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A STUDY OF PLANT MATERIALS
SUITABLE FOR USE IN
WATERSHED AND WILDLIFE HABITAT IMPROVEMENT
IN THE
TRINITY RIVER WATERSHED, CALIFORNIA



United States
Department of
Agriculture

Forest
Service

Six Rivers
National
Forest

507 F Street
Eureka, CA 95501

Reply To: 2500

Date: April 2, 1990

To: Cooperators

Dear Cooperator:

Here is a copy of "A Study of Plant Materials Suitable for Use in Watershed and Wildlife Habitat Improvement in the Trinity River Watershed, California" that we have just completed.

Revegetation is nature's most important restoration process. We can intervene in this process to accelerate it and influence its outcome. We can be most effective when we have an understanding of the natural systems with which and upon which it operates.

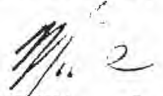
To achieve long-term restoration, it is crucial that we make appropriate decisions on species selection and culture; but the necessary considerations are complex.

To help with this, we've compiled a lot of information here. Of course it is far from comprehensive. The report is in a 3-ring binder so that it can be readily amended to make it more useful.

Please share your insights and experiences in revegetation with us, and with the Field Office of the US Fish and Wildlife Service in Weaverville, so we can build our collective knowledge further.

President Bush has called for the planting and maintenance of a billion trees annually. Let's get started.

Sincerely,


MICHAEL J. FURNISS
Hydrologist

enclosure

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**A STUDY OF PLANT MATERIALS
SUITABLE FOR USE IN
WATERSHED AND WILDLIFE HABITAT IMPROVEMENT
IN THE
TRINITY RIVER WATERSHED, CALIFORNIA**

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Michael J. Furniss

and

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USDA Forest Service
Six Rivers National Forest
507 F Street
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March, 1990

ABSTRACT

This study compiles information relevant to the revegetation and restoration of landslides, riparian areas and eroded or derelict land located within the Trinity River watershed, California. Plant materials are listed with consideration for species selection, stock development and the use of native plant species for watershed restoration and fish and wildlife habitat improvement. Plant species are grouped according to their environmental preferences using moisture and temperature indexes along with information on each species range in elevation, geology, and plant community. A plant selection key is provided to aid in the selection of species that are appropriate for the revegetation of various habitats. Information is also given on species cultural requirements and suitability for erosion control. Government and private sources of plant materials and other related supplies and services are provided along with information that will assist in the planning of large scale revegetation projects. The reader should note that, due to the quantity of data available, this report may not be complete in certain aspects and was designed to be updated periodically as new information and materials become available. The purpose of the report is to supply information to persons interested in watershed and wildlife habitat improvement and does not intend to endorse any specific methods, philosophy or vendors.

ACKNOWLEDGEMENTS

We gratefully acknowledge the Trinity River Task Force, the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service for their support of this project and for the provision of funds which made it possible. We would also like to thank the many individuals and organizations that provided information or assisted in obtaining information necessary for the completion of this project. We especially thank Jeff Mattison, David Solis, Bill Brock and Tom Jopson for their valuable contributions and advice. Special thanks to George Albert for the cover illustration.

TABLE OF CONTENTS

Page	
ii	ABSTRACT
iii	ACKNOWLEDGEMENTS
vii	LIST OF TABLES
ix	LIST OF FIGURES
1	INTRODUCTION
2	STUDY AREA
2	LOCATION
2	TOPOGRAPHY
4	CLIMATE
4	GEOLOGY
5	Ultra Basic (UB) Rock Type
5	Basic Igneous (BI) Rock Type
5	Mixed Metamorphic and Non-Metamorphic (MX) Rock Type
6	South Fork Mountain Schist (MS) Rock Type
6	Granitic (GR) Rock Type
6	Quaternary (Q) Rock Type
6	SOILS
6	VEGETATION
7	Red Fir (RF) Forest Community
8	White Fir (WF) Forest Community
8	Mixed Fir (MF) Forest Community
8	Mixed Pine (MP) Forest Community
9	Jeffrey Pine (JP) Forest Community
9	Douglas-fir - Pine (DP) Forest Community
10	Douglas-fir (DF) Forest Community
10	Oregon White (QG) Oak Community
10	California Black (QK) Oak Community
11	Tanoak - Madrone (TM) Forest Community
11	Oak Chaparral (QC) Community
11	Mixed Chaparral (MC) Community
11	Annual Grassland (GA) and Perennial Grassland (GP) Community

TABLE OF CONTENTS (continued)

Page	
12	PLANT SPECIES SELECTION
13	ENVIRONMENTAL SUITABILITY
14	DESCRIPTION OF PLANT SPECIES SELECTION KEY
14	Moisture Groups
15	Temperature Groups
17	PLANT SPECIES SELECTION KEY
36	PLANT SPECIES SUITABILITY AND CULTURE
36	SUITABILITY
38	LAWS AND REGULATIONS
39	FEDERAL LANDS
43	STATE AND PRIVATE LANDS
45	CULTURE
74	WILDLIFE HABITAT ENHANCEMENT
95	AVAILABILITY OF PLANT MATERIALS
95	PLANT MATERIAL STOCK TYPES
97	DEVELOPMENT OF LOCAL PLANT STOCK
127	PROJECT PLANNING
130	DISCUSSION
131	BIBLIOGRAPHY
148	APPENDIXES
148	A. A supplemental list of agencies, foundations, societies and private organizations that can provide information on watershed and wildlife habitat improvement of areas located within the Trinity River watershed, California. (‡ - Trinity River Task Force member).
154	B. List of plant species which are suitable for watershed and wildlife habitat improvement for areas located within the Trinity River watershed, California.
161	C. List of noxious weeds for Humboldt County and Trinity County, California.

TABLE OF CONTENTS (continued)

Page

APPENDIXES (continued)

- | | | |
|-----|----|---|
| 162 | D. | List of plant species which are specifically NOT recommended for watershed and wildlife habitat improvement for areas located within the Trinity River watershed, California. |
| 163 | E. | Sample watershed revegetation inventory data sheet. |

LIST OF TABLES

Table	Page	
1.	<p>Mean annual temperature and precipitation data for weather stations located in the Trinity River watershed, California. Temperature is in °F. and precipitation is in inches. Weitchpec data follows Elford (1964). Other data follows USCOMM National Oceanic and Atmospheric Administration (19??). Elevations are Big Bar 1,440 ft., Hayfork 2,300 ft., Forest Glen 2,340 ft., Weaverville 2,162 ft. and Weitchpec 1,700 ft.</p>	4.
2.	<p>List of the four vegetation formations and fourteen vegetation communities that occur in the Trinity River watershed, California. Classification follows CALVEG (Parker and Matyas 1979) as adapted by Toth (1982).</p>	7.
3.	<p>Moisture groups used in the plant selection key. Groups are based on topographic position, aspect and the moisture index developed by Waring and Major (1964).</p>	15.
4.	<p>Temperature group characteristics used in the plant selection key. Temperature regimes follow definitions given in the USDA Soil Mngmt. Support Serv. (1985). Temperature index follows definitions given in Waring and Major (1964).</p>	15.
5.	<p>Species suitable for revegetating sites located NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in tables 3 and 4. (* = Nitrogen fixer, B = Biennial, A = Annual).</p>	19.
6.	<p>Species suitable for revegetating sites located on ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in tables 3 and 4. (* = Nitrogen fixer, B = Biennial, A = Annual).</p>	32.
7.	<p>Species list with information on suitability and cultural requirements. Suitability summarizes information on efficacy and use of each species for revegetation. Culture includes information on seed treatment, seed stratification, propagation, flowering time and fruiting time. (* = Nitrogen fixer, B = Biennial, A = Annual, ‡ = Good bet as plug or bare root, † = Good bet as seed).</p>	48.
8.	<p>Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on the percent of each groups annual diet and the number of wildlife species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).</p>	76.

LIST OF TABLES (continued)

Table		Page
9.	Species list with information on sources. List includes information on percent success (SUC) nurseries have experienced growing each species and potential (POT) for using each species in revegetation projects. Potential (POT) was rated: 1 = Good, 2 = Moderate, 3 = Marginal, 4 = Bad. Source abbreviations are listed in Table 10. (* = Nitrogen fixer, B = Biennial, A = Annual).	98.
10.	List of private and government sources which may provide plant materials, supplies and services necessary for revegetation projects located within the Trinity River watershed, California.	116.

LIST OF FIGURES

Figure		Page
1.	Study area location map. Trinity River watershed, California.	3.
2.	Seed collection zones for California. Map taken from Seeds of Woody Plants of the United States (USDA Forest Service 1974).	44.
3.	Simplified project scheduling diagram. Depicts steps and time required for the successful planning and implementation of a revegetation project. /1 = Forest Service timeframe, 2/ = Timeframe varies with species, 3/ = Add one year for 2-0 stock.	128.
4.	Trinity River watershed vegetation community map.	BACK
5.	Trinity River watershed generalized geology map.	BACK
6.	Trinity River watershed mean annual precipitation and potential evapotranspiration isohyetal map.	BACK
7.	Trinity River watershed 1:500,000 scale USGS topographic basemap.	BACK

ECOSYSTEM REHABILITATION

"What better investment of funds (ie. labor and materials) is there than ecosystem rehabilitation? Establishing forests, stopping erosion, building up biomass and soil fertility, improving grasslands, restoring the productivity of the land and its biosystems. This is creating true riches."

- Michael Pilarski -

PLANTING AFTER EARTHWORKS

"Every time we move soil, we should be ready to follow straight on with planting or seeding. That is, we need to have planned the planting and stabilization of the area, and to have the plant materials on standby to implement our plan as soon after disturbance as possible."

- Bill Mollison -

INTRODUCTION

The utilization of resources in combination with natural processes have resulted in a significant degradation of the landscape and loss of habitat for fish and wildlife in the Trinity River watershed located in northwest California. Resource utilization has included the construction of two reservoirs and subsequent water diversion in the upper watershed resulting in reduced flows of the Trinity River, increased sedimentation and a significant loss of anadromous fish habitat. This has resulted in a drastic reduction in fish populations and a decline in the scenic and recreational qualities of the Trinity River. The loss of land areas inundated by the reservoirs has also resulted in substantial reductions in the populations of deer and other wildlife historically found in the Trinity River watershed. Other activities that have had substantial negative effects on fish and wildlife resources in the Trinity River watershed include road building, timber harvesting, mining, fishing and hunting.

