



PLANTS ESTABLISHING IN ROCKY MOUNTAIN ENVIRONMENTS-- a manual for choosing native species for revegetation.

T Weaver, D Gustafson, and J Lichthardt

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Montana State University, Bozeman

MSU Biology Reports

PREPARED FOR

State of Montana Department of Transportation, R&D
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native species for revegetation.

ABSTRACT. Species which have established naturally on a disturbed site in a given environment-- climate and disturbance level (defined below)-- are good candidates for revegetation plantings in that environment. On this basis we recommend native plants (grasses, forbs, and shrubs) for revegetation plantings, if they occur on at least half of the sites sampled in the environmental type and cover at least 1% of the ground there. We also list exotic plants establishing on once disturbed roadside sites; if these plants do not invade native vegetation they might, under some circumstances, be used for revegetation. The environmental types considered include dry grasslands (BOGR/STCO and AGSP/BOGR), moist grasslands (FESC/FEID and FEID/AGCA) sagebrush (ARAR/FEID and ARTRVAS/FEID), warm dry forests (PSME/ SYAL and PSME/PHMA), warm moist forests (POTR/CARU, THPL/OPHO, TSHE/CLUN, ABLA/CLUN), cool forests (ABLA/XETE, ABLA/ARCO, and ABLA/VACC), mountain meadows (FEID/AGCA, listed above) and alpine (DESC/CARX). In each environment plant performance is contrasted across five disturbance types: continually disturbed types (roadshoulders and the adjacent ditch slope), once disturbed sites (roadcuts with organic matter removed and cleared right-of-way without organic matter removal), and undisturbed late seral sites.

KEY WORDS: revegetation, restoration, native plants, exotic plants, noxious weeds, trampling, disturbance, primary succession, secondary succession

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INTRODUCTION

Society and law mandate revegetation of disturbed areas for the sake of erosion control, beauty, and species preservation. Genecology mandates use of local material from species of choice-- to assure installation of plants which are genetically suited for the local environment. Ironically, the more obvious principle-- choosing species thriving naturally in the environment-- has been promoted less.

The object of this paper is, thus, to list species which establish well in major environmental types (HTs) of the northern Rocky Mountains, that is, species which are likely to thrive if used in revegetation attempts. In our discussion, we emphasize native over exotic species for three reasons.

1) National and state policy encourage establishment of native vegetation on 'waste lands' adjacent to roads and highways (Clinton 1994, STURRA 1987). 2) Society and law mandate against introduction of exotic species into national park and national forest lands (NFMA, 1974). 3) Information on natives is less available. Despite policies discouraging the use of exotics, one may occasionally consider planting an exotic. To this end we list exotics which do best in each environmental type (HT). And with this list we provide measures of tendencies of each exotic to spread into adjacent native vegetation; we cannot encourage use of species which spread into either undisturbed vegetation or the vegetation of logged/burned sites since such plantings are destructive of a national heritage.

For plantings we suggest species which naturally invade a series of environments which are most common in the Northern Rockies; that is, sixteen climatic zones and, in each, sites with a particular level of disturbance-- undisturbed, rarely disturbed, or continuously disturbed. The environmental types (HTs, Pfister et al 1977, Mueggler and Stewart 1980, Steele et al 1983) considered include foothill grasslands (*Bouteloua gracilis*/*Stipa comata*, *Agropyron spicatum*/*Bouteloua gracilis*, and *Festuca scabrella*/*Festuca idahoensis*), foothill shrublands (*Artemisia arbuscula*/*Festuca idahoensis* and *Artemisia tridentata* vaseyana/*Festuca idahoensis*), warm dry forests (*Pseudotsuga menziesii*/*Symphoricarpos alba* and *Pseudotsuga menziesii*/*Physocarpus malvaceus*), warm moist forests (*Populus tremuloides*/*Calamagrostis rubescens*, *Thuja plicata*/*Oplopanax horridum*, *Tsuga plicata*/*Clintonia uniflora*, *Abies lasiocarpa*/*Clintonia uniflora*, and *Abies lasiocarpa*/*Xerophyllum tenax*), cool forests (*Abies lasiocarpa*/*Arnica cordifolia* and *Abies lasiocarpa*/*Vaccinium scoparium*), mountain meadows (*Festuca idahoensis*/*Agropyron caninum*) and alpine meadows (*Deschampsia caespitosa*/*Carex* species).

Within an environmental type different species establish under different disturbance regimes. Therefore, we contrast establishment on sites at roadsides which are undisturbed, once disturbed (logged or roadcut) and continually disturbed (road shoulders or well drained ditch slopes below the shoulder).

METHODS.

Sites were sampled in sixteen environmental types-- broadly representative of the vegetation of then northern Rocky Mountains-- to determine 1) what native plants invade disturbed sites and might be useful for revegetation and 2) what exotic plants invade similar sites and whether they spread into native vegetation (early or late seral). We sampled six to eleven sites in each type (Table 1). The environmental types-- named for late seral vegetation that occupies them-- included dry grasslands (BOGR/ STCO and AGSP/ BOGR), moist grasslands (FESC/ FEID and FEID/ AGCA), sagebrush-lands (ARAR/ FEID and ARTRvas/ FEID), warm dry forests (PSME/ SYAL and PSME/ PHMA), warm moist forests (POTR/ CARU, THPL/ OPHO, TSHE/ CLUN, ABLA/ CLUN), cool forests (ABLA/ XETE, ABLA/ ARCO, and ABLA/VASC), mountain meadows (FEID/ AGCA above), and alpine (DECE/ CAREX). Environmental types (HTs) names, decoded, and the locations sampled are listed in Table 1.

All sites were located along major roads for two reasons. 1) We wanted to compare native establishment on adjacent surfaces which were disturbed once vs continuously. And, 2) we wanted to compare exotic establishment on adjacent highly disturbed and undisturbed sites. Thus, we recorded all plants present at continuously disturbed sites (road shoulder and adjacent ditch slopes), once disturbed sites (roadcuts and cleared right-of-ways) and undisturbed sites. By working on roadsides crossing through undisturbed vegetation we maximized the availability of native seeds on disturbed sites. By working with sites along highways, we maximized the availability of exotic seeds on disturbed and undisturbed sites. After establishment on roadsides, the availability of seeds on adjacent undisturbed sites was further increased; thus the capacity of exotics to invade native vegetation (early seral right-of-way cuts or late seral undisturbed vegetation).

Vegetation composition was recorded by measuring presence, frequency and cover of each species at each of approximately 800 sites (16 environmental types (HTs) x 5 disturbance types x 10 replications). 1) Presence was recorded by listing plant species present in a 1 x 25 m plot representative of the zone and parallel to the road. We separately noted any other species present in adjacent and similar vegetation. 2) Ubiquity was recorded by dividing the presence plot into five 1 x 5 m segments and determining what percent were occupied by each species. 3) Cover of a species was measured by recording the percent of seventy-five points covered by each species. The seventy-five points were located by lowering three pins into the vegetation in each meter. 4) 'Constancy' was calculated as the percent of sites in the environmental type in which the species occurred. 5) 'Frequency' was calculated as the percent of plots containing the species; this percent was calculated only across quadrats at sites where the species occurred since it is intended to represent the success of the species at sites where it occurs. 6) 'Cover' was, similarly, integrated over a type by averaging cover measurements across all sites at which the species occurred. 7) Frequency and cover were calculated only across sites at which the species occurred; if one wanted frequency or cover values for the environmental zone as a whole he would multiplied the values presented by constancy to account for sites at which the species did not occur.

Table 1. Environmental types in which colonization of natives and exotics were observed. Listing is in approximate altitudinal order.

Environmental type (HT)	Abbrev.	Samples.	Sample location.
<i>Stipa comata</i> / <i>Bouteloua gracilis</i>	STCO/BOGR	7	Broadwater MT
<i>Agropyron spicatum</i> / <i>Bouteloua gracilis</i>	AGSP/BOGR	8	Broadwater MT
<i>Festuca scabrella</i> / <i>Festuca idahoensis</i>	FESC/FEID Note FEID/AGCA below.	10	Glacier MT
<i>Artemisia arbuscula</i> / <i>Festuca idahoensis</i>	ARAR/FEID	10	Teton WY
<i>Artemisia tridentata</i> <i>vaseyana</i> / <i>F idahoensis</i>	ARTRvas/FEID	10	Teton WY
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i>	PSME/SYAL	10	Meagher, Gallatin, Park MT
<i>Pseudotsuga meziesii</i> / <i>Physocarpus malvaceus</i>	PSME/PHMA	6	Gallatin, Park MT, Yellowstone NP, WY
<i>Populus tremuloides</i> / <i>Calamagrostis rubescens</i>	POTR/CARU	8	Glacier MT
<i>Thuja plicata</i> / <i>Oplopanax horridum</i>	THPL/OPHO	10	Flathead MT
<i>Tsuga heterophylla</i> / <i>Clintonia uniflora</i>	TSHE/CLUN	10	Flathead MT
<i>Abies lasiocarpa</i> / <i>Clintonia uniflora</i>	ABLA/CLUN	9	Flathead MT
<i>Abies lasiocarpa</i> / <i>Xerophyllum tenax</i>	ABLA/XETE	10	Flathead MT
<i>Abies lasiocarpa</i> / <i>Arnica cordifolia</i>	ABLA/ARCO	10	Teton WY
<i>Abies lasiocarpa</i> / <i>Vaccinium scoparium</i>	ABLA/VASC	10	Teton WY
<i>Festuca idahoensis</i> / <i>Agropyron caninum</i>	FEID/AGCA	10	Teton WY
<i>Deschampsia caespitosa</i> / <i>Carex species.</i>	DECA/CASP	11	Park Wy, Carbon WY

RESULTS AND DISCUSSION

The accompanying essays address-- one environmental type at a time-- three questions about revegetation. 1) What native grasses, forbs, and shrubs do well in each environment and disturbance zone? We arbitrarily define 'doing well' as occurring on over 50% of the sites (constancy > 50%) and having a ground cover greater than 1%. 2) What commonly planted exotic grasses and forbs do well in each environment and disturbance zone. 3) What exotics-- planted or invading weeds-- should be avoided (or controlled)-- since they spread from highly disturbed areas into native vegetation (either undisturbed or seral).

We discuss the environmental types in altitudinal order, ie from dry grassland through forest to alpine. Environmental definitions follow Pfister et al (1977), Mueggler and Stewart (1980), and Steele et al (1983)-- and keys are available there. Even without those keys one can usually identify them by noting that, in the type name, the first species named dominates the overstory of late seral vegetation and the second is at least well represented (5% cover) in the understory.

Our recommendations are based on data presented in Tables 2-17 and the user is expected to use the tables to confirm (or reject) our conclusions. To facilitate this each essay is accompanied by a table listing the species commonly establishing in the five disturbance zones of the environmental type (HT) under consideration. In these tables species names are coded with eight letters, the first four of the genus name and the first four of the specific epithet. This was done to allow presentation of data on all disturbance zones. Where the name is not obvious, refer to the species list at the end of the report. 'Commonly establishing' is defined as occurring on over 30% of the ten representative sites sampled; rarer species are occasionally included.

The tables provide three measures of a plant's success in an environment (HT) and disturbance zone (DZ). 1) Constancy (CN) tells what percent of the sites in the environment and zone contain the species; it is thus determined by the species' capacity to the site and by the species' capacity to establish somewhere on the site. 2) Frequency (FQ) indicates-- for the sites at which the species exists-- how well it is doing. Presence in most quadrats (eg 80% frequency) indicates that the species has gotten to the site and usually does well in the environment; presence in only a few quadrats (eg 20%) indicates that, while it has arrived at the site it requires a fairly rare microenvironment in the environment. 3) Cover (CV) also indicates-- for sites to which the species has dispersed-- how the species is doing. Very high cover (20%) usually indicates that the plant establishes easily and reproduces vigorously (often vegetatively)-- and thus provides ground cover desirable for aesthetics, erosion control, and animal use. While a plant with low cover does not serve these functions, it may be desirable for aesthetic ('a splash of color') or genetic ('rare species') reasons'. Cover was measured with a point frame; thus while coverage is reported as a repeatable index of 'true cover' it may be lower than cover estimated ocularly (cf Daubenmire 1968 & 1970, Pfister et al 1977, Mueggler and Stewart 1980, and Steele et al 1983).

Note, above, that success indicators (frequency and cover) are calculated for sites that contain the species. This is done to indicate how well the plant world do if it dispersed perfectly, that is, if it were planted at the site under consideration. If one needs to know, instead, the importance of the species in the environmental type/ disturbance zone as a whole, he will lower the value by multiplying the success indicator by the accompanying constancy. For example, in the *Bouteloua gracilis*/ *Stipa comata* zone, *Stipa* has a cover in the undisturbed zone of 0.99 x 24% and on the road shoulder of 0.57 x 1%.

While this report discusses plant establishment in major environmental types (HTS) of Glacier, Yellowstone, and Grand Teton National Parks, users in adjacent areas may seek to apply our observations to revegetation of disturbed areas outside the parks. If the same environmental type is being managed, our information should be directly transferable. If the environmental type is intermediate between environmental types described the reader may interpolate between related vegetation types. Tables facilitating this operation will appear in Weaver 1994.

Our report is devoted primarily to revegetation of once disturbed sites (eg roadcuts). A user especially interested in continuously trampled sites may want to compare plants of roadcut and road shoulder sites to identify especially resistant plants. Grasses and prostrate plants tend to be resistant; upright forbs and shrubs are susceptible (Dale and Weaver 1974). When choosing plants for heavy traffic areas consider plant lists from related environmental types to either locate additional candidate plants or plants for a related but unstudied environmental type (HT).

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A. Plants establishing in STIPA COMATA/ BOUTELOUA GRACILIS environment (HTs).

Table 2. lists plants 'establishing well' in *Bouteloua gracilis*/ *Stipa comata* environments. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses usually provide the matrix for revegetation. On once-disturbed sites four native grasses establish well, especially *Stipa comata* and *Oryzopsis hymenoides*. Grasses successful on from undisturbed sites will probably also establish on once-disturbed sites-- besides *Stipa comata*, especially *Bouteloua gracilis*, *Carex filifolia*, and *Poa sandbergii*. Increasing amounts of *Sporobolus cryptantha*, *Agropyron smithii*, and *Carex filifolia* at the roadside probably indicate trample resistance.

Candidates for native forb seeding in this environment are few. No forbs do well in once or oft disturbed zones. *Spharalcea coccinea*, *Phlox hoodii*, and *Erigeron pumilus* are the best candidates from the undisturbed zone.

Half shrubs establishing in the once disturbed and undisturbed zones can surely be established in the once-disturbed zone. Candidates are *Artemisia frigida*, *Gutierrezia sarothrae*, and *Opuntia polyacantha*.

Exotic grasses successful in zones of this environmental type include one weed (*Bromus tectorum*) and three planted species (*Agropyron cristatum*, *Poa pratensis*, and *Bromus inermis*). The first three do well on roadcut sites and weakly invade undisturbed sites.

Exotic forbs of this environmental type include one probably planted species (*Melilotus officinale*) and three relatively successful weeds. *Melilotus* invades undisturbed vegetation successfully and four weeds-- including *Lactuca*, *Centarea*, and *Tragopogon*-- have high constancies in undisturbed vegetation.

Table 2. Plants commonly establishing in the STCO/ BOGR environment.
species

		climax			cleared			road cut			ditch			shoulder		
species		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		7			0			7			7			7		
Native grasses:																
STIPCOMA	G	99.99	24.		.	.	.	99.74	7.		86.60	5.		57.40	1.	
BOUTGRAC	G	99.86	10.		.	.	.	71.23	1.		43.17	0.		43.23	0.	
AGRCAMAJ	G	.	.	.	.	.	.	71.27	0.		57.23	2.		57.23	0.	
ORYZHYME	G	.	.	.	.	.	.	57.30	4.		14. 0.	0.		.	.	
POASANDB	G	86.99	3.		.	.	.	57.27	0.		.	.	.	.	.	
SITAHYST	G	57.27	0.		.	.	.	57.27	2.		43.10	0.		14. 3.	0.	
AGROSPIC	G	14.10	1.		.	.	.	57.15	0.		14. 0.	0.		.	.	
CAREFILI	G	71.70	5.		.	.	.	29.17	0.		.	.	.	.	.	
KOELCRIS	G	86.46	1.		.	.	.	43.31	0.		57.11	0.		14. 3.	0.	
AGROSMIT	G	43.37	2.		.	.	.	43.23	2.		71.31	2.		86.54	2.	
SPORCRYP	G	.	.	.	.	.	.	29. 9.	0.		71.37	0.		71.43	2.	
STIPVIRI	G	.	.	.	.	.	.	14. 8.	0.		43.16	0.		43.20	1.	
ARISLONG	G	.	.	.	.	.	.	.	.		43.40	1.		.	.	
FESTIDAH	G	.	.	.	.	.	.	.	.		29.13	0.		29.27	0.	
Native forbs:																
PHLOOOD	F	71.60	0.		.	.	.	29. 0.	0.		.	.	.	.	.	
SPHACOCC	F	71.52	0.		.	.	.	29.24	0.		.	.	.	.	.	
ERIGPUMI	F	57.40	0.		.	.	.	14.15	0.		.	.	.	.	.	
CHRYVILL	F	43.10	0.		.	.	.	.	.		.	.	.	14.10	0.	
CIRSUNDU	F	43. 0.	0.		.	.	.	.	.		.	.	.	.	.	
LYGOJUNC	F	14.20	0.		.	.	.	29.13	0.		.	.	.	.	.	
ARTEDRAC	F	29.60	1.		.	.	.	29.80	4.		14.20	0.		.	.	
PLANPATA	F	14.33	0.		.	.	.	29.20	0.		14. 0.	0.		29. 7.	0.	
EUPHGLYP	F	.	.	.	.	.	.	14.15	0.		29.10	0.		29.15	0.	
COMMUMBE	F	29.20	0.		.	.	.	14.10	0.		.	.	.	.	.	
HAPLSPIN	F	29.30	0.		.	.	.	14. 0.	0.		.	.	.	.	.	
LAPPREDO	F	29.10	0.		.	.	.	14.10	0.		14. 5.	0.		29.10	0.	
LIATPUNC	F	14.10	0.		.	.	.	14. 0.	0.		14.30	0.		14.20	1.	
PAROESS	F	29.30	1.		.	.	.	.	.		.	.	.	.	.	
ASTRGRAC	F	29.50	1.		.	.	.	.	.		.	.	.	.	.	
ERIOMICR	F	29.30	0.		.	.	.	.	.		.	.	.	.	.	
ANTEROSE	F	29.20	0.		.	.	.	.	.		14. 7.	0.		.	.	
HELIANNU	F	.	.	.	.	.	.	.	.		29. 0.	0.		14. 7.	0.	
VERBBRAC	F	.	.	.	.	.	.	.	.		43.60	0.		29.47	8.	
Native shrubs and trees:																
GUTISARO	S	43.27	0.		.	.	.	86.23	0.		14. 0.	0.		.	.	
ARTEFRIG	S	71.72	2.		.	.	.	57.20	0.		29. 0.	0.		14. 0.	0.	
OPUNPOLY	C	57.20	0.		.	.	.	14.12	0.		.	.	.	.	.	
ARTECANA	S	.	.	.	.	.	.	14. 0.	0.		.	.	.	.	.	
CHRYNAUS	S	.	.	.	.	.	.	14.20	0.		.	.	.	.	.	
ARTRIVAS	S	14. 0.	0.		.	.	.	14. 0.	0.		14. 0.	0.		14. 0.	0.	
EUROLANA	S	29.10	0.		.	.	.	14. 0.	0.		.	.	.	.	.	
TETRCANE	S	14. 0.	0.		.	.	.	.	.		.	.	.	.	.	
YUCCGLAU	S	14.20	0.		.	.	.	.	.		14.80	3.		.	.	
JUNISCOP	T	.	.	.	.	.	.	.	.		29. 0.	0.		.	.	

Table 2, continued.

Exotic grasses:												
BROMTECT	*	G	57.26.	0.	.	.	.	99.60.	1.	71.69.14.	86.83.	7.
BROMJAPO	*	G	29.	9.	0.	.	.	86.40.	0.	29.	9.	0.
AGROCRIS	*	G	43.	3.	0.	.	.	71.34.	2.	99.60.	7.	86.51.
POAPRATE	*	G	29.11.	0.	.	.	.	43.37.	6.	99.77.	9.	99.86.
BROMINER	*	G	.	.	.	.	.	29.10.	0.	71.50.	3.	71.63.
TRITAEST	*	G	14.	0.	0.	.	.	14.	0.	0.	14.	5.
POACOMPR	*	G	.	.	.	.	.	14.	7.	0.	29.33.	3.
AGROINTE	*	G	.	.	.	.	.	.	.	.	29.60.	0.
Exotic forbs:												
MELIOFFI	*	F	57.40.	1.	.	.	.	86.60.	1.	99.37.	2.	57.23.
ALYSALYS	*	F	86.46.	0.	.	.	.	86.49.	0.	71.54.	1.	71.66.
DESCPINN	*	F	57.37.	0.	.	.	.	57.14.	0.	29.	6.	0.
LACTSERI	*	F	29.	3.	0.	.	.	57.14.	0.	29.17.	0.	57.40.
CENTMACU	*	F	57.	0.	0.	.	.	43.11.	0.	71.17.	0.	57.17.
TRAGDUBI	*	F	57.33.	0.	.	.	.	43.10.	0.	.	.	43.23.
SISYALTI	*	F	43.10.	0.	.	.	.	43.27.	0.	43.13.	0.	29.17.
CAMEMIMA	*	F	29.	8.	0.	.	.	43.16.	0.	57.24.	0.	29.
KOCHSCOP	*	F	29.17.	0.	.	.	.	29.17.	0.	29.13.	0.	57.40.
SALSKALI	*	F	29.10.	0.	.	.	.	29.25.	0.	14.	5.	0.
GRINSQUA	*	F	.	.	.	.	.	29.20.	0.	43.33.	0.	29.13.
VERBTHAP	*	F	14.	0.	0.	.	.	29.	0.	0.	29.	0.
TARAOFFI	*	F	29.10.	0.	.	.	.	.	.	29.15.	0.	14.20.
MELIALBA	*	F	.	.	.	.	.	14.13.	2.	29.	7.	0.
LEPICAMP	*	F	29.90.	0.	.	.	.	14.	0.	0.	.	.
SISYLOES	*	F	29.27.	0.	.	.	.	.	.	.	.	14.
Ground cover.												
MOS&LICH			57.	0.	3.	.	.	43.	0.	2.	29.	0.
LITTER			99.	0.	36.	.	.	99.	0.	32.	99.	0.
ROCK			29.	0.	2.	.	.	99.	0.	14.	99.	0.
SOIL			99.	0.	10.	.	.	99.	0.	25.	57.	0.

B. Plants establishing in the AGROPYRON SPICATUM/ BOUTELOUA GRACILIS environment (HT) .

Table 3 lists plants 'establishing well' in *Agropyron spicatum*/ *Bouteloua gracilis* environments. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses usually provide the matrix for roadside revegetation projects. On once disturbed sites four native species establish well-- especially *Agropyron spicatum*, *Stipa comata*, and *Agropyron smithii*. Three additional graminoids, including *Bouteloua gracilis*, appear in undisturbed vegetation and might be added to a seed mix. On constantly disturbed roadside sites *Agropyron spicatum* declines while *Bouteloua*, *Stipa* and *Sporobolus cryptantha* hold their own.

Forbs may enrich grassy vegetation. No forbs established well on once disturbed sites; only two (*Spharalcea coccinea* and *Gaura coccinea*) had high constancy. Several species from undisturbed vegetation could probably be established: *Chrysopsis villosa*, *Phlox hoodii* and leguminous *Astragalus gracilis*. While repeatedly disturbed vegetation at the roadside contained almost no species, low flexible species, eg *Phlox*, among the preceding might be tried.

Half shrubs established on once disturbed (roadcut) and undisturbed sites, but not on repeatedly disturbed sites. *Artemisia frigida*, *Gutierrezia sarothrae* and *Opuntia polyacantha* are noteworthy.

Exotic grasses establishing in this zone included two weeds (*Bromus*) and several planted species. When planted, *Poa pratensis*, *Bromus inermis*, and *Agropyron cristatum* establish well at the roadside and reasonably well on roadcuts. *Poa*, *Agropyron*, and *Bromus japonicus* invaded undisturbed vegetation weakly; *Bromus tectorum* invaded more strongly.

Exotic forbs appearing in this zone included one planted species (*Melilotus officinale*) and several weedy species. *Melilotus* invaded undisturbed vegetation weakly and two exotics (*Alyssum alyssoides* and *Tragopogon dubius*) do better in undisturbed than disturbed vegetation.

Table 3. Plants commonly establishing in the AGSP-BOGR environment.
species

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		8			0			8			8			8		
Native grasses:																
AGROSPIC	G	99.95.16.			.	.	.	88.73.12.			25.18. 2.			.	.	.
AGROSMIT	G	88.75. 4.			.	.	.	63.18. 2.			88.58. 4.			88.38. 4.		
STIPCOMA	G	99.98. 9.			.	.	.	63.28. 2.			75.68. 9.			50.45. 1.		
POASANDB	G	99.88. 2.			.	.	.	50.45. 1.			50.23. 1.			13. 3. 0.		
STIPVIRI	G	25.20. 0.			.	.	.	38.20. 0.			63.50. 1.			38.27. 0.		
KOELCRIS	G	75.67. 2.			.	.	.	38.23. 0.			13. 7. 0.			25.10. 0.		
BOUTGRAC	G	99.98. 5.			.	.	.	13. 5. 0.			38.18. 0.			75.23. 1.		
CAREFILI	G	99.80. 2.			.	.	.	13. 3. 0.			13. 5. 0.			.	.	.
ORYZHYME	G	.	.	.	.	.	.	25.20. 1.			25. 0. 0.			.	.	.
AGRCAMAJ	G	.	.	.	.	.	.	25.10. 0.			13. 3. 0.			75.57. 0.		
SPORCRYP	G	.	.	.	.	.	.	13. 0. 0.			63.47. 2.			63.67. 7.		
ELYMCANA	G	.	.	.	.	.	.	13.15. 1.			13. 5. 0.			50.20. 0.		
ARISLONG	G	.	.	.	.	.	.	13. 0. 0.			38.73. 7.			25.27. 0.		
SITAHYST	G	.	.	.	.	.	.	13. 0. 0.			13.13. 0.			25.40. 2.		
HORDJUBA	G	.	.	.	.	.	.	.			.			25.20. 0.		
Native forbs:																
SPHACOCC	F	88.45. 0.			.	.	.	50. 0. 0.			.			.		
GAURCOCC	F	38.23. 0.			.	.	.	50. 3. 0.			.			.		
CIRSUNDU	F	50.35. 0.			.	.	.	38. 5. 0.			13. 5. 0.			.		
LIATPUNC	F	38.16. 0.			.	.	.	38. 8. 0.			.			.		
PHLOHOOD	F	50.52. 0.			.	.	.	25. 8. 0.			.			.		
ASTRGRAC	F	63.48. 1.			.	.	.	.			.			.		
CHRYVILL	F	63.16. 0.			.	.	.	13.12. 0.			13. 0. 0.			25.20. 2.		
PLANPATA	F	38.27. 0.			.	.	.	13.13. 0.			.			.		
HELIANNU	F	.	.	.	.	.	.	25.12. 0.			38.20. 0.			25.16. 0.		
EUPHGLYP	F	.	.	.	.	.	.	.			13. 0. 0.			38.45. 0.		
Native shrubs:																
ARTEFRIG	S	88.78. 1.			.	.	.	88.25. 0.			13. 0. 0.			13. 5. 0.		
OPUNPOLY	C	88.46. 0.			.	.	.	50. 9. 0.			13. 0. 0.			.		
GUTISARO	S	50.44. 1.			.	.	.	50.28. 0.			.			.		
JUNISCOP	T	25. 0. 0.			.	.	.	25. 0. 0.			.			.		
CHRYNAUS	S	25.13. 1.			.	.	.	13. 0. 0.			.			.		
ARTECANA	S	25.20. 1.			.	.	.	.			.			.		
ARTRIVAS	S	13. 0. 0.			.	.	.	13.13. 0.			.			13. 7. 0.		
ROSA SPP	S	.	.	.	.	.	.	25. 7. 0.			25.53. 2.			.		

Table 3, continued.

