be developed in order to prevent overgrazing and erosion and manage the native and non-native grasslands on the landfill. Guideline objectives are as follows:

- Specify the timing and duration of grazing events (particularly for those species identified as either invasive weeds or undesirable in the long term) **[see TASK 1 above]**. Determine if timely sheep grazing can limit non-native grass seed production.
- Determine the palatability of *Bromus carinatus* (California brome-grass) to sheep. Determine if timely sheep grazing can be used to reduce short term accumulations of *Bromus* biomass and increase seed production.
- Prepare a fencing/cross fencing plan.

Submittal dates: January 15, 1997 (draft field study text and fencing plan)
May 1, 1997 (completion of field studies)

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