In response to the decline of fish and wildlife populations in the Trinity River watershed, the United States legislature enacted the Trinity River Basin Fish and Wildlife Management Program Act, which was signed into law by the President in October of 1984 (Public Law 98-541). The purpose of the Act is to make funds available for the development of a Fish and Wildlife Management Program whose goals are to restore fish and wildlife populations in the Trinity River watershed to pre-reservoir levels (Trinity River Task Force 1989). The Act also provides for the creation of a 14-member interagency group called the Trinity River Basin Fish and Wildlife Task Force (Appendix A) whose purpose is to assist the Secretary of Interior in the formulation and implementation of the Management Program.

The emphasis of the Management Program is the restoration of fish and wildlife populations in the watershed. Since evidence has shown that declines in fish and wildlife populations have occurred due to increased sedimentation or degradation and loss of habitat (USDI Fish and Wildlife Service 1983, Knott 1974), a primary goal of the program will be the rehabilitation of habitat through the reestablishment of suitable vegetation along streamsides, on landslides, on derelict and eroding land, and on areas disturbed by other restoration work. In order to accomplish this goal, agencies within the Task Force will be procuring large quantities of plant materials and seed stock and will require information on plant species availability and suitability.

This study was initiated in anticipation of the need for information on the availability and suitability of plant stock for revegetation projects within the Trinity River watershed. Some suitable plant materials are available but these generally exist in limited quantities or consist of non-adapted species or species not appropriate for erosion control work. In addition, information on species availability and suitability is generally scarce or hard to find. The objectives of the study were to:

- Identify plant species that are suitable and appropriate for revegetating landslides, eroding and derelict land, disturbed areas and riparian areas that occur in the Trinity River watershed.

- Conduct a review of the existing knowledge and literature relevant to plant materials and revegetation techniques suitable for projects within the Trinity River watershed. Survey individuals and agencies with specialized knowledge of the relevant plant materials and cultural techniques including private and government nursery managers, extension specialists, government specialists and private contractors.
- Evaluate and group each plant species according to ecosystem considerations including climate, plant community, geology, soil, and ecological preference. Evaluate and summarize each species according to invasiveness/naturalness, efficacy in erosion control and soil-building, suitability for wildlife habitat improvement, seed availability/ collection techniques, ease of culture, special cultural requirements, field planting considerations, production success and time.
- Outline available methods for agencies within the Trinity River Task Force to obtain plant materials for revegetation work.

STUDY AREA

LOCATION

The Trinity River watershed encompasses an approximately 2,970 square mile area located in northwest California (Figure 1). The north, east, south and southwest watershed boundary line is coincident with the Trinity County boundary line and encompasses the major portion of the watershed. The remaining northwest portion of the watershed lies within eastern Humboldt County.

The main stem of the Trinity River originates in the Scott Mountains located in the northeast portion of the watershed and flows east approximately 150 miles to its confluence with the Klamath River near the town of Weitchpec. The South Fork of the Trinity River has its origins in the north Yolla Bolly Mountains located in the southern portion of the watershed and flows north approximately 96 miles to its confluence with the main stem of the Trinity River near the town of Salyer. The North Fork of the Trinity River originates in the Trinity Alps Wilderness Area and joins the main stem at Helena.

TOPOGRAPHY

The Trinity River watershed is characterized by steep mountainous terrain with elevations ranging from 318 feet at Weitchpec to approximately 9,000 feet in the Trinity Alps. The watershed is roughly triangular in shape and is encompassed by tall mountain ranges including the Trinity Alps, Salmon Mountains and Scott Mountains on the north, South Fork Mountain on the west and the Trinity Mountains on the east.

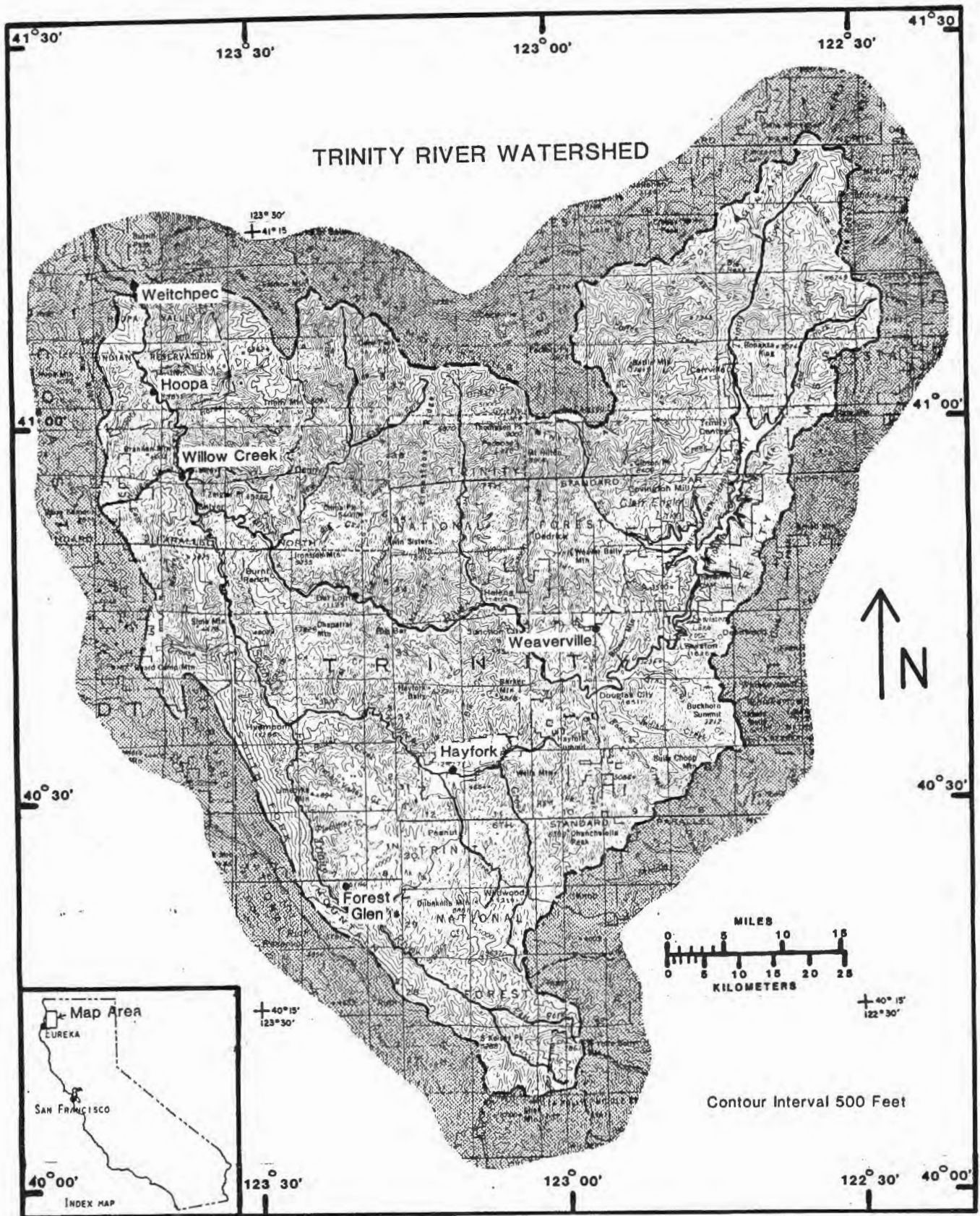


Figure 1. Study area location map. Trinity River watershed, California.

CLIMATE

The Trinity River watershed lies within a region of cool, moist winters and hot, dry summers. Temperature and precipitation vary considerably throughout the watershed depending on elevation, aspect, topography and distance from the ocean. In general, average temperature increases with distance from the ocean and decreases with elevation. Conversely, precipitation decreases with distance from the ocean and increases with elevation. Table 1 lists mean temperature and precipitation data for various weather stations located in the watershed.

Table 1. Mean annual temperature and precipitation data for weather stations located in the Trinity River watershed, California. Temperature is in °F. and precipitation is in inches. Weitchpec data follows Elford (1964). Other data follows USCOMM National Oceanic and Atmospheric Administration (19??). Elevations are Big Bar 1,440 ft., Hayfork 2,300 ft., Forest Glen 2,340 ft., Weaverville 2,162 ft. and Weitchpec 1,700 ft.,

STATION/ DATA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Big Bar/ Precipitation	5.7	6.2	3.4	2.4	1.0	0.9	0.2	0.1	0.9	1.6	5.2	6.1	33.6
Forest Glen/ Temperature Precipitation	35.5 12.0	39.5 10.6	43.8 7.8	49.6 3.8	55.7 2.6	61.3 0.9	68.4 0.3	66.5 0.1	62.3 0.8	52.4 4.0	42.3 6.6	37.0 11.6	51.2 60.0
Hayfork/ Precipitation	5.1	5.6	2.9	1.8	0.8	0.5	0.1	0.1	0.7	1.2	4.0	6.0	28.8
Weitchpec/ Temperature Precipitation	38.0 16.3	41.8 10.5	46.6 5.8	50.1 5.0	55.2 3.8	60.0 1.4	67.6 1.0	68.0 0.1	62.0 2.1	55.2 3.8	45.2 12.8	39.0 11.3	52.4 73.4
Weaverville/ Temperature Precipitation	36.8 7.3	40.8 5.7	45.0 4.2	51.2 2.4	57.9 1.6	64.3 0.9	71.4 0.2	69.4 0.2	64.1 0.6	54.5 2.5	44.3 4.3	38.4 7.0	53.2 36.9

GEOLOGY

The Trinity River watershed contains elements of several geologic provinces, subprovinces, formations and other geologic types which combine to form a complex geologic matrix. For the purposes of this report, geologic types have been grouped into six basic rock types known to have an influence on sediment production and vegetation distribution in the area. The descriptions of these rock types correspond to the generalized geology map included with this report (Figure 5). A more detailed description of the geology of the watershed may be found in several publications including the Main Stem Trinity River Watershed Erosion Investigation (Calif. Dept. of Water Res. 1980), South Fork Trinity River Watershed Erosion Investigation (Calif. Dept. of Water Res. 1979), Geologic Resources Inventory, Six Rivers National Forest (Applied Earth Sciences 1980) and the

Geology of the Willow Creek 15 minute Quadrangle, Humboldt and Trinity Counties, California (Young 1978).

In general, there appears to be a high correspondence between the amount of sediment transported by streams and the underlying rock types (Applied Earth Science 1980). In steep terrain, active slides, earthflows and barren [natural or man-caused] areas are the major sources of sediment (Knott 1974, Applied Earth Science 1980). Granitic rocks in the watershed develop soils that are extremely surface erodible and sensitive to disturbance (USDA Soil Conservation Service 1981). Most slides predominantly occur on rock types strong enough to maintain steep slopes while earthflows are confined to surficial deposits on slopes or highly sheared and weak rock types (Applied Earth Science 1980).