Exotic grasses.																
BROMTECT	*	G	75.35.	3.	.	.	.	75.60.	2.	88.73.	3.	63.53.	2.			
BROMJAPO	*	G	25.24.	1.	.	.	.	63.40.	0.	.	.	25.	8.	0.		
POAPRATE	*	G	25.13.	0.	.	.	.	50.45.	6.	99.68.	9.	99.78.	5.			
BROMINER	*	G	.	.	.	.	.	50.30.	5.	88.43.	9.	88.65.	6.			
AGROCRIS	*	G	25.	0.	0.	.	.	.	.	50.30.	1.	50.53.	3.			
POACOMPR	*	G	.	.	.	.	.	13.15.	0.	13.	0.	0.	25.20.	0.		
AGROINTE	*	G	.	.	.	.	.	.	.	25.20.	0.	.	.	.		
AGROREPE	*	G	.	.	.	.	.	.	.	.	.	38.73.	6.			
TRITAEST	*	G	.	.	.	.	.	.	.	.	.	38.33.	0.			
Exotic forbs:																
ALYSALYS	*	F	88.75.	3.	.	.	.	99.43.	0.	88.40.	0.	50.25.	0.			
MELIOFFI	*	F	75.35.	0.	.	.	.	88.48.	1.	63.25.	1.	50.30.	1.			
TRAGDUBI	*	F	88.49.	1.	.	.	.	88.23.	0.	50.	6.	0.	13.	3.	0.	
DESCPINN	*	F	50.36.	0.	.	.	.	50.32.	0.	38.20.	0.	13.	4.	0.		
CENTMACU	*	F	38.	3.	0.	.	.	38.10.	0.	25.13.	0.	25.	0.	0.		
CAMEMIMA	*	F	13.	5.	0.	.	.	50.35.	0.	38.	5.	0.	.	.	.	
GRINSQUA	*	F	.	.	.	.	.	38.	8.	0.	38.	4.	0.	25.24.	1.	
TARAOFFI	*	F	38.27.	0.	.	.	.	25.	3.	0.	25.10.	0.	38.	7.	0.	
LACTSERI	*	F	38.40.	0.	.	.	.	25.40.	0.	50.36.	0.	13.	8.	0.		
SISYALTI	*	F	25.10.	0.	.	.	.	13.	5.	0.	13.	0.	0.	13.10.	0.	
LEPICAMP	*	F	25.25.	0.	.	.	.	13.	5.	0.	13.	5.	0.	.	.	.
VERBTHAP	*	F	13.	0.	0.	.	.	13.	0.	0.	13.10.	0.	.	.	.	
POLYAVIC	*	F	.	.	.	.	.	13.	7.	0.	.	.	.	25.60.	2.	
MEDISATI	*	F	.	.	.	.	.	.	.	.	25.	0.	0.	.	.	.
Ground cover.																
MOS&LICH			63.	0.	5.	.	.	13.	0.	1.	.	.	.	.	.	.
LITTER			99.	0.35.	.	.	.	99.	0.34.	99.	0.41.	99.	0.15.	.	.	.
SOIL			63.	0.	7.	.	.	99.	0.	7.	50.	0.	4.	63.	5.	2.
ROCK			50.	0.	4.	.	.	88.	0.24.	88.	0.	9.	99.	0.49.	.	.

C. Plants establishing in *FESTUCA SCABRELLA*/ *FESTUCA IDAHOENSIS* environment (HTs)

Table 4 lists plants 'establishing well' in the *Festuca scabrella*/ *Festuca idahoensis* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses form the matrix for most revegetation plantings. Natives doing well on once-disturbed sites in this zone are *Festuca idahoensis* and *Agropyron spicatum*. Grasses occupying undisturbed sites-- and likely to establish on once disturbed sites-- include these grasses as well as *Festuca scabrella*, *Agropyron spicatum*, *A. caninum*, *Koeleria cristata* and *Carex* species. *Festuca idahoensis* and *Agropyron caninum* do best at constantly disturbed roadside sites.

Forbs-- especially composites-- commonly establish in this zone. Nine species do well on once disturbed sites; these include *Lupinus sericeus*, *Solidago spathulata*, *Fragaria* spp, and *Monarda fistulosa*. At least five species from undisturbed sites might be added; these include *Eriogonum umbellatum*, *Lithospermum ruderales*, *Geum triflorum*, *Artemisia ludoviciana* and *Phlox hoodii*. While most of these species appear on the ditch slope, only three-- *Achillea millefolium*, *Potentilla gracilis* and *Solidago spathulata*-- appear on roadshoulders.

Rosa species, *Arctostaphylos uva-ursi*, *Potentilla fruticosa*, and *Amalanchier alnifolia*, and perhaps *Symphoricarpos albus* are sufficiently important in undisturbed or once-disturbed sites to justify planting. While they may spread to ditch slopes, upright shrubs will not tolerate the trampling they would experience on road shoulders (Dale and Weaver 1974).

The four exotic grasses thriving in this zone were probably all planted there. While all perform well, *Phleum pratense* and *Poa pratensis* spread strongly into undisturbed vegetation; *Poa compressa* spreads less strongly.

Of exotic forbs appearing in this zone, *Melilotus officinalis* and *Trifolium procumbens* were probably planted and spread weakly into undisturbed vegetation. *Centaurea maculosa* and *Linaria vulgaris*, never planted, have moved up the road corridor and invade undisturbed vegetation weakly.

Table 4. Plants commonly establishing in the FESC/ FEID environment.
species climax cleared road cut ditch shoulder
 cn fq cv cn fq cv cn fq cv cn fq cv cn fq cv
 10 0 10 10 10

Native grasses.

FESTIDAH	G	99.96.14.	.	.	.	90.58. 3.	50.44. 3.	20. 8. 0.
FESTSCAB	G	99.98.18.	.	.	.	60.20. 0.	40.12. 0.	10. 4. 0.
AGROSPIC	G	80.60. 3.	.	.	.	50.36. 2.	40.22. 1.	.
CAREXSPP	G	60.46. 1.	.	.	.	40.23. 0.	10. 3. 0.	.
KOELCRIS	G	70.48. 1.	.	.	.	40.14. 0.	60.28. 0.	40.10. 0.
AGRCAAND	G	50.26. 1.	.	.	.	30.23. 1.	50.34. 1.	50.34. 0.
DANTINTE	G	40.45. 0.	.	.	.	.	.	.
AGRCAMAJ	G	.	.	.	.	.	10.20. 0.	20.20. 0.

Native forbs.

ACHIMILL	F	90.72. 1.	.	.	.	90.64. 1.	99.76. 1.	90.58. 0.
ANEMMULT	F	70.36. 1.	.	.	.	90.60. 1.	70.40. 1.	.
GAILARIS	F	80.36. 0.	.	.	.	90.40. 1.	40.20. 0.	10. 2. 0.
SOLISPAT	F	70.32. 1.	.	.	.	90.54. 3.	70.50. 2.	50.22. 0.
LUPISERI	F	90.78. 6.	.	.	.	99.78. 5.	60.52. 2.	10. 2. 0.
GALIBORE	F	99.86. 2.	.	.	.	80.54. 1.	70.38. 1.	.
ASTEMODE	F	30.13. 0.	.	.	.	60.28. 0.	60.48. 1.	40.23. 0.
CAMPROTU	F	50.34. 0.	.	.	.	60.29. 0.	30.20. 0.	.
SENECANU	F	50.40. 0.	.	.	.	60.46. 1.	40.43. 1.	.
FRAGASPP	F	30.13. 0.	.	.	.	60.30. 2.	30.23. 1.	.
MONAFIST	F	10. 4. 0.	.	.	.	50.56. 2.	50.72. 3.	10. 4. 0.
OXYTSPLE	F	30.20. 0.	.	.	.	50.17. 0.	70.43. 1.	10. 3. 0.
PENSCONF	F	60.29. 1.	.	.	.	50.40. 0.	30. 9. 0.	10. 3. 0.
ERIGCOMP	F	10. 4. 0.	.	.	.	40.24. 0.	.	30.24. 0.
ANTEROSE	F	80.30. 0.	.	.	.	40.10. 0.	30.14. 0.	.
GERAVISC	F	20.25. 0.	.	.	.	40.25. 0.	40.40. 3.	10. 5. 0.
POTTEGRAC	F	40.16. 0.	.	.	.	40.14. 0.	50.24. 1.	60.22. 1.
SEDULANC	F	30.11. 0.	.	.	.	40.40. 1.	50.31. 0.	.
ERIOUMBE	F	60.67. 3.	.	.	.	30.20. 0.	.	.
LITHRUDE	F	60.31. 1.	.	.	.	30. 6. 0.	20.11. 1.	.
GEUMTRIF	F	50.60. 3.	.	.	.	20. 8. 0.	.	.
AGOSGLAU	F	50.32. 1.	.	.	.	.	20. 8. 0.	.
BUPLAMER	F	30.23. 0.	.	.	.	30.10. 0.	30.13. 0.	.
ASTECAMP	F	20.27. 0.	.	.	.	30.27. 0.	10.13. 0.	.
LOMATRIT	F	30.67. 1.	.	.	.	20.20. 1.	10. 0. 0.	.
PHLOHOOD	F	20.30. 1.	.	.	.	20.50. 0.	10.20. 0.	.
CHRYVILL	F	30.10. 0.	.	.	.	10. 3. 0.	30.17. 0.	20. 7. 0.
HEDYOCCI	F	10. 7. 0.	.	.	.	20.27. 3.	30.53. 1.	10. 7. 0.
ARTELUDO	F	20.13. 0.	.	.	.	20.33. 1.	20.20. 1.	10. 7. 0.
SOLICANA	F	.	.	.	.	20.15. 0.	30.15. 0.	.
CIRSHOOK	F	.	.	.	.	.	30.27. 0.	.

Table 4, continued.

Native shrubs.									
ROSA SPP	S	99.46.	1.	.	.	.	80.56.	3.	40.24. 3. 20. 2. 0.
POTEFRUT	S	60.34.	2.	.	.	.	30.11.	0.	50.20. 1. 10. 3. 0.
ARCTUVAU	S	50.52.	7.	.	.	.	30.28.	7.	10.12. 1. . . .
PRUNVIRG	S	10.10.	0.	.	.	.	20.20.	3.	10.10. 1. . . .
AMELALNI	S	50.48.	1.	.	.	.	10.12.	1.	
SYMPALBA	S	10.13.	0.	.	.	.	30.27.	0.	
BERBREPE	S	10.50.	3.	.	.	.	20.30.	1.	
Exotic grasses.									
PHLEPRAT	* G	90.46.	1.	.	.	.	99.82.	2.	90.78. 2. 80.70. 1.
POAPRATE	* G	60.27.	1.	.	.	.	80.76.	4.	70.40. 2. . . .
POACOMPR	* G	10. 6.	0.	.	.	.	60.30.	2.	80.34. 1. 90.68. 3.
BROMINER	* G	.	.	.	.	.	50.30.	3.	60.27. 2. . . .
AGROALBA	* G	.	.	.	.	.	.	.	10. 5. 0. 30.20. 0.
Exotic forbs.									
CENTMACU	* F	10. 4.	0.	.	.	.	70.54.	7.	90.60.17. 99.84. 9.
MELIOFFI	* F	10. 7.	0.	.	.	.	60.31.	0.	90.58. 1. 70.36. 0.
CERAVULG	* F	40.20.	0.	.	.	.	40.23.	0.	20. 6. 0. 20. 6. 0.
TRIFPROC	* F	10. 9.	0.	.	.	.	40.29.	0.	70.77. 3. 60.31. 0.
TRAGDUBI	* F	20. 8.	0.	.	.	.	40.24.	0.	30.20. 0. 10. 8. 0.
CIRSARVE	* F	30.33.	0.	.	.	.	30.60.	2.	10. 7. 0. . . .
TARAOFFI	* F	.	.	.	.	.	30. 9.	0.	80.38. 1. 90.58. 0.
LINAVULG	* F	20.33.	2.	.	.	.	20.33.	2.	10. 7. 0. . . .
VERBTHAP	* F	.	.	.	.	.	20.20.	0.	20.33. 0. . . .
TRIFHYBR	* F	.	.	.	.	.	20.13.	0.	20.13. 0. . . .
ALYSALYS	* F	10. 3.	0.	.	.	.	10. 7.	0.	50.40. 0. 40.27. 0.
PLANMAJO	* F	.	.	.	.	.	.	.	10. 5. 0. 30.30. 0.
Ground cover.									
MOS&LICH		90. 0.	9.	.	.	.	50. 0.	8.	70. 0. 3. . . .
LITTER		99. 0.	19.	.	.	.	99. 0.	17.	99. 0.12. 40. 0. 1.
SOIL		70. 0.	3.	.	.	.	90. 0.	13.	60. 0. 7. 20. 0. 0.
ROCK		60. 0.	2.	.	.	.	80. 0.	11.	99. 0.22. 99. 0.83.

D. Plants establishing in the ARTEMISIA ARBUSCULA/ FESTUCA IDAHOENSIS environment (HTs) .

Table 5 lists plants 'establishing well' in the *Artemisia tridentata* arbuscula / *Festuca idahoensis* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses usually form the matrix for site revegetation. Three grasses establish well on once-disturbed sites: *Stipa lettermanii*, *Agropyron spicatum*, and *Koeleria cristata*. No additional grasses are available from undisturbed vegetation. On constantly disturbed sites, *Agropyron caninum*, *Bromus carinatus*, and *Festuca idahoensis* do well. *Agropyron spicatum* apparently tolerates disturbance especially poorly.

Plantings will be enriched with forbs. Four forbs establishing well on once disturbed sites are *Lupinus sericeus*, *Eriogonum umbellatum*, and *Aster eatonii*, and *Antennaria luzuloides*. Undisturbed vegetation contains the same forbs. Forbs establishing on disturbed sites include *Lupinus sericeus* as well as *Achillea millefolium*, *Potentilla diversifolia*, *Solidago spathulata*, *Viguiera multiflora* and several mustards.

The shrubs appearing in this zone-- *Artemisia arbuscula*-- are well adapted for once-disturbed sites and poorly adapted for road shoulder sites.

Exotic grasses of this environment-- *Poa pratensis*, *Bromus inermis*, *Dactylis glomerata* and *Phleum pratense*-- were probably planted in and were usually successful in the constantly disturbed zones. *Poa pratensis* spreads strongly into undisturbed vegetation.

Six exotic forbs do well in this environment. Planted *Medicago lupulina* spreads weakly into undisturbed vegetation. The most invasive weeds-- *Polygonum aviculare* and *Madia glomerata*-- have little tendency to dominate.

Table 5. Plants commonly establishing in the ARAR/ FEID environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			0			10			10			10		
Native grasses.																
STIPLETT	G	90.38.	1.		.	.	.	99.62.	3.		60.16.	0.		10. 4.	0.	
KOELCRIS	G	99.82.	3.		.	.	.	80.62.	1.		50.18.	0.		.	.	.
BROMCARI	G	40.12.	0.		.	.	.	80.38.	0.		80.42.	3.		70.30.	1.	
AGROSPIC	G	99.90.	5.		.	.	.	60.46.	2.		10. 2.	0.		.	.	.
FESTIDAH	G	20. 6.	0.		.	.	.	30.17.	0.		60.63.	5.		70.71.	7.	
AGRCAMAJ	G	30. 8.	0.		.	.	.	20.16.	1.		80.36.	2.		60.30.	1.	
MELISPEC	G	70.51.	0.		.	.	.	10. 3.	0.		.	.		.	.	.
STIPCOMA	G	.	.		.	.	.	.	.		.	.		40.25.	1.	
Native forbs.																
LUPISERI	F	99.72.	4.		.	.	.	99.86.	10.		99.88.	7.		80.32.	1.	
COLLPARV	F	99.54.	0.		.	.	.	90.36.	0.		40.14.	0.		10. 2.	0.	
ERIOUMBE	F	99.94.	10.		.	.	.	80.68.	7.		70.38.	1.		.	.	.
ARABHOLB	F	70.35.	0.		.	.	.	70.28.	0.		.	.		10. 3.	0.	
LEPIDENS	F	.	.		.	.	.	70.32.	0.		90.32.	1.		90.44.	2.	
SEDULANC	F	90.53.	0.		.	.	.	60.24.	0.		10. 2.	0.		.	.	.
SOLISPAT	F	50.23.	0.		.	.	.	60.20.	0.		70.48.	5.		60.25.	1.	
FRITPUDI	F	80.29.	0.		.	.	.	60.20.	0.		.	.		.	.	.
ASTEEATO	F	20. 8.	0.		.	.	.	50.26.	1.		90.48.	2.		99.80.	6.	
ANTELUZU	F	30.24.	1.		.	.	.	50.36.	1.		20.16.	0.		.	.	.
ASTEINTE	F	20. 7.	0.		.	.	.	40.27.	1.		30.37.	4.		.	.	.
ERIGDIVE	F	.	.		.	.	.	40.24.	0.		20.16.	0.		.	.	.
LINAHARK	F	10. 8.	0.		.	.	.	40.20.	0.		10. 4.	0.		.	.	.
VIGUMULT	F	.	.		.	.	.	40.37.	2.		70.77.	2.		50.31.	1.	
LOMATRIT	F	50.37.	0.		.	.	.	10.10.	0.		20.10.	0.		.	.	.
GAYONUTT	F	30.20.	1.		.	.	.	30.17.	0.		20.17.	0.		.	.	.
ERIGEATO	F	20.20.	1.		.	.	.	30.50.	0.		20.15.	0.		.	.	.
LOMAAMBI	F	.	.		.	.	.	20.16.	0.		40.20.	0.		.	.	.
ACHIMILL	F	.	.		.	.	.	10. 2.	0.		99.40.	1.		99.74.	4.	
BALSSAGI	F	20.35.	3.		.	.	.	10.10.	0.		20.15.	0.		.	.	.
GILEAGGR	F	.	.		.	.	.	.	.		30.33.	0.		.	.	.
SENEINTE	F	30.20.	0.		.	.	.	.	.		.	.		.	.	.
POTEDIVE	F	.	.		.	.	.	.	.		30.28.	1.		50.48.	3.	
Native shrubs.																
ARTEARBU	S	99.98.	22.		.	.	.	99.80.	9.		30.16.	0.		.	.	.
ARTRIVAS	S	10.20.	1.		.	.	.	10.20.	1.		10.20.	1.		.	.	.

Table 5, continued.

Exotic grasses.							
POAPRATE * G	90.70. 7.	.	.	.	99.74. 6.	99.98.16.	99.98.26.
DACTGLOM * G	.	.	.	.	20.17. 1.	40.20. 2.	60.40. 3.
BROMINER * G	.	.	.	.	20. 8. 0.	80.32. 2.	99.50. 6.
PHLEPRAT * G	.	.	.	.	10.10. 0.	.	40.30. 1.
AGROALBA * G	.	.	.	.	.	20.10. 1.	40.27. 0.
Exotic forbs.							
POLYAVIC * F	99.70. 1.	.	.	.	90.66. 1.	90.40. 1.	50.22. 0.
RUMEACET * F	20. 4. 0.	.	.	.	90.60. 3.	90.62. 2.	90.70. 4.
MADIGLOM * F	60.27. 0.	.	.	.	70.33. 0.	60.38. 1.	50.27. 1.
CHENALBU * F	10. 3. 0.	.	.	.	40.27. 1.	50.33. 0.	.
TRAGDUBI * F	20. 4. 0.	.	.	.	10. 2. 0.	70.40. 0.	70.40. 1.
TARAOFFI * F	10. 2. 0.	.	.	.	.	80.34. 1.	99.70. 3.
ARABGLAB * F	10. 2. 0.	.	.	.	10. 7. 0.	60.40. 0.	40.20. 0.
MEDILUPU * F	.	.	.	.	10. 4. 0.	70.44. 3.	99.72. 4.
CENTMACU * F	.	.	.	.	10.33. 3.	20.40. 9.	30.53.14.
TRIFREPE * F	.	.	.	.	.	40.20. 1.	60.53. 4.
LACTSERI * F	.	.	.	.	.	30.27. 0.	20.13. 0.
Ground cover.							
MOS&LICH	99. 0.10.	.	.	.	90. 0. 4.	60. 0. 1.	.
LITTER	99. 0. 5.	.	.	.	90. 0. 3.	90. 0. 5.	80. 0. 4.
SOIL	99. 0.19.	.	.	.	99. 0.16.	99. 0.10.	90. 0. 3.
ROCK	99. 0. 9.	.	.	.	99. 0.27.	99. 0.24.	99. 0.14.

E. Plants commonly establishing in the ARTEMISIA TRIDENTATA vaseyana/ FESTUCA IDAHOENSIS environment (HTs).

Table 6 lists plants 'establishing well' in the Artemisia tridentata vaseyana/ Festuca idahoensis environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses form the matrix for most revegetation. Four grasses do well on undisturbed sites in this zone: Bromus carinatus, Stipa lettermanii, ?Koeleria cristata, and Agropyron spicatum. Festuca idahoensis and some ?Carex species, from undisturbed vegetation, will probably establish well.

A diversity of forbs could be added. Five species-- including Lupinus sericeus, Balsamorhiza sagittata, Eriogonum umbellatum and Achillea millefolium-- establish well on once-disturbed sites. Besides these, three species-- including Antennaria microphylla-- are important in undisturbed vegetation. While fewer forbs did well in the constantly disturbed zone, species succeeding here included plants commonly succeeding in the undisturbed zone: Lupinus sericeus, Achillea millefolium, and Potentilla diversifolia.

The shrub, Artemisia tridentata vaseyana, could be planted on once-disturbed sites. Or it is likely to invade eventually. Shrubs are not expected to do well on constantly disturbed sites. Woody based Eriogonums may be good candidates for stabilizing soils.

Four exotic grasses, probably planted, did well on constantly disturbed sites. One, Poa pratensis, spread strongly to undisturbed vegetation.

Six exotic forbs did well in this environmental zone and several spread weakly into adjacent undisturbed vegetation. Two non-spreading forbs (Melilotus officinalis and Medicago lupulina) were probably planted in.

Table 6. Plants commonly establishing in the ARTRvas/ FEID environment.
species

species		climax			cleared			road cut			ditch			shoulder			
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	
		10			0			10			10			10			
Native grasses.																	
STIPLETT	G	80.22.	1.		.	.	.	99.74.	3.		70.30.	1.		40.20.	1.		
BROMCARI	G	99.56.	2.		.	.	.	99.72.	3.		99.90.	4.		70.52.	2.		
AGROSPIC	G	99.60.	2.		.	.	.	70.26.	1.		20. 8.	0.		.	.	.	
KOELCRIS	G	90.76.	3.		.	.	.	70.50.	2.		50.28.	1.		10. 6.	0.		
CAREXSPP	G	50.18.	1.		.	.	.	40.13.	0.		40.27.	1.		40. 9.	0.		
AGRCAMAJ	G	30. 8.	0.		.	.	.	20. 4.	0.		90.46.	1.		99.56.	2.		
FESTIDAH	G	60.31.	1.		.	.	.	.	.		10. 3.	0.		20.11.	0.		
MELISPEC	G	80.53.	1.		.	.	.	20.18.	1.		.	.		.	.	.	
CAREROSS	G	30.25.	1.		.	.	.	20.15.	1.		.	.		.	.	.	
DANTUNIS	G	20.20.	2.		.	.	.	20.15.	0.		20.15.	1.		.	.	.	
SITAHYST	G	10.16.	0.		.	.	.	20.20.	0.		30.24.	0.		10. 4.	0.		
CAREHOOD	G	.	.		.	.	.	20.14.	0.		60.43.	1.		40.26.	1.		
AGROSCAB	G	.	.		.	.	.	10.13.	0.		30.53.	1.		10.20.	0.		
STIPCOMA	G	.	.		.	.	.	10.80.	1.		10.40.	0.		10.40.	1.		
Native forbs.																	
LUPISERI	F	99.72.	3.		.	.	.	99.80.	4.		99.74.	6.		80.46.	4.		
ERIOUMBE	F	99.86.	8.		.	.	.	99.92.	8.		80.28.	1.		30.12.	0.		
LEPIDENS	F	50.12.	0.		.	.	.	90.52.	1.		90.70.	0.		90.64.	1.		
ACHIMILL	F	40.20.	1.		.	.	.	60.30.	1.		70.33.	1.		60.48.	2.		
SEDULANC	F	90.44.	1.		.	.	.	80.26.	0.		30. 6.	0.		.	.	.	
ERIGOCHR	F	40.20.	0.		.	.	.	60.40.	1.		20. 8.	0.		30. 8.	0.		
FRITPUDI	F	80.48.	0.		.	.	.	60.23.	0.		10. 3.	0.		.	.	.	
COLLPARV	F	60.45.	1.		.	.	.	50.28.	0.		10. 3.	0.		.	.	.	
BALSSAGI	F	80.45.	2.		.	.	.	50.28.	1.		10. 3.	0.		10. 5.	0.		
ARABHOLB	F	90.38.	0.		.	.	.	20. 7.	0.		10. 4.	0.		10. 2.	0.		
ANTEMICR	F	60.37.	1.		.	.	.	10. 3.	0.		20.10.	0.		.	.	.	
GILEAGGR	F	40.33.	0.		.	.	.	20.10.	0.		.	.		10. 3.	0.		
AGOSGLAU	F	50.40.	0.		.	.	.	10. 4.	0.		.	.		.	.	.	
OROBFASC	F	40.32.	0.		.	.	.	30.20.	0.		.	.		.	.	.	
LOMATRIT	F	40.52.	0.		.	.	.	20.16.	0.		.	.		.	.	.	
EPILPANI	F	40.13.	0.		.	.	.	30.13.	0.		40.23.	0.		40.20.	0.		
LINAHARK	F	20.20.	0.		.	.	.	30.25.	0.		10. 5.	0.		.	.	.	
ERIGDIVE	F	10. 3.	0.		.	.	.	20.17.	0.		40.20.	0.		40.33.	0.		
SOLISPAT	F	10.13.	0.		.	.	.	10. 7.	0.		30.20.	2.		30.20.	0.		
ERIGEATO	F	.	.		.	.	.	40.24.	1.		10. 4.	0.		.	.	.	
VIGUMULT	F	.	.		.	.	.	20.20.	1.		40.50.	1.		30.50.	0.		
OXALDILL	F	.	.		.	.	.	20.27.	0.		20.40.	1.		20.47.	2.		
POTEDIVE	F	.	.		.	.	.	.	.		20. 7.	0.		60.50.	1.		
CAMPROTU	F	.	.		.	.	.	.	.		40.48.	0.		30.24.	0.		
Native shrubs.																	
ARTEARBU	S	30.40.	2.		.	.	.	10. 7.	0.		.	.		.	.	.	
ARTRIVAS	S	99.98.	20.		.	.	.	99.76.	3.		90.60.	2.		50.18.	0.		

Table 6, continued.

Exotic grasses.							
POAPRATE * G	90.72.12.	.	.	.	99.80. 8.	99.94. 9.	99.94.11.
DACTGLOM * G	.	.	.	.	30.17. 0.	40.30. 1.	30.27. 1.
PHLEPRAT * G	.	.	.	.	.	20.17. 1.	70.29. 0.
BROMINER * G	.	.	.	.	.	10. 9. 0.	70.40. 3.
AGROALBA * G	.	.	.	.	.	10.20. 0.	30.67. 5.
Exotic forbs.							
RUMEACET * F	.	.	.	.	90.62. 3.	99.90. 9.	90.80. 7.
MADIGLOM * F	50.27. 0.	.	.	.	50.31. 1.	80.47. 1.	60.33. 1.
TRAGDUBI * F	30. 9. 0.	.	.	.	50.20. 0.	80.51. 0.	70.31. 1.
TARAOFFI * F	20. 9. 0.	.	.	.	50.34. 1.	60.37. 2.	70.57. 1.
POLYAVIC * F	30.11. 0.	.	.	.	40.34. 1.	30.14. 1.	60.40. 4.
CHENALBU * F	30. 8. 0.	.	.	.	40.15. 1.	40.23. 0.	30.20. 0.
LINAVULG * F	10.20. 0.	.	.	.	20.27. 1.	10.13. 0.	10.13. 0.
ARABGLAB * F	.	.	.	.	20.50. 0.	10.20. 0.	10.20. 0.
LACTSERI * F	.	.	.	.	20.20. 0.	30.20. 0.	40.60. 2.
MEDILUPU * F	.	.	.	.	.	60.20. 0.	60.36. 1.
MELIOFFI * F	.	.	.	.	.	10. 5. 0.	40.30. 3.
TRIFREPE * F	.	.	.	.	.	30.15. 1.	10.10. 1.
Ground cover.							
MOS&LICH	80. 0. 7.	.	.	.	70. 0. 5.	10. 0. 0.	10. 0. 0.
LITTER	99. 0.15.	.	.	.	99. 0.10.	90. 0. 6.	80. 0. 5.
SOIL	99. 0.12.	.	.	.	99. 0.13.	80. 0. 4.	30. 0. 0.
ROCK	99. 0. 9.	.	.	.	99. 0.27.	99. 0.44.	99. 0.43.

F. Plants establishing in PSEUDOTSUGA MENZIESII/ SYMPHORICARPUS ALBA environment (HTs)

Table 7 lists plants 'establishing well' in Pseudotsuga menziesii/ Symphoricarpos alba environments (HTs). Use of the table is discussed in other essays, for example essay seven or nine.

Grasses usually provide a matrix for revegetation. None of the species in the once-disturbed vegetation meet the 'doing well' criterion, probably because exotic grasses were over poweringly seeded. Among natives Agropyron caninum, Bromus ciliatus, Calamagrostis rubescens and Poa interior are probably suitable. Plants performing well on logged sites in the same environment will probably establish well: Calamagrostis rubescens, Carex geyeri and Bromus anomalis-- and probably B carinatus and Festuca idahoensis. The performance of these graminoids in adjacent undisturbed vegetation also suggests success in revegetation plantings. Agropyron caninum and Bromus spp are most successful on constantly disturbed sites.

Native forbs may enrich this matrix. Achillea millefolium, Astragalus miser, Valeriana dioica, and Fragaia spp do well on once-disturbed sites. Plants performing well on logged sites in this environment will probably also do well; they include Lupinus argentea, Geranium viscosissimum, Solidago missouriensis, Aster conspicuous, and Arnica cordifolia. [Several forbs from undisturbed sites be added; they include Aster conspicuous and Epilobium angustifolia. Though many native forbs exist in the constantly disturbed zone only a few (eg Achillea millefolium and Fragaria spp) do well; one might also try Astragalus miser, Aster occidentalis, Geranium viscosissimum and Solidago missouriensis.

Their presence on once-disturbed sites and logged sites suggests that Symphoricarpos albus, Rosa spp, Spirea betulifolia, Berberis repens and perhaps Shepardia canadensis or Juniperus communis would grow well on rarely disturbed sites. Due to their brittle stems none of these plants are likely to thrive on constantly disturbed sites.

All the exotic grasses dominating roadside vegetation (Poa pratensis, Phleum pratense, and Bromus inermis) were probably planted there. If exotics are considered for seeding note that Poa pratensis-- and to a lesser extent Phleum pratense, Dactylis glomerata, and Bromus inermis-- invade cleared and probably burned forest. These grasses, and especially Poa pratensis, invade undisturbed sites.

Many exotic forbs arrive in seed mixes or spread down the road corridor. Melilotus officinalis, Trifolium repens and Trifolium pratense were surely planted and do well. The Trifoliums, including Trifolium hybridum, spread weakly into cleared (right-of-way) and forested areas. While not seeded, other forbs-- including Taraxacum, Cirsium, Tragopogon, and Alyssum-- arrive on site and spread weakly into cleared areas or even undisturbed forest.

Table 7. Plants commonly establishing in the PSME-SYAL environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			4			10			10			10		
Native grasses.																
AGRCAMAJ	G	40.14.	0.		50.15.	0.		60.20.	0.		90.46.	3.		80.62.	3.	
POAINTER	G	40.23.	0.		.	.	.	40.50.	1.		30.37.	0.		20.17.	0.	
BROMCILI	G	30.24.	1.		.	.	.	40.48.	1.		30.44.	3.		20.24.	1.	
AGRCAUNI	G	50.27.	0.		.	.	.	30.20.	0.		10. 0.	0.		.	.	.
CALARUBE	G	99.72.	7.		75.60.	5.		30.10.	1.		.	.	.	.	.	.
CAREGEYE	G	50.40.	2.		50.30.	1.		.	.	.	.	.	.	.	.	.
BROMANOM	G	10. 5.	0.		75.47.	1.		10. 5.	0.		.	.	.	10. 5.	0.	
FESTIDAH	G	10.12.	0.		50. 7.	0.		20.12.	0.		.	.	.	10. 4.	0.	
BROMCARI	G	30.30.	0.		50.30.	0.		20.20.	1.		30.23.	0.		20. 7.	0.	
POAPALUS	G	30.20.	0.		50.33.	0.		30.48.	1.		20.24.	0.		10.16.	0.	
STIPOCCI	G	20.20.	0.		50.30.	0.		20. 4.	0.		.	.	.	.	.	.
TRISSPIC	G	10. 5.	0.		25.40.	0.		30.35.	0.		10.15.	0.		.	.	.
MUHLASPE	G	.	.	.	25.40.	0.		20.13.	0.		10.13.	0.		.	.	.
AGRCALAT	G	.	.	.	25.20.	0.		.	.	.	.	.	.	.	.	.
BRINEPUM	G	.	.	.	25. 7.	0.		.	.	.	20.33.	2.		30.33.	1.	
KOELCRIS	G	10.20.	0.		25.20.	0.		.	.	.	.	.	.	.	.	.
Native forbs.																
ACHIMILL	F	80.54.	0.		99.60.	2.		80.64.	1.		70.44.	0.		80.54.	1.	
FRAGASPP	F	90.72.	4.		99.75.	2.		70.52.	2.		50.38.	4.		50.36.	7.	
CAMPROTU	F	20. 9.	0.		99.25.	1.		70.58.	0.		20. 4.	0.		.	.	.
ANEMMULT	F	10. 6.	0.		50.13.	0.		60.49.	0.		10. 6.	0.		.	.	.
ASTRMISE	F	80.47.	1.		75.73.	1.		60.60.	2.		40.24.	0.		40.38.	1.	
VALEDIOI	F	40.23.	1.		25.99.	0.		60.63.	2.		20.10.	0.		10. 7.	0.	
ANTEROSE	F	40.24.	0.		99.15.	0.		50.32.	0.		10. 4.	0.		10. 2.	0.	
GALIBORE	F	80.67.	1.		99.95.	1.		50.16.	0.		20. 4.	0.		.	.	.
LUPIARGE	F	30.34.	2.		75.55.	3.		40.17.	0.		10. 9.	0.		20. 6.	0.	
GERAVISC	F	60.15.	0.		99.45.	1.		40.38.	1.		40.33.	1.		30.28.	1.	
SOLIMISS	F	20.20.	1.		50.70.	1.		40.70.	2.		20.35.	3.		20.40.	3.	
ASTECONS	F	80.76.	5.		99.80.	4.		30.22.	1.		30.18.	0.		20.11.	1.	
ARNICORD	F	60.66.	2.		99.55.	1.		20.17.	1.		20.17.	0.		10.11.	0.	
THALOCCI	F	60.77.	2.		75.73.	0.		20. 7.	0.		10. 3.	0.		.	.	.
DISPTRAC	F	60.37.	0.		75.20.	0.		.	.	.	10. 3.	0.		.	.	.
SMILRACE	F	40.35.	1.		75.20.	0.		.	.	.	.	.	.	.	.	.
SENECANU	F	.	.	.	75.13.	0.		10.13.	0.		.	.	.	10. 7.	0.	
SMILSTEL	F	20.27.	0.		50.50.	0.		.	.	.	10. 7.	0.		.	.	.
PHACLIN	F	.	.	.	50.60.	0.		30.50.	0.		20.10.	0.		10. 5.	0.	
ERIGSPEC	F	.	.	.	50. 7.	0.		30.27.	0.		30. 7.	0.		20. 7.	0.	
VIOLADUN	F	20. 6.	0.		25.20.	0.		40.29.	0.		20.20.	1.		20.11.	0.	
POTTEGRAC	F	30.37.	0.		50.47.	0.		30. 7.	0.		30.27.	0.		20.13.	0.	
SEDULANC	F	10. 4.	0.		50.30.	0.		30.16.	0.		.	.	.	.	.	.
CLEMCOLU	F	40.25.	0.		50.10.	0.		20.20.	0.		.	.	.	.	.	.
POTEGLAN	F	.	.	.	25.20.	0.		40.50.	0.		20.20.	0.		10. 5.	0.	
CERAARVE	F	.	.	.	.	.	.	40.28.	1.		10. 8.	0.		10. 0.	0.	
AGOSGLAU	F	.	.	.	.	.	.	40.44.	0.		30.12.	0.		10. 4.	0.	
TRAGPRAT	F	20. 3.	0.		.	.	.	40.31.	0.		40.29.	1.		20.20.	0.	

Table 7, continued.

ASTEOCCHI	F	10.16. 1.	. . .	30.36. 1.	50.52. 2.	40.72. 2.
EPILANGU	F	50.27. 1.	. . .	30.33. 0.	20.27. 1.	30.23. 0.
EPILMINU	F	. . .	. . .	30.40. 0.	. . .	. . .
EPILPANI	F	20. 8. 0.	25. 7. 0.	30.20. 0.	10. 4. 0.	. . .
SOLICANA	F	10. 4. 0.	25.10. 1.	30.16. 1.	10.20. 3.	10.20. 3.
ERIOLOANA	F	. . .	. . .	30.40. 0.	10.20. 0.	10. 7. 0.
GENTAMAR	F	. . .	. . .	30.13. 0.	10. 7. 0.	10. 7. 0.
Native shrubs and trees.						
ROSA SPP	S	99.64. 2.	99.85. 3.	30. 8. 0.	20.10. 1.	20.12. 0.
SYMPALBA	S	99.96.12.	99.99.11.	30.10. 1.	10. 4. 0.	10. 2. 0.
SHEPCANA	S	30.15. 1.	. . .	30.25. 2.	. . .	10. 5. 0.
BERBREPE	S	60.53. 1.	75.35. 1.	. . .	. . .	. . .
SPIRBETU	S	40.75. 6.	75.80. 4.	10.10. 0.	. . .	. . .
RIBESSPP	S	30.15. 0.	. . .	10. 5. 0.	10.10. 2.	. . .
AMELALNI	S	30.40. 2.	. . .	. . .	. . .	. . .
ARCTUVAU	S	10.40. 0.	25.40. 4.	10.20. 0.	. . .	. . .
PRUNVIRG	S	10.10. 1.	25.20. 5.	. . .	. . .	. . .
ARTEFRIG	S	. . .	25.20. 0.	. . .	. . .	. . .
JUNICOMM	S	. . .	25.40. 0.	. . .	. . .	. . .
ARTRIVAS	S	. . .	. . .	10. 7. 0.	10. 7. 0.	10. 7. 0.
PSEUMENZ	T	60.27. 0.	50.27. 2.	70.53. 3.	10. 4. 0.	20. 7. 0.
POPUTREM	T	10. 0. 0.	25.20. 0.	10. 0. 0.	. . .	. . .
JUNISCOP	T	10.10. 0.	25.20. 0.	10.10. 0.	. . .	. . .
OHPSEUME	T	99.62.51.	25.15.11.	. . .	. . .	. . .
Exotic grasses.						
PHLEPRAT * G		40.26. 0.	99.65. 0.	70.54. 2.	99.74. 3.	99.62. 3.
POAPRATE * G		90.56. 1.	99.50. 4.	70.38. 2.	90.76. 7.	70.54. 5.
BROMINER * G		30. 2. 0.	25.10. 0.	50.32. 4.	99.78.12.	99.88. 9.
DACTGLOM * G		10. 8. 0.	50.27. 0.	20. 5. 0.	40.10. 0.	20. 8. 0.
POACOMPR * G		10.12. 0.	. . .	10. 4. 0.	20.28. 1.	30.40. 2.
FESTPRAT * G		. . .	. . .	10.16. 0.	40.28. 3.	20. 8. 0.
AGROREPE * G		. . .	. . .	. . .	10.15. 0.	40.50. 3.
TRITAEST * G		. . .	. . .	. . .	20.20. 0.	20.20. 0.
Exotic forbs.						
TARAOFFI * F		70.40. 0.	99.55. 0.	80.66. 2.	90.54. 1.	99.78. 1.
TRIFPRAT * F		20.17. 1.	25.50. 3.	50.20. 1.	30.10. 0.	. . .
TRIFREPE * F		30.18. 1.	25.20. 1.	50.43. 3.	50.63. 4.	50.48. 2.
MEDILUPU * F		. . .	. . .	40.33. 1.	40.30. 0.	20. 7. 0.
CIRSARVE * F		. . .	25. 5. 0.	40.20. 0.	60.28. 1.	20.13. 1.
MELIOFFI * F		. . .	. . .	30.26. 0.	70.57. 0.	50.60. 3.
CYNOOFFI * F		. . .	. . .	20.15. 0.	20. 5. 0.	30.15. 0.
TRAGDUBI * F		. . .	50.13. 1.	20. 8. 0.	30.12. 0.	10. 4. 0.
MADIGLOM * F		. . .	. . .	10. 5. 0.	20.25. 0.	40.50. 2.
TRIFHYBR * F		. . .	25.20. 0.	10.20. 0.	10.13. 0.	10.13. 0.
LACTSERI * F		. . .	. . .	10.13. 0.	10.20. 0.	30.27. 0.
CHENALBU * F		10. 0. 0.	25.10. 0.	. . .	20.20. 0.	10.20. 0.
ALYSALYS * F		. . .	25.40. 0.	. . .	10.20. 0.	. . .
POLYAVIC * F		. . .	. . .	. . .	10.13. 0.	30.53. 0.
Ground cover.						
MOS&LICH		90. 0. 8.	75. 0. 2.	50. 0. 6.	30. 0. 1.	30. 0. 1.
LITTER		99. 0.42.	99. 0.37.	99. 0.24.	99. 0.29.	99. 0.19.
SOIL		20. 0. 0.	99. 0. 4.	90. 0.24.	99. 0. 6.	60. 0. 7.
ROCK		10. 0. 0.	25. 0. 0.	80. 0.13.	90. 0.10.	99. 0.27.

G. Plants establishing in the PSEUDOTSUGA MENZIESII/ PHYSOCARPUS MALVACEUS environment (HTs).

Table 8 lists plants 'establishing well' in the Pseudotsuga menziesii/ Physocarpus malvaceus environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses may form the matrix for revegetation. The only species 'growing well' in the once disturbed zone is *Agropyron spicatum*. *Agropyron caninum* coexists and might be planted. *Calamagrostis rubescens* and *Carex geyeri* grow well on logged sites and would probably perform well in plantings. The potential of all these graminoids is probably understated due to competition from exotics heavily seeded in this zone. *Agropyron caninum* is the only native grass doing well on continuously disturbed roadside sites.

Forbs enrich a grassy matrix. *Fragaria* spp, *Solidago missouriensis*, and *Astragalus miser* established well on once-disturbed sites. In addition, *Antennaria rosea*, *Aster conspicuous*, *Clematis columbiana*-- from logged sites-- would probably perform well. One other forb from undisturbed sites, *Arnica cordifolia*, might do well on rarely disturbed sites. Few forbs do well on continuously disturbed sites; *Achillea millefolium*, *Lupinus argenteus*, *Geranium viscosissimum*, and *Artemisia ludoviciana* are among the best.

Shrubs can do well in rarely disturbed sites, but not on continuously disturbed roadside sites. *Symphoricarpos albus* and *Prunus virginiana* had 50% constancy on the once-disturbed site. They, along with *Rosa* spp, *Juniperus scopulorum*, *Physocarpus malvaceus*, and *Spirea betulolia* did well on logged sites and are expected to do well in revegetation. Besides these, *Amelanchier alnifolia* did well on undisturbed sites and will likely thrive on occasionally disturbed sites.

Four exotic grasses-- *Bromus inermis*, *Poa pratensis*, and *Phleum pratense*, *Dactylis glomerata*-- were planted onto and did well on continuously disturbed sites. *Poa pratensis* and *Phleum pratense* invade cleared right-of-ways and, probably, logged or burned areas. Both enter undisturbed forests as well.

Exotic forbs arrived by seeding or migration down road corridors. *Melilotus officinale* and *Medicago lupulinus* were seeded and did well in at least one disturbed zone; *Medicago* and two *Trifoliums* spread weakly into logged areas. Weedy plants had minimum success in this environment and those that entered logged areas-- eg *Tarxacum*, *Tragopogon*, *Verbascum*, and *Cirsium*-- had little tendency to spread into adjacent forest lands.

Table 8. Plants commonly establishing in the PSME-PHMA environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		6			4			6			6			6		
Native grasses.																
AGRCAMAJ	G	33.13.	0.		50.25.	0.		83.23.	0.		33.13.	1.		99.80.	3.	
AGROSPIC	G	17. 7.	0.		25.60.	0.		50.80.	2.		17. 0.	0.		.	.	.
CALARUBE	G	83.68.	3.		75.53.	1.		17. 4.	0.		.	.	.	.	.	.
POAPALUS	G	17.10.	0.		99.35.	0.		33.30.	1.		33.20.	0.		.	.	.
CAREGEYE	G	33.40.	0.		50.60.	3.		.	.	.	.	.	.	.	.	.
CAREXSPP	G	17. 5.	0.		25.13.	0.		33.10.	0.		.	.	.	17. 5.	0.	
BROMANOM	G	.	.	.	.	.		33.30.	0.		33.40.	0.		17.40.	1.	
AGRCAUNI	G	17.30.	1.		25.20.	0.		.	.	.	.	.	.	.	.	.
FESTIDAH	G	17.10.	0.		25.99.	3.		.	.	.	.	.	.	.	.	.
BROMCARI	G	.	.	.	.	.		.	.	.	33.10.	1.		.	.	.
BROMCILI	G	17.20.	0.		25.40.	1.		.	.	.	.	.	.	.	.	.
BRINEPUM	G	.	.	.	25.20.	0.		.	.	.	17.40.	3.		.	.	.
Native forbs.																
ACHIMILL	F	50.17.	0.		99.55.	0.		83.40.	0.		67.40.	0.		67.30.	0.	
CAMPROTU	F	50.10.	0.		75.35.	1.		83.50.	0.		33.10.	0.		17. 7.	0.	
FRAGASPP	F	67.57.	1.		75.30.	1.		67.43.	1.		33.30.	3.		33.23.	2.	
EPILMINU	F	.	.	.	.	.		50.47.	0.		17.13.	0.		.	.	.
EPILPANI	F	.	.	.	.	.		50.33.	0.		.	.	.	.	.	.
ASTRMISE	F	67.60.	1.		50.60.	2.		50.40.	1.		33.12.	1.		33.16.	0.	
SOLIMISS	F	.	.	.	25. 7.	0.		50.24.	1.		17.16.	1.		33.16.	0.	
HIERCYNO	F	.	.	.	75.27.	0.		50.36.	0.		17. 8.	0.		.	.	.
GALIBORE	F	83.44.	0.		99.80.	2.		17.12.	0.		17. 8.	0.		17.12.	0.	
CLEMCOLU	F	50.40.	1.		99.40.	1.		.	.	.	17. 4.	0.		17. 4.	0.	
ASTECONS	F	83.84.	3.		75.93.	6.		17. 4.	0.		.	.	.	.	.	.
SMILRACE	F	67.85.	2.		75.40.	0.		.	.	.	.	.	.	.	.	.
ANTEROSE	F	.	.	.	50.33.	1.		33. 5.	0.		17. 5.	0.		17. 0.	0.	
ARNICORD	F	67.75.	2.		50.47.	0.		.	.	.	.	.	.	.	.	.
VIOLCANA	F	.	.	.	50.20.	0.		17. 7.	0.		.	.	.	.	.	.
ALLICERN	F	.	.	.	50.60.	0.		.	.	.	.	.	.	.	.	.
MONAFIST	F	.	.	.	50.20.	0.		.	.	.	.	.	.	.	.	.
LUPIARGE	F	.	.	.	25.20.	0.		33.53.	1.		50.60.	3.		33.47.	1.	
VALEDIOI	F	50.20.	0.		25.10.	0.		17. 5.	0.		.	.	.	.	.	.
BALSSAGI	F	33.27.	1.		25.20.	0.		33.13.	0.		17. 7.	1.		.	.	.
HELIUNIF	F	33.50.	0.		.	.		33.60.	1.		17.30.	1.		17.10.	1.	
ERIOLOANA	F	17.10.	0.		.	.		33.40.	0.		17.20.	1.		17.30.	0.	
ARTELUDO	F	.	.	.	.	.		33. 5.	0.		50.15.	0.		33.15.	2.	
POTEGRAC	F	.	.	.	.	.		33.30.	0.		17.30.	0.		17.20.	1.	
GERAVISC	F	.	.	.	.	.		33.40.	0.		17.30.	0.		33.60.	1.	
TRAGPRAT	F	.	.	.	.	.		33.40.	0.		33.50.	0.		17.50.	1.	
ARTEDRAC	F	.	.	.	.	.		33.20.	0.		17.30.	0.		.	.	.
POLYDOUG	F	.	.	.	.	.		33.20.	1.		.	.	.	.	.	.
ERIOUMBE	F	.	.	.	.	.		33.30.	1.		.	.	.	.	.	.
SENECANU	F	.	.	.	.	.		33.30.	0.		.	.	.	.	.	.
ASTEOCCI	F	17.20.	1.		.	.		17.10.	0.		17.10.	0.		33.20.	1.	
HEUCCYLI	F	33.13.	0.		.	.		17.27.	0.		.	.	.	.	.	.
ARABHOLB	F	.	.	.	.	.		17.13.	0.		33.27.	0.		17.27.	0.	

Table 8. Plants commonly establishing in the PSME-PHMA environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		6			4			6			6			6		
Native grasses.																
AGRCAMAJ	G	33.13.	0.		50.25.	0.		83.23.	0.		33.13.	1.		99.80.	3.	
AGROSPIC	G	17. 7.	0.		25.60.	0.		50.80.	2.		17. 0.	0.		.	.	.
CALARUBE	G	83.68.	3.		75.53.	1.		17. 4.	0.		.	.	.	.	.	.
POAPALUS	G	17.10.	0.		99.35.	0.		33.30.	1.		33.20.	0.		.	.	.
CAREGEYE	G	33.40.	0.		50.60.	3.		.	.	.	.	.	.	.	.	.
CAREXSPP	G	17. 5.	0.		25.13.	0.		33.10.	0.		.	.	.	17. 5.	0.	
BROMANOM	G	.	.	.	.	.	.	33.30.	0.		33.40.	0.		17.40.	1.	
AGRCAUNI	G	17.30.	1.		25.20.	0.		.	.	.	.	.	.	.	.	.
FESTIDAH	G	17.10.	0.		25.99.	3.		.	.	.	.	.	.	.	.	.
BROMCARI	G	.	.	.	.	.	.	.	.	.	33.10.	1.		.	.	.
BROMCILI	G	17.20.	0.		25.40.	1.		.	.	.	.	.	.	.	.	.
BRINEPUM	G	.	.	.	25.20.	0.		.	.	.	17.40.	3.		.	.	.
Native forbs.																
ACHIMILL	F	50.17.	0.		99.55.	0.		83.40.	0.		67.40.	0.		67.30.	0.	
CAMPROTU	F	50.10.	0.		75.35.	1.		83.50.	0.		33.10.	0.		17. 7.	0.	
FRAGASPP	F	67.57.	1.		75.30.	1.		67.43.	1.		33.30.	3.		33.23.	2.	
EPILMINU	F	.	.	.	.	.	.	50.47.	0.		17.13.	0.		.	.	.
EPILPANI	F	.	.	.	.	.	.	50.33.	0.		.	.	.	.	.	.
ASTRMISE	F	67.60.	1.		50.60.	2.		50.40.	1.		33.12.	1.		33.16.	0.	
SOLIMISS	F	.	.	.	25. 7.	0.		50.24.	1.		17.16.	1.		33.16.	0.	
HIERCYNO	F	.	.	.	75.27.	0.		50.36.	0.		17. 8.	0.		.	.	.
GALIBORE	F	83.44.	0.		99.80.	2.		17.12.	0.		17. 8.	0.		17.12.	0.	
CLEMCOLU	F	50.40.	1.		99.40.	1.		.	.	.	17. 4.	0.		17. 4.	0.	
ASTECONS	F	83.84.	3.		75.93.	6.		17. 4.	0.		.	.	.	.	.	.
SMILRACE	F	67.85.	2.		75.40.	0.		.	.	.	.	.	.	.	.	.
ANTEROSE	F	.	.	.	50.33.	1.		33. 5.	0.		17. 5.	0.		17. 0.	0.	
ARNICORD	F	67.75.	2.		50.47.	0.		.	.	.	.	.	.	.	.	.
VIOLCANA	F	.	.	.	50.20.	0.		17. 7.	0.		.	.	.	.	.	.
ALLICERN	F	.	.	.	50.60.	0.		.	.	.	.	.	.	.	.	.
MONAFIST	F	.	.	.	50.20.	0.		.	.	.	.	.	.	.	.	.
LUPIARGE	F	.	.	.	25.20.	0.		33.53.	1.		50.60.	3.		33.47.	1.	
VALEDIOI	F	50.20.	0.		25.10.	0.		17. 5.	0.		.	.	.	.	.	.
BALSSAGI	F	33.27.	1.		25.20.	0.		33.13.	0.		17. 7.	1.		.	.	.
HELIUNIF	F	33.50.	0.		.	.	.	33.60.	1.		17.30.	1.		17.10.	1.	
ERIOLOANA	F	17.10.	0.		.	.	.	33.40.	0.		17.20.	1.		17.30.	0.	
ARTELUDO	F	.	.	.	.	.	.	33. 5.	0.		50.15.	0.		33.15.	2.	
POTEGRAC	F	.	.	.	.	.	.	33.30.	0.		17.30.	0.		17.20.	1.	
GERAVISC	F	.	.	.	.	.	.	33.40.	0.		17.30.	0.		33.60.	1.	
TRAGPRAT	F	.	.	.	.	.	.	33.40.	0.		33.50.	0.		17.50.	1.	
ARTEDRAC	F	.	.	.	.	.	.	33.20.	0.		17.30.	0.		.	.	.
POLYDOUG	F	.	.	.	.	.	.	33.20.	1.		.	.	.	.	.	.
ERIOUMBE	F	.	.	.	.	.	.	33.30.	1.		.	.	.	.	.	.
SENECANU	F	.	.	.	.	.	.	33.30.	0.		.	.	.	.	.	.
ASTEOCCI	F	17.20.	1.		.	.	.	17.10.	0.		17.10.	0.		33.20.	1.	
HEUCCYLI	F	33.13.	0.		.	.	.	17.27.	0.		.	.	.	.	.	.
ARABHOLB	F	.	.	.	.	.	.	17.13.	0.		33.27.	0.		17.27.	0.	

Table 8, continued.

VIOLADUN	F	50.20. 0.	. . .	17.27. 0.	17. 7. 0.	17.20. 0.
DISPTRAC	F	67.65. 2.	25.33. 0.	. . .	. . .	. . .
THALOCCI	F	50.53. 1.	25.10. 0.	. . .	. . .	. . .
SMILSTEL	F	33.20. 0.	25.10. 0.	. . .	. . .	. . .
CASTMINI	F	17.20. 0.	25.99. 0.	. . .	. . .	. . .
ASTEFOLI	F	17. 0. 0.	25.40. 0.	. . .	. . .	. . .
DELPOCCI	F	17.40. 0.	25.20. 0.	. . .	. . .	. . .
CREPACUM	F	. . .	25.60. 1.	. . .	17.20. 0.	. . .
ERIGSPEC	F	. . .	25.40. 0.	. . .	17.10. 0.	17.10. 0.
Native shrubs and trees.						
SYMPALBA	S	99.97. 8.	99.75. 7.	50.17. 0.	17. 3. 0.	17. 3. 0.
PRUNVIRG	S	17. 5. 0.	50.40. 4.	50. 5. 0.	. . .	. . .
PHYSMALV	S	99.99.27.	99.80.10.	33. 3. 0.	. . .	. . .
ROSA SPP	S	83.37. 0.	75.45. 1.	33.20. 1.	17. 3. 1.	. . .
RIBESSPP	S	. . .	. . .	33.10. 0.	. . .	. . .
RUBUIDEA	S	. . .	. . .	33.50. 0.	. . .	. . .
ARTEFRIG	S	. . .	25.40. 0.	17.20. 0.	. . .	. . .
SHEPCANA	S	17. 0. 0.	50.30. 0.	17. 0. 0.	. . .	. . .
AMELALNI	S	50.32. 1.	75.40. 0.	. . .	. . .	. . .
BERBREPE	S	83.32. 0.	50.20. 0.	. . .	. . .	. . .
SPIRBETU	S	83.72. 3.	75.99. 5.	. . .	. . .	. . .
JUNICOMM	S	33.50. 9.	25.40. 7.	. . .	. . .	. . .
ARCTUVAU	S	17. 0. 0.	25.40. 0.	. . .	. . .	. . .
OHPSEUME	T	99.70.56.	50.20.10.	. . .	. . .	. . .
PSEUMENZ	T	50.13. 0.	99.45. 1.	99.37. 1.	. . .	. . .
JUNISCOP	T	33.10. 0.	50.50. 1.	17.10. 0.	17. 0. 0.	. . .
POPUTREM	T	. . .	50.13. 2.	33.30. 0.	17.10. 0.	17. 5. 0.
Exotic grasses.						
PHLEPRAT * G		50.13. 0.	75.30. 0.	83.73. 3.	67.43. 4.	67.37. 2.
BROMINER * G		. . .	. . .	83.33. 1.	83.83.10.	99.77.12.
POAPRATE * G		83.37. 1.	99.75. 3.	67.33. 2.	99.87. 4.	99.83. 9.
DACTGLOM * G		17. 5. 0.	. . .	50.70. 5.	67.80. 9.	50.20. 1.
FESTPRAT * G		. . .	. . .	50.27. 0.	. . .	. . .
BROMTECT * G		17.10. 0.	25.30. 0.	33.50. 1.	. . .	. . .
POACOMPR * G		. . .	. . .	17. 8. 0.	50.20. 1.	50.12. 0.
TRITAEST * G		. . .	. . .	17. 7. 0.	. . .	50.20. 0.
AGROREPE * G		. . .	. . .	. . .	33.40. 6.	33.53. 3.
AGROCRIS * G		. . .	. . .	. . .	. . .	33.50. 0.
Exotic forbs.						
TARAOFFI * F		50.20. 0.	75.25. 0.	83.47. 0.	50.43. 1.	50.40. 2.
TRAGDUBI * F		17. 4. 0.	50.20. 0.	50.12. 0.	. . .	. . .
MEDILUPU * F		. . .	75.35. 0.	67.48. 1.	33.24. 0.	33.36. 0.
VERBTHAP * F		. . .	50.10. 0.	50.10. 0.	33. 0. 0.	. . .
MELIOFFI * F		. . .	. . .	50.16. 0.	50.40. 2.	50.32. 1.
LACTSERI * F		. . .	. . .	50.15. 0.	. . .	33.25. 1.
CIRSARVE * F		. . .	50.10. 0.	17.13. 0.	. . .	17. 7. 0.
TRIFPRAT * F		17. 5. 0.	50. 0. 0.	17.15. 0.	33.25. 0.	17.20. 0.
ALYSALYS * F		. . .	25.60. 0.	17.20. 0.	. . .	17.20. 0.
TRIFREPE * F		. . .	25. 0. 0.	17. 0. 0.	33.35. 3.	17.25. 3.
CYNOOFFI * F		. . .	. . .	17. 0. 0.	33. 7. 0.	. . .
Ground cover.						
MOS&LICH		99. 0.11.	50. 0. 5.	. . .	67. 0. 4.	33. 0. 2.
LITTER		99. 0.31.	99. 0.30.	99. 0.13.	99. 0.28.	99. 0.11.
SOIL		. . .	50. 0. 3.	99. 0.21.	67. 0. 7.	67. 0. 3.
ROCK		33. 0. 1.	50. 0. 6.	99. 0.47.	99. 0.18.	99. 0.43.