Ultra Basic (UB) Rock Type

The ultra basic (UB) rock type occurs throughout the watershed as relatively small bodies or inclusions. This type is composed of mesozoic ultrabasic intrusive rocks which include serpentinite, dunite and peridotite (Strand 1962). All are a form of a ferromagnesian silicate mineral that develops soils that are chemically infertile. Ultra basics initially occur as intrusive igneous rocks which may eventually become metamorphosed, as in serpentinite, or slightly metamorphic or non-metamorphic, as in dunite or peridotite (Kruckeberg 1984). Areas dominated by ultra basics are characteristically unstable and prone to landslides. In general, areas dominated by serpentinite are less stable than the blocky weathering peridotite or serpentinitized peridotite (Applied Earth Science 1980). Vegetation cover on ultra basics is usually limited to brush or stunted trees.

Basic Igneous (BI) Rock Type

The basic igneous (BI) rock type occurs primarily in the eastern portion of the watershed (Figure 5). It consists of mesozoic basic intrusive rocks which include gabbro, hornblende gabbro, and banded gabbro schist (Strand 1962).

Mixed Metamorphic and Non-Metamorphic (MX) Rock Type

The mixed metamorphic and non-metamorphic (MX) type is the most common type in the watershed (Figure 5). On the western edge of the watershed, this type is composed primarily of non-metamorphosed sedimentary rocks with isolated discontinuous bodies of slightly metamorphosed and non-metamorphic sedimentary and volcanic rocks. Rock types include sandstone with smaller amounts of shale, chert, basalt, limestone, and conglomerate.

The central portion of the watershed is composed of pre-cretaceous metamorphic rocks which may be more highly metamorphosed equivalents of the Upper Jurassic strata that occur along the western portion of the watershed (Strand 1962).

South Fork Mountain Schist (MS) Rock Type

The south fork mountain schist (MS) type occurs in a relatively thin belt along South Fork Mountain in the western portion of the watershed. This type is composed of pre-cretaceous metasedimentary rocks which include schist, phyllite metachert, metagraywacke, breccia, mica-quartz, and slate. Southwest facing slopes in this type are commonly mantled with a thick, unstable, relatively thin apron of colluvium (Applied Earth Science 1980).

Granitic (GR) Rock Type

The granitic (GR) type occurs throughout the watershed as intrusions and discontinuous bodies. The type is composed of mesozoic granitic rocks which include quartz-diorite in the Trinity Alps area and hornblende diorite in the Ironside Mountain area.

Quaternary (Q) Rock Type

The quaternary (Q) type is composed of relatively young sedimentary deposits including recent alluvium, old alluvium, young stream terrace deposits, landslides and colluvium. This type mainly occurs on valley bottoms, terraces and alluvial flood plains.

SOILS

Soils found in the study area are formed primarily from the local parent material or rock type. Soil properties important to plant growth are extremely variable. Soil development is influenced by environmental variables such as climate, rock type, rock structure, slope, aspect, topographic position and time in addition to the effects of plants and animals on the site (Jenny 1941). Soils found on steeper slopes are commonly derived from colluvium or the downslope movement of rock and soil material from above under the influence of gravity. Soils that occur on landslides or disturbed areas are generally not as well developed as soils that occur on adjacent slopes. These soils generally lack the development of an A horizon or sub-horizons, are commonly composed of decomposed parent material and are almost always deficient in nitrogen. Many landslides are derived from serpentized ultrabasic rocks which additionally have unique chemical properties and are relatively infertile. Soils formed along drainages and waterways often assume fluventic properties due to the repeated deposition of alluvium. Alluvial soils are commonly more fertile but are generally more difficult to establish vegetation on due to periodic disturbances from flooding.

VEGETATION

The Trinity River watershed is composed of a complex mosaic of four vegetation formations and at least fourteen distinct vegetation communities (Table 2). A formation is defined as a major

unit of vegetation that generally extends over a large area and has a distinctive physiognomy (life form) and crown closure (Parker and Matyas 1979). A map of the communities that occur in the watershed is provided in Figure 4 of this report. Communities are defined at the series level which is generally characterized by the dominant overstory species. The map and its description follow the CALVEG classification (Parker and Matyas 1979) as adapted by Toth (1982).

Table 2. A list of the four vegetation formations and fourteen vegetation communities that occur in the Trinity River watershed, California. Classification follows CALVEG (Parker and Matyas 1979) as adapted by Toth (1982).

MAP CODE	VEGETATION FORMATION	VEGETATION COMMUNITY
RF WF MF MP JP DP DF	CONIFER FORMATION	Red Fir Forest White Fir Forest Mixed Fir Forest Mixed Pine Forest Jeffrey Pine Forest Douglas-fir - Pine Forest Douglas-fir Forest
QG QK TM	HARDWOOD FORMATION	Oregon White Oak Woodland California Black Oak Woodland Tanoak - Madrone Forest
QC CM	CHAPARRAL FORMATION	Oak Chaparral Mixed Chaparral
GA GP	HERBACEOUS FORMATION	Annual Grassland Perennial Grassland

Red Fir (RF) Forest Community

The Red Fir Forest community is dominated by Shasta red fir (*Abies magnifica* var. *shastensis*) which typically forms a dense canopy cover that becomes more open with age. Understory species are uncommon and may include twin flower (*Linnaea borealis*), western prince's pine (*Chimaphila umbellatum*), and arnica (*Arnica discoidea*). Species dominating open areas include white thorn (*Ceanothus cordulatus*), bitter cherry (*Prunus emarginata*), western chokecherry (*Prunus virginiana*), huckleberry oak (*Quercus vaccinifolia*) and blue elderberry (*Sambucus caerulea*). Moist open areas are commonly dominated by meadows with patches of alder thickets. Riparian species include alder

(*Alnus sinuata*) and mountain alder (*A. tenuifolia*). The Red Fir Forest community occurs throughout the watershed on mountain summits and slopes greater than 5,500 feet. Typical locations include South Fork Mountain, Trinity Mountain, Trinity Alps and the Scott Mountain area (Figure 4).

White Fir (WF) Forest Community

The White Fir Forest community is dominated by nearly pure stands of white fir (*Abies concolor*) with incense cedar (*Libocedrus decurrens*) becoming more common in older stands. Associated species are uncommon and include canyon live oak (*Quercus chrysolepis*), golden chinquapin (*Castanopsis chrysophylla*), twin flower (*Linnaea borealis*), and western prince's pine (*Chimaphila umbellata*). Open areas are commonly dominated by snow brush (*Ceanothus velutinus*), bitter cherry (*Prunus emarginata*), Sadler's oak (*Quercus sadleriana*) and huckleberry oak (*Quercus vaccinifolia*). Riparian species include alder (*Alnus sinuata*), mountain alder (*A. tenuifolia*) and occasionally black cottonwood (*Populus trichocarpa*). The community occurs from about 4,500 feet to 5,500 feet throughout the watershed and intergrades with the Red Fir Forest community at higher elevations and the Mixed Fir Forest community at lower elevations.

Mixed Fir (MF) Forest Community

The Mixed Fir Forest community is dominated by white fir (*Abies concolor*) and Douglas-fir (*Pseudotsuga menziesii*). Associated canopy species include sugar pine (*Pinus lambertiana*), incense cedar (*Libocedrus decurrens*) and ponderosa pine (*Pinus ponderosa*). Douglas-fir is more common at lower elevations while white fir generally dominates upper elevation slopes. Ponderosa pine and sugar pine are more common on drier slopes and in the eastern portion of the watershed. Understory species are uncommon and include canyon live oak (*Quercus chrysolepis*), golden chinquapin (*Castanopsis chrysophylla*), twin flower (*Linnaea borealis*) and western prince's pine (*Chimaphila umbellata*). Open areas are commonly dominated by snow brush (*Ceanothus velutinus*), Sadler's oak (*Quercus sadleriana*) and huckleberry oak (*Quercus vaccinifolia*). Riparian species include big leaf maple (*Acer macrophyllum*), alder (*Alnus sinuata*), mountain alder (*A. tenuifolia*), dogwood (*Cornus nuttallii*) and occasionally black cottonwood (*Populus trichocarpa*). The Mixed Fir Forest community ranges between approximately 2,500 feet and 4,500 feet elevation. It intergrades with the White Fir Forest community at higher elevations. At elevations below 3,500 feet, the community intergrades with the Douglas-fir Forest community in the western portion of the watershed, the Douglas-fir - Pine Forest community in the central portion of the watershed and the Mixed Pine Forest community in the eastern portion of the watershed.

Mixed Pine (MP) Forest Community

The Mixed Pine Forest community is dominated by a mixture of conifer species including ponderosa pine (*Pinus ponderosa*), digger pine (*Pinus sabiniana*), sugar pine (*Pinus lambertiana*),

knobcone pine (*Pinus attenuata*), Douglas-fir (*Pseudotsuga menziesii*), incense cedar (*Libocedrus decurrens*) and white fir (*Abies concolor*). The community generally occurs on dry-mesic to xeric slopes in the eastern portion of the watershed (Figure 4). Ponderosa pine and digger pine are more common on drier slopes and aspects while Douglas-fir and white fir mostly occur on north aspects or moister slope positions. Associated species include canyon live oak (*Quercus chrysolepis*), madrone (*Arbutus menziesii*), manzanita (*Arctostaphylos* sp.) and other chaparral species. Riparian species include bigleaf maple (*Acer macrophyllum*), white alder (*Alnus rhombifolia*), dogwood (*Cornus nuttallii*) and occasionally black cottonwood (*Populus trichocarpa*).

The Mixed Pine Forest community also occurs on ultra basic soils throughout the eastern and southern portion of the watershed. The community composition and structure on ultra basic soils generally varies significantly from the composition and structure on other parent materials. Dominant species include Jeffrey pine (*Pinus jeffreyi*), lodgepole pine (*Pinus contorta*), knobcone pine and western white pine (*P. monticola*). Douglas-fir, white fir and sugar pine are uncommon on ultra basic soils and are generally stunted in appearance. Common understory species include pinemat manzanita (*Arctostaphylos nevadensis*), buckbrush (*Ceanothus cuneatus*) and coffee berry (*Rhamnus californica*). Riparian species may include azalea (*Rhododendron occidentale*) and a variety of forb and grass species tolerant to ultra basic soils.