H. Plants commonly establishing in *POPULUS TREMULOIDES*/ *CALAMAGROSTIS RUBESCENS* environment (HTs).

Table 9 lists plants 'establishing well' in the *Populus tremuloides*/*Calamagrostis rubescens* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses usually provide a matrix for revegetation. The only native grass doing well on once-disturbed sites is *Agropyron caninum*. Others were probably excluded by planted exotic grasses. The success of *Calamagrostis rubescens* and *Elymus glaucus* in adjacent undisturbed vegetation make them good candidates for revegetation. *Agropyron caninum* grows well on continuously disturbed sites.

Forbs may enrich the grassy matrix. Three native forb species do well on once-disturbed sites: *Solidago spathulata*, *Agoseris glauca*, and *Galium boreale*. The vegetation of undisturbed sites contains other likely species including composites (*Aster modestus*, *Aster conspicuus*?, *Solidago canadensis*?) and legumes (*Vicia americana* and *Lathyrus ochroleucus*). Continuously disturbed sites regularly support a few forbs including *Equisetum arvense*, *Aster modestus*, *Achillea millefolium*, *Lupinus argenteus*, and *Potentilla gracilis*, *Solidago spathulata*; only *Equisetum* seems very trample resistant.

Aspen and four shrub species can occupy rarely disturbed sites in this environmental type. The shrubs are *Rosa* species, *Symphoricarpos*, *Spiraea*, and *Amelanchier*.

Four exotic grasses were planted into and do well on continuously disturbed sites. *Phleum pratense* and *Bromus inermis* invaded forest stands of this type fairly strongly and *Agrostis alba* and *Poa pratensis* invade to a lesser degree; while we expect invasion to be stronger than in undisturbed forest, we have no data on exotic invasion of cleared sites.

Two of the four exotic forbs planted on roadsides (*Melilotus officinalis*, *Trifolium procumbens*, and *T hybridum*, and *T pratense*) spread into aspen forests. Weedy *Centaurea* also tends to spread from roadsides into aspen forests. We have no data on exotic invasion of cleared sites, but we expect it to be stronger than forest invasion.

Table 9. Plants commonly establishing in the POTR /CARU environment (HT).

species	climax			cleared			road cut			ditch			shoulder		
	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
	8			0			8			8			8		
Native grasses.															
AGRCAMAJ	G	.	.	.	.	.	88.38.	1.		88.43.	1.		75.30.	1.	
CAREXSPP	G	.	.	.	.	.	13.30.	1.		25.60.	8.		13.10.	0.	
CALARUBE	G	99.75.	4.	.	.	.	13. 8.	0.		.	.	.	.	.	.
AGRCAAND	G	.	.	.	.	.	13.20.	0.		13. 7.	0.		38.27.	0.	
ELYMGLAU	G	88.77.	3.	.	.	.	.	.	.	.	.	.	.	.	.
JUNCBALT	G	.	.	.	.	.	.	.	.	25.40.	2.		.	.	.
AGROTHUR	G	25.30.	0.	.	.	.	.	.	.	.	.	.	.	.	.
Native forbs.															
ACHIMILL	F	38.15.	0.	.	.	.	99.48.	0.		75.68.	2.		99.30.	0.	
GALIBORE	F	13.13.	0.	.	.	.	75.47.	1.		25.20.	1.		.	.	.
AGOSGLAU	F	.	.	.	.	.	63.53.	2.		38.20.	1.		63.33.	0.	
SOLISPAT	F	.	.	.	.	.	50.37.	2.		63.37.	1.		50.17.	0.	
VICIAMER	F	99.60.	1.	.	.	.	50.15.	0.		38.20.	0.		.	.	.
LUPISERI	F	.	.	.	.	.	38.33.	1.		.	.	.	.	.	.
LUPIARGE	F	.	.	.	.	.	38.55.	6.		50.60.	2.		13. 5.	0.	
ASTEMODE	F	50.63.	4.	.	.	.	38.37.	2.		63.83.	5.		50.40.	0.	
EQUIARVE	F	.	.	.	.	.	38.35.	0.		50.70.	4.		50.50.	7.	
GERAVISC	F	63.37.	1.	.	.	.	38.23.	1.		25.11.	0.		.	.	.
SOLICANA	F	75.46.	3.	.	.	.	38.20.	1.		75.34.	1.		25.14.	0.	
LOMATRIT	F	13.10.	0.	.	.	.	25.20.	0.		25.30.	1.		13. 5.	0.	
PENSCONF	F	.	.	.	.	.	25.20.	0.		13. 0.	0.		.	.	.
ASTERSPP	F	.	.	.	.	.	25.50.	1.		13.20.	0.		13.10.	0.	
ASTECONS	F	99.78.	13.	.	.	.	13.13.	1.		13.10.	0.		.	.	.
LOMADISS	F	50.65.	1.	.	.	.	13. 5.	0.		13.10.	0.		.	.	.
FRAGASPP	F	99.68.	2.	.	.	.	13. 5.	0.		63.18.	0.		.	.	.
ASTEFOLI	F	.	.	.	.	.	.	.	.	.	.	.	25.30.	1.	
EPILANGU	F	63.64.	2.	.	.	.	.	.	.	.	.	.	.	.	.
THALOCCI	F	99.88.	8.	.	.	.	.	.	.	.	.	.	.	.	.
GATRIFLO	F	75.73.	0.	.	.	.	.	.	.	.	.	.	.	.	.
SMILSTEL	F	99.55.	3.	.	.	.	.	.	.	.	.	.	.	.	.
CASTMINI	F	75.40.	0.	.	.	.	.	.	.	.	.	.	.	.	.
LATHOCHR	F	63.64.	2.	.	.	.	.	.	.	13. 4.	0.		.	.	.
OSMOOCCI	F	99.75.	5.	.	.	.	.	.	.	13. 3.	0.		.	.	.
HERALANA	F	88.29.	0.	.	.	.	.	.	.	.	.	.	.	.	.
PEDIBRAC	F	50.40.	1.	.	.	.	.	.	.	.	.	.	.	.	.
ASTELAEV	F	38.87.	3.	.	.	.	.	.	.	.	.	.	.	.	.
POTEGRAC	F	.	.	.	.	.	.	.	.	50.30.	2.		.	.	.
ANGEARGU	F	25.40.	1.	.	.	.	.	.	.	.	.	.	.	.	.
Native shrubs and trees.															
AMELALNI	S	99.78.	10.	.	.	.	.	.	.	13. 8.	0.		.	.	.
ROSA SPP	S	99.75.	5.	.	.	.	38.15.	1.		25.13.	1.		.	.	.
SYMPALBA	S	99.88.	12.	.	.	.	25.10.	0.		.	.	.	.	.	.
SPIRBETU	S	38.67.	4.	.	.	.	.	.	.	.	.	.	.	.	.
SHEPCANA	S	25.50.	5.	.	.	.	.	.	.	.	.	.	.	.	.

Table 9, continued.

BERBREPE	S	25.50. 0.	.	.	.	.	.	.	.	.	.	.	.
PRUNVIRG	S	13.13. 2.	.	.	.	13. 7. 0.	25.13. 1.	.	.	.	.	.	.
POPUTREM	T	.	.	.	.	75.50. 1.	.	.	.	.	.	.	.
OHPOPATR	T	99.95.86.	.	.	.	.	.	.	.	.	.	.	.
Exotic grasses.													
PHLEPRAT * G		99.65. 2.	.	.	.	99.88. 6.	99.88. 7.	99.58. 2.					
POACOMPR * G		.	.	.	.	88.53. 2.	99.80. 5.	99.83. 6.					
POAPRATE * G		13. 8. 0.	.	.	.	75.35. 1.	88.58. 5.	88.23. 1.					
AGROALBA * G		25.17. 2.	.	.	.	63.43. 4.	88.60.11.	63.46. 4.					
BROMINER * G		50.23. 0.	.	.	.	25.10. 0.	38.13. 0.	.	.	.			
Exotic forbs.													
TARAOFFI * F		50.18. 0.	.	.	.	88.38. 0.	99.88. 6.	99.95.12.					
MELIOFFI * F		13. 3. 0.	.	.	.	99.78. 2.	99.88. 4.	88.33. 0.					
CIRSARVE * F		25. 6. 0.	.	.	.	88.66. 2.	25.11. 0.	.	.	.			
TRIFPROC * F		25.10. 0.	.	.	.	75.30. 1.	99.75. 3.	88.58. 3.					
CENTMACU * F		.	.	.	.	75.37. 1.	50.43. 3.	50.46. 6.					
MADIGLOM * F		.	.	.	.	38.23. 0.	38.29. 1.	38.17. 0.					
TRIFHYBR * F		.	.	.	.	25.20. 1.	63.46. 2.	38.11. 0.					
TRIFPRAT * F		.	.	.	.	.	25.20. 1.	.	.	.			
TRIFREPE * F		.	.	.	.	.	13. 7. 0.	25.13. 0.					
PLANMAJO * F		.	.	.	.	.	50.50. 2.	25.20. 1.					
Ground cover.													
MOS&LICH		.	.	.	.	13. 0. 0.	50. 0. 8.	13. 0. 1.					
LITTER		99. 0.15.	.	.	.	99. 8. 8.	88. 0.14.	25. 0. 1.					
SOIL		13. 0. 1.	.	.	.	99. 0.42.	63. 0. 6.	13. 0. 1.					
ROCK		.	.	.	.	99. 0.15.	75. 0. 9.	99. 0.57.					

I. Plants establishing in the THUJA PLICATA/ OPLOPANAX HORRIDUM environment (HT).

Table 10 lists plants 'establishing well' in the Thuja plicata/ Oplopanax horridum environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses form a matrix for most revegetation projects. Probably due to shading none do well in any zone of Glacier National Park Thuja plicata forests. Thus one might look to environmentally similar Abies lasiocarpa/ Clintonia uniflora sites for candidates: Festuca idahoensis, Festuca scabrella, Agropyron caninum, and perhaps Bromus ciliata or Elymus glaucus. Agropyron caninum should do best on trampled sites.

Forbs enrich the grassy matrix. Since we have no data for logged or once disturbed sites we must refer to ditch slopes and/or similar (Tsuga-Abies) environments. On once disturbed sites one might seed any of the ten forbs found on ditch slope sites-- especially Adenocaulon bicolor, Equisetum arvense, Fragaria spp, Geum macrophyllum, Solidago canadensis, or Aster laevis. On continuously disturbed sites Fragaria spp, Achillea millefolium, and Geum macrophyllum should perform best.

Shrubs suitable for planting in this environment include Oplopanax horridum, Symphoricarpos albus, Menziesia ferruginea, Rubus parviflorus, Cornus stolonifera, and based on presence in related types, Vaccinium globulare and Pachistima myrsinites.

Five exotic grasses appear in this environment. Four establish well at roadsides. Bromus inermis and Phleum pratense invade logged sites in similar environments (ABLA/CLUN and TSHE/CLUN). No exotic grasses invade cedar forests.

Of the four exotic Trifoliums appearing at roadsides three-- especially T repens-- do well. Their performance in Tsuga/ Abies sites suggest that they may invade logged, but not forested, areas weakly. Four weedy exotics occupy continuously disturbed sites. Based on their performance in similar environments Cirsium arvense, Taraxacum officinale, Chrysanthemum leucanthemum, Prunella vulgaris, and Plantago major may colonize logged, but not forested, sites weakly.

Table 10. Plants commonly establishing in the THPL-OPHO environment.

species	climax			cleared			road cut			ditch			shoulder		
	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
	10			0			0			10			10		
Native grasses.															
BROMCILI	G	10.	7.	0.	.	.	.	.	.	20.	67.	12.	.	.	.
MELISMIT	G	10.	40.	0.	.	.	.	.	.	.	.	.	.	.	.
TRISCANE	G	.	.	.	.	.	.	.	.	20.	40.	0.	.	.	.
STIPLETT	G	.	.	.	.	.	.	.	.	10.	40.	0.	.	.	.
DESCCESP	G	.	.	.	.	.	.	.	.	10.	40.	1.	.	.	.
CAREXSPP	G	.	.	.	.	.	.	.	.	10.	10.	1.	20.	20.	1.
Native forbs.															
TIARTRIF	F	99.	96.	6.	.	.	.	.	.	.	.	.	.	.	.
CIRCALPI	F	80.	45.	1.	.	.	.	.	.	.	.	.	.	.	.
STREAMPL	F	40.	40.	1.	.	.	.	.	.	.	.	.	.	.	.
VERACALI	F	30.	40.	5.	.	.	.	.	.	.	.	.	.	.	.
TRILOVAT	F	30.	27.	0.	.	.	.	.	.	.	.	.	.	.	.
ATHYFILI	F	90.	93.	17.	.	.	.	.	.	10.	7.	0.	.	.	.
GYMNDRYO	F	99.	90.	9.	.	.	.	.	.	30.	6.	0.	.	.	.
CLINUNIF	F	99.	68.	2.	.	.	.	.	.	20.	4.	0.	.	.	.
ARALNUDI	F	80.	40.	1.	.	.	.	.	.	20.	5.	0.	.	.	.
GATRIFID	F	70.	35.	0.	.	.	.	.	.	60.	43.	1.	.	.	.
SMILSTEL	F	70.	29.	0.	.	.	.	.	.	50.	49.	2.	.	.	.
VIOLORBI	F	90.	36.	1.	.	.	.	.	.	50.	18.	1.	.	.	.
ADENBICO	F	90.	56.	2.	.	.	.	.	.	80.	51.	2.	.	.	.
OSMOCHIL	F	40.	13.	0.	.	.	.	.	.	40.	25.	0.	.	.	.
EQUIARVE	F	10.	8.	0.	.	.	.	.	.	50.	68.	2.	20.	12.	0.
FRAGASPP	F	.	.	.	.	.	.	.	.	99.	76.	5.	80.	56.	3.
ACHIMILL	F	.	.	.	.	.	.	.	.	80.	45.	0.	70.	40.	1.
GEUMMACR	F	.	.	.	.	.	.	.	.	70.	73.	11.	70.	68.	3.
ANAPMARG	F	.	.	.	.	.	.	.	.	70.	46.	1.	.	.	.
SOLICANA	F	.	.	.	.	.	.	.	.	50.	53.	3.	40.	17.	0.
ASTELAEV	F	.	.	.	.	.	.	.	.	50.	52.	4.	10.	12.	0.
CORNCANA	F	.	.	.	.	.	.	.	.	20.	70.	3.	10.	20.	1.
Native shrubs and trees.															
OPLOHRR	F	99.	84.	22.	.	.	.	.	.	.	.	.	.	.	.
VACCGLOB	S	20.	30.	0.	.	.	.	.	.	.	.	.	.	.	.
SPIRBETU	S	10.	20.	0.	.	.	.	.	.	.	.	.	.	.	.
SYMPALBA	S	20.	12.	1.	.	.	.	.	.	40.	20.	0.	10.	4.	0.
LINNBORE	S	20.	13.	0.	.	.	.	.	.	30.	33.	2.	30.	20.	0.
OHACERGL	S	30.	30.	12.	.	.	.	.	.	20.	10.	3.	.	.	.
MENZFERR	S	10.	10.	0.	.	.	.	.	.	10.	10.	1.	.	.	.
RUBUPARV	S	.	.	.	.	.	.	.	.	40.	35.	4.	.	.	.
CORNSTOL	S	.	.	.	.	.	.	.	.	30.	20.	1.	.	.	.
OHTSUGHE	T	99.	98.	85.	.	.	.	.	.	20.	16.	11.	.	.	.
TAXUBREV	T	40.	28.	1.	.	.	.	.	.	10.	4.	0.	.	.	.
OHTHUHPL	T	30.	60.	37.	.	.	.	.	.	10.	5.	1.	.	.	.

Exotic grasses.

POAPRATE * G	.	.	.	.	.	.	.	.	99.94.14.	99.94.15.
AGROALBA * G	.	.	.	.	.	.	.	.	99.88. 5.	99.80. 6.
PHLEPRAT * G	.	.	.	.	.	.	.	.	60.54. 1.	50.46. 1.
BROMINER * G	.	.	.	.	.	.	.	.	40.68. 6.	10. 4. 0.
DACTGLOM * G	.	.	.	.	.	.	.	.	30.16. 2.	99.60. 4.

Exotic forbs.

TARAOFFI * F	10.	2.	0.	.	.	.	.	.	99.94. 8.	99.99.12.
TRIFREPE * F	.	.	.	.	.	.	.	.	99.84. 8.	99.98.13.
PLANMAJO * F	.	.	.	.	.	.	.	.	80.48. 3.	99.96.15.
CHRYLEUC * F	.	.	.	.	.	.	.	.	70.89. 7.	70.77. 3.
TRIFPRAT * F	.	.	.	.	.	.	.	.	70.75. 6.	20. 8. 0.
PRUNVULG * F	.	.	.	.	.	.	.	.	60.73. 5.	50.63. 2.
CIRSARVE * F	.	.	.	.	.	.	.	.	50.68. 2.	. . .
TRIFAGRA * F	.	.	.	.	.	.	.	.	40.55. 1.	10. 5. 0.
TRIFPROC * F	.	.	.	.	.	.	.	.	30.11. 1.	70.37. 1.
PLANLANC * F	.	.	.	.	.	.	.	.	30.25. 1.	40.50. 3.
CERAVULG * F	.	.	.	.	.	.	.	.	20.15. 0.	40.60. 0.

Ground cover.

MOS&LICH	99.	0.	5.	.	.	.	.	.	50. 0. 1.	60. 0. 5.
LITTER	99.	0.	34.	.	.	.	.	.	90. 0. 5.	99. 0.10.
SOIL	10.	0.	0.	.	.	.	.	.	. . .	30. 5. 1.
ROCK	.	.	.	.	.	.	.	.	. . .	90. 0. 6.

J. Plants establishing in the TSUGA HETEROPHYLLA/ CLINTONIA UNIFLORA environment (HT).

Table 11 lists plants 'establishing well' in the Tsuga heterophylla/ Clintonia uniflora environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses may be sought for a revegetation matrix. On once-disturbed sites one sees only Festuca scabrella and Carex species and they are not thriving, probably due to heavy seeding with exotic grasses. Since no grasses are present under Tsuga, one must look for appropriate species in similar environments, especially Abies/ Clintonia: Festuca idahoensis, Festuca scabrella and Agropyron caninum. The large grass-like lily, Xerophyllum tenax, should be used as a bunchgrass.

Forbs may enrich this matrix. On once-disturbed sites three forbs do well: Solidago canadensis, Fragaria spp, and Heiracium albiflorum. Achillea millefolium and Anaphalis margaritacea might also be tried. Undisturbed sites offer little else, except Xerophyllum tenax, mentioned above. Solidago canadensis, Fragaria spp, and Achillea millefolium are probably the best candidates for continuously disturbed plantings.

If shrubs are sought they can be drawn from species doing well on undisturbed sites, primarily, Spirea betulifolia, Pachistima myrsinites and Vaccinium globulare.

Six exotic grasses--especially Phleum pratense, Poa compressa, P pratensis, Agrostis alba and Bromus inermis-- do well at roadsides where they were planted. Bromus and Phleum have spread weakly into cleared land. No exotic grasses have entered undisturbed forest.

Four planted exotic forbs, all Trifoliums, did well in once-disturbed and continuously disturbed sites. Three of them entered logged areas (roadside right-of-ways) weakly. Among the successful self-dispersing exotics only Taraxacum officinale, Chrysanthemum leucanthemum, Centaurea maculosa, and Artemisia absinthium spread (weakly) into logged land; none colonized forests.

Table 11. Plants commonly establishing in the TSHE-CLUN environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			10			10			10			10		
Native grasses.																
CAREXSPP	G	.	.	.	.	.	.	20.25.	2.		40.45.	2.		.	.	.
FESTSCAB	G	.	.	.	10.	4.	0.	20.16.	1.		50.48.	9.		20.16.	1.	
AGROSCAB	G	.	.	.	.	.	.	.	.		30.53.	2.		10.	7.	1.
KOELCRIS	G	.	.	.	.	.	.	.	.		.	.		10.40.	3.	
FESTOCCI	G	20.20.	0.		20.27.	1.		10.	7.	0.	.	.		.	.	.
STIPLETT	G	.	.	.	.	.	.	10.20.	0.		.	.		.	.	.
TRISCANE	G	.	.	.	.	.	.	10.20.	0.		.	.		.	.	.
AGROSPIC	G	.	.	.	.	.	.	.	.		10.20.	0.		.	.	.
CALARUBE	G	10.20.	3.		10.40.	1.		.	.		.	.		.	.	.
FESTIDAH	G	.	.	.	.	.	.	.	.		10.20.	0.		.	.	.
AGRCAMAJ	G	.	.	.	.	.	.	.	.		10.20.	0.		.	.	.
HORDJUBA	G	.	.	.	.	.	.	.	.		.	.		10.20.	0.	
Native forbs.																
SOLICANA	F	.	.	.	30.10.	1.		90.48.	2.		80.40.	1.		70.42.	1.	
ANAPMARG	F	.	.	.	10.	7.	0.	80.38.	0.		60.22.	0.		50.22.	0.	
FRAGASPP	F	.	.	.	.	.	.	70.58.	4.		60.45.	2.		40.15.	1.	
ACHIMILL	F	.	.	.	.	.	.	60.22.	0.		50.31.	1.		50.18.	0.	
HIERALBI	F	30.	9.	0.	60.54.	3.		60.51.	2.		.	.		40.14.	0.	
EPILANGU	F	10.	3.	0.	10.	3.	0.	30.13.	0.		10.	3.	0.	.	.	.
CASTMINI	F	.	.	.	10.	7.	0.	20.67.	3.		10.	7.	0.	.	.	.
ANTEROSE	F	.	.	.	20.20.	1.		20.15.	0.		10.	5.	0.	.	.	.
ANTENEGL	F	.	.	.	10.	7.	1.	20.40.	2.		20.13.	1.		.	.	.
ASTELAEV	F	.	.	.	.	.	.	20.30.	1.		20.80.	4.		20.30.	0.	
CERAARVE	F	.	.	.	.	.	.	20.	8.	0.	90.16.	0.		99.50.	0.	
EPILPANI	F	.	.	.	.	.	.	10.10.	0.		.	.		30.15.	0.	
MELALINE	F	40.15.	0.		60.38.	2.		20.	8.	0.	.	.		.	.	.
CLINUNIF	F	70.57.	2.		20.17.	0.		10.	9.	0.	.	.		.	.	.
VIOLORBI	F	60.29.	0.		60.29.	0.		10.	7.	0.	.	.		.	.	.
GOODOBLO	F	30.25.	0.		20.15.	0.		.	.		.	.		.	.	.
XEROTENA	F	60.53.	10.		40.33.	5.		.	.		.	.		.	.	.
ATHYFILI	F	30.47.	3.		20.53.	6.		.	.		.	.		.	.	.
Native shrubs and trees.																
SALIXSPP	S	.	.	.	20.	3.	0.	40.13.	0.		60.33.	1.		10.	3.	0.
OHALNUSI	S	.	.	.	.	.	.	30.60.	29.		10.13.	3.		.	.	.
LINNBORE	S	80.75.	4.		50.28.	1.		30.23.	1.		10.	3.	0.	.	.	.
RUBUPARV	S	10.	3.	0.	30.10.	0.		30.23.	3.		10.	3.	0.	20.	7.	0.
PACHMYRS	S	60.31.	3.		30.26.	1.		20.11.	0.		.	.		.	.	.
SPIRBETU	S	50.72.	6.		50.60.	2.		20.12.	1.		.	.		.	.	.
CHIMUMBE	S	80.65.	1.		40.25.	0.		.	.		.	.		.	.	.
ROSA SPP	S	40.28.	1.		20.12.	0.		.	.		.	.		10.	4.	0.
VACCGLOB	S	99.66.	4.		30.24.	3.		.	.		.	.		.	.	.

Table 11, continued.

Native trees.						
THUJPLIC	T	. . .	. . .	40.60. 1.	30.45. 0.	. . .
PICEASPP	T	. . .	. . .	30.27. 0.	. . .	. . .
OHTSUGHE	T	60.90.68.	50.77.62.	30.37. 9.	. . .	. . .
OHPICESP	T	30.28. 5.	20.12. 4.	30.28. 3.	. . .	. . .
OHPINUCO	T	50.70.40.	40.47.22.	20.10. 2.	. . .	. . .
PINUMONT	T	. . .	. . .	20.20. 0.	20.13. 0.	. . .
OHBETUPA	T	20.20. 4.	30.24.13.	20.20. 7.	. . .	. . .
OHPINUMO	T	30.20. 3.	40.20. 6.	. . .	. . .	. . .
OHTHUHPL	T	90.71.29.	60.53.32.	. . .	. . .	. . .
Exotic grasses.						
PHLEPRAT * G		. . .	10.10. 0.	90.72. 4.	80.64. 7.	90.64. 3.
AGROALBA * G		. . .	. . .	60.54. 2.	70.77. 4.	60.40. 1.
BROMINER * G		. . .	30.52. 7.	50.88.20.	50.64. 4.	40.32. 3.
POAPRATE * G		. . .	. . .	40.20. 0.	90.58. 4.	60.32. 1.
POACOMPR * G		. . .	. . .	10. 2. 0.	40.11. 0.	90.60. 2.
DACTGLOM * G		. . .	. . .	10. 0. 0.	20.16. 0.	40.24. 0.
Exotic forbs.						
TRIFHYBR * F		. . .	10.11. 1.	90.58. 3.	70.40. 2.	40.24. 1.
TARAOFFI * F		. . .	20. 4. 0.	90.40. 1.	90.64. 5.	99.72. 4.
TRIFREPE * F		. . .	20.12. 1.	80.30. 1.	80.64. 5.	90.60. 5.
TRIFPRAT * F		. . .	20. 9. 0.	70.56. 3.	70.58. 3.	60.40. 3.
TRIFPROC * F		. . .	. . .	70.28. 1.	70.58. 5.	70.73. 6.
CHRYLEUC * F		. . .	. . .	50.36. 1.	90.60. 6.	90.58. 2.
PRUNVULG * F		. . .	. . .	40.20. 1.	60.54. 2.	60.60. 3.
SILECUCU * F		. . .	. . .	30.16. 0.	30.12. 1.	20. 8. 1.
CENTMACU * F		. . .	10. 3. 0.	20.13. 1.	50.50. 4.	60.67. 7.
MELIOFFI * F		. . .	10. 5. 0.	20. 5. 0.	30.25. 0.	20.10. 0.
TRIFAGRA * F		. . .	20.10. 0.	20.35. 1.	30.20. 0.	. . .
CIRSVULG * F		. . .	. . .	20. 9. 0.	70.34. 0.	10. 3. 0.
HYPEPERF * F		. . .	. . .	10. 0. 0.	10. 5. 0.	40.35. 1.
ARTEABSI * F		. . .	10. 4. 0.	10. 4. 0.	10. 4. 0.	30.36. 0.
PLANMAJO * F		. . .	. . .	10. 3. 0.	50.40. 2.	70.71. 4.
TRAGDUBI * F		. . .	. . .	10. 4. 0.	40.12. 0.	20.12. 0.
VERBTHAP * F		. . .	. . .	. . .	50.17. 0.	60.63. 2.
Ground cover.						
MOS&LICH		90.10.20.	99. 0.15.	99.10.21.	99. 4.15.	80. 0. 4.
LITTER		99. 0.53.	99. 0.57.	99.10.28.	99. 0.22.	99. 0.13.
ROCK		. . .	30. 0. 2.	50. 0. 4.	90. 0. 4.	90. 0.35.
SOIL		. . .	50. 0. 4.	40. 0. 4.	40. 0. 1.	60. 0. 8.

K. Plants establishing in the ABIES LASIOCARPA/ CLINTONIA UNIFLORA environment (HT).

Table 12 lists plants 'establishing well' in the *Abies lasiocarpa*/ *Clintonia uniflora* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses are usually sought for a revegetation matrix. On once-disturbed sites *Festuca idahoensis*, *Festuca scabrella*, and *Agropyron caninum* and *Elymus glaucus* established best. Their potential success is probably understated due to competition with planted exotics. The forb, *Xerophyllum tenax*, from logged sites, should be considered. These grasses, and miscellaneous *Carexes*, were most successful on continuously disturbed sites.

Native forbs can enrich the matrix. Six native forbs-- including *Aster laevis*, *Fragaria* spp, *Achillea millefolium*, *Solidago canadensis* and *Castilleja miniata*-- established well on once-disturbed sites. Of the five additional native forbs doing well on logged and undisturbed sites only *Xerophyllum tenax* and *Arnica cordifolia* seem desirable for once-disturbed sites. On continuously disturbed sites one might seed the same species-- *Aster*, *Fragaria*, *Anaphalis*, *Achillea*, and *Solidago*-- or perhaps *Cerastium arvensis*.

Shrubs may be desirable. None are invasive on disturbed sites. From logged sites one might draw *Spirea betulifolia*, *Vaccinium myrtillus*, or *Pachistima myrsinites*. From undisturbed sites one might add *Vaccinium globulare*, *Rubus parviflorus*, or *Menziesia ferruginea*.

Exotic grasses were planted on disturbed areas and did well there. One can depend on *Phleum pratense*, *Poa pratensis*, *Bromus inermis*, and to a lesser extent *Agrostis alba* and *Poa compressa*. *Phleum pratense* and *Bromus inermis* spread weakly into logged (and likely burned) areas. None of these grasses invaded forested sites in this environment.

Exotic forbs included three *Trifoliums* probably seeded along the road; one invades logged (and burned) areas weakly, but does not enter undisturbed forest. Other exotics-- for example *Taraxacum* and *Plantago*-- establish along roads, but barely invade once-disturbed and undisturbed sites.

Table 12. Plants establishing in the ABLA/ CLUN environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		9			4			9			5			9		
Native grasses.																
FESTIDAH	G	.	.	.	.	.	.	44.60.	1.		40.15.	1.		.	.	.
CAREXSPP	G	.	.	.	.	.	.	33.30.	0.		40.50.	1.		11.20.	1.	
FESTSCAB	G	.	.	.	25.	7.	0.	33.40.	2.		60.20.	0.		11.	7.	0.
ELYMGLAU	G	.	.	.	25.20.		0.	22.20.	0.		.	.	.	.	.	.
AGRCAMAJ	G	.	.	.	.	.	.	11.13.	0.		40.40.	1.		22.27.	1.	
MELISMIT	G	33.93.		2.	.	.	.	.	.	.	.	.	.	.	.	.
CALARUBE	G	33.47.		3.	25.27.		3.	.	.	.	.	.	.	.	.	.
Native forbs.																
FRAGASPP	F	.	.	.	.	.	.	78.33.	2.		60.40.	4.		78.47.	1.	
ANAPMARG	F	.	.	.	25.27.		0.	67.48.	2.		60.60.	2.		78.58.	1.	
ACHIMILL	F	.	.	.	25.	5.	0.	67.44.	2.		99.36.	0.		99.69.	3.	
ASTELAEV	F	.	.	.	.	.	.	56.84.	9.		20.99.	21.		56.84.	9.	
SOLICANA	F	.	.	.	25.	5.	0.	56.40.	2.		80.28.	1.		44.17.	0.	
CASTMINI	F	.	.	.	25.40.		0.	56.64.	1.		20.20.	0.		.	.	.
HIERALBI	F	11.10.		0.	75.35.		1.	33.50.	1.		40.15.	2.		33.40.	0.	
HERALANA	F	22.45.		5.	.	.	.	33.30.	0.		20.20.	0.		22.20.	0.	
THALOCCI	F	56.76.		5.	.	.	.	22.20.	2.		.	.	.	.	.	.
VIOLORBI	F	44.43.		0.	.	.	.	11.	3.	0.	.	.	.	11.	3.	0.
ARNILATI	F	11.15.		1.	25.60.		1.	11.	5.	0.	20.30.	2.		11.10.	0.	
CERAARVE	F	.	.	.	25.	5.	0.	11.	3.	0.	40.15.	1.		67.67.	1.	
EPILPANI	F	.	.	.	.	.	.	11.	5.	0.	.	.	.	44.55.	0.	
EPILANGU	F	22.20.		0.	25.40.		1.	11.10.	0.		.	.	.	.	.	.
ARNICORD	F	78.74.		3.	.	.	.	11.	3.	0.	.	.	.	.	.	.
XEROTENA	F	44.35.		3.	50.40.		3.	.	.	.	.	.	.	11.10.	1.	
TIARTRIF	F	44.36.		1.	25.10.		0.	.	.	.	.	.	.	.	.	.
GATRIFLO	F	44.65.		0.	.	.	.	.	.	.	.	.	.	.	.	.
ADENBICO	F	11.20.		1.	25.40.		0.	.	.	.	.	.	.	.	.	.
MELALINE	F	.	.	.	75.73.		0.	.	.	.	.	.	.	.	.	.
ATHYFILI	F	11.30.		0.	25.20.		0.	.	.	.	.	.	.	.	.	.
CORNCANA	F	33.60.		0.	.	.	.	.	.	.	.	.	.	.	.	.
CLINUNIF	F	89.83.		2.	.	.	.	.	.	.	.	.	.	.	.	.
LUPIARGE	F	.	.	.	25.40.		4.	.	.	.	.	.	.	.	.	.
Native shrubs and trees.																
SALIXSPP	S	22.	9.	0.	75.20.		0.	33.14.	0.		40.20.	0.		11.	3.	0.
PACHMYRS	S	44.48.		6.	99.35.		1.	22.28.	2.		.	.	.	.	.	.
SORBSCOP	S	33.20.		0.	.	.	.	22.10.	0.		.	.	.	.	.	.
RUBUPARV	S	56.73.		20.	25.40.		4.	22.17.	2.		20.10.	1.		11.	3.	0.
SPIRBETU	S	44.70.		2.	99.65.		3.	11.10.	0.		.	.	.	.	.	.
MENZFERR	S	78.69.		29.	.	.	.	.	.	.	.	.	.	.	.	.
ALNUINCA	S	.	.	.	25.20.		0.	.	.	.	20.20.	0.		.	.	.
VACCMYRT	S	33.73.		13.	75.93.		10.	.	.	.	.	.	.	.	.	.
BERBREPE	S	11.10.		0.	50.20.		0.	.	.	.	.	.	.	.	.	.
VACCGLOB	S	67.63.		7.	25.	7.	0.	.	.	.	20.10.	0.		.	.	.
ROSA SPP	S	22.13.		0.	25.13.		0.	.	.	.	.	.	.	.	.	.

Table 12, continued.

RUBUIDEA	S	.	.	.	25.60.	1.	.	.	.	.	.	.	.
AMELALNI	S	.	.	.	25.20.	0.	.	.	.	.	.	.	.
LINNBORR	S	33.55.	5.		75.40.	3.	.	.	.	.	.	.	.
PICEASPP	T	22.20.	0.		50.70.	0.	44.30.	0.	40.33.	2.	11.13.	1.	
ABIELASC	T	.	.	.	25.40.	1.	44.24.	0.	40.40.	0.	11.8.	1.	
OHPINUCC	T	22.60.	28.		25.7.	2.	11.27.	6.	.	.	.	.	
OHPINUMC	T	.	.	.	25.60.	9.	.	.	.	.	.	.	
PINUCONT	T	11.33.	0.		50.27.	0.	.	.	20.7.	0.	.	.	
OHPOPTRI	T	.	.	.	25.20.	5.	.	.	.	.	.	.	
OHLARIOC	T	11.99.	60.		25.60.	29.	.	.	.	.	.	.	
OHABIELA	T	56.56.	30.		.	.	.	.	.	.	.	.	
OHPICESP	T	44.52.	29.		25.7.	1.	.	.	.	.	.	.	
Exotic grasses.													
PHLEPRAT * G		.	.	.	25.5.	0.	99.76.	2.	80.76.	9.	89.69.	3.	
BROMINER * G		.	.	.	25.25.	4.	89.73.	6.	80.68.	4.	89.62.	2.	
POAPRATE * G		.	.	.	.	.	67.47.	1.	99.36.	2.	67.51.	3.	
AGROALBA * G		.	.	.	.	.	44.23.	0.	20.20.	1.	67.43.	1.	
POACOMPR * G		.	.	.	.	.	11.3.	0.	20.5.	0.	67.40.	1.	
BROMTECT * G		.	.	.	25.80.	1.	.	.	.	.	.	.	
DACTGLOM * G		.	.	.	.	.	.	.	20.0.	0.	44.50.	1.	
Exotic forbs.													
TRIFHYBR * F		.	.	.	.	.	89.58.	3.	99.80.	8.	56.40.	1.	
TARAOFFI * F		.	.	.	25.5.	0.	89.53.	2.	99.68.	3.	99.76.	4.	
TRIFPROC * F		.	.	.	.	.	56.43.	2.	60.33.	1.	78.66.	3.	
TRIFREPE * F		.	.	.	25.5.	0.	44.23.	0.	60.28.	1.	78.50.	2.	
SILECUCU * F		.	.	.	.	.	33.30.	1.	.	.	22.15.	0.	
CIRSVULG * F		.	.	.	.	.	22.20.	0.	40.20.	0.	.	.	
CENTMACU * F		.	.	.	.	.	.	.	40.10.	0.	33.12.	0.	
CHRYLEUC * F		.	.	.	.	.	.	.	40.50.	3.	22.60.	1.	
PLANMAJO * F		.	.	.	.	.	.	.	20.7.	0.	67.70.	3.	
Ground cover.													
MOS&LICH		78.0.	4.		75.0.	7.	89.0.	13.	99.0.	12.	11.0.	0.	
LITTER		99.0.	26.		99.0.	43.	99.0.	21.	80.0.	27.	67.0.	3.	
SOIL		.	.	.	75.0.	18.	89.0.	13.	20.0.	0.	11.0.	0.	
ROCK		11.0.	0.		50.0.	3.	99.0.	16.	99.0.	13.	99.0.	59.	

L. Plants establishing in the ABIES LASIOCARPA/ XEROPHYLLUM TENAX environment (HT) .

Table 13 lists plants 'establishing well' in the *Abies lasiocarpa*/ *Xerophyllum tenax* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses may form the matrix in revegetation. No native grasses do well in the once-disturbed zone, perhaps because exotics were so strongly seeded. *Festuca idahoensis*, *Agropyron caninum*, and *Calamagrostis rubescens* are among the best candidates since they establish here. *Xerophyllum tenax*, from undisturbed sites, is a good candidate. Grasses from similar environments (ABLA/ CLUN or ABLA/ARCO) are also possible. On continuously disturbed sites *Agropyron caninum* and *Carex* spp do best.

Forbs may enrich this matrix. Eight forbs do well on once-disturbed sites; these include *Achillea millefolium*, *Aster laevis*, *Penstemon confertus*, and *Lupinus sericeus*. *Arnica cordifolia*, important on undisturbed sites, might establish. On continuously disturbed sites *Achillea*, *Aster*, *Penstemon*, and *Potentilla argentea* would likely establish.

Among shrubs, *Vaccinium globulare* may be the best candidate for planting. *Spiraea betulifolia*, *Vaccinium myrtilis*, and *Alnus incana* are the best candidates; *Vaccinium globulare* is another possibility.

Six exotic grasses establish at the roadside. *Phleum pratense*, *Poa pratensis*, and *Bromus inermis* grow best. They grow less well on the road cut. *Pheum*, *Poa*, and *Agrostis alba* weakly invade logged areas, but are excluded from forests.

Four exotic clovers (*Trifolium*) planted at roadsides do well there. They do less well on roadcuts. *Trifolium repens* (only) invades logged areas (weakly) and it does not enter forests. *Taraxacum officinale*, the most successful roadside weedy exotic, has little entry into logged or undisturbed forest land.

Table 13. Plants commonly establishing in the ABLA/ XETE environment (HT).
species

		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			5			10			10			10		
Native grasses.																
CAREXSPP	G	.	.	.	.	.	.	60.47.	2.		50.50.	4.		.	.	.
AGRCAMAJ	G	.	.	.	.	.	.	50.25.	0.		70.53.	1.		70.78.	4.	
KOELCRIS	G	.	.	.	.	.	.	20.25.	0.		10.5.	0.		10.5.	0.	
FESTIDAH	G	.	.	.	.	.	.	20.13.	0.		10.13.	0.		.	.	.
DANTINTE	G	.	.	.	.	.	.	10.10.	0.		10.30.	2.		.	.	.
CALARUBE	G	.	.	.	.	.	.	10.10.	0.		10.30.	0.		.	.	.
FESTSCAB	G	.	.	.	.	.	.	.	.		20.30.	1.		10.10.	0.	
AGRCAAND	G	.	.	.	.	.	.	.	.		10.10.	0.		20.30.	1.	
Native forbs.																
ACHIMILL	F	.	.	.	80.24.	0.		99.66.	2.		99.82.	3.		90.58.	4.	
CAMPROTU	F	.	.	.	20.20.	0.		80.53.	1.		40.18.	0.		30.13.	0.	
ASTELAEV	F	.	.	.	.	.		70.66.	3.		70.74.	5.		50.51.	5.	
AGOSGLAU	F	.	.	.	.	.		70.38.	1.		70.24.	1.		80.58.	1.	
FRAGASPP	F	.	.	.	99.76.	5.		50.27.	1.		30.11.	1.		40.18.	1.	
LUPISERI	F	.	.	.	40.12.	0.		50.92.	3.		50.52.	1.		20.8.	0.	
POTEARGE	F	.	.	.	.	.		50.56.	0.		50.72.	3.		30.16.	0.	
PENSCONF	F	.	.	.	.	.		50.77.	6.		50.53.	3.		40.20.	0.	
ANTEROSE	F	.	.	.	.	.		50.47.	1.		30.13.	0.		.	.	.
CIRSHOOK	F	.	.	.	.	.		40.17.	0.		30.17.	0.		30.14.	0.	
ANAPMARG	F	.	.	.	.	.		40.17.	1.		20.6.	0.		40.14.	0.	
POTEGRAC	F	.	.	.	.	.		40.18.	0.		10.5.	0.		40.10.	0.	
SEDULANC	F	.	.	.	.	.		40.40.	0.		30.20.	0.		10.5.	0.	
HEUCCYLI	F	.	.	.	.	.		40.35.	0.		10.10.	0.		20.15.	1.	
VICIAMER	F	.	.	.	.	.		30.25.	0.		20.25.	0.		20.15.	0.	
EPILANGU	F	.	.	.	80.30.	0.		20.8.	0.		40.20.	0.		30.10.	1.	
CERAARVE	F	.	.	.	.	.		10.7.	0.		30.40.	0.		10.13.	0.	
PEDIBRAC	F	.	.	.	60.33.	0.		10.7.	0.		.	.		.	.	
XEROTENA	F	99.94.	17.		99.96.	15.		.	.		.	.		.	.	
ARNICORD	F	50.88.	13.		99.92.	24.		.	.		.	.		.	.	
ANTERACE	F	.	.	.	40.40.	5.		.	.		10.7.	0.		.	.	
GOODOBLO	F	30.25.	0.		20.5.	0.		.	.		.	.		.	.	
PYROSECU	F	50.56.	0.		20.5.	0.		.	.		.	.		.	.	
Native shrubs and trees.																
ALNUSINU	S	.	.	.	.	.		30.25.	1.		10.5.	0.		10.5.	1.	
SALIXSPP	S	.	.	.	20.10.	1.		10.5.	1.		30.15.	1.		10.5.	0.	
SPIRBETU	S	30.30.	1.		99.84.	9.		20.5.	0.		.	.		.	.	
OHALNUSI	S	20.16.	7.		99.84.	66.		.	.		.	.		.	.	
VACCGLOB	S	50.83.	12.		20.20.	1.		.	.		.	.		.	.	
VACCMYRT	S	99.72.	9.		99.80.	13.		.	.		.	.		.	.	
CHIMUMBE	S	90.58.	3.		.	.		.	.		.	.		.	.	
ABIELASC	T	.	.	.	20.10.	0.		60.31.	1.		40.13.	0.		10.2.	0.	
PINUCONT	T	20.10.	0.		20.40.	0.		50.20.	0.		30.13.	0.		10.3.	0.	
PICEASPP	T	.	.	.	20.20.	0.		40.28.	0.		10.4.	0.		10.4.	0.	
OHABIELA	T	99.92.	66.		40.20.	7.		30.14.	2.		.	.		.	.	
OHPINUCO	T	30.24.	9.		20.20.	6.		20.32.	11.		.	.		.	.	

Table 13, continued.

Exotic grasses.									
PHLEPRAT * G	.	.	.	40.	8.	0.	99.68.	1.	90.80. 5. 99.96.10.
POAPRATE * G	.	.	.	20.	4.	0.	70.28.	0.	70.70. 5. 60.43. 2.
BROMINER * G	.	.	.	.	.	.	60.31.	0.	80.60. 3. 60.62. 8.
AGROALBA * G	.	.	.	20.	8.	0.	50.27.	0.	20.10. 0. 40.23. 0.
POACOMPR * G	.	.	.	.	.	.	30.11.	0.	80.22. 0. 40.16. 0.
DACTGLOM * G	.	.	.	.	.	.	10. 5.	0.	20.20. 0. 30.25. 0.
Exotic forbs.									
TRIFPRAT * F	.	.	.	.	.	.	80.65.	2.	70.58. 8. 70.65. 5.
TRIFREPE * F	.	.	.	20.	5.	1.	80.24.	0.	70.31. 2. 70.40. 2.
TRIFHYBR * F	.	.	.	.	.	.	60.55.	3.	80.53. 5. 70.45. 2.
TARAOFFI * F	.	.	.	.	.	.	50.28.	1.	90.64. 3. 99.92. 8.
TRIFPROC * F	.	.	.	.	.	.	30. 7.	0.	60.22. 1. 70.47. 1.
TRAGDUBI * F	.	.	.	.	.	.	.	.	10.10. 0. 40.40. 0.
CENTMACU * F	.	.	.	.	.	.	.	.	20.15. 0. 40.20. 0.
Ground cover.									
MOS&LICH	60.	0.	7.	20.	0.	1.	99.	0.17.	40. 0. 3. 10. 0. 0.
LITTER	99.	0.46.		99.	0.31.		99.	0.15.	99. 0.19. 90. 0. 8.
SOIL	20.	0. 1.		20.	0. 0.		99.	0.12.	50. 0. 3. 10. 0. 0.
ROCK	10.	0. 0.		.	.	.	90.	0.30.	99. 0.29. 99. 0.40.

M. Plants commonly establishing in the ABIES LASIOCARPA/ ARNICA CORDIFOLIA environment (HTs).

Table 14 lists plants 'establishing well' in the *Abies lasiocarpa*/ *Arnica cordifolia* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses may be sought for a revegetation matrix. On once-disturbed sites *Bromus carinatus*, *Agropyron caninum*, and *Carex* species do well. From undisturbed sites one might add *Poa reflexa* and *Calamagrostis rubescens*. *Agropyron caninum* and *Poa palustris* do best at roadsides. All of these grasses might do better in the absence of planted exotics.

Forbs may enrich the matrix. On once-disturbed sites *Lupinus argentea* and composites (*Aster occidentalis*, *Achillea millefolium*, and *Solidago multiradiata*) do best. One might add *Epilobium angustifolium*, *Geranium viscosissimum*, *Antennaria racemosa* or *Aster conspicuus* from the logged zone. Less likely possibilities, from the undisturbed forest zone, are *Arnica cordifolia* and *Fragaria* spp. Two forbs-- *Achillea millefolium* and *Aster occidentalis*-- do best at the continuously disturbed roadside.

Shrubs are rare and unimportant in this zone. Only *Lonicera utahensis* has a constancy greater than 20% in the logged or undisturbed zones. *Shepherdia canadensis* and *Vaccinium scoparium*, present, are long shots.

Three exotic grasses do well in continuously disturbed roadside vegetation: *Phleum pratense*, *Bromus inermis*, and *Poa pratensis*. They do less well on roadcuts and, along with *Agrostis alba*, weakly invade logged, but not forested, areas.

Of the four exotic legumes likely planted here, two (*Trifolium hybridum* and *T. repens*) did well in constantly disturbed areas. They do less well on roadcuts and are apparently excluded from logged and undisturbed forest lands. *Taraxacum officinale* and *Madia glomerata* are the only weedy exotics entering the area strongly; *Taraxacum* (only) entered logged, but not forested, areas regularly.

Table 14. Plants commonly establishing in the ABLA-ARCO environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			10			10			10			10		
Native grasses.																
AGRCAMAJ	G	.	.	.	40.14.	0.		99.48.	1.		99.84.	7.		99.88.	6.	
CAREXSPP	G	10.	4.	0.	70.34.	1.		80.36.	1.		.	.	.	10.	2.	0.
BROMCARI	G	.	.	.	30.11.	0.		60.54.	2.		30.20.	0.		.	.	.
TRISSPIC	G	30.	6.	0.	99.52.	0.		60.40.	0.		30.	8.	0.	10.	4.	0.
POAREFLE	G	.	.	.	60.53.	1.		30.13.	0.		.	.	.	.	.	.
CALARUBE	G	50.17.	0.		30.23.	5.		.	.	.	.	.	.	.	.	.
BROMCILI	G	20.20.	0.		10.30.	0.		10.10.	0.		.	.	.	.	.	.
CAREHOOD	G	.	.	.	.	.	.	20.16.	1.		30.16.	0.		20.12.	0.	
POAALPIN	G	.	.	.	.	.	.	20.13.	0.		20.40.	0.		.	.	.
FESTIDAH	G	.	.	.	.	.	.	.	.		10.20.	1.		10.40.	2.	
POAPALUS	G	.	.	.	.	.	.	.	.		30.17.	1.		50.30.	1.	
Native forbs.																
LUPIARGE	F	80.51.	2.		80.76.	6.		80.69.	4.		20.	4.	0.	.	.	.
SOLIMULT	F	40.14.	0.		90.60.	3.		70.38.	1.		50.18.	0.		10.	4.	0.
FRAGASPP	F	70.38.	1.		90.71.	3.		60.27.	0.		60.24.	0.		40.18.	0.	
EPILANGU	F	99.88.	5.		90.74.	5.		60.22.	0.		.	.	.	.	.	.
ACHIMILL	F	.	.	.	40.16.	0.		70.52.	1.		99.82.	4.		90.70.	4.	
ASTEOCCI	F	.	.	.	10.	3.	0.	59.	0.41.		99.	0.23.		70.	0.	3.
AGOSGLAU	F	.	.	.	10.	6.	0.	50.34.	0.		30.17.	0.		.	.	.
ANTERACE	F	99.54.	1.		80.68.	6.		20.	8.	1.	.	.	.	.	.	.
GERAVISC	F	60.25.	0.		60.48.	1.		30.15.	0.		10.	3.	0.	.	.	.
ASTECONS	F	40.37.	2.		60.49.	4.		.	.	.	.	.	.	.	.	.
ARNICORD	F	99.99.	15.		50.14.	0.		10.	2.	0.	.	.	.	.	.	.
POTEGARGE	F	10.	4.	0.	40.28.	0.		20.12.	0.		.	.	.	10.	4.	0.
POTEGRAC	F	.	.	.	10.	3.	0.	30.	9.	0.	30.17.	2.		40.20.	1.	
ASTERSPP	F	10.	4.	0.	10.20.	4.		30.28.	1.		30.60.	4.		30.32.	0.	
OXYTDEFL	F	.	.	.	10.20.	1.		20.25.	0.		30.25.	1.		40.25.	1.	
EPILPANI	F	.	.	.	.	.	.	30.27.	0.		.	.	.	.	.	.
ERIOLOANA	F	.	.	.	.	.	.	30.47.	0.		.	.	.	.	.	.
LEPIDENS	F	.	.	.	.	.	.	10.	4.	0.	50.72.	1.		.	.	.
POLYDOUG	F	.	.	.	.	.	.	10.	5.	0.	40.45.	1.		20.10.	0.	
CASTMINI	F	.	.	.	10.15.	0.		.	.	.	30.55.	1.		20.15.	0.	
ANTEMICR	F	.	.	.	30.27.	1.		.	.	.	.	.	.	.	.	.
FRASSPEC	F	40.40.	1.		10.25.	2.		.	.	.	.	.	.	.	.	.
PYROSECU	F	80.53.	0.		10.	3.	0.	.	.	.	.	.	.	.	.	.
AQUICOER	F	80.51.	1.		30.22.	0.		.	.	.	.	.	.	.	.	.
OSMOOCCI	F	70.37.	1.		20.	9.	0.	.	.	.	.	.	.	.	.	.
Native shrubs and trees.																
LONIUTAH	S	80.43.	2.		20.	8.	0.	.	.	.	.	.	.	.	.	.
PINUCONT	T	10.	3.	0.	60.47.	0.		30.10.	0.		.	.	.	.	.	.
OHPINUCO	T	80.58.	21.		90.66.	28.		30.18.	4.		.	.	.	.	.	.
ABIELASC	T	80.50.	1.		70.32.	2.		30.14.	0.		.	.	.	.	.	.
OHPICESP	T	40.35.	17.		20.10.	1.		.	.	.	.	.	.	.	.	.
PICEASPP	T	20.15.	0.		30.45.	2.		.	.	.	.	.	.	.	.	.
OHABIELA	T	99.66.	34.		.	.	.	.	.	.	.	.	.	.	.	.

Table 14, continued.

Exotic grasses.								
PHLEPRAT * G	.	.	.	20.10. 0.	80.54. 1.	99.88. 5.	99.94. 7.	
BROMINER * G	.	.	.	30.20. 1.	70.54. 2.	80.56. 4.	99.80.13.	
POAPRATE * G	.	.	.	10. 2. 0.	50.24. 1.	99.76. 7.	99.98.20.	
AGROALBA * G	.	.	.	10. 4. 0.	20. 8. 0.	30. 8. 0.	10. 8. 0.	
DACTGLOM * G	.	.	.	.	10. 7. 0.	10.20. 1.	30.40. 1.	
POACOMPR * G	.	.	.	.	10. 3. 0.	40.17. 0.	30.27. 2.	
Exotic forbs.								
TARAOFFI * F	.	.	.	99.76. 2.	99.84. 5.	99.86. 5.	99.88. 5.	
TRIFHYBR * F	.	.	.	.	80.71.12.	80.78.17.	90.53. 3.	
MADIGLOM * F	.	.	.	.	30.28. 0.	50.48. 1.	.	.
MEDILUPU * F	.	.	.	.	30.35. 2.	20.25. 1.	20.15. 0.	
ARABGLAB * F	.	.	.	10. 4. 0.	20.20. 0.	40.20. 0.	10. 4. 0.	
TRIFREPE * F	.	.	.	.	10. 8. 0.	50.36. 1.	20.12. 1.	
POLYAVIC * F	.	.	.	.	.	20.15. 0.	40.35. 1.	
MATRMATR * F	.	.	.	.	.	20.10. 0.	40.35. 1.	
MELIOFFI * F	.	.	.	.	.	30.20. 0.	20.25. 0.	
Ground cover.								
MOS&LICH	50. 0. 5.	80. 0.13.	50. 0. 2.	.	.	.	10. 0. 0.	
LITTER	99. 0.64.	90. 0.29.	60. 0. 4.	70. 0. 3.	70. 0. 2.			
SOIL	20. 0. 0.	80. 0.13.	90.53. 5.	60.80. 5.	60.57. 2.			
ROCK	10. 0. 0.	20. 0. 0.	90. 0.13.	90. 0.14.	99. 0.28.			

N. Plants commonly establishing in the *ABIES LASIOCARPA*/ *VACCINIUM SCOPARIUM* environment (HTs).

Table 15 lists plants 'establishing well' in the *Abies lasiocarpa*/ *Vaccinium scoparium* environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses provide a matrix for revegetation. No natives from the once-disturbed zone had high constancy and cover; four high constancy grasses are *Agropyron caninum*, *Poa palustris*, and *Agrostis scabra*, *Bromus carinatus*. *Calamagrostis rubescens*, *Carex geyeri*, and *Elymus glauca* from the logged (and undisturbed) zone may be better candidates. Among the native grasses *Agropyron caninum* and *Poa palustris* perform best on constantly disturbed roadsides.

Forbs enrich this matrix. Six native forbs do well on once-disturbed sites; they include *Geranium viscosissimum*, *Fragaria* spp, *Epilobium angustifolium* and *Lupinus argenteus*. Six additional forbs from logged (and undisturbed) areas are likely to establish well; they include *Aster conspicuous*, *Arnica cordifolia*, *Antennaria microphylla*, *A racemosa*.

No shrubs perform well on once-disturbed sites. Thus shrubs establishing well on logged areas are our best candidates: *Vaccinium scoparium*, *Lonicera utahensis*, and *Shepherdia canadensis*. Poorer possibilities, merely present on these sites, include *Potentilla fruticosa*, *Juniperus communis*, *Vaccinium globulare* and *Salix* spp.

Five seeded exotic grasses establish on continuously disturbed roadsides: *Phleum pratense*, *Poa pratensis*, *Agrostis alba*, *Bromus inermis* and *Dactylis glomerata*. All establish on roadcuts. All invade logged sites weakly, but none enter forests.

Of the four exotic legumes likely planted here three-- *Trifolium hybridum*, *T. repens*, and *Medicago lupulina*-- grow well in continuously disturbed sites. They grow less well on once-disturbed roadcut surfaces and invade logged areas weakly. They do not invade established forests. Exotic weeds which establish well include *Taraxacum officinale*, *Madia glomerata*, *Polygonum aviculare*, and *Matricaria matricarioides*. *Taraxacum* invades logged (but not forested) areas strongly; the others invade weakly.