Jeffrey Pine (JP) Forest Community

The Jeffrey Pine Forest community primarily occurs on soils derived from ultra basic parent material. The community is usually dominated by Jeffrey pine (*Pinus jeffreyi*) which commonly forms an open woodland with a sparse to dense brush understory. Associated overstory species may include incense cedar (*Libocedrus decurrens*), knobcone pine (*Pinus attenuata*), digger pine (*P. sabiniana*), lodgepole pine (*P. contorta*), sugar pine (*P. lambertiana*), and western white pine (*P. monticola*). Understory species may include manzanita (*Arctostaphylos* spp.), pinemat manzanita (*A. nevadensis*), buckbrush (*Ceanothus cuneatus*), squaw carpet (*C. prostratus*), huckleberry oak (*Quercus vaccinifolia*) coffeeberry (*Rhamnus californica*) and a variety of forb and grass species. Riparian species may include azalea (*Rhododendron occidentale*) and a variety of forb and grass species tolerant to ultra basic soils. The Jeffrey Pine Forest community occurs in scattered locations throughout the watershed. Typical locations include Horse Mountain and Dubakella Mountain.

Douglas-fir - Pine (DP) Forest Community

The Douglas-fir - Pine Forest community is dominated by a mixture of Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) with an understory of madrone (*Arbutus menziesii*) and/or canyon live oak (*Quercus chrysolepis*). Tanoak is generally absent. Associated species may include sugar pine (*Pinus lambertiana*), digger pine (*P. sabiniana*), pinemat manzanita (*Arctostaphylos nevadensis*), greenleaf manzanita (*A. patula*), whiteleaf manzanita (*A. viscida*) and huckleberry oak (*Quercus vaccinifolia*). The community commonly occurs throughout the central portion of the

watershed at elevations below 4,500 feet. At elevations above 3,500 feet, the community intergrades with elements of the Mixed Fir Forest community. Drier slopes and aspects are commonly dominated by scattered digger pine with a significant canyon live oak understory. Riparian species include bigleaf maple (*Acer macrophyllum*), white alder (*Alnus rhombifolia*) and willow (*Salix* spp.). Red alder (*Alnus oregana*) may also occur in riparian areas at elevations below 500 feet.

The species composition of this community on ultra basic soils is very similar to the Jeffrey Pine Forest community and may intergrade in areas that are more concentrated in ultra basic minerals.

Douglas-fir (DF) Forest Community

The Douglas-fir Forest community is dominated primarily by Douglas-fir (*Pseudotsuga menziesii*) in the overstory with tanoak (*Lithocarpus densiflora*) and madrone (*Arbutus menziesii*) forming a secondary canopy layer. This community occurs primarily on mesic slopes in the western portion of the watershed below 4,500 feet elevation (Figure 4). The community intergrades with elements of the Mixed Fir Forest community at elevations above 3,500 feet and the Douglas-fir - Pine Forest community to the east. Understory species include salal (*Gaultheria shallon*), rhododendron (*Rhododendron macrophyllum*) and evergreen huckleberry (*Vaccinium ovatum*). Sugar pine (*Pinus lambertiana*), ponderosa pine (*P. ponderosa*) and canyon live oak (*Quercus chrysolepis*) become more common on drier slopes and aspects. Riparian species include bigleaf maple (*Acer macrophyllum*), vine maple (*A. circinatum*), red alder (*Alnus oregana*), white alder (*A. rhombifolia*), California hazel (*Corylus cornuta*) and a variety of forb and grass species.

Oregon White Oak (QG) Woodland Community

The Oregon White Oak Woodland community commonly occurs on dry sites in association with the Douglas-fir Forest community, Douglas-fir - Pine Forest community, Mixed Pine Forest community, California Black Oak Woodland community and Grassland communities throughout lower elevations in the watershed. The community occurs in more extensive stands in various locations including Hayfork and Weaverville. Stands are commonly dominated by Oregon white oak (*Quercus garrayana*). California black oak (*Quercus kelloggii*) is a common associate and may become the dominant overstory species in some locations. The understory is commonly dominated by a variety of grass and forb species with scattered shrubs including deer brush (*Ceanothus integrifolius*) and poison oak (*Rhus diversiloba*). Riparian species may include bigleaf maple (*Acer macrophyllum*), white alder (*Alnus rhombifolia*), red alder (*A. oregana*) and occasionally black cottonwood (*Populus trichocarpa*).

California Black Oak (QK) Woodland Community

The California Black Oak Woodland community commonly occurs on dry sites in association with the Douglas-fir Forest community, Douglas-fir - Pine Forest community, Mixed Pine Forest

community, California Black Oak Woodland community or Grassland communities throughout lower elevations in the watershed. The community is similar in species composition to the Oregon White Oak Woodland community and is distinguished only in areas where California black oak (*Quercus kelloggii*) dominates the overstory.

Tanoak - Madrone (TM) Forest Community

The Tanoak - Madrone Forest community is dominated by tanoak (*Lithocarpus densiflora*) and madrone (*Arbutus menziesii*). This community generally occurs in association with the Douglas-fir Forest community on sites where environmental conditions such as fire or dry soils prohibit the establishment of conifers. Understory species include canyon live oak (*Quercus chrysolepis*), greenleaf manzanita (*Arctostaphylos patula*), whiteleaf manzanita (*Arctostaphylos viscida*), deer brush (*Ceanothus integerrimus*) and poison oak (*Rhus diversiloba*).

Oak Chaparral (QC) Community

The Oak Chaparral community occurs in small pockets throughout the entire watershed on relatively dry soils derived from ultra basic parent material. A significant amount of this community was mapped in the northeast and central portions of the watershed (Figure 4). The community is composed of a variety of shrub species including huckleberry oak (*Quercus vaccinifolia*), Brewer's oak (*Q. garryana* var. *brewerii*), chamise (*Adenostoma fasciculatum*), pinemat manzanita (*Arctostaphylos nevadensis*), greenleaf manzanita (*A. patula*), mountain mahogany (*Cercocarpus betuloides*), silktassel (*Garrya buxifolia*), tanoak shrubform (*Lithocarpus densiflora* var. *echinoides*), California bay laurel (*Umbellularia californica*), and coffeeberry (*Rhamnus californica*).

Mixed Chaparral (MC) Community

The Mixed Chaparral community occurs on relatively harsh sites having shallow soils throughout the watershed. Species composition is variable and may include greenleaf manzanita (*Arctostaphylos patula*), pinemat manzanita (*A. nevadensis*), white thorn (*Ceanothus cordulatus*), squaw mat (*C. pumilus*), bitter cherry (*Prunus emarginata*), coffee berry (*Rhamnus californica*) and various other chaparral species.

Annual Grassland (GA) and Perennial Grassland (GP) Communities

The Annual Grassland community and Perennial Grassland community form a complex mosaic throughout the watershed and are generally difficult to distinguish. Annual grass species are composed primarily of species introduced from Europe. These species are commonly very aggressive and better adapted to frequent disturbances associated with cattle grazing, agriculture and periodic burning. Areas dominated by perennial grass species occur in limited amounts throughout the

watershed and generally become more common at higher elevations. Most grasslands are generally of a mixture of annual grasses, perennial grasses and various forb species with species composition varying significantly depending on elevation, site moisture and the types of disturbances that have occurred.

PLANT SPECIES SELECTION

The selection of plant species that are suitable for watershed rehabilitation and wildlife habitat enhancement is dependent on a number of factors including:

- **Environmental Suitability:** Includes whether the plant species is environmentally adapted to the site. This requires knowledge of each species environmental range in relation to site characteristics such as aspect, slope, topographic position, elevation, soil moisture, soil chemistry, precipitation, temperature, community and geology.
- **Plant Species Suitability and Culture:** Suitability includes considerations of root structure, above-ground structure (ie. tree, shrub, forb or grass), species permanence (i.e. perennial, biennial or annual), and soil-building characteristics (e.g. deciduous vs. evergreen; nitrogen-fixing capability). Suitability also includes considerations of the various laws and regulations related to the selection of species based on their origin (seed zone or native vs. non-native), invasiveness and its influence on biodiversity. Culture includes considerations of cultural requirements and the feasibility of large-scale culture.
- **Wildlife Habitat Enhancement:** Includes considerations of whether the plant species will improve wildlife habitat by providing food (fruits, browse, nectar, etc.), cover (thermal cover, shelter), and nesting habitat.
- **Availability of Plant Materials:** This includes where the plants may be obtained and whether they are available in a suitable form (e.g. bare root, plug, container or seed).

The consideration of the above factors is complex. In addition, much of the information is obscure, hard to obtain, or unavailable. The lack of adequate information commonly results in a significant reduction in the number of suitable or available plant species that may be used for revegetation projects. Even where information is available, the successful establishment of species on various habitats is unpredictable and subject to the vagaries of nature.

The following sections of this report have been designed to provide as much information as possible related to the above factors. The information is not meant to be complete however and users are advised to also utilize other publications (e.g. those listed in the bibliography) or to contact other authorities (e.g. Appendix A.) for more detailed information.

ENVIRONMENTAL SUITABILITY

One of the most important factors to consider when selecting plant species for revegetation projects is the suitability of the species to the environmental conditions of the site. This requires an understanding of which environmental factors are important in controlling the natural distribution of vegetation in the area and which species are adapted to those factors. Plant communities in the Trinity River watershed generally occur along a complex set of environmental gradients predominantly controlled by geology, moisture and temperature (Whittaker 1960).

Geology is generally the most important factor influencing vegetation growth and distribution in this area (Whittaker 1960). Major differences in vegetation growth and distribution occur on areas dominated by ultra basic rock types vs. areas dominated by other rock types (Barbour and Major 1988, Kruckeberg 1984). Vegetation that occurs on soils derived from ultra basic rock types vary significantly in species composition and appearance from vegetation that occurs on soils derived from other rock types. These differences are due to the toxic properties of ultra basic soils which are generally attributed to its main mineral constituent, olivine: $(Mg,Fe)_2SiO_4$ and, to a lesser degree, chromite and pyroxene (Kruckeberg 1984). The chemical composition of these minerals results in the formation of soils that have low concentrations of calcium and high concentrations of magnesium, iron, nickel and chromium. This composition is mildly toxic to plants and results in reduced vegetation cover which in turn results in lower levels of nitrogen and phosphorous. The reduced vegetation cover adds to the self-reinforcing nature of this process by increasing soil temperatures and moisture stress (Kruckeberg 1984).

Where geology is uniform, moisture is considered the most important factor controlling vegetation distribution in this area (Whittaker 1960). Moisture is related to a complex set of site conditions including aspect, slope, soil texture, soil rock content, topographic position, elevation, precipitation and solar insolation. Moisture is also complexly related to temperature and the influence of each is generally difficult to separate. For example, the influence of temperature on moisture is directly related to solar insolation which is indirectly related to aspect, elevation and topographic position. All of the above factors have a direct influence on evapotranspiration or the amount of moisture lost to the atmosphere through evaporation and transpiration under existing temperature and moisture conditions.