Table 15. Plants commonly establishing in the ABLA-VASC environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			10			10			10			10		
Native grasses.																
TRISSPIC	G	50.14.	0.		60.24.	0.		60.22.	0.		10. 2.	0.		.	.	.
AGRCAMAJ	G	.	.	.	30.10.	0.		50.16.	0.		80.42.	1.		80.32.	1.	
POAPALUS	G	.	.	.	10. 3.	0.		50.34.	0.		50.51.	4.		30.31.	2.	
AGROSCAB	G	.	.	.	20. 9.	0.		50.17.	0.		40.17.	0.		20. 6.	0.	
BROMCARI	G	.	.	.	30.20.	0.		40.36.	0.		20.16.	0.		10. 8.	0.	
CALARUBE	G	80.76.	7.		90.66.	8.		30.14.	1.		.	.	.	.	.	.
ELYMGLAU	G	60.16.	0.		50.24.	1.		10. 2.	0.		.	.	.	.	.	.
CAREGEYE	G	10. 8.	0.		50.72.	6.		30.32.	3.		.	.	.	.	.	.
DANTINTE	G	20.13.	0.		30.53.	1.		.	.	.	.	.	.	.	.	.
BROMCILI	G	20.13.	0.		20.27.	0.		.	.	.	.	.	.	.	.	.
DESCELON	G	.	.	.	10. 7.	0.		30.47.	1.		.	.	.	.	.	.
FESTIDAH	G	.	.	.	10. 7.	0.		30.27.	0.		20.47.	2.		20.60.	3.	
CAREHOOD	G	.	.	.	10.25.	1.		30.65.	12.		10. 5.	0.		.	.	.
DESCCESP	G	.	.	.	.	.		20.20.	1.		30.50.	6.		20.30.	2.	
JUNCBALT	G	.	.	.	.	.		20.27.	0.		30.33.	1.		10. 7.	0.	
CAREMICR	G	.	.	.	.	.		20.20.	0.		20.60.	1.		20.30.	1.	
AGROEXAR	G	.	.	.	.	.		.	.	.	30.33.	0.		10.13.	0.	
Native forbs.																
ACHIMILL	F	20.10.	0.		70.30.	0.		90.46.	0.		70.28.	0.		20. 8.	0.	
GERAVIS	F	90.62.	3.		80.67.	7.		80.47.	2.		40.20.	0.		30. 7.	0.	
POTEARGE	F	10. 2.	0.		90.33.	0.		70.42.	1.		50.18.	0.		10. 2.	0.	
FRAGASPP	F	40.33.	1.		90.58.	3.		70.49.	4.		20.11.	0.		20. 4.	0.	
EPILANGU	F	90.76.	4.		99.80.	6.		60.30.	1.		10. 2.	0.		.	.	.
AGOSGLAU	F	10. 3.	0.		60.50.	0.		60.43.	1.		20. 7.	0.		10. 3.	0.	
LUPIARGE	F	60.51.	1.		60.60.	4.		50.56.	4.		10. 4.	0.		20. 4.	0.	
ARNICORD	F	90.76.	5.		80.42.	1.		40.12.	0.		.	.	.	.	.	.
ANTERACE	F	30.27.	1.		60.70.	1.		30.27.	1.		.	.	.	.	.	.
CAMPROTU	F	20. 8.	0.		50.56.	0.		30.28.	0.		.	.	.	.	.	.
ANTEMICR	F	.	.	.	50.46.	2.		40.29.	1.		10. 3.	0.		10. 3.	0.	
PEREBOLA	F	.	.	.	30.30.	0.		40.85.	1.		40.25.	0.		10. 0.	0.	
ASTEINTE	F	30.32.	2.		40.64.	3.		40.76.	7.		40.44.	1.		30.12.	0.	
SOLIMULT	F	10. 3.	0.		20.10.	0.		40.47.	2.		30.13.	0.		20.13.	0.	
ASTECONS	F	70.77.	7.		60.51.	4.		.	.	.	.	.	.	.	.	.
LUPISERI	F	30.28.	2.		40.45.	3.		30.30.	2.		10. 5.	0.		.	.	.
ASTERSPP	F	.	.	.	20.30.	1.		30.40.	2.		20.30.	1.		30.35.	2.	
SOLICANA	F	.	.	.	30.30.	1.		30.40.	1.		30.45.	3.		10.15.	0.	
OSMOOCCI	F	70.20.	0.		40.14.	0.		10. 3.	0.		.	.	.	.	.	.
GENTTENE	F	10. 6.	0.		40.11.	0.		30.17.	0.		.	.	.	.	.	.
HIERALBI	F	50.43.	0.		30.33.	2.		10. 3.	0.		10. 3.	0.		.	.	.
LIGUFILI	F	30.47.	2.		20.33.	0.		10.13.	0.		.	.	.	.	.	.
GALIBORE	F	10.20.	0.		30.67.	1.		.	.	.	10. 7.	0.		.	.	.
THALOCCI	F	50.52.	3.		10. 4.	0.		.	.	.	.	.	.	.	.	.
PYROSECU	F	70.40.	1.		.	.	.	.	.	.	.	.	.	.	.	.
EPILPANI	F	10.25.	2.		.	.	.	.	.	.	20.15.	0.		20.20.	1.	
GAYONUTT	F	.	.	.	.	.	.	.	.	.	20.60.	1.		30.53.	2.	

Table 15, continued.

Native shrubs and trees.							
SALIXSPP	S	10. 5. 0.	10.15. 0.	40.35. 1.	10.10. 2.	10. 5. 0.	
VACCSCOP	S	99.98.28.	80.44. 9.	. . .	. . .	. . .	
LONIUTAH	S	99.46. 3.	40.12. 1.	. . .	. . .	. . .	
SHEPCANA	S	40.30. 4.	40.25. 2.	. . .	. . .	. . .	
LINNBOR	S	30.47. 3.	. . .	. . .	. . .	. . .	
OHPINUCO	T	70.48.19.	80.62.34.	60.52.17.	. . .	. . .	
PINUCONT	T	50.20. 0.	60.31. 0.	50.40. 0.	. . .	. . .	
PICEASPP	T	20. 5. 0.	40.20. 1.	50.23. 2.	. . .	. . .	
ABIELASC	T	70.36. 1.	70.28. 1.	30.10. 0.	. . .	. . .	
OHABIELA	T	90.72.34.	30. 6. 0.	. . .	. . .	. . .	
Exotic grasses.							
PHLEPRAT * G		. . .	30. 6. 0.	80.50. 1.	90.68. 5.	90.82. 7.	
POAPRATE * G		. . .	30.20. 0.	40.30. 1.	90.54. 3.	90.74.11.	
AGROALBA * G		. . .	10. 7. 0.	40.23. 0.	50.57.13.	60.53. 7.	
BROMINER * G		. . .	30.16. 1.	40.56. 5.	40.60. 6.	50.64. 8.	
DACTGLOM * G		. . .	10. 4. 0.	20.28. 0.	50.48. 4.	40.52. 4.	
POACOMPR * G		. . .	. . .	. . .	20.30. 1.	. . .	
AGROREPE * G		. . .	. . .	. . .	30.40. 5.	10.27. 2.	
FESTPRAT * G		. . .	. . .	. . .	20.33. 2.	10.13. 0.	
Exotic forbs.							
TRIFHYBR * F		. . .	40.16. 0.	80.60. 7.	60.58. 9.	80.54. 7.	
TARAOFFI * F		. . .	80.48. 2.	80.64. 3.	99.82. 4.	99.76. 5.	
MADIGLOM * F		. . .	20.20. 0.	50.43. 1.	50.63. 4.	40.33. 1.	
MEDILUPU * F		. . .	10. 5. 0.	40.30. 2.	60.50. 2.	50.55. 3.	
POLYAVIC * F		. . .	30.23. 0.	40.17. 0.	40.47. 2.	50.47. 2.	
TRIFREPE * F		. . .	10. 7. 0.	40.18. 0.	80.62. 9.	40.31. 3.	
MELIOFFI * F		. . .	10.15. 1.	30.60.17.	30.75. 5.	40.50. 2.	
MATRMATR * F		. . .	. . .	. . .	40.30. 2.	50.53. 1.	
Ground cover.							
MOS&LICH		70. 0. 1.	90. 0. 5.	50. 0. 7.	10. 0. 0.	. . .	
LITTER		99.10.29.	99. 0.26.	99. 0. 9.	80. 0. 5.	60. 0. 2.	
SOIL		20. 0. 0.	60. 0. 8.	90. 0.19.	70. 0. 8.	50. 0. 3.	
ROCK		. . .	10. 0. 0.	70. 0. 8.	90. 0.17.	99. 0.38.	

O. Plants establishing in the FESTUCA IDAHOENSIS/ AGROPYRON CANINUM environment (HTs) .

Table 16 lists plants 'establishing well' in the Festuca idahoensis/ Agropyron caninum environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses form a matrix for revegetation plantings. Five species do well on once-disturbed sites (road cuts); they include Agropyron caninum, Festuca idahoensis and Bromus carinatus. Other likely useful graminoids from undisturbed vegetation are Stipa occidentalis and Carex hoodii. While most of these grasses are intolerant of trampling, Agropyron caninum and Hordeum brachyantherum occupy continuously disturbed sites.

Forbs establishing naturally in this zone are numerous. On once-disturbed sites nine species-- including Potentilla gracilis, Aster integrifolius?, Aster occidentalis, Fragaria spp, Epilobium angustifolium, Lupinus argentea, and Achillea millefolium-- do well. Additional possibilities from undisturbed vegetation include Geranium viscosissimum and Valeriana occidentalis. Only four species are did well on continuously disturbed sites in this environment: Achillea millefolium, Potentilla gracilis, Aster occidentalis, and Agoseris glauca.

Four exotic grasses, likely planted, occurred in this zone. Poa pratensis and Phleum pratense were successful in all zones, and tend to spread into undisturbed vegetation. Bromus inermis and Agrostis alba are successful in constantly disturbed zones, but are much less likely to spread.

Seven exotic forbs did well in this zone. Three of them-- Trifolium hybridum, Melilotus officinale, and Medicago lupulina-- were likely planted. Only Melilotus has much tendency to spread into undisturbed vegetation. Of four weeds, two-- Taraxacum officinalis and Descurania pinnata-- tend to spread into undisturbed vegetation.

Table 16. Plants commonly establishing in the FEID-AGCA environment.

species		climax cn fq cv 10	cleared cn fq cv 0	road cut cn fq cv 10	ditch cn fq cv 10	shoulder cn fq cv 10
Native grasses.						
AGRCAMAJ	G	99.98. 7.	. . .	90.66. 4.	80.78. 4.	99.58. 2.
FESTIDAH	G	99.98.18.	. . .	80.46. 1.	20. 4. 0.	10. 2. 0.
TRISSPIC	G	80.56. 0.	. . .	80.32. 1.	20.12. 0.	. . .
BROMCARI	G	80.75. 4.	. . .	70.65. 2.	20.15. 1.	. . .
HORDERAC	G	10. 3. 0.	. . .	50.35. 2.	80.53. 2.	40.18. 0.
DESCCESP	G	10. 5. 0.	. . .	40.65. 8.	40.45. 3.	20.30. 0.
CAREHOOD	G	80.63. 2.	. . .	40.28. 2.	40.25. 2.	10.10. 1.
POA SPSP	G	90.71. 2.	. . .	40.24. 1.	10. 0. 0.	. . .
MELISPEC	G	80.58. 0.	. . .	20. 7. 0.	10. 2. 0.	. . .
STIPOCCI	G	70.69. 1.	. . .	20. 9. 0.	. . .	. . .
CARERAYN	G	70.54. 1.	. . .	10. 3. 0.	. . .	. . .
DANTINTE	G	40.45. 0.	. . .	. . .	. . .	. . .
Native forbs.						
ACHIMILL	F	99.72. 1.	. . .	99.56. 1.	99.82. 3.	90.68. 2.
AGOSGLAU	F	99.80. 1.	. . .	90.64. 2.	90.44. 1.	30.10. 0.
POTTEGRAC	F	99.88.11.	. . .	80.42. 2.	80.38. 1.	60.26. 1.
ASTEINTE	F	99.80. 7.	. . .	70.44. 3.	20. 6. 0.	. . .
ASTEOCCI	F	70.20. 0.	. . .	60.40. 4.	90.60. 6.	80.62. 7.
FRAGASPP	F	80.68. 5.	. . .	60.33. 2.	40.23. 2.	20. 5. 0.
LUPIARGE	F	60.77. 4.	. . .	50.31. 1.	. . .	. . .
EPILANGU	F	80.78. 7.	. . .	50.35. 2.	30.15. 1.	. . .
GERAVISC	F	90.93. 7.	. . .	50.42. 1.	40.24. 1.	. . .
EPILMINU	F	20.17. 0.	. . .	50.40. 0.	40.33. 1.	10. 3. 0.
POLYDOUG	F	70.80. 1.	. . .	40.33. 1.	10.13. 0.	10. 5. 0.
ERIOLOANA	F	20.24. 0.	. . .	40.40. 0.	10. 4. 0.	. . .
PHACHAST	F	. . .	. . .	40.35. 1.	10.10. 0.	. . .
ARABDRUM	F	40.37. 0.	. . .	40.33. 0.	30.17. 0.	. . .
COLLLINE	F	80.78. 1.	. . .	30.28. 1.	20. 5. 0.	10. 3. 0.
VALEOCCI	F	50.32. 2.	. . .	20.12. 1.	10. 4. 0.	10. 4. 0.
ANDRSEPT	F	50.63. 0.	. . .	30.17. 0.	20.10. 0.	. . .
COLLPARV	F	50.57. 0.	. . .	20.17. 0.	. . .	. . .
LIGUFILI	F	40.60. 5.	. . .	10. 5. 0.	. . .	10. 5. 0.
ARNIMOLL	F	30.27. 0.	. . .	20.13. 0.	. . .	. . .
ERIOUMBE	F	30.53. 0.	. . .	20.27. 0.	. . .	. . .
THALOCCI	F	50.76. 3.	. . .	. . .	. . .	. . .
ACONCOLU	F	50.48. 1.	. . .	. . .	. . .	. . .
PEDIBRAC	F	40.45. 1.	. . .	. . .	. . .	. . .
GEUMTRIF	F	40.40. 1.	. . .	. . .	. . .	. . .

Table 16 continued.

Exotic grasses.									
PHLEPRAT * G	60.30.	0.	.	.	.	70.40.	1.	99.60.	1.
POAPRATE * G	50.22.	0.	.	.	.	70.40.	3.	90.68.	3.
POACOMPR * G	.	.	.	.	.	10.4.	0.	30.32.	2.
BROMINER * G	.	.	.	.	.	.	.	80.36.	2.
AGROALBA * G	.	.	.	.	.	.	.	40.30.	1.
Exotic forbs.									
TARAOFFI * F	60.32.	0.	.	.	.	99.60.	1.	99.88.	5.
TRIFHYBR * F	.	.	.	.	.	60.24.	1.	70.60.	5.
MEDILUPU * F	.	.	.	.	.	30.13.	0.	30.33.	2.
DESCPINN * F	40.28.	1.	.	.	.	20.32.	1.	20.20.	1.
MADIGLOM * F	20.12.	0.	.	.	.	20.28.	0.	40.56.	1.
POLYAVIC * F	20.23.	0.	.	.	.	.	.	50.40.	2.
MELIOFFI * F	10.6.	0.	.	.	.	10.11.	0.	40.20.	0.
Ground cover.									
MOS&LICH	10.0.	1.	.	.	.	.	.	.	.
LITTER	99.0.	5.	.	.	.	50.0.	1.	30.0.	1.
SOIL	99.0.	11.	.	.	.	99.0.	40.	90.0.	19.
ROCK	20.0.	0.	.	.	.	80.0.	14.	99.0.	34.

P. Plants establishing in the DESCHAMPSIA CAESPITOSA/ CAREX SCOPULORUM (alpine) environment (HTs).

Table 17 lists plants 'establishing well' in the Deschampsia caespitosa/ Carex scop (alpine) environment. Establishing well is arbitrarily defined as 'constancy >50% in at least one disturbance zone and cover >1% in occupied sites in that zone (see definitions below).' Columns 3-6 compare lists of plants appearing on undisturbed, once disturbed (road cut), managed (ditch slope), and trampled (road shoulder) sites. In each column three indices of success are given: 1) constancy (cn) gives the percent of sites in the environmental type (HT) containing the species, 2) frequency (fq) reports the percent of 1x4m quadrats which contain the species at sites where the species is present, and 3) cover (cv) tells what percent of the ground is covered by that species at sites where the species is present.

Grasses provide a matrix for revegetation. Five graminoids including Deschampsia caespitosa, Festuca ovina, and Poa alpina establish well on once-disturbed sites. Undisturbed vegetation offers the same same species and two Carexes. Four grasses do well on continuously disturbed areas; Deschampsia caespitosa is the most successful.

Forbs enrich the matrix. Nine forbs-- including Lupinus argentea-- do well on once-disturbed sites. Geum rossii, Potentilla diversifolia and Trifolium parryi-- from undisturbed vegetation, should also be tried on once-disturbed sites. Forbs successful on continuously disturbed sites are almost as numerous and include some apparently trample resistant plants-- among them Potentilla diversifolia and Geum rossii.

We recorded no trees or shrubs suitable for revegetation of this environmental type.

Only one exotic plant-- Taraxacum officinale-- is common; it does well in disturbed vegetation and performs poorly in undisturbed vegetation.

Table 17. Plants commonly establishing in the DECA/ CARX environment.

species		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		11			0			11			11			11		
Native grasses.																
DESCCESP	G	99.89	12.		.	.	.	99.98	8.		99.96	8.		91.82	5.	
FESTOVIN	G	99.95	3.		.	.	.	91.87	2.		91.45	1.		99.76	0.	
POAALPIN	G	64.31	0.		.	.	.	82.56	2.		91.84	3.		82.58	1.	
LUZUSPIC	G	99.91	1.		.	.	.	82.51	1.		45.16	0.		27.13	0.	
TRISSPIC	G	99.87	1.		.	.	.	82.62	0.		99.75	1.		99.85	1.	
CARESCOP	G	91.76	8.		.	.	.	82.46	1.		64.36	2.		27.16	0.	
POAGRAYA	G	36.18	1.		.	.	.	55.38	1.		36.30	1.		45.30	1.	
CAREPHAE	G	9.4	0.		.	.	.	55.29	0.		73.31	0.		55.24	0.	
CARESCIR	G	64.91	7.		.	.	.	45.40	1.		45.63	2.		45.40	1.	
POASECND	G	36.20	0.		.	.	.	45.28	0.		55.35	0.		64.38	1.	
JUNCDRUM	G	9.5	0.		.	.	.	36.50	2.		18.20	0.		9.10	0.	
PHLEALPI	G	.	.		.	.	.	27.15	0.		27.20	0.		18.30	0.	
AGRCALAT	G	18.2	0.		.	.	.	9.4	0.		45.29	0.		73.51	0.	
AGROVARI	G	27.40	0.		.	.	.	9.10	0.		9.5	0.		.	.	
CAREELYN	G	45.36	0.		.	.	.	.	.		.	.		.	.	
CARERUPE	G	36.48	3.		.	.	.	.	.		9.16	0.		.	.	
Native forbs.																
POLYBIST	F	91.76	1.		.	.	.	99.62	0.		64.27	0.		36.13	0.	
POTEDIVE	F	99.89	1.		.	.	.	99.89	2.		91.71	3.		91.65	2.	
ARTESCOP	F	82.73	2.		.	.	.	91.75	1.		91.75	1.		91.62	1.	
ARENOBTU	F	82.66	1.		.	.	.	91.60	1.		45.12	0.		36.12	0.	
GEUMROSS	F	91.84	13.		.	.	.	82.35	0.		73.49	1.		64.40	2.	
ERIGSIMF	F	64.42	0.		.	.	.	82.38	0.		64.31	0.		55.18	0.	
SOLIMULT	F	36.30	1.		.	.	.	73.60	1.		64.60	4.		64.45	1.	
ANTEROSE	F	45.18	0.		.	.	.	73.33	1.		55.18	0.		45.18	0.	
ANDRSEPT	F	55.24	0.		.	.	.	64.36	0.		18.7	0.		27.16	0.	
SEDULANC	F	82.40	0.		.	.	.	55.34	0.		27.6	0.		9.2	0.	
SIBAPROC	F	45.31	1.		.	.	.	55.46	1.		36.20	0.		.	.	
MICRCUSP	F	36.57	1.		.	.	.	55.73	1.		55.80	1.		36.63	0.	
DRABINSE	F	64.31	0.		.	.	.	55.16	0.		27.13	0.		18.4	0.	
LUPIARGE	F	45.80	3.		.	.	.	45.96	8.		36.56	3.		36.28	1.	
TRIFPARR	F	82.87	6.		.	.	.	45.44	2.		64.60	2.		36.31	2.	
CERANUTA	F	55.33	0.		.	.	.	45.22	0.		55.27	0.		82.62	0.	
MERTALPI	F	27.17	0.		.	.	.	45.40	0.		36.20	0.		.	.	
SILEACAU	F	27.18	0.		.	.	.	45.18	0.		36.9	0.		45.27	0.	
STELOALT	F	64.56	1.		.	.	.	36.24	0.		45.24	1.		18.4	0.	
PHLOPULV	F	55.40	0.		.	.	.	27.9	0.		18.6	0.		18.17	1.	
GENTALGI	F	45.63	1.		.	.	.	36.14	0.		.	.		9.3	0.	
PEDIGROE	F	45.53	1.		.	.	.	27.7	0.		9.3	0.		.	.	
POLEVISC	F	27.26	0.		.	.	.	36.11	0.		18.3	0.		36.23	1.	
ANTELANA	F	18.13	0.		.	.	.	36.37	1.		18.7	0.		.	.	
SENEFREM	F	9.10	0.		.	.	.	36.43	0.		36.27	0.		36.30	0.	
PENSPROC	F	36.44	1.		.	.	.	27.28	0.		9.4	0.		9.8	0.	
CALTLEPT	F	36.90	2.		.	.	.	27.40	0.		.	.		.	.	
ACHIMILL	F	18.6	0.		.	.	.	27.23	0.		55.46	2.		55.37	1.	

Table 17, continued.

CASTPULC	F	45.26. 0.	.	.	.	18. 6. 0.	9. 3. 0.	.	.	.
ASTEALPE	F	45.68. 2.	.	.	.	18.16. 0.	18. 8. 0.	9.12. 0.	.	.
SENEFUSC	F	45.64. 1.	.	.	.	18.20. 0.	27.12. 0.	.	.	.
TRIFNANU	F	27.27. 0.	.	.	.	.	18. 0. 0.	36.17. 0.	.	.
ALLICERN	F	27.53. 2.	.	.	.	9.27. 1.	.	.	.	.
SELADENS	F	45.32. 0.	.	.	.	.	.	.	.	.
MYOSSYLV	F	36.15. 0.	.	.	.	.	.	.	.	.
OXYRDIGY	F	.	.	.	.	27.28. 0.	36.20. 0.	18. 8. 0.	.	.
TARALYRA	F	.	.	.	.	18. 8. 0.	18.16. 0.	27.44. 0.	.	.
ERIGCOMP	F	.	.	.	.	.	18. 6. 0.	55.46. 1.	.	.
DRYAECTO	F	.	.	.	.	9.20. 0.	.	.	.	.
Native shrubs and trees.										
SALIARCT	S	9.80. 4.	.	.	.	9.40. 1.	9.60. 1.	.	.	.
SALIXSPP	S	9.50. 5.	.	.	.	18.60. 2.	9.20. 0.	.	.	.
SALIRETI	S	9.20. 1.	.	.	.	9.10. 0.	.	.	.	.
Exotic grasses.										
BROMINER * G		.	.	.	.	.	9. 4. 0.	36.20. 0.	.	.
PHLEPRAT * G		.	.	.	.	9. 5. 0.	18.10. 0.	18.10. 0.	.	.
FESTPRAT * G		.	.	.	.	.	.	9.20. 0.	.	.
POACOMPR * G		9. 7. 0.	.	.	.	.	9. 7. 0.	18.40. 0.	.	.
FESTRUBR * G		9.40. 0.	.	.	.	9. 0. 0.	.	.	.	.
Exotic forbs.										
TARAOFFI * F		9. 2. 0.	.	.	.	36. 9. 0.	82.55. 1.	82.56. 1.	.	.
RUMEACET * F		27.15. 0.	.	.	.	9.15. 0.	18.15. 0.	18. 5. 0.	.	.
Ground cover.										
MOS&LICH		64. 0. 6.	.	.	.	64. 0. 2.	18. 0. 1.	18. 0. 0.	.	.
LITTER		99. 0.24.	.	.	.	99. 0. 8.	91. 0. 8.	73. 0. 3.	.	.
SOIL		64. 0. 3.	.	.	.	99. 0.21.	82. 0. 7.	36. 0. 2.	.	.
ROCK		55. 0. 4.	.	.	.	99. 0.36.	99. 0.54.	99. 0.74	.	.

KEY TO SPECIES NAME ABBREVIATIONS.

Names of the species discussed may contain thirty letters. Therefore using full names is inconsistent with presentation of the five columns of data given in Tables 2-17. Thus we have abbreviated species names with an eight letter code consisting of the first four letters of the genus name and the first four letters of the species epithet. While practitioners can often recognize species names from this code, we provide the following table to facilitate translation. Additional information on plant origin, plant form, and plant family is included.

In the following table, then, the columns are 1) abbreviation, 2) origin (native or exotic =*), 3) life form (grass =G, forb =F, shrub =S, tree =T), 4) species name, and 5) plant family.

Table Species found in the 'exotic study': I lists exotics and II lists natives. Codes (numeric and 8 letter), life form (Grass, Forb, Shrub, Tree), origin (*=exotic) and plant families are also given. 1 January 1994. Interim list, some improvement expected.

I Exotics

316	AGROALBA	G*	H	Agrostis alba L	Gramineae
305	AGROCRIS	G*	H	Agropyron cristatum (L)Gaertn.	Gramineae
306	AGROINTE	G*	H	Agropyron intermedium (Host)Beauv	Gramineae
307	AGROREPE	G*	H	Agropyron repens (L)Beauv	Gramineae
322	ALOPPRAT	G*	H	Alopecurus pratensis L	Gramineae
410	ALYSALYS	F*	H	Alyssum alyssoides L	Cruciferae
434	ARABGLAB	F*	H	Arabis glabra (L) Bernh	Cruciferae
323	ARRHELAT	G*	H	Arrhenatherum elatius (L)Presl	Gramineae
446	ARTEABSI	F*	H	Artemisia absinthium L.	Compositae
302	AVENSATI	G*	H	Avena sativa L	Gramineae
470	BERTINCA	F*	H	Berteroa incana (L)DC	Cruciferae
816	BRASKABE	F*	H	Brassica kaber (DC)Wheeler	Cruciferae
326	BROMINE1	G*	H	Bromus inermis Leys	Gramineae
327	BROMJAPO	G*	H	Bromus japonicus Thunb	Gramineae
328	BROMTECT	G*	H	Bromus tectorum L	Gramineae
472	CAMEMICR	F*	H	Camelina microcarpa (L) Andr	Cruciferae
474	CAPSBURS	F*	H	Capsella bursa-pastoris (L)Med	Cruciferae
482	CENTMACU	F*	H	Centaurea maculosa Lam	Compositae
488	CERAVULG	F*	H	Cerastium vulgatum L	Charyophyllaceae
489	CHENALBU	F*	H	Chenopodium album L	Chenopodiaceae
491	CHRYLEUC	F*	H	Chrysanthemum leucanthemum L.	Compositae
499	CIRSARVE	F*	H	Cirsium arvense (L)Scop	Compositae
506	CIRSVULG	F*	H	Cirsium vulgare (Savi)Tenore	Compositae
512	CONVARVE	F*	H	Convolvulus arvensis L.	Convolvulaceae
818	CYNOFFFI	F*	H	Cynoglossum officinale	Boraginaceae
337	DACTGLOM	G*	H	Dactylis glomerata L	Gramineae
518	DESCPINN	F*	H	Descurainia pinnata (Walt)Britt	Cruciferae
345	FESTARUN	G*	H	Festuca arundinacea Schreb.	Gramineae
347	FESTPRAT	G*	H	Festuca pratensis Huds.	Gramineae
348	FESTRUBR	G*	H	Festuca rubra L.	Gramineae
564	GRINSQUA	F*	H	Grindelia squarrosa (Pursh)Dunal	Compositae
599	HYPERPERF	F*	H	Hypericum perforatum L	Hypericaceae
600	KOCHSCOP	F*	H	Kochia scoparia (L) Schrad.	Chenopodiaceae
603	LACTSERR	F*	H	Lactuca serriola L	Compositae
609	LAPPECHI	F*	H	Lappula echinata Gilib.	Boraginaceae
605	LEPICAMP	F*	H	Lepidium campestre (L)R Br	Cruciferae
612	LINADALM	F*	H	Linaria dalmatica (L) Mill	Scrophulareaceae
611	LINAVULG	F*	H	Linaria vulgaris Hill	Scrophulareaceae
633	LYCHALBA	F*	H	Lychnis alba L	Caryophyllaceae
635	MADIGLOM	F*	H	Madia glomerata Hook	Compositae
CHECK					
636	MATRMATR	F*	H	Matricaria matricarioides (Less)Porter	Compositae
825	MATRIMAR	F*	H	Matricaria maritima L	Compositae
637	MEDILUPU	F*	H	Medicago lupulina L	Leguminosae
638	MEDISATI	F*	H	Medicago sativa L	Leguminosae
644	MELIALBA	F*	H	Melilotus alba Desr	Leguminosae

647	MELIOFFI	F*	H	Melilotus officinalis (L) Lam	Leguminosae
364	PHALARUN	G*	H	Phalaris arundinacea L	Gramineae
367	PHLEPRAT	G*	H	Phleum pratense L	Gramineae
689	PLANLANC	F*	H	Plantago lanceolata L	Plantaginaceae
691	PLANMAJO	F*	H	Plantago major L	Plantaginaceae
370	POACOMPR	G*	H	Poa compressa L	Gramineae
373	POAPRATE	G*	H	Poa pratensis L	Gramineae
692	POLYACHO	F*	H	Polygonum achoreum Blake	Polygonaceae
693	POLYAVIC	F*	H	Polygonum aviculare L	Polygonaceae
707	PRUNVULG	F*	H	Prunella vulgaris L [also native]	Labiatae
719	RUMEACET	F*	H	Rumex acetosa L or R acetosella L	Polygonaceae
721	RUMECRIS	F*	H	Rumex crispus L	Polygonaceae
723	SALSKALI	F*	H	Salsola kali L	Chenopodiaceae
380	SETAVIRI	G*	H	Setaria viridis (L) Beauv	Gramineae
734	SILECUCU	F*	H	Silene cucubalus Wibel	Caryophyllaceae
736	SISYALTI	F*	H	Sisymbrium altissimum L	Cruciferae
737	SISYLOES	F*	H	Sisymbrium loeselii L	Cruciferae
746	SPERRUBR	F*	H	Spergula rubra (L) Presl	Caryophyllaceae
749	TANAVULG	F*	H	Tanacetum vulgare L	Compositae
751	TARAOFFI	F*	H	Taraxacum officinale Weber	Compositae
755	THLAARVE	F*	H	Thlaspi arvense L	Cruciferae
760	TRAGDUBI	F*	H	Tragopogon dubius Scop	Compositae
763	TRIFAGRA	F*	H	Trifolium agrarium L	Leguminosae
766	TRIFHYBR	F*	H	Trifolium hybridum L	Leguminosae
769	TRIFPRAT	F*	H	Trifolium pratense L	Leguminosae
772	TRIFPROC	F*	H	Trifolium procumbens L	Leguminosae
775	TRIFREPE	F*	H	Trifolium repens L	Leguminosae
382	TRITAEST	G*	H	Triticum aestivum L	Leguminosae
787	VERBTHAP	F*	H	Verbascum thapsus L	Scrophulaceae
790	VEROOFFI	F*	H	Veronica officinalis L	Scrophulaceae

II Natives.

1	ABIELASI	T	H	<i>Abies lasiocarpa</i> (Hook.) Nutt.	Pinaceae
101	ACERGLAB	S	H	<i>Acer glabrum</i> Torr.	Aceraceae
401	ACHIMILL	F	H	<i>Achillea millefolium</i> L.	Compositae
402	ACONCOLU	F	H	<i>Aconitum columbianum</i> Nutt.	Ranunculaceae
403	ACTERUBR	F	H	<i>Actea rubra</i> (Ait.) Willd.	Ranunculaceae
404	ADENBICO	F	H	<i>Adenocaulon bicolor</i> Hook.	Compositae
406	AGASURTI	F	H	<i>Agastache urticifolia</i> (Benth) Kuntze	Labiatae
407	AGOSGLAU	F	H	<i>Agoseris glauca</i> (Pursh) Raf.	Compositae
304	AGROCAN1	G	H	<i>Agropyron caninum</i> var <i>andinum</i> (S&S) Hitch	Gramineae
300	AGROCAN2	G	H	<i>Agropyron caninum</i> var <i>latiglume</i> (S&S) Hitch	Gramineae
301	AGROCAN3	G	H	<i>Agropyron caninum</i> var <i>majus</i> (Vasey) Hitch	Gramineae
303	AGROCAN4	G	H	<i>Agropyron caninum</i> var <i>unilaterale</i> (Vasey) H	Gramineae
311	AGROBORE	G	H	<i>Agrostis borealis</i> Hartm.	Gramineae
317	AGROEXAR	G	H	<i>Agrostis exarata</i> Trin.	Gramineae
318	AGROIDAH	G	H	<i>Agrostis idahoensis</i> Nash	Gramineae
319	AGROSCAB	G	H	<i>Agrostis scabra</i> Willd.	Gramineae
308	AGROSCRI	G	H	<i>Agropyron scribneri</i> Vasey	Gramineae
310	AGROSMIT	G	H	<i>Agropyron smithii</i> Rydb	Gramineae
313	AGROSPIC	G	H	<i>Agropyron spicatum</i>	Gramineae
320	AGROTHUR	G	H	<i>Agrostis thurberiana</i> Hitch.	Gramineae
321	AGROVARI	G	H	<i>Agrostis variabilis</i> Rydb	Gramineae
409	ALLICERN	F	H	<i>Allium cernuum</i> Roth	Liliaceae
408	ALLIGEYE	F	H	<i>Allium geyeri</i> Wats	Liliaceae
104	ALNUINCA	S	H	<i>Alnus incana</i> (L) Moench	Betulaceae
105	ALNUSINU	S	H	<i>Alnus sinuata</i> (Regel) Rydb	Betulaceae
411	ALYSDESE	F	H	<i>Alyssum desertorum</i> Stapf	Cruciferae
108	AMELALNI	S	H	<i>Amelanchier alnifolia</i> Nutt	Rosaceae
413	ANAPMARG	F	H	<i>Anaphalis margaritacea</i> (L) B&H	Compositae
416	ANDRSEPT	F	H	<i>Androsace septentrionalis</i> L	Primulaceae
418	ANEMDRUM	F	H	<i>Anemone drummondii</i> Wats.	Ranunculaceae
419	ANEMMULF	F	H	<i>Anemone multifida</i> Poir.	Ranunculaceae
422	ANGEARGU	F	H	<i>Angelica arguta</i> Nutt	Umbelliferae
427	ANTEANAP	F	H	<i>Antennaria anaphaloides</i> Rydb	Compositae
430	ANTELANA	F	H	<i>Antennaria lanata</i> (Hook.) Greene	Compositae
423	ANELUZU	F	H	<i>Antennaria luzuloides</i> T&G	Compositae
POOL					
424	ANTEMICR	F	H	<i>Antennaria microphylla</i> Rydb.	Compositae
429	ANTEROSE	F	H	<i>A rosea</i> [added to #424, but save for record]	
425	ANTENEGL	F	H	<i>Antennaria negelecta</i> Greene	Compositae
428	ANTERACE	F	H	<i>Antennaria racemosa</i> Hook	Compositae
431	APOCANDR	F	H	<i>Apocyanum androsaemifolium</i> L	Apocynaceae
432	AQUICOER	F	H	<i>Aquilegia coerulea</i> James.	Ranunculaceae
828	AQUIFLAV	F	H	<i>Aquilegia flavescens</i> Wats.	Ranunculaceae
433	ARABDRUM	F	H	<i>Arabis drummondii</i> Gray	Cruciferae
435	ARABHOLB	F	H	<i>Arabis holboellii</i> Hornem.	Cruciferae
436	ARAB SPP	F	H	ARABIS SPECIES	Cruciferae
830	ARABLEMM	F	H	<i>Arabis lemmonii</i> Wats.	Cruciferae
831	ARABNUTT	F	H	<i>Arabis nuttallii</i> Robins.	Cruciferae
822	ARABHIRS	F	H	<i>Arabis hirsuta</i> (L) Scop	Cruciferae
437	ARALNUDI	F	H	<i>Aralia nudicaulis</i> L	Araliaceae
111	ARCTUVAU	S	H	<i>Arctostaphylos uva-ursi</i> (L) Spreng	Ericaceae
438	ARENCONG	F	H	<i>Arenaria congesta</i> Nutt.	Caryophyllaceae

829	ARENHOOK	F	H	<i>Arenaria hookeri</i> Nutt.	Caryophyllaceae
445	ARENULATE	F	H	<i>Arenaria lateriflora</i> L.	Caryophyllaceae
832	ARENMACR	F	H	<i>Arenaria macrophylla</i> Hook	Caryophyllaceae
439	ARENObTU	F	H	<i>Arenaria obtusiloba</i> (Rydberg) Fern.	Caryophyllaceae
833	ARENROS2	F	H	<i>Arenaria rossii</i> R.Br. var <i>apetala</i>	Caryophyllaceae
834	ARENRUBE	F	H	<i>Arenaria rubella</i> (Walhlenb.) JE Smith	Caryophyllaceae
314	ARISLONG	G	H	<i>Aristida longiseta</i> Steud	Gramineae
440	ARNICORD	F	H	<i>Arnica cordifolia</i> Hook	Compositae
443	ARNILATI	F	H	<i>Arnica latifolia</i> Bong.	Compositae
444	ARNIMOLL	F	H	<i>Arnica mollis</i> Hook	Compositae
442	ARNIPARR	F	H	<i>Arnica parryi</i> Gray	Compositae
113	ARTEARBU	S	H	<i>Artemisia arbuscula</i> Nutt.	Compositae
447	ARTECAMP	F	H	<i>Artemisia campestris</i> L	Compositae
115	ARTECANA	S	H	<i>Artemisia cana</i> Pursh	Compositae
448	ARTEDRAC	F	H	<i>Artemisia dracunculus</i> L.	Compositae
117	ARTEFRIG	S	H	<i>Artemisia frigida</i> Willd.	Compositae
449	ARTELUDO	F	H	<i>Artemisia ludoviciana</i> Nutt.	Compositae
450	ARTEMICH	F	H	<i>Artemisia michauxiana</i> Bess.	Compositae
835	ARTESCOF	F	H	<i>Artemisia scopulorum</i> Gray	Compositae
119	ARTETRI1	S	H	<i>Artemisia tridentata</i> (Nutt) Vaseyana	Compositae
836	ASTEALPI	F	H	<i>Aster alpigenus</i> (T&G) Gray.	Compositae
452	ASTECAMP	F	H	<i>Aster campestris</i> Nutt.	Compositae
453	ASTECONS	F	H	<i>Aster conspicuus</i> Lindl.	Compositae
454	ASTEEATO	F	H	<i>Aster eatonii</i> (Gray)	Compositae
455	ASTEFOLI	F	H	<i>Aster foliaceus</i> Lindl.	Compositae
456	ASTEHESP	F	H	<i>Aster hesperius</i> Gray	Compositae
457	ASTEINTE	F	H	<i>Aster integrifolius</i> Nutt.	Compositae
458	ASTELAEV	F	H	<i>Aster laevis</i> L	Compositae
459	ASTEMODE	F	H	<i>Aster modestus</i> Lindl.	Compositae
460	ASTEOCCI	F	H	<i>Aster occidentalis</i> (Nutt) T&G	Compositae
451	ASTEPANS	F	H	<i>Aster pansus</i> (Blake) Cronquist	Compositae
441	ASTEPERE	F	H	<i>Aster perelegans</i> Nels&Macbr	Compositae
461	ASTE SPP	F	H	<i>Aster species</i> [DON'T TABLE]	Compositae
462	ASTRADSU	F	H	<i>Astragalus adsurgens</i> Hook.	Leguminosae
811	ASTRALPI	F	H	<i>Astragalus alpinus</i> L.	Leguminosae
464	ASTRASPP	F	H	<i>Astragalus species</i>	Leguminosae
812	ASTRCRAS	F	H	<i>Astragalus crassicaulus</i> Nutt.	Leguminosae
813	ASTRGILV	F	H	<i>Astragalus gilviflorus</i> Sheld.	Leguminosae
466	ASTRGRAC	F	H	<i>Astragalus gracilis</i> Nutt.	Leguminosae
463	ASTRMISE	F	H	<i>Astragalus miser</i> Dougl.	Leguminosae
814	ASTRPURS	F	H	<i>Astragalus purshii</i> Dougl.	Leguminosae
465	ASTRTENE	F	H	<i>Astragalus tenellus</i> Pursh.	Leguminosae
467	ATHYFILI	F	H	<i>Athyrium filix-femina</i> (L) Roth	Polypodiaceae
468	BALSSAGI	F	H	<i>Balsamorhiza sagittata</i> (Pursh) Nutt	Compositae
469	BARBORTH	F	H	<i>Barbarea orthoceras</i> Ledeb	Cruciferae
120	BERBREPE	S	H	<i>Berberis repens</i> Lindl	Berberidaceae
4	BETUPAPY	T	H	<i>Betula papyrifera</i> Marsh	Betulaceae
891	BOTRMULT	F	H	<i>Botrychium multifidum</i> (Gmel) Trevis	Ophoglossaceae
315	BOUTGRAC	G	H	<i>Bouteloua gracilis</i> (HBK) Lag.	Gramineae
309	BROMINE2	G	H	<i>Bromus inermis</i> Leys var <i>pumpellianus</i>	Gramineae
312	BROMANOM	G	H	<i>Bromus anomalus</i> Ruper	Gramineae
324	BROMCARI	G	H	<i>Bromus carinatus</i> H&A	Gramineae
325	BROMCILI	G	H	<i>Bromus ciliatus</i> L	Gramineae
471	BUPLAMER	F	H	<i>Bupleurum americanum</i> Coult&Rose	Umbellifereae
329	CALANEGL	G	H	<i>Calamagrostis neglecta</i> (Ehrh) GM&S	Gramineae

330	CALARUBE	G	H	Calamagrostis rubescens Buck	Gramineae
839	CALTLEPT	F	H	Caltha leptosepala DC	Ranunculaceae
473	CAMPROTU	F	H	Campanula rotundifolia L.	Campanulaceae
392	CAREAENE	G	H	Carex aenea Fern.	Cyperaceae
388	CARECAPI	G	H	Carex capitata L.	Cyperaceae
390	CAREELYN	G	H	Carex elynoides Holm	Cyperaceae
391	CAREFILI	G	H	Carex filifolia Nutt	Cyperaceae
332	CAREGEYE	G	H	Carex geyeri Boott	Cyperaceae
333	CAREHOOD	G	H	Carex hoodii Boott	Cyperaceae
334	CAREMICR	G	H	Carex microglochin Wahl [alpine bogs]	Cyperaceae
393	CAREPHAE	G	H	Carex phaeocephala Piper	Cyperaceae
335	CARERAYN	G	H	Carex raynoldsii Dewey	Cyperaceae
394	CARERETR	G	H	Carex retrorsa Schw	Cyperaceae
336	CAREROSS	G	H	Carex rossii Boott	Cyperaceae
395	CARERUPE	G	H	Carex rupestris All.	Cyperaceae
396	CARESCIR	G	H	Carex scirpoidea Michx.	Cyperaceae
397	CARESCOP	G	H	Carex scopulorum Holm	Cyperaceae
398	CARESICC	G	H	Carex siccata Dewey	Cyperaceae
389	CARESTEN	G	H	Carex stenophylla Wahl.	Cyperaceae
331	CARE SPP	G	H	CAREX SPP	
476	CASTLUTE	F	H	Castilleja lutescens (Greenm) Rydb	Scrophularaceae
479	CASTMINI	F	H	Castilleja miniata Dougl	Scrophularaceae
480	CASTPILO	F	H	Castilleja pilosa (Wats) Rydb	Scrophularaceae
840	CASTPULC	F	H	Castilleja pulchella Rydb	Scrophularaceae
485	CERAARVE	F	H	Cerastium arvense L	Caryophyllaceae
841	CERANUTA	F	H	Cerastium nutans Raf.	Caryophyllaceae
123	CHIMUMBE	S	H	Chimaphila umbellata (L) Bart	Ericaceae
124	CHRYNAUS	S	H	Chrysothamnus nauseosis (Pall) Britt	Compositae
494	CHRYVILL	F	H	Chrysopsis villosa (Pursh) Nutt	Compositae
125	CHRYVISC	S	H	Chrysothamnus viscidiflorus (Hook) Nutt	Compositae
497	CIRCALPI	F	H	Circaea alpina L	Onagraceae
503	CIRSHOOK	F	H	Cirsium hookerianum Nutt	Compositae
504	CIRSSCAR	F	H	Cirsium scariosum Nutt	Compositae
505	CIRSUNDU	F	H	Cirsium undulatum (Nutt) Spreng	Compositae
508	CLEMCOLU	F	H	Clematis columbiana (Nutt) T&G	Ranunculaceae
507	CLEMHIRS	F	H	Clematis hirsutissima Pursh	Ranunculaceae
817	CLEMLIGU	F	H	Clematis ligusticifolia Nutt.	Ranunculaceae
509	CLINUNIF	F	H	Clintonia uniflora (Schult) Kunth	Liliaceae
511	COLLLINE	F	H	Collomia linearis Nutt.	Polemoniaceae
510	COLLPARV	F	H	Collinsia parviflora Lindl.	Scrophulariaceae
514	COMMUMBE	F	H	Commandra umbellata (L) Nutt.	Santalaceae
513	CONYCANA	F	H	Conyza canadensis (L) Cronq	Compositae
515	CORNCANA	F	H	Cornus canadensis L	Cornaceae
126	CORNSTOL	S	H	Cornus stolonifera Michx	Cornaceae
498	CORYAURE	F	H	Corydalis aurea Willd.	Fumariaceae
139	CORYPSPP	C	H	Coryphantha spp (Engelm) Lemire= Mammalaria	Cactaceae
129	CRATDOUG	S	H	Crategus douglasii Lindl.	Rosaceae
516	CREPACUM	F	H	Crepis acuminata Nutt	Compositae
517	CRYPTORR	F	H	Cryptantha torreyana (Gray) Greene	Boraginaceae
892	CYSTFRAG	F	H	Cystopteris fragilis (L) Bernh	Polypodiaceae
338	DANTINTE	G	H	Danthonia intermedia Vasey	Gramineae
339	DANTUNIS	G	H	Danthonia unispicata (Thurb) Munro	Gramineae

520	DELPOCCI	F	H	Delphinium occidentale Wats.	Ranunculaceae
340	DESCCESP	G	H	Deschampsia caespitosa (L) Beauv	Gramineae
341	DESCELON	G	H	Deschampsia elongata (Hook) Munro	Gramineae
519	DISPTRAC	F	H	Disporum trachycarpum (Wats) Benth & Hook	Liliaceae
842	DODEPULC	F	H	Dodecatheon pulchellum (Raf) Merrill	Primulaceae
821	DOUGMONT	F	H	Douglasia montana Gray	Primulaceae
843	DRABAURE	F	H	Draba aurea Vahl	Cruciferae
844	DRABCRAS	F	H	Draba crassifolia R Grah.	Cruciferae
845	DRABDENS	F	H	Draba densifolia Nutt.	Cruciferae
846	DRABGLAB	F	H	Draba glabella Pursh.	Cruciferae
847	DRABINCE	F	H	Draba incerta Pays.	Cruciferae
848	DRYAOCTO	F	H	Dryas octopetala L.	Rosaceae
344	ELLYMCANA	G	H	Elymus canadensis L	Gramineae
383	ELLYMCINE	G	H	Elymus cinereus Scrib & Merr	Gramineae
342	ELLYMGLAU	G	H	Elymus glaucus Buckl.	Gramineae
901	ELMALB			Elymus glaucus probably, not pooled	
849	EPILALPI	F	H	Epilobium alpinum L.	Onagraceae
521	EPILANGU	F	H	Epilobium angustifolium L	Onagraceae
522	EPILMINU	F	H	Epilobium minutum Lindl.	Onagraceae
523	EPILPANI	F	H	Epilobium paniculatum Nutt.	Onagraceae
524	EQUIARVE	F	H	Equisetum arvense L.	Equisetaceae
525	EQUILAEV	F	H	Equisetum laevigatum A. Br.	Equisetaceae
851	ERIGACRI	F	H	Erigeron acris L	Compositae
528	ERIGCAES	F	H	Erigeron caespitosus Nutt	Compositae
533	ERIGCOMP	F	H	Erigeron compositus Pursh	Compositae
534	ERIGDIVE	F	H	Erigeron divergens T & G	Compositae
532	ERIGEATO	F	H	Erigeron eatonii Gray	Compositae
853	ERIGFLAB	F	H	Erigeron flabellifolius Rydb	Compositae
527	ERIGGLAB	F	H	Erigeron glabellus Nutt	Compositae
535	ERIGOCHR	F	H	Erigeron ochroleucus Nutt	Compositae
529	ERIGPUMI	F	H	Erigeron pumilus Nutt	Compositae
854	ERIGSIMP	F	H	Erigeron simplex Greene	Compositae
536	ERIGSPEC	F	H	Erigeron speciosus (Lindl) DC	Compositae
549	ERIOFLAV	F	H	Eriogonum flavum Nutt.	Polygonaceae
531	ERIOLANA	F	H	Eriophyllum lanatum (Pursh) Forbes	???
530	ERIOMICR	F	H	Eriogonum microthecium Nutt.	Polygonaceae
823	ERIOOVAL	F	H	Eriogonum ovalifolium Nutt.	Polygonaceae
537	ERIOUMBE	F	H	Eriogonum umbellatum Torr.	Polygonaceae
824	ERODCICU	F	H	Erodium cicutarium (L) L'Her	Geraniceae
POOL					
550	ERYSASPE	F	H	Erysimum asperum (Nutt) DC	Cruciferae
850	ERYSASPE	F		[Add to ARYASPE #550, but save for record]	
538	EUPHGLYP	F	H	Euphorbia glyptosperma Engelm.	Euphorbiaceae
130	EUROLANA	S	H	Eurotia lanata (Pursh) Moq	Chenopodiaceae
343	FESTIDAH	G	H	Festuca idahoensis Elmer	Gramineae
346	FESTOCCI	G	H	Festuca occidentalis Hook	Gramineae
350	FESTOVIN	G	H	Festuca ovina L	Gramineae
349	FESTSCAB	G	H	Festuca scabrella Torr.	Gramineae
539	FRAGASPP	F	H	Fragaria virginiana Duchesne & F vesca L	Rosaceae
540	FRASSPEC	F	H	Frasera speciosa Dougl	Gentianaceae
541	FRITPUDI	F	H	Fritillaria pudica (Pursh) Spreng	Liliaceae
542	GAILARIS	F	H	Gaillardia aristata Pursh.	Compositae

547	GALIASPE	F	H	Galium asperrium Gray.	Rubiaceae
543	GALIBIFO	F	H	Galium bifolium Wats.	Rubiaceae
545	GALIBORE	F	H	Galium boreale L.	Rubiaceae
551	GALITRI1	F	H	Galium trifidum L	Rubiaceae
544	GALITRI2	F	H	Galium triflorum Michx	Rubiaceae
548	GA-TRIFLO	F		Galium triflorum or G trifidum prob, not pooled	
555	GAURCOCC	F	H	Gaura coccinia (Nutt)Pursh	Onagraceae
546	GAYOHUMI	F	H	Gayophytum humile Juss.	Onagraceae
855	GENTALGI	F	H	Gentiana algida Pall	Gentianaceae
556	GENTAMAR	F	H	Gentiana amarella L	Gentianaceae
552	GENTTENE	F	H	Gentiana tenella Rottb.	Gentianaceae
553	GERARICH	F	H	Geranium richardsonii Fisch&Trautv	Geraniaceae
554	GERAVISC	F	H	Geranium viscosissimum F&M	Geraniaceae
557	GEUMMACR	F	H	Geum macrophyllum Willd.	Rosaceae
857	GEUMROSS	F	H	Geum rossii (R. Br.) Ser	Rosaceae
560	GEUMTRIF	F	H	Geum triflorum Pursh.	Rosaceae
561	GILEAGGR	F	H	Gilia aggregata (Pursh)Spreng	Polemoniaceae
563	GOODOBLO	F	H	Goodyera oblongifolia Raf	Orchidaceae
131	GUTISARO	S	H	Gutierrezia sarothrae (Pursh)Britt&Rusby	Compositae
566	GYMNDRYO	F	H	Gymnocarpium dryopteris (L)Newm	Polypodiaceae
569	HABEDILA	F	H	Habenaria dilitata (Pursh)Hook	Orchidaceae
572	HABEORBI	F	H	Habenaria orbiculata (Pursh)Torr	Orchidaceae
575	HACKFLOR	F	H	Hackelia floribunda (Lehm)Johnst	Boraginaceae
576	HAPLSPIN	F	H	Haplopappus spinulosus (Pursh)DC	Compositae
578	HEDYFLOR	F		Hedysarum occidentale probably	
581	HEDYOCCI	F	H	Hedysarum occidentale Greene	Leguminosae
583	HELIANNU	F	H	Helianthus annus L	Compositae
353	HELIHOOK	G	H	Helictotrichon hookeri (Scrib)Henrard	Gramineae
582	HELIQUIN	F	H	Helianthella quinquenervis (Hook)Gray	Compositae
584	HELIUNIF	F	H	Helianthella uniflora (Nutt)T&G	Compositae
586	HERALANA	F	H	Heracleum lanatum Michx	Umbelliferae
587	HEUCCYLI	F	H	Heuchera cylindrica Dougl	Saxifragaceae
594	HEUCGROS	F	H	Heuchera grossulariifolia	Saxifragaceae
588	HEUCOCCI	F		Heuchera probably, not pooled	
589	HEUCPARV	F	H	Heuchera parvifolia Nutt.	Saxifragaceae
590	HIERALBI	F	H	Hieracium albiflorum Hook	Compositae
591	HIERAURA	F	H	Hieracium aurantiacum L	Compositae
592	HIERCYNO	F	H	Hieracium cynoglossoides Arv.Touv.	Compositae
593	HIERGRAC	F	H	Hieracium gracile Hook	Compositae
596	HIERUMBE	F	H	Hieracium umbellatum L	Compositae
351	HORDBRAC	G	H	Hordeum brachyantherum Nevski	Gramineae
352	HORDJUBA	G	H	Hordeum jubatum L	Gramineae
859	HULSALGI	F	H	Hulsea algida Gray	Compositae
597	HYMEACAU	F	H	Hymenoxys acaulis (Pursh)Parker	Compositae
595	HYMEFIFI	F	H	Hymenopappus filifolius Hook	Compositae
598	HYMERICH	F	H	Hymenoxys richardsonii (Hook)Cockerell	Compositae
602	IRISSMISS	F	H	Iris missouriensis	Iridace
355	JUNCBALT	G	H	Juncus balticus Willd.	Juncaceae
356	JUNCDRUM	G	H	Juncus drummondii E Meyer	Juncaceae
132	JUNICOMM	S	H	Juniperus communis L.	Pinaceae
6	JUNISCOP	T	H	Juniperus scopulorum Sarg.	Pinaceae
399	KOBRMYOS	G	H	Kobresia myosuroides (Vill)Fiori	Cyperaceae
358	KOELCRIS	G	H	Koeleria cristata Pers	Gramineae

601	LACTPULC	F	H	Lactuca pulchella (Pursh)DC	Compositae
610	LAPPREDO	F	H	Lappula redowskii (Hornem)Greene	Boraginaceae
7	LARIOCCI	T	H	Larix occidentalis Nutt.	Pinaceae
604	LATHOCHR	F	H	Lathyrus ochroleucus Hook.	Leguminosae
606	LEPIDENS	F	H	Lepidium densiflorum Schrad.	Cruciferae
613	LESQALPI	F	H	Lesquerella alpina (Nutt) Wats.	Cruciferae
614	LIATPUNC	F	H	Liatris punctata Hook	Compositae
607	LIGUFILI	F	H	Ligusticum filicinum Wats.	Umbelliferae
608	LINAHARK	F	H	Linanthus harknessii (Curran) Greene	Polemoniaceae
135	LINNBORE	S	H	Linnaea borealis L.	Caprifoliaceae
615	LIPERLEW	F	H	Linum perenne lewisii (Pursh)Eat&Wright	Liliaceae
617	LISTCORD	F	H	Listera cordata (L)R.Br	Orchidaceae
619	LITHINCI	F	H	Lithospermum incisum Lehm.	Boraginaceae
620	LITHRUDE	F	H	Lithospermum ruderale Dougl.	Boraginaceae
621	LOMAAMBI	F	H	Lomatium ambiguum (Nutt)Coult&Rose	Umbellifereae
623	LOMADISS	F	H	Lomatium dissectum(Nutt)Math&Const.	Umbellifereae
626	LOMATRIT	F	H	Lomatium triternatum (Pursh)Coult&Ross	Umbellifereae
137	LONIINVO	S	H	Lonicera involucrata (Rich) Banks	Caprifoliaceae
138	LONIUTAH	S	H	Lonicera utahensis Wats.	Caprifoliaceae
629	LUPIARGE	F	H	Lupinus argenteus Pursh.	Leguminosae
632	LUPISERI	F	H	Lupinus sericeus Pursh.	Leguminosae
400	LUZUSPIC	G	H	Luzula spicata (L)DC	Juncaceae
634	LYGOJUNC	F	H	Lygodesmia juncea (Pursh)D Don	Compositae
631	MACHCANE	F	H	Machaeranthera canescens (Pursh)Gray	Compositae
641	MELALINE	F	H	Melampyrum lineare Desr	Scrophulariaceae
361	MELISMIT	G	H	Melica smithii (Porter)Vasey	Gramineae
362	MELISPEC	G	H	Melica spectabilis Scrib	Gramineae
651	MENTDECA	F	H	Mentzelia decapetala (Pursh)Urb&Gilg	Losaceae
141	MENZFERR	S	H	Menziesia ferruginea Smith	Ericaceae
860	MERTALPI	F	H	Mertensia alpina (Torr)G Don	Boraginaceae
648	MERTCILIL	F	H	Mertensia ciliata (Torr G Don	Boraginaceae
649	MERTLANC	F	D	Mertensia lanceolata (Pursh)DC	Boraginaceae
861	MICRCUSP	F	H	Microseris cuspidata(Pursh)Schultz-Bip	Compositae
650	MICRGRAC	F	H	Microsteris gracilis (Hook)Greene	Polemoniaceae
652	MIRANYCT	F	H	Mirabilis nyctaginea (Michx)MacM	Nyctaginaceae
653	MONAFIST	F	H	Monarda fistulosa. L	Labiatae
360	MUHLASPE	G	H	Muhlenbergia asperifolia (N&M)Parodi	Gramineae
660	MUSIDIVA	F	H	Musineon divaricatum(Pursh)Nutt	Umbelliferae
900	CRUC SPP			[Unidentified mustards]	Cruciferae
862	MYOSSYL	F	H	Myosotis sylvatica Hoffm	Boraginaceae
654	OENOHOK	F	H	Oenothera hookeri T&G	Onagraceae
2	OHABIELA	T	H	Abies lasiocarpa (Hook) Nutt.	overhead
102	OHACERGL	S	H	Acer glabrum Torr.	overhead
103	OHALNUIN	S	H	Alnus incana (L.) Moench	overhead
106	OHALNUSI	S	H	Alnus sinuata (Regel.) Rydb.	overhead
109	OHAMELAL	S	H	Amelanchier alnifolia Nutt.	overhead
5	OHBTUPA	T	H	Betula papyrifera Marsh.	overhead
9	OHJUNISC	T	H	Juniperus scopularum Sarg.	overhead
8	OHLARIOC	T	H	Larix occidentalis Nutt.	overhead
11	OHPICESP	T	H	Picea engelmannii Parry	overhead
18	OHPINPON	T	H	Pinus ponderosa Dougl.	overhead
14	OHPINUCO	T	H	Pinus contorta Dougl.	overhead
17	OHPINUMO	T	H	Pinus monticola Dougl.	overhead
23	OHPOPTRI	T	H	Populus tricarpha T&G	overhead
20	OHPOPTR	T	H	Populus tremuloides Michx.	overhead
26	OHPSUME	T	H	Pseudotsuga menziesii (Mirbel)Franco	overhead
169	OHSALISP	S	H	Salix spp	overhead