The selection of species that are compatible with the environmental conditions of a site is difficult since species distribution commonly varies independently in relation to a complex set of environmental gradients. Also, the environmental preferences of a species is generally difficult to determine and may vary significantly with location or ecotype. Some attempts have been made to describe the environmental preferences of plant species in northwest California. Waring and Major (1964) assigned moisture and temperature index values to many of the species common to this area. Whittaker (1960) described the distribution of tree and shrub species along a moisture-gradient index for low elevations located in the central Siskiyou Mountains of California and Oregon. Sawyer and Thornburgh (1974) described the distribution of vegetation species in northwest California in relation to a moisture equivalency index based on aspect, topographic position and elevation.

Environmental indexes such as these appear useful for determining plant species suitability for revegetation projects in the Trinity River watershed.

DESCRIPTION OF PLANT SPECIES SELECTION KEY

The selection of plant species that are environmentally suitable for revegetating a site requires the integration of the environmental range of each species with the environmental conditions of the site. A dichotomous key was designed with this report to assist in this task. The key uses site environmental conditions and species environmental indexes to produce a list (Tables 5 and 6) of plant species that are environmentally adapted to the site. Species were grouped by entering their environmental ranges and indexes into the Form Entry System (FES) computer program using the Forest Service Data General computer. The PRESENT computer program was then used to query the data base and produce various lists of plant species that may be suitable for revegetating sites having different environmental conditions.

Site environmental characteristics used in the key include plant community, geology, elevation, moisture and temperature. Plant community and geology follow the descriptions given in the STUDY AREA section of this report and as mapped in Figures 4 and 5. Moisture and temperature were grouped into broad groups based on site environmental characteristics and species environmental indexes.

Moisture Groups

Variables used in the key to group species into the three broad moisture groups listed in Table 3 included plant community, elevation, aspect, topographic position and the various moisture indexes developed by Waring and Major (1964), Whittaker (1960) and Sawyer and Thornburgh (1974).

Plant communities are very effective indicators of moisture conditions on a site. This relationship is evident when the precipitation and potential evapotranspiration map (Figure 6) is compared with the vegetation community map (Figure 4) of the Trinity River watershed. The maps show a direct relationship between the increase in potential evapotranspiration rates (decreasing moisture) from west to east and the change in vegetation communities from the relatively moist Douglas-fir community to the drier Douglas-fir-Pine community and eventually to the even drier Mixed Pine community in the eastern portion of the watershed.

The influence of aspect and topographic position on moisture conditions has been demonstrated in previous studies. Sawyer and Thornburgh (1974) developed a sixteen-level moisture equivalency index using evidence that south facing aspects are generally drier than north facing aspects and also upper slopes are drier than lower slopes and valley bottoms. Based on this concept, three moisture groups were developed combining aspect and topographic position. The groups are distributed along a relative moisture gradient from dry to wet as shown in Table 3.

Species moisture ranges were determined using the index values developed by Waring and Major (1964). Where no values were given, estimates were made using values given by Whittaker

(1960) or Sawyer and Thornburgh (1974) or by estimating values using the techniques similar to Waring and Major (1964). Moisture values were determined for each species by combining Waring and Major's seven levels into the three moisture groups shown in Table 3.

Table 3. Moisture groups used in the plant selection key. Groups are based on topographic position, aspect and the moisture index developed by Waring and Major (1964).

GROUPS	TOPO POSITION	ASPECT	MOISTURE INDEX
DRY	Ridges and Summits	SE, SSE, S, SSW,	GROUP I
	Upper & Mid Slopes	SW, WSW, W, WNW	GROUP II
MOIST	Ridges and Summits	NW, NNW, N, NNE,	GROUP III
	Upper, Mid & Lower Slopes	NE, ENE, E, ESE	GROUP IV
	OR Lower Slopes	SE, SSE, S, SSW, SW, WSW, W, WNW	GROUP V
WET	Valley Bottoms, Alluvial Terraces Ravines, Draws & Seeps	None	GROUP VI GROUP VII

Temperature Groups

Site temperature has been grouped into three broad temperature groups based on elevation, aspect, community and temperature regime as shown in Table 4. Temperature ranges were determined for each species by combining Waring and Major's (1964) five temperature groups into the three temperature groups defined in Table 4. Species elevation ranges follow values given in Munz and Keck (1959).

Table 4. Temperature group characteristics used in the plant selection key. Temperature regimes follow definitions given in the USDA Soil Mngmt. Support Serv. (1985). Temperature indexes follow definitions given in Waring and Major (1964).

GROUP	TEMPERATURE GROUP CHARACTERISTICS
COLD	<p>Elevation: Generally above 5,000 feet.</p> <p>Aspect: Most exposures. May include south exposures above 6,000 feet.</p> <p>Community: White Fir Forest, Red Fir Forest and Mixed Fir Forest communities.</p> <p>Indicator Species: White Fir, Red Fir</p> <p>Temperature index: Group I - Subalpine Climate Type; Group II - Cold Desert Climate and Montane Climate Types.</p> <p>Temperature regime: Frigid</p>

Table 4. Temperature group characteristics used in the plant selection key. Temperature regimes follow definitions given in the USDA Soil Mngmt. Support Serv. (1985). Temperature indexes follow definitions given in Waring and Major (1964). (Continued)

GROUP	TEMPERATURE GROUP CHARACTERISTICS
WARM	<p>Elevation: Generally below 5,000 feet.</p> <p>Aspect: Most exposures except south exposures in inland plant communities.</p> <p>Vegetation Community: Douglas-fir and Douglas-fir-Pine Forest communities. Includes most other mapped communities at elevations less than 5,000 feet on aspects other than south.</p> <p>Indicator Species: Douglas-fir</p> <p>Temperature Index: Group IV - Cool Temperate Climate Type; Group V - Coastal Maritime Climate Type.</p> <p>Temperature regime: Mesic</p>
HOT	<p>Elevation: Generally below 5,000 feet.</p> <p>Aspect: More common on extreme southern exposures.</p> <p>Vegetation Community: Mixed Pine Forest, Oak Woodland, Oak Chaparral, Mixed Chaparral and Grassland communities.</p> <p>Indicator Species: Digger pine, Blue Oak</p> <p>Temperature index: Group III - Continental and Central Valley Climate Types.</p> <p>Temperature regime: Thermic</p>

PLANT SPECIES SELECTION KEY

- | | |
|--|------------|
| 1. Elevation greater than 5,000 feet. Temperature group is cold. | 2. |
| 2. Site occurs in a riparian area or seep area. Moisture group is wet. | 3. |
| 3. Parent material is ultra basic. (COLD/WET) | Table 6-A. |
| 3. Parent material is not ultra basic. (COLD/WET) | Table 5-A. |
| 2. Site does not occur in a riparian area or seep. Moisture group is not wet. | 4. |
| 4. Parent material is ultra basic. | 5. |
| 5. Aspect is SE-WNW (134-292 deg.) Topographic position is mid-slope to ridgetop or summit. (COLD/DRY) | Table 6-C. |
| 5. Aspect is NW-ESE (293-360 deg. or 0-135 deg.) OR aspect is SE-WNW (134-292 deg.) and topographic position is lower slope. (COLD/MOIST) | Table 6-B. |
| 4. Parent material is not ultra basic. | 6. |
| 6. Aspect is SE-WNW (134-292 deg.) and topographic position is mid-slope to ridgetop or summit. (COLD/DRY) | Table 5-C. |
| 6. Aspect is NW-ESE (293-360 deg and 0-135 deg) OR aspect is SE-WNW (134-292 deg) and topographic position is lower slope. (COLD/MOIST) | Table 5-B. |
| 1. Elevation is less than 5,000 feet. Temperature group is warm or hot. | 7. |
| 7. Surrounding plant community is Jeffrey Pine Forest, Mixed Pine Forest, Oak Woodland, Grassland, or Chaparral. | 8. |
| 8. Site occurs in a riparian area or seep. Moisture group is wet. | 9. |
| 9. Parent material is ultra basic. (WARM/WET) | Table 6-D. |
| 9. Parent material is not ultra basic. (WARM/WET) | Table 5-D. |
| 8. Site does not occur in a riparian area or seep. Moisture group is not wet. | 10. |
| 10. Parent material is ultra basic. | 11. |
| 11. Aspect is SE-WNW (134-292 deg.) and topographic position is mid-slope to ridgetop or summit. (HOT/DRY) | Table 6-I. |
| 11. Aspect is NW-ESE (293-360 deg. or 0-135 deg.) OR aspect is SE-WNW (134-292 deg.) and topographic position is lower slope. (WARM/MOIST) | Table 6-E. |
| 10. Parent material is not ultra basic. | 12. |
| 12. Aspect is SE-WNW (134-292 deg.) and topographic position is mid-slope to ridgetop or summit. (HOT/DRY) | Table 5-I. |

12. Aspect is NW-ESE (293-360 deg. or 0-135 deg.) OR aspect is SE-WNW (134-292 deg.) and topographic position is lower slope. (WARM/MOIST)	Table 5-E.
7. Surrounding plant community is Douglas-fir Forest or Douglas-fir-Pine Forest.	13.
13. Site occurs in a riparian area or seep. Moisture group is wet.	14.
14. Parent material is ultra basic. (WARM/WET)	Table 6-D.
14. Parent material is not ultra basic. (WARM/WET)	Table 5-D.
13. Site does not occur in a riparian area or seep. Moisture group is not wet.	15.
15. Parent material is ultra basic.	16.
16. Aspect is SE-WNW (134-292 deg.) and topographic position is mid-slope to ridgetop or summit. (WARM/DRY)	Table 6-F.
16. Aspect is NW-ESE (293-360 deg. or 0-135 deg.) OR aspect is SE-WNW (134-292 deg.) and topographic position is lower slope. (WARM/MOIST)	Table 6-E.
15. Parent material is not ultra basic.	17.
17. Aspect is SE-WNW (134-292 deg.) and topographic position is mid-slope to ridgetop or summit. (WARM/DRY)	Table 5-F.
17. Aspect is NW-ESE (293-360 deg. or 0-135 deg.) OR aspect is SE-WNW (134-292 deg.) and topographic position is lower slope. (WARM/MOIST)	Table 5-E.

Table 5. Species suitable for revegetating sites located on NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, B = Biennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
TREES										
<i>Abies concolor</i> white fir	-	+	X	-	-	-	-	-	-	3,000 - 10,000
<i>Abies grandis</i> grand fir	-	-	-	-	X	-	-	-	-	0 - 1,000
<i>Abies magnifica</i> var. <i>shastensis</i> Shasta red fir	-	X	X	-	-	-	-	-	-	5,000 - 9,000
<i>Acer macrophyllum</i> big leaf maple	-	-	-	X	-	-	X	-	-	0 - 5,000
<i>Alnus oregana</i> red alder (*)	-	-	-	X	-	-	-	-	-	0 - 500
<i>Alnus rhombifolia</i> white alder (*)	-	-	-	+	-	-	X	-	-	0 - 5,000
<i>Arbutus menziesii</i> Pacific madrone	-	-	-	-	+	X	-	+	-	0 - 5,000
<i>Calocedrus decurrens</i> incense cedar	-	+	+	-	+	X	-	-	-	0 - 4,800
<i>Castanopsis chrysophylla</i> golden chinquapin	-	+	+	-	X	+	-	-	-	1,000 - 6,000
<i>Chamaecyparis lawsoniana</i> Port-Orford cedar	-	-	-	X	+	-	-	-	-	0 - 4,800
<i>Chamaecyparis nootkatensis</i> Alaska-cedar /3	-	X	-	-	-	-	-	-	-	5,000
<i>Cornus nuttallii</i> mountain dogwood	-	-	-	X	+	-	+	-	-	0 - 6,000
<i>Fraxinus latifolia</i> Oregon ash	-	-	-	X	-	-	X	-	-	0 - 5,500
<i>Juniperus occidentalis</i> western juniper	-	-	X	-	-	+	-	-	-	3,000 - 10,500
<i>Lithocarpus densiflora</i> tanoak	-	-	-	-	X	+	-	-	-	0 - 4,500
<i>Picea sitchensis</i> Sitka spruce	-	-	-	-	X	-	-	-	-	0 - 1,200
<i>Pinus attenuata</i> knobcone pine	-	-	-	-	-	+	-	-	X	0 - 4,000
<i>Pinus contorta</i> ssp. <i>contorta</i> shore pine /3	-	-	-	-	X	-	-	-	-	0 - 4,000

/1 = Elevation follows Munz and Keck (1959)

/2 = Non-native naturalized species

/3 = Non-native exotic species.

Table 5. Species suitable for revegetating sites located on NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, B = Biennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
<i>Pinus contorta</i> ssp. <i>murrayana</i> lodgepole pine	-	+	X	-	+	X	-	X	-	5,000 - 11,000
<i>Pinus jeffreyi</i> jeffrey pine	-	-	X	-	+	X	-	+	-	3,500 - 9,000
<i>Pinus lambertiana</i> sugar pine	-	-	X	-	-	X	-	-	-	2,500 - 9,000
<i>Pinus monticola</i> western white pine	-	-	X	-	-	X	-	-	-	2,000 - 9,800
<i>Pinus sabiniana</i> digger pine	-	-	-	-	-	+	-	-	X	0 - 4,500
<i>Populus fremontii</i> cottonwood	-	-	-	X	-	-	X	-	-	0 - 6,500
<i>Populus tremuloides</i> quaking aspen	X	+	-	-	-	-	-	-	-	6,000 - 10,000
<i>Populus trichocarpa</i> black cottonwood	X	-	-	X	-	-	X	-	-	0 - 9,000
<i>Pseudotsuga menziesii</i> douglas-fir	-	-	-	-	X	+	-	-	-	0 - 5,000
<i>Quercus douglasii</i> blue oak	-	-	-	-	-	+	-	-	X	0 - 3,500
<i>Quercus garryana</i> Oregon white oak	-	-	-	-	+	X	-	-	+	1,000 - 5,000
<i>Quercus kelloggii</i> California black oak	-	+	-	-	+	X	-	-	+	1,000 - 8,000
<i>Robinia pseudo-acacia</i> black locust /2 (*)	-	-	-	-	X	X	-	X	X	0 - 3,000
<i>Salix lasiandra</i> willow	X	-	-	X	-	-	-	-	-	0 - 8,000
<i>Salix laevigata</i> willow	-	-	-	X	-	-	-	-	-	0 - 5,000
<i>Sequoiadendron giganteum</i> giant sequoia /2	-	X	+	-	X	+	-	-	-	4,600 - 8,400
<i>Sequoia sempervirens</i> coast redwood	-	-	-	+	X	-	-	-	-	0 - 2,000
<i>Taxus brevifolia</i> Pacific yew	-	-	-	X	-	-	-	-	-	0 - 7,000
<i>Thuja plicata</i> western red cedar	-	-	-	+	X	-	-	-	-	0 - 2,000

/1 = Elevation follows Munz and Keck (1959)

/2 = Non-native naturalized species

/3 = Non-native exotic species.

Table 5. Species suitable for revegetating sites located on NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, B = Biennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
<i>Tsuga heterophylla</i> western hemlock	-	-	-	+	X	-	-	-	-	0 - 2,000
<i>Tsuga mertensiana</i> mountain hemlock	-	X	X	-	-	-	-	-	-	6,000 - 11,000
<i>Umbellularia californica</i> California bay-laurel	-	-	-	X	X	-	-	-	-	0 - 5,000
TALL SHRUBS (> 5 ft.)										
<i>Acer circinatum</i> vine maple	-	-	-	X	+	-	-	-	-	0 - 5,000
<i>Acer glabrum</i> var. <i>torreyi</i> mountain maple	-	X	+	-	+	-	-	-	-	5,000 - 9,000
<i>Aesculus californica</i> California buckeye	-	-	-	-	-	+	-	-	X	0 - 4,000
<i>Alnus sinuata</i> Sitka alder (*)	X	-	-	+	-	-	-	-	-	0 - 7,000
<i>Alnus tenuifolia</i> mountain alder (*)	+	X	-	-	-	-	-	-	-	4,500 - 7,500
<i>Betula occidentalis</i> water birch	X	-	-	+	-	-	-	-	-	2,000 - 8,000
<i>Ceanothus thrysiflorus</i> blue blossom (*)	-	-	-	-	X	+	-	-	-	0 - 2,000
<i>Ceanothus velutinus</i> snow brush (*)	-	X	-	-	X	+	-	-	-	3,500 - 10,000
<i>Cephalanthus occidentalis</i> var. <i>californicus</i> California buttonbush	-	-	-	X	-	-	X	-	-	0 - 3,000
<i>Cercocarpus ledifolius</i> curled-leaf mtn.-mahogany (*)	-	-	X	-	-	X	-	-	-	4,000 - 10,500
<i>Cornus californica</i> dogwood	X	-	-	X	-	-	-	-	-	0 - 8,000
<i>Cornus sessilis</i> dogwood	-	-	-	X	-	-	-	-	-	500 - 5,000
<i>Cornus stolonifera</i> American dogwood	X	-	-	X	-	-	-	-	-	0 - 9,000
<i>Corylus cornuta</i> var. <i>californica</i> California hazel	-	+	-	-	X	-	-	-	-	0 - 7,000

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<i>Holodiscus discolor</i> var. <i>delnortensis</i> creambush oceanspray	-	-	-	-	X	X	-	+	-	0 - 4,500
<i>Myrica californica</i> California wax-myrtle	-	-	-	-	X	-	-	-	-	0 - 500
<i>Osmaronia cerasiformis</i> oso berry	-	-	-	X	-	-	-	-	-	0 - 5,600
<i>Philadelphus lewisii</i> mock-orange	-	-	-	X	+	-	-	-	-	1,000 - 4,500
<i>Physocarpus capitatus</i> ninebark	-	-	-	X	+	-	-	-	-	0 - 4,500
<i>Prunus emarginata</i> bitter cherry	-	X	+	-	-	-	-	-	-	0 - 9,000
<i>Prunus virginiana</i> western choke cherry	-	X	-	-	X	-	-	+	-	0 - 8,200
<i>Quercus garryana</i> var. <i>breweri</i> Brewer oak	-	-	X	-	-	X	-	-	+	2,000 - 6,000
<i>Quercus wislizenii</i> interior live oak	-	-	-	-	-	+	-	-	X	0 - 5,000
<i>Rhamnus purshiana</i> cascara sagrada	-	-	-	-	X	-	-	-	-	0 - 5,000
<i>Rhododendron macrophyllum</i> rhododendron	-	-	-	+	X	-	-	-	-	0 - 4,000
<i>Rubus spectabilis</i> salmon berry	-	-	-	-	X	-	-	-	-	0 - 1,000
<i>Salix lasiolepis</i> arroyo willow	-	-	-	X	-	-	-	-	-	0 - 7,000
<i>Salix scouleriana</i> Scouler's willow	X	-	-	X	+	-	-	-	-	0 - 10,000
<i>Sambucus caerulea</i> blue elderberry	-	-	X	-	-	-	-	-	-	0 - 10,000
<i>Sambucus callicarpa</i> elderberry	-	-	-	X	+	-	-	-	-	0 - 2,000
<i>Sorbus californica</i> mountain-ash	-	X	-	-	-	-	-	-	-	5,000 - 10,900
<i>Sorbus cascadenis</i> mountain-ash	-	X	-	-	-	-	-	-	-	4,000 - 6,000

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MEDIUM SHRUBS (> 2 ft. & < 5 ft.)										
<i>Amelanchier alnifolia</i> service-berry	-	-	-	-	X	+	-	-	-	0 - 5,000
<i>Amelanchier pallida</i> service-berry	-	-	X	+	-	X	+	-	-	0 - 11,000
<i>Amelanchier pumila</i> service-berry	-	X	-	-	-	-	-	-	-	6,000 - 8,000
<i>Arctostaphylos cinerea</i> hoary manzanita	-	-	-	-	-	+	-	-	X	0 - 2,500
<i>Arctostaphylos columbiana</i> hairy manzanita	-	-	-	-	-	+	-	-	X	0 - 2,500
<i>Arctostaphylos glandulosa</i> eastwood manzanita	-	-	-	-	-	+	-	-	X	1,000 - 6,000
<i>Arctostaphylos glauca</i> bigberry manzanita	-	-	-	-	-	+	-	-	X	0 - 4,500
<i>Arctostaphylos intricata</i> manzanita	-	-	-	-	-	+	-	-	X	0 - 2,500
<i>Arctostaphylos manzanita</i> Parry manzanita	-	-	-	-	-	+	-	-	X	300 - 4,000
<i>Arctostaphylos parvifolia</i> manzanita	-	-	-	-	-	+	-	-	X	0 - 5,000
<i>Arctostaphylos patula</i> greenleaf manzanita	-	-	-	-	-	+	-	-	X	2,000 - 9,000
<i>Arctostaphylos viscida</i> whiteleaf manzanita	-	-	-	-	-	+	-	-	X	500 - 5,000
<i>Baccharis pilularis</i> var. <i>consanguinea</i> coyote brush	-	-	-	-	X	+	-	-	-	0 - 2,000
<i>Baccharis pilularis</i> var. <i>pilularis</i> dwarf coyote brush	-	-	-	-	X	+	-	-	-	0 - 2,000
<i>Berberis aquifolium</i> Oregon grape	-	+	-	-	X	-	-	-	-	0 - 7,000
<i>Calycanthus occidentalis</i> spice-bush	-	-	-	+	+	-	X	-	-	0 - 4,000
<i>Castanopsis sempervirens</i> bush chinquapin	-	-	X	-	-	+	-	-	+	2,500 - 11,000