175	OHSHECAN	S	H	Sheperdia canadensis (L) Nutt	overhead
29	OHTAXUBR	T	H	Taxus brevifolia Nutt.	overhead
32	OHTHUJPL	T	H	Thuja plicata Donn.	overhead
35	OHTSUGHE	T	H	Tsuga heterophylla (Raf.) Sarg.	overhead
656	OPLOHARR	F	H	Oplopanax horridum (Smith) Miq	Araliaceae
142	OPUNPOLY	C	H	Opuntia polyacantha Haw	Cactaceae
657	OROBFASC	F	H	Orobanche fasciculata Nutt	Orobanchaceae
659	ORTHTENU	F	H	Orthocarpus tenuifolius (Pursh) Benth	Scrophulariaceae
363	ORYZHYME	G	H	Oryzopsis hymenoides (R&S) Ricker	Gramineae
662	OSMOCHIL	F	H	Osmorhiza chilensis H&A	Umbelliferae
665	OSMOOCCI	F	H	Osmorhiza occidentalis (Nutt) Torr	Umbelliferae
666	OXALDILL	F	H	Oxalis dillenii Jacq	Oxalidaceae
863	OXYRDIGY	F	H	Oxyria digyna (L) Hill	Polygonaceae
668	OXYTCAMP	F	H	Oxytropis campestris (L) DC	Leguminosae
669	OXYTDEFL	F	H	Oxytropis deflexa (Pall) DC	Leguminosae
671	OXYTSERI	F	H	Oxytropis sericea Nutt.	Leguminosae
674	OXYTSPL	F	H	Oxytropis splendens Dougl.	Leguminosae
144	PACHMYRS	S	H	Pachistima myrsinites (Pursh) Raf.	Celastraceae
384	PANICAPP	G	H	Panicum capillare L	Gramineae
675	PAROCESS	F	H	Paronychia sessiliflora Nutt	Carophyllaceae
677	PEDIBRAC	F	H	Pedicularis bracteosa Benth.	Scrophulariaceae
864	PEDIGROE	F	H	Pedicularis groenlandica Retz	Scrophulariaceae
678	PEDIRACE	F	H	Pedicularis racemosa Dougl.	Scrophulariaceae
680	PENSALBI	F	H	Penstemon albidus Nutt.	Scrophulariaceae
682	PENSCONF	F	H	Penstemon confertus Dougl.	Scrophulariaceae
683	PENSCYAN	F	H	Penstemon cyaneus Pennell	Scrophulariaceae
681	PENSERIA	F	H	Penstemon eriantherus Pursh.	Scrophulariaceae
865	PENSPROC	F	H	Penstemon procerus Dougl	Scrophulariaceae
684	PENS SPP	F	H	PENSETMON SPECIES	
685	PERIBOLA	F	H	Perideridia bolanderi (Gray) Nels & Macbr	Umbelliferae
679	PERIGAIR	F	H	Perideridia gairdneri (H&A) Math	Umbelliferae
826	PHACFRAN	F	H	Phacelia franklinii (R Br) Gray	Hydrophyllaceae
686	PHACHAST	F	H	Phacelia hastata Dougl.	Hydrophyllaceae
688	PHACLIN	F	H	Phacelia linearis (Pursh) Holz	Hydrophyllaceae
366	PHLEALPI	G	H	Phleum alpinum L	Gramineae
687	PHLOHOOD	F	H	Phlox hoodii Rich.	Polemoniaceae
867	PHLOPULV	F	H	Phlox pulvinata (Wherry) Cronquist	Polemoniaceae
45	PHYSMALV	S	H	Physocarpus malvaceus (Greene) Kuntze	Rosaceae
10	PICEASPP	T	H	Picea engelmannii Parry. includes P. columbiana	
13	PINUCONT	T	H	Pinus contorta Dougl.	Pinaceae
16	PINUMONT	T	H	Pinus monticola Dougl.	Pinaceae
690	PLANPATA	F	H	Plantago patagonica Jacq	Plantaginaceae
368	POA ALPI	G	H	Poa alpina L.	Gramineae
870	POA CUSI	G	H	Poa cusickii Vasey	Gramineae
357	POA GRAY	G	H	Poa grayana Vasey	Gramineae
365	POA INTE	G	H	Poa interior Rydb.	Gramineae
871	POA JUNC	G	H	Poa juncifolia Scribn.	Gramineae
371	POA PALU	G	H	Poa palustris L.	Gramineae
386	POA PATT	G	H	Poa pattersonii Vasey ['POAPATER']	Gramineae
372	POA REFL	G	H	Poa reflexa Vasey & Scribn.	Gramineae
387	POA RUPI	G	H	Poa rupicola Nash	Gramineae
POOL?					
359	POA SAND	G	H	Poa sandbergii Vasey	Gramineae
876	POA SECU	G	H	Poa secunda [Pooled to POA SAND, #359, but save f.r.]	
354	POA SCAB	G	H	Poa scabrella (Thurb) Benth. [POACANBY]	Gramineae
369	POA SPP	G	H	POA SPECIES	

706	POLEPULC	F	H	Polemonium pulcherrimum Hook.	Polemoniaceae
868	POLEVISC	F	H	Polemonium viscosissimum Nutt.	Polemoniaceae
869	POLYBIST	F	H	Polygonum bistortoides Pursh	Polygonaceae
694	POLYDOUG	F	H	Polygonum douglasii Greene	Polygonaceae
875	POLYVIVI	F	H	Polygonum viviparum L	Polygonaceae
19	POPUTREM	T	H	Populus tremuloides Michx.	Salicaceae
22	POPUTRIC	T	H	Populus tricocarpa T&G	Salicaceae
695	POTEARGE	F	H	Potentilla argentea L.	Rosaceae
696	POTEDIVE	F	H	Potentilla diversifolia Lehm.	Rosaceae
147	POTEFRUT	S	H	Potentilla fruticosa L.	Rosaceae
697	POTEGLAN	F	H	Potentilla glandulosa Lindl.	Rosaceae
698	POTTEGRAC	F	H	Potentilla gracilis Dougl.	Rosaceae
701	POTEHIPP	F	H	Potentilla hippiana L.	Rosaceae
704	POTENORV	F	H	Potentilla norvegica L.	Rosaceae
705	POTENSPP	F	H	POTENTILLA SPECIES	
150	PRUNVIRG	S	H	Prunus virginiana L.	Rosaceae
25	PSEUMENZ	T	H	Pseudotsuga menziesii (Mirbel) Franco	Pinaceae
708	PSORARGO	F	H	Psoralea argophylla Pursh	Leguminosae
709	PYROASAR	F	H	Pyrola asarifolia Michx	Ericaceae
711	PYROSECU	F	H	Pyrola secunda L	Ericaceae
710	PYROUNIF	F	H	Pyrola uniflora L	Ericaceae
714	RATICOLU	F	H	Ratibida columnifera (Nutt) Woot&Standl.	Compositae
153	RHAMALNI	S	H	Rhamnus alnifolia L'Her	Rhamnaceae
154	RHUSTRIL	S	H	Rhus trilobata Nutt	Anacardiaceae
156	RIBEMONT	S	H	Ribes monteigenum McClatchie	Grossulariaceae
155	RIBESETO	S	H	Ribes setosum Lindl.	Grossulariaceae
158	RIBESSPP	S	H	Ribes spp L.	Grossulariaceae
157	RIBEVISC	S	H	Ribes viscosissimum Pursh	Grossulariaceae
716	RORICURV	F	H	Rorippa curvisiliqua (Hook) Bessey	Cruciferae
159	ROSA SPP	S	H	Rosa woodsii & nutkana ****	Rosaceae
162	RUBUIDAE	S	H	Rubus idaeus L	Rosaceae
165	RUBUPARV	S	H	Rubus parviflorus Nutt	Rosaceae
722	RUMEPAUC	F	H	Rumex paucifolius Nutt.	Polygonaceae
166	SALIARCT	S	H	Salix arctica Pall.	Salicaceae
167	SALINIVA	S	H	Salix nivalis Hook.	Salicaceae
168	SALIXSPP	S	H	Salix species	Salicaceae
171	SAMBRACE	S	H	Sambucus racemosa L	Caprifoliaceae
872	SAXIOREG	F	H	Saxifraga oregana Howell	Saxifragaceae
724	SEDULANC	F	H	Sedum lanceolatum Torr.	Crassulaceae
874	SEDUROSE	F	H	Sedum roseum (L) Scop	Crassulaceae
893	SELADENS	F	H	Selaginella densa Rydb	Selaginellaceae
727	SENECANU	F	H	Senecio canus Hook	Compositae
877	SENECRAS	F	H	Senecio crassulus Gray	Compositae
730	SENEFOET	F	H	Senecio foetidus Howell	Compositae
878	SENEFREM	F	H	Senecio fremontii T&G	Compositae
879	SENEFUSC	F	H	Senecio fuscatus Hayek	Compositae
731	SENEINTE	F	H	Senecio integerrimus Nutt.	Compositae
733	SENESERR	F	H	Senecio serra Hook.	Compositae
732	SENETRIA	F	H	Senecio triangularis Hook	Compositae
174	SHEPCANA	S	H	Shepherdia canadensis (L) Nutt	Elaeagnaceae
880	SIBBPROC	F	H	Sibbaldia procumbens L [SIBAvs SIBB]	Rosaceae
881	SILEACAU	F	H	Silene acaulis L	Caryophyllaceae
735	SILESCOU	F	H	Silene scouleri Hook.	Caryophyllaceae
374	SITAHYST	G	H	Sitaneon hystrix (Nutt) Smith	Gramineae

882	SMELCALY	F	H	Smelowskia calycina (Steph) Camey	Cruciferae
738	SMILRACE	F	H	Smilacina racemosa (L) Desf	Liliaceae
739	SMILSTEL	F	H	Smilacina stellata (L) Desf	Liliaceae
740	SOLICANA	F	H	Solidago canadensis L.	Compositae
741	SOLIGIGA	F	H	Solidago gigantea Ait	Compositae
742	SOLIMISS	F	H	Solidago missouriensis Nutt	Compositae
743	SOLIMULT	F	H	Solidago multiradiata Ait.	Compositae
745	SOLISPAT	F	H	Solidago spathulata DC	Compositae
180	SORBSCOP	S	H	Sorbus scopulina Greene	Rosaceae
747	SPHACOC	F	H	Sphaeralcea coccinea (Pursh) Rydb	Malvaceae
177	SPIRBETU	S	H	Spirea betulifolia Pall.	Rosaceae
385	SPORCRYP	G	H	Sporobolus cryptandrus (Torr) Torr	Gramineae
884	SPRAUMBE	F	H	Spraguea umbellata Torr	Caryophyllaceae
750	STELCALY	F	H	Stellaria calycantha (Ledeb) Bong.	Caryophyllaceae
POOL					
885	STELOALT	F	H	Stellaria longipipes Goldie var altocaulis	Caryophyll
886	STELOMON	F	H	S monantha [Pool to STELOALT #885, but save f.r.]	
827	STEPRUNC	F	H	Stephanomeria runcinata Nutt	Compositae
375	STIPCOMA	G	H	Stipa comata Trin& Rupr	Gramineae
376	STIPLETT	G	H	Stipa lettermanii Vasey	Gramineae
377	STIPOCCI	G	H	Stipa occidentalis Thurb	Gramineae
381	STIPVIRI	G	H	Stipa viridula Trin	Gramineae
748	STREAMPL	F	H	Streptopus amplexifolius (L) DC	Liliaceae
179	SYMPALBU	S	H	Symphoricarpos albus (L) Blake	Caprifoliaceae
887	TARALYRA	F	H	Taraxacum lyratum (Ledeb) DC	Compositae
28	TAXUBREV	T	H	Taxus brevifolia Nutt	Taxaceae
182	TETRCANE	S	H	Tetrademia canescens DC	Compositae
754	THALOCCI	F	H	Thalictrum occidentale Gray	Ranunculaceae
31	THUJPLIC	T	H	Thuja plicata Donn	Cupressaceae
757	TIARTRIF	F	H	Tiarella trifoliata L	Saxifragaceae
758	TOWNHOOK	F	H	Townsendia hookeri Beaman	Compositae
761	TRAGPRAT	F	H	Tragopogon pratensis L	Compositae
767	TRIFLONG	F	H	Trifolium longipes Nutt.	Leguminosae
888	TRIFNANU	F	H	Trifolium nanum Torr.	Leguminosae
889	TRIFPARR	F	H	Trifolium parryi Gray.	Leguminosae
894	TRISPARR	G		[Pooled with T parryi #889, but save for record]	
778	TRILOVAT	F	H	Trillium ovatum Pursh	Liliaceae
378	TRISCANE	G	H	Trisetum canescens Buckl	Gramineae
379	TRISSPIC	G	H	Trisetum spicatum (L) Richter	Gramineae
34	TSUGHETE	T	H	Tsuga heterophylla (Raf) Sarg	Pinaceae
776	URTIDIOI	F	H	Urtica dioica L	Urticaceae
183	VACCGLOB	S	H	Vaccinium globulare Rydb	Ericaceae
186	VACCMYRT	S	H	Vaccinium myrtillus L	Ericaceae
189	VACCSCOP	S	H	Vaccinium scoparium Leiberg	Ericaceae
780	VALEDIOI	F	H	Valeriana dioica L	Valerianaceae
779	VALEOCCI	F	H	Valeriana occidentalis Heller	Valerianaceae
781	VALESITC	F	H	Valeriana sitchensis Bong.	Valerianaceae

784	VERACALI	F	H	Veratrum californicum Durand	Liliaceae
788	VERBBRAC	F	H	Verbena bracteata Lag and Rodr	Boraginaceae
793	VEROSERP	F	H	Veronica serpyllifolia L	Scrophulariaceae
890	VEROWORM	F	H	Veronica worms kjoldii Roem&Schult	Scrophulariaceae
795	VICIAMER	F	H	Vicia americana Muhl	Leguminosae
796	VIGUMULT	F	H	Viguiera multiflora (Nutt)Blake	Compositae
797	VIOLADUN	F	H	Viola adunca SM.	Violaceae
799	VIOLCANA	F	H	Viola canadensis L	Violaceae
800	VIOLNUTT	F	H	Viola nuttallii Pursh	Violaceae
802	VIOLORBI	F	H	Viola orbiculata Geyer	Violaceae
805	XEROTENA	F	H	Xerophyllum tenax (Pursh)Nutt	Liliaceae
190	YUCCGLAU	S	H	Yucca glauca Nutt	Liliaceae
808	ZIGAELEG	F	H	Zigadenus elegans Pursh	Liliaceae
895	LITTER				
896	MOS&LICH				
897	ROCK				
898	SOIL				
899	UNKNOWN				

Table 2

Q500 / B302

These herbs were sorted and removed to shorten the table.

LYGOJUNC	F	25.20. 0.	.	.	.	.	.	.	.	.	.	.	.
CREPACUM	F	25.30. 0.	.	.	.	.	.	.	.	.	.	.	.
RATICOLU	F	25.10. 0.	.	.	.	.	.	.	.	.	.	.	.
ERIGPUMI	F	25.60. 0.	.	.	.	.	.	.	.	.	.	.	.
HYMERICH	F	25. 7. 0.	.	.	.	25. 0. 0.	.	.	.	.	.	.	.
ASTRPURS	F	13.30. 0.	.	.	.	25.30. 0.	.	.	.	.	.	.	.
ARTEDRAC	F	25.20. 0.	.	.	.	13. 0. 0.	.	.	.	.	.	.	.
MUSIDIVA	F	25. 0. 0.	.	.	.	13.10. 0.	.	.	.	.	.	.	.
ERYSASPE	F	25.10. 0.	.	.	.	13.10. 0.	.	.	.	.	.	.	.
ARENCONG	F	25.30. 0.	.	.	.	13.50. 0.	13.10. 0.	.	.	.	.	.	.
ACHIMILL	F	13.13. 0.	.	.	.	13.27. 0.	.	.	.	13.27. 0.	.	.	.
CLEMLIGU	F	.	.	.	.	25.50. 5.	13.10. 1.	.	.	.	.	.	.
ARTELUDO	F	.	.	.	.	13. 0. 0.	25.20. 1.	13. 7. 0.	.	.	.	.	.
LAPPREDO	F	.	.	.	.	13. 0. 0.	13.10. 0.	13.10. 0.	.	.	.	.	.

Replns w/
Table 4 from field

why?

Table 3. Plants commonly establishing in the FESC /FEID environment.
species

		climax			cleared			road cut			ditch			shoulder		
		cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv	cn	fq	cv
		10			0			10			10			10		
Native grasses.																
FESTIDAH	G	99.96	14.		.	.	.	90.58	3.		50.44	3.		20.8	0.	
FESTSCAB	G	99.98	18.		.	.	.	60.20	0.		40.12	0.		10.4	0.	
AGROSPIC	G	80.60	3.		.	.	.	50.36	2.		40.22	1.		.	.	.
CAREXSPP	G	60.46	1.		.	.	.	40.23	0.		10.3	0.		.	.	.
KOELCRIS	G	70.48	1.		.	.	.	40.14	0.		60.28	0.		40.10	0.	
AGRCAAND	G	50.26	1.		.	.	.	30.23	1.		50.34	1.		50.34	0.	
DANTINTE	G	40.45	0.		.	.	.	.	.		.	.		.	.	.
AGRCAMAJ	G	.	.		.	.	.	.	.		10.20	0.		20.20	0.	
Native forbs.																
ACHIMILL	F	90.72	1.		.	.	.	90.64	1.		99.76	1.		90.58	0.	
ANEMMULT	F	70.36	1.		.	.	.	90.60	1.		70.40	1.		.	.	.
GAILARIS	F	80.36	0.		.	.	.	90.40	1.		40.20	0.		10.2	0.	
SOLISPAT	F	70.32	1.		.	.	.	90.54	3.		70.50	2.		50.22	0.	
LUPISERI	F	90.78	6.		.	.	.	99.78	5.		60.52	2.		10.2	0.	
GALIBORE	F	99.86	2.		.	.	.	80.54	1.		70.38	1.		.	.	.
ASTEMODE	F	30.13	0.		.	.	.	60.28	0.		60.48	1.		40.23	0.	
CAMPROTU	F	50.34	0.		.	.	.	60.29	0.		30.20	0.		.	.	.
SENECANU	F	50.40	0.		.	.	.	60.46	1.		40.43	1.		.	.	.
FRAGASPP	F	30.13	0.		.	.	.	60.30	2.		30.23	1.		.	.	.
MONAFIST	F	10.4	0.		.	.	.	50.56	2.		50.72	3.		10.4	0.	
OXYTSPL	F	30.20	0.		.	.	.	50.17	0.		70.43	1.		10.3	0.	
PENSCONF	F	60.29	1.		.	.	.	50.40	0.		30.9	0.		10.3	0.	
ERIGCOMP	F	10.4	0.		.	.	.	40.24	0.		.	.		30.24	0.	
ANTEROSE	F	80.30	0.		.	.	.	40.10	0.		30.14	0.		.	.	.
GERAVISC	F	20.25	0.		.	.	.	40.25	0.		40.40	3.		10.5	0.	
POTTEGRAC	F	40.16	0.		.	.	.	40.14	0.		50.24	1.		60.22	1.	
SEDULANC	F	30.11	0.		.	.	.	40.40	1.		50.31	0.		.	.	.
BUPLAMER	F	30.23	0.		.	.	.	30.10	0.		30.13	0.		.	.	.
LITHRUDE	F	60.31	1.		.	.	.	30.6	0.		20.11	1.		.	.	.
ASTECAMP	F	20.27	0.		.	.	.	30.27	0.		10.13	0.		.	.	.
ERIOUMBE	F	60.67	3.		.	.	.	30.20	0.		.	.		.	.	.
HEDYOCCE	F	10.7	0.		.	.	.	20.27	3.		30.53	1.		10.7	0.	
LOMATRIT	F	30.67	1.		.	.	.	20.20	1.		10.0	0.		.	.	.
GEUMTRIF	F	50.60	3.		.	.	.	20.8	0.		.	.		.	.	.
PHLOHOOD	F	20.30	1.		.	.	.	20.50	0.		10.20	0.		.	.	.
SOLICANA	F	.	.		.	.	.	20.15	0.		30.15	0.		.	.	.
CHRYVILL	F	30.10	0.		.	.	.	10.3	0.		30.17	0.		20.7	0.	
ARTELUDO	F	20.13	0.		.	.	.	20.33	1		20.20	1		10.7	0.	
AGOSGLAU	F	50.32	1.		.	.	.	.	.		20.8	0.		.	.	.
CIRSHOOK	F	.	.		.	.	.	.	.		30.27	0.		.	.	.
Native shrubs.																
ROSA SPP	S	99.46	1.		.	.	.	80.56	3.		40.24	3.		20.2	0.	
SYMPALBA	S	10.13	0.		.	.	.	30.27	0.		.	.		.	.	.
POTEFRUT	S	60.34	2.		.	.	.	30.11	0.		50.20	1.		10.3	0.	
ARCTUVAU	S	50.52	7.		.	.	.	30.28	7.		10.12	1.		.	.	.
AMELALNI	S	50.48	1.		.	.	.	10.12	1.		.	.		.	.	.

Table 3, continued.

Exotic grasses.														
PHLEPRAT	*	G	90.46.	1.	.	.	.	99.82.	2.	90.78.	2.	80.70.	1.	
POAPRATE	*	G	60.27.	1.	.	.	.	80.76.	4.	70.40.	2.	.	.	.
POACOMPR	*	G	10.6.	0.	.	.	.	60.30.	2.	80.34.	1.	90.68.	3.	
BROMINER	*	G	.	.	.	.	.	50.30.	3.	60.27.	2.	.	.	.
AGROALBA	*	G	.	.	.	.	.	.	.	10.5.	0.	30.20.	0.	
Exotic forbs.														
CENTMACU	*	F	10.4.	0.	.	.	.	70.54.	7.	90.60.	17.	99.84.	9.	
MELIOFFI	*	F	10.7.	0.	.	.	.	60.31.	0.	90.58.	1.	70.36.	0.	
CERAVULG	*	F	40.20.	0.	.	.	.	40.23.	0.	20.6.	0.	20.6.	0.	
TRIFPROC	*	F	10.9.	0.	.	.	.	40.29.	0.	70.77.	3.	60.31.	0.	
TRAGDUBI	*	F	20.8.	0.	.	.	.	40.24.	0.	30.20.	0.	10.8.	0.	
TARAOFFI	*	F	.	.	.	.	.	30.9.	0.	80.38.	1.	90.58.	0.	
CIRSARVE	*	F	30.33.	0.	.	.	.	30.60.	2.	10.7.	0.	.	.	.
ALYSALYS	*	F	10.3.	0.	.	.	.	10.7.	0.	50.40.	0.	40.27.	0.	
PLANMAJO	*	F	.	.	.	.	.	.	.	10.5.	0.	30.30.	0.	
Ground cover.														
MOS&LICH			90.0.	9.	.	.	.	50.0.	8.	70.0.	3.	.	.	.
LITTER			99.0.	19.	.	.	.	99.0.	17.	99.0.	12.	40.0.	1.	.
SOIL			70.0.	3.	.	.	.	90.0.	13.	60.0.	7.	20.0.	0.	0.
ROCK			60.0.	2.	.	.	.	80.0.	11.	99.0.	22.	99.0.	83.	.

Table 7
Pence / Gyal

The following species were removed, after sorting, as too scarce.

CAREXSPP

AQUIFLAV	F	10.20. 0.	25.20. 1.	20.10. 0.	. . .	. . .
HIERCYNO	F	. . .	25.10. 0.	20.13. 0.	10. 7. 0.	. . .
ARABISPP	F	10.10. 0.	25.20. 0.	20.20. 0.	. . .	. . .
CASTMINI	F	20.20. 0.	25.30. 0.	10. 0. 0.	. . .	. . .
ALLICERN	F	20. 7. 0.	25. 0. 0.	10.13. 0.	. . .	. . .
OSMOCHIL	F	20. 4. 0.	25.10. 0.	10. 8. 0.	10. 8. 0.	10. 4. 0.
PERIGAIR	F	20. 5. 0.	25.10. 0.	10. 5. 0.	20. 0. 0.	. . .
ASTEFOLI	F	10.50. 5.	25.99. 3.	10.20. 0.	10.50. 4.	10.50. 2.
ASTEINTE	F	10.20. 0.	25.40. 1.	10.20. 1.	. . .	. . .
ANTERACE	F	20.60. 3.	. . .	10.10. 1.	. . .	. . .
FRITPUDI	F	10. 7. 0.	25.10. 0.	10. 0. 0.	. . .	. . .
GAILARIS	F	. . .	25.20. 0.	10. 0. 0.	. . .	. . .
ARENLATE	F	20.33. 0.	25. 0. 0.	10.13. 0.	20.20. 0.	20.13. 0.
MONAFIST	F	. . .	25. 0. 0.	. . .	. . .	. . .
ARTELUDO	F	. . .	25.10. 0.	. . .	10.30. 1.	20. 0. 0.
CLEMHIRS	F	. . .	25. 0. 0.	. . .	. . .	. . .
CORYAURE	F	. . .	25.20. 0.	. . .	10.10. 0.	. . .
PYROSECU	F	10.40. 0.	25.60. 0.	. . .	. . .	. . .
SENESERA	F	. . .	. . .	. . .	30.53. 0.	10. 7. 0.
ARABDRUM	F	. . .	25.40. 0.	. . .	. . .	10.10. 0.
GEUMTRIF	F	10.13. 0.	25. 0. 0.	. . .	10. 7. 0.	10. 7. 0.
HABEDILA	F	10.20. 0.	25.20. 0.	. . .	. . .	. . .
HELIANNU	F	. . .	25.10. 0.	. . .	10.10. 0.	10. 0. 0.
VALESITC	F	. . .	25. 0. 0.	. . .	. . .	. . .
HEUCPARR	F	10.20. 1.	25.40. 1.	. . .	. . .	. . .
HIERALBI	F	10.80. 1.	25.80. 1.	. . .	. . .	. . .

Table 2
 Punc/plms

Plants eliminated as 'too rare', some are interesting.

KOELCRIS	G	.	.	.	25.40.	0.	.	.	.	.	.	.	.	.	.	.
CARERETR	G	.	.	.	25.20.	0.	.	.	.	.	.	.	.	.	.	.
BUPLAMER	F	17.40.	0.	25.50.	2.	17. 0.	0.	.	.	.	.	.	.	.	.	.
POTEGLAN	F	17.10.	0.	25.20.	0.	.	.	.	.	.	.	.	.	.	.	.
LITHINCI	F	.	.	.	25.20.	0.	17.10.	0.	.	.	.	.	.	.	.	.
ARENOBTU	F	.	.	.	25.20.	0.	17.20.	0.	17.20.	0.	.	.	.	.	.	.
ANEMMULT	F	.	.	.	25.30.	0.	17.20.	0.	17. 7.	0.	.	.	.	.	.	.
SEDULANC	F	.	.	.	25.40.	0.	17.50.	0.	.	.	.	17.10.	0.	.	.	.
LIPERLEW	F	.	.	.	25.40.	0.	.	.	.	.	.	.	.	.	.	.
CHRYVILL	F	.	.	.	25.20.	1.	.	.	.	.	.	.	.	.	.	.
RATICOLU	F	.	.	.	25. 0.	0.	.	.	.	.	.	.	.	.	.	.
AGASURTI	F	.	.	.	25.80.	3.	.	.	.	.	.	.	.	.	.	.
ERIGCAES	F	.	.	.	25.80.	12.	.	.	.	.	.	.	.	.	.	.
GALIASPE	F	.	.	.	25.20.	0.	.	.	.	.	.	.	.	.	.	.
HEUCGRO	F	.	.	.	25.20.	0.	.	.	.	.	.	.	.	.	.	.
VICIAMER	F	.	.	.	25.20.	0.	.	.	.	.	.	.	.	.	.	.
VIOLNUTT	F	.	.	.	25.60.	0.	.	.	.	.	.	.	.	.	.	.
LACTPULC	F	.	.	.	25.20.	0.	.	.	.	.	.	.	.	.	.	.
ARENCONG	F	.	.	.	25.99.	4.	.	.	.	.	.	.	.	.	.	.
BERTINCA *	F	.	.	.	25.40.	0.	.	.	.	.	.	17.40.	0.	.	.	.