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<i>Ceanothus cordulatus</i> mountain whitethorn (*)	-	X	+	-	X	-	-	-	-	3,000 - 9,500
<i>Ceanothus cuneatus</i> buck brush (*)	-	-	+	-	-	+	-	-	X	0 - 6,000
<i>Ceanothus integerrimus</i> var. <i>californicus</i> deer brush (*)	-	-	-	-	+	X	-	+	-	1,000 - 5,000
<i>Ceanothus leucodermis</i> chaparral whitethorn (*)	-	-	+	-	-	+	-	-	X	0 - 6,000
<i>Ceanothus lemmonii</i> Lemmon's ceanothus (*)	-	-	-	-	-	X	-	-	+	1,200 - 3,500
<i>Ceanothus sanguineus</i> red stem ceanothus (*)	-	-	-	-	-	X	-	X	-	0 - 4,000
<i>Cercis occidentalis</i> western redbud (*)	-	-	-	-	+	+	-	X	-	0 - 4,500
<i>Cercocarpus betuloides</i> mountain mahogany (*)	-	-	-	-	-	+	-	-	X	0 - 6,000
<i>Crataegus douglasii</i> hawthorn	-	-	-	-	-	X	-	-	-	2,500 - 5,500
<i>Eriodictyon californicum</i> yerba santa	-	-	-	-	-	X	-	-	X	0 - 5,500
<i>Eriodictyon trichocalyx</i> hairy yerba santa	-	-	-	-	-	X	-	-	X	0 - 8,000
<i>Euonymus occidentalis</i> western burning bush	-	-	-	X	-	-	-	-	-	0 - 5,200
<i>Garrya elliptica</i> silk-tassel	-	-	-	-	+	X	-	-	-	0 - 2,000
<i>Garrya fremontii</i> silk-tassel	-	-	-	-	+	X	-	-	X	0 - 7,500
<i>Gaultheria ovatifolia</i> slender salal	-	-	-	-	X	-	-	-	-	3,000 - 5,500
<i>Gaultheria shallon</i> salal	-	-	-	+	X	-	-	-	-	0 - 2,500
<i>Heteromeles arbutifolia</i> toyon	-	-	-	-	-	+	-	+	X	0 - 4,000
<i>Lonicera involucrata</i> twinberry	X	+	-	X	+	-	-	-	-	0 - 10,000
<i>Lotus yollabolliensis</i> bird's foot trefoil (*)	-	-	X	-	-	-	-	-	-	5,500 - 7,000

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<i>Lupinus albitrongs</i> lupine (*)	-	-	-	-	-	X	-	-	-	0 - 5,000
<i>Lupinus luteolus</i> lupine (*, A)	-	-	-	-	-	X	-	-	X	0 - 6,000
<i>Lupinus polyphyllus</i> lupine (*)	-	+	-	-	X	-	-	-	-	0 - 7,500
<i>Mimulus aurantiacus</i> monkey-flower	-	-	-	-	-	X	-	-	X	0 - 3,000
<i>Pickeringia montana</i> chaparral pea /3 (*)	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Quercus dumosa</i> scrub oak	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Quercus sadleriana</i> Sadler's oak	-	X	-	-	+	-	-	-	-	3,100 - 7,000
<i>Quercus vaccinifolia</i> huckleberry oak	-	-	X	-	-	X	-	-	-	3,000 - 10,000
<i>Rhamnus californica</i> ssp. <i>occidentalis</i> coffeeberry	-	-	+	-	-	X	-	-	-	0 - 7,500
<i>Rhododendron occidentale</i> western azalea	+	-	-	X	X	-	-	-	-	0 - 7,500
<i>Rhus trilobata</i> squaw bush	-	-	-	-	-	+	-	-	X	0 - 3,500
<i>Ribes bracteosum</i> stink gooseberry	-	-	-	-	X	-	-	-	-	0 - 3,000
<i>Ribes lobbii</i> Lobb's gooseberry	-	-	-	-	-	X	-	-	-	0 - 6,500
<i>Ribes marshallii</i> aplegate gooseberry	-	X	-	-	-	-	-	-	-	5,000 - 7,000
<i>Ribes sanguineum</i> red flowering current	-	-	-	-	X	-	-	-	-	2,000 - 6,000
<i>Rosa californica</i> rose	-	-	-	-	X	-	-	-	-	0 - 6,000
<i>Rosa gymnocarpa</i> wood rose	-	-	-	-	X	-	-	-	-	0 - 6,000
<i>Shepherdia argentea</i> buffalo-berry /3 (*)	-	-	-	+	+	-	X	+	-	3,500 - 6,500
<i>Styrax officinalis</i> var. <i>californica</i> snowdrop bush	-	-	-	-	-	+	-	-	X	0 - 3,000

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<i>Trichostema lanatum</i> wooly blue-curls /3 (*)	-	-	-	-	-	+	-	-	X	0 - 3,500
<i>Trichostema lanceolatum</i> vinegar weed (*)	-	-	-	-	-	+	-	-	X	0 - 3,500
<i>Vaccinium membranaceum</i> thinleaf huckleberry	-	X	-	-	-	-	-	-	-	4,300 - 7,000
<i>Vaccinium ovatum</i> California huckleberry	-	-	-	-	X	-	-	-	-	0 - 2,500
<i>Vaccinium parvifolium</i> red huckleberry	-	-	-	X	X	-	-	-	-	0 - 5,000
<i>Zauschneria californica</i> California fuschia	-	-	-	-	-	X	-	-	-	0 - 3,500
LOW SHRUBS (< 2 ft.)										
<i>Arctostaphylos nevadensis</i> pinemat manzanita	-	-	-	-	X	X	-	-	-	2,000 - 10,000
<i>Arctostaphylos uva-ursi</i> bearberry	-	-	-	-	X	-	-	-	-	0 - 200
<i>Berberis nervosa</i> dwarf Oregon grape	-	-	-	-	X	-	-	-	-	0 - 6,000
<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	-	-	-	-	-	X	-	-	X	0 - 5,400
<i>Lonicera hispidula</i> var. <i>vacillans</i> honeysuckle	-	-	-	-	X	-	-	-	-	0 - 2,500
<i>Rubus leucodermis</i> western raspberry	-	+	-	-	X	-	-	-	-	0 - 7,000
<i>Rubus parviflorus</i> thimbleberry	-	+	-	-	X	-	-	-	-	0 - 8,000
<i>Rubus ursinus</i> Pacific blackberry	-	-	-	-	X	-	-	-	-	0 - 3,000
<i>Rubus vitifolius</i> California blackberry	-	-	-	-	X	-	-	-	-	0 - 4,000
<i>Salvia sonomensis</i> creeping sage	-	-	-	-	-	X	-	-	X	0 - 6,500
<i>Symphoricarpos mollis</i> creeping snowberry	-	-	-	-	X	-	-	+	-	0 - 5,000
<i>Symphoricarpos rivularis</i> snowberry	-	-	-	X	-	-	-	-	-	0 - 4,000

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<i>Vitis californica</i> California wild grape	-	-	-	+	-	-	X	-	-	0 - 4,000
<i>Whipplea modesta</i> yerba de selva	-	-	-	-	X	-	-	-	-	0 - 4,500
FORBS										
<i>Achillea borealis</i> ssp. <i>californica</i> yarrow	-	-	-	-	-	X	-	-	+	0 - 2,500
<i>Achillea lanulosa</i> yarrow	-	+	X	-	+	X	-	-	-	2,500 - 8,000
<i>Achillea millefolium</i> yarrow /2	-	-	-	-	+	X	-	+	+	0 - 3,000
<i>Anaphalis margaritacea</i> pearly everlasting	-	-	+	-	-	X	-	+	+	0 - 8,500
<i>Aralia californica</i> spikenard	-	-	-	X	-	-	-	-	-	0 - 5,000
<i>Calyptidium umbellatum</i> pussy paws	-	-	X	-	-	X	-	-	-	2,500 - 11,000
<i>Epilobium angustifolium</i> fireweed	-	X	-	-	X	-	-	-	-	0 - 9,000
<i>Eschscholzia californica</i> California poppy	-	-	-	-	-	X	-	-	X	0 - 6,500
<i>Gilia capitata</i> gilia	-	-	-	-	-	X	-	-	-	0 - 6,000
<i>Helianthus annuus</i> sunflower	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Ipomopsis aggregata</i> scarlet gilia	-	+	X	-	-	+	-	-	-	3,500 - 10,300
<i>Lathyrus japonicus</i> pea (*)	-	-	-	-	X	-	-	-	-	0 - 1,000
<i>Lathyrus polyphyllus</i> pea (*)	-	-	-	-	+	X	-	-	-	0 - 4,000
<i>Lathyrus torreyi</i> pea (*)	-	-	-	-	X	-	-	-	-	0 - 1,500
<i>Lathyrus vestitus</i> pea (*)	-	-	-	-	+	X	-	-	-	0 - 4,000
<i>Linum perenne</i> ssp. <i>lewisii</i> western blue flax	-	-	X	-	+	X	-	-	X	4,000 - 11,000

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<i>Lotus crassifolius</i> big deervetch (*)	-	-	+	-	-	X	-	+	+	2,000 - 8,000
<i>Lotus micranthus</i> bird's foot trefoil (*, A)	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Lotus purshianus</i> Spanish clover (*, A)	-	-	-	-	-	X	-	-	X	0 - 7,000
<i>Lotus scoparius</i> deerweed (*)	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Lupinus albicaulis</i> lupine (*)	-	-	-	-	X	-	-	-	-	2,000 - 8,500
<i>Lupinus bicolor</i> lupine (*, A)	-	-	-	-	+	X	-	+	+	0 - 3,000
<i>Lupinus densiflorus</i> lupine (*, A)	-	-	-	-	-	X	-	-	-	0 - 2,000
<i>Lupinus nanus</i> sky lupine (*, A)	-	-	-	-	-	X	-	-	-	0 - 3,000
<i>Lupinus succulentus</i> lupine (*, A)	-	-	-	-	-	X	-	-	-	0 - 2,000
<i>Melilotus albus</i> white sweet-clover /2 (*, B)	-	-	-	-	X	+	-	+	-	0 - 3,000
<i>Melilotus officinalis</i> yellow sweet-clover /2 (*, B)	-	-	-	-	X	+	-	+	-	0 - 3,000
<i>Mimulus guttatus</i> monkey flower	X	-	-	X	-	-	X	-	-	0 - 10,000
<i>Polystichum munitum</i> sword fern	-	-	-	X	-	-	-	-	-	0 - 2,500
<i>Thermopsis gracilis</i> false-lupine (*)	-	-	-	-	X	X	-	-	-	1,000 - 5,000
<i>Thermopsis macrophylla</i> false-lupine (*)	-	-	-	-	-	X	-	-	X	0 - 4,500
<i>Trifolium beckwithii</i> Beckwith's clover /2 (*)	-	X	-	-	X	-	-	-	-	4,000 - 7,000
<i>Trifolium bifidum</i> clover (*, A)	-	-	-	-	-	X	-	-	-	0 - 2,000
<i>Trifolium cillolatum</i> tree clover (*, A)	-	-	-	-	-	X	-	-	-	0 - 5,000
<i>Trifolium dubium</i> clover /2 (*, A)	-	-	-	-	-	X	-	-	-	0 - 2,500

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<i>Trifolium hirtum</i> rose clover/2 (*, A)	-	-	-	-	-	X	-	-	-	0 - 3,000
<i>Trifolium incarnatum</i> crimson clover/2 (*, A)	-	-	-	-	X	+	-	-	-	0 - 3,000
<i>Trifolium longipes</i> long-stalked clover (*)	-	-	X	-	-	-	-	-	-	0 - 9,000
<i>Trifolium microcephalum</i> littlehead clover (*, A)	-	-	X	-	-	X	-	-	-	0 - 8,500
<i>Trifolium microdon</i> clover (*, A)	-	-	-	-	-	X	-	-	-	0 - 2,500
<i>Trifolium oliganthum</i> clover (*, A)	-	-	-	-	-	X	-	-	-	0 - 3,500
<i>Trifolium pratense</i> red clover /2 (*)	-	-	-	-	-	X	-	-	-	0 - 3,000
<i>Trifolium repens</i> white clover /2 (*)	-	-	+	-	X	+	-	-	-	0 - 7,000
<i>Trifolium subterraneum</i> sub clover /2 (*)	-	-	-	-	-	X	-	-	-	0 - 3,000
<i>Trifolium tridentatum</i> clover (*, A)	-	-	-	-	-	X	-	-	-	0 - 5,000
<i>Trifolium variegatum</i> clover (*, A)	-	-	X	-	-	X	-	-	-	0 - 8,000
<i>Veronica americana</i> brooklime	X	-	-	X	-	-	X	-	-	0 - 10,500
<i>Vicia americana</i> vetch (*)	-	-	-	-	X	+	-	-	-	0 - 5,000
<i>Vicia californica</i> vetch (*)	-	-	-	-	X	+	-	-	-	2,000 - 8,000
<i>Vicia gigantea</i> vetch (*)	-	-	-	-	X	-	-	-	-	0 - 3,000
<i>Vicia villosa</i> winter vetch /2 (*, A, B)	-	-	-	-	X	X	-	-	-	0 - 3,000
<i>Woodwardia fimbriata</i> chain fern	-	-	-	X	-	-	-	-	-	0 - 5,000
<i>Xerophyllum tenax</i> beargrass	-	-	-	+	X	+	-	-	-	0 - 6,000
GRASSES										

/1 = Elevation follows Munz and Keck (1959)

/2 = Non-native naturalized species

/3 = Non-native exotic species.

Table 5. Species suitable for revegetating sites located on NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, B = Biennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
<i>Agropyron</i> sp. X <i>Triticum</i> sp. wheatgrass X wheat	-	-	-	-	X	-	-	-	-	-
<i>Agropyron dasystachyum</i> northern wheatgrass	-	-	-	-	-	-	-	-	X	2,000 - 4,000
<i>Agropyron intermedium</i> intermediate wheatgrass	-	-	-	-	+	X	-	+	+	-
<i>Agropyron smithii</i> western wheatgrass	-	-	-	-	-	-	-	-	X	5,000 - 6,500
<i>Agropyron trachycaulum</i> slender wheatgrass	-	X	X	-	-	-	-	-	-	0 - 11,000
<i>Agrostis alba</i> redtop /2	-	-	-	-	-	-	-	X	-	0 - 7,500
<i>Arrhenatherum elatius</i> tall oatgrass /2	-	-	-	-	X	+	-	-	-	0 - 4,500
<i>Avena sativa</i> cultivated oat /2	-	-	-	-	-	+	-	-	X	0 - 4,000
<i>Briza maxima</i> quaking grass /2 (A)	-	-	-	-	X	+	-	-	-	0 - 2,000
<i>Briza minor</i> quaking grass/2 (A)	-	-	-	-	+	X	-	-	-	0 - 3,000
<i>Bromus carinatus</i> California brome (A)	-	-	X	-	-	X	-	-	-	0 - 10,500
<i>Bromus marginatus</i> mountain brome	-	-	X	-	-	X	-	-	-	0 - 11,000
<i>Bromus mollis</i> soft chess /2 (A)	-	-	-	-	+	X	-	+	X	0 - 4,000
<i>Calamagrostis canadensis</i> blue-joint reedgrass	X	-	-	-	-	-	-	-	-	5,000 - 11,200
<i>Calamagrostis koelerioides</i> fire reedgrass	-	-	+	-	+	X	-	+	-	0 - 7,300
<i>Calamagrostis nutkaensis</i> reedgrass	-	-	-	X	X	-	-	-	-	0 - 5,700
<i>Carex bolanderi</i> sedge	X	-	-	X	-	-	-	-	-	0 - 8,100
<i>Carex nudata</i> sedge	-	-	-	X	-	-	-	-	-	150 - 5,000
<i>Dactylus glomerata</i> orchard grass /2	-	-	+	-	+	X	-	-	-	0 - 7,000

/1 = Elevation follows Munz and Keck (1959)
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Table 5. Species suitable for revegetating sites located on NON-ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, B = Biennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
<i>Danthonia californica</i> California oatgrass	-	-	-	-	+	X	-	-	-	0 - 5,000
<i>Deschampsia caespitosa</i> tufted hairgrass	X	-	-	-	-	-	-	-	-	3,300 - 12,500
<i>Elymus glaucus</i> blue rye	-	+	X	-	+	X	-	-	-	0 - 7,500
<i>Elymus triticoides</i> alkali rye	-	X	-	-	X	-	-	-	-	0 - 7,500
<i>Festuca californica</i> California fescue	-	-	-	-	+	X	-	-	-	0 - 6,000
<i>Festuca idahoensis</i> red fescue	-	-	-	-	+	X	-	+	X	0 - 5,000
<i>Festuca occidentalis</i> western fescue	-	-	-	-	+	X	-	+	X	0 - 6,500
<i>Festuca rubra</i> red fescue	-	X	-	-	X	-	-	-	-	0 - 8,500
<i>Hierochloa occidentalis</i> vanilla grass	-	-	-	+	X	-	-	-	-	0 - 2,000
<i>Hordeum brachyantherum</i> barley	-	X	-	-	X	-	-	-	-	0 - 11,000
<i>Hordeum californicum</i> California barley	-	-	-	-	-	-	-	X	-	0 - 8,500
<i>Hordeum jubatum</i> foxtail	-	X	+	-	X	+	-	-	-	0 - 10,000
<i>Phleum alpinum</i> mountain timothy	X	-	-	-	-	-	-	-	-	5,000 - 11,500
<i>Poa rhizomata</i>	-	-	-	-	X	-	-	-	-	1,500 - 3,000
<i>Sitanion hystrix</i> squirreltail	-	-	X	-	-	X	-	-	-	0 - 13,000
<i>Stipa occidentalis</i> western needlegrass	-	-	X	-	-	-	-	-	-	5,000 - 11,500
<i>Stipa pulchra</i> needlegrass	-	-	-	-	-	+	-	-	X	0 - 5,000
<i>Vulpia myuros</i> zoro fescue /3 (A)	-	-	-	-	-	X	-	-	X	0 - 3,000

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Table 6. Species suitable for revegetating sites located on ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, P = Perennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
TREES										
<i>Abies concolor</i> white fir	-	+	X	-	-	-	-	-	-	3,000 - 10,000
<i>Abies magnifica</i> var. <i>shastensis</i> Shasta red fir	-	X	X	-	-	-	-	-	-	5,000 - 9,000
<i>Arbutus menziesii</i> Pacific madrone /4	-	-	-	-	+	X	-	+	-	0 - 5,000
<i>Calocedrus decurrens</i> incense cedar	-	+	+	-	+	X	-	-	-	2,400 - 8,200
<i>Chamaecyparis lawsoniana</i> Port-Orford cedar	-	-	-	X	+	-	-	-	-	0 - 4,800
<i>Pinus attenuata</i> knobcone pine	-	-	-	-	-	X	-	-	X	0 - 4,000
<i>Pinus contorta</i> ssp. <i>contorta</i> shore pine /3	-	-	-	-	X	-	-	-	-	0 - 4,000
<i>Pinus contorta</i> ssp. <i>murrayana</i> lodgepole pine	-	+	X	-	+	X	-	X	-	5,000 - 11,000
<i>Pinus jeffreyi</i> jeffrey pine	-	-	X	-	+	X	-	+	-	3,500 - 9,000
<i>Pinus lambertiana</i> sugar pine	-	-	X	-	-	X	-	-	-	2,500 - 9,000
<i>Pinus monticola</i> western white pine	-	-	X	-	-	X	-	-	-	2,000 - 9,800
<i>Pinus sabiniana</i> digger pine	-	-	-	-	-	+	-	-	X	0 - 4,500
<i>Pseudotsuga menziesii</i> Douglas-fir /4	-	-	-	-	X	+	-	-	-	0 - 5,000
<i>Robinia pseudo-acacia</i> black locust /2 (*)	-	-	-	-	X	X	-	X	+	0 - 3,000
TALL SHRUBS (> 5 ft.)										
<i>Holodiscus discolor</i> var. <i>delnortensis</i> creambush oceanspray	-	-	-	-	X	X	-	+	-	0 - 4,500
<i>Quercus garryana</i> var. <i>breweri</i> Brewer oak	-	-	X	-	-	X	-	-	+	2,000 - 6,000
<i>Rhododendron macrophyllum</i> rhododendron	-	-	-	+	X	-	-	-	-	0 - 4,000

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/4 = Marginally tolerant to ultra-basic soils.

Table 6. Species suitable for revegetating sites located on ultra basic rock type. X designates optimum habitat and + designates potential habitat. Moisture and temperature groups follow definitions given in Tables 3 and 4. (* = Nitrogen fixer, P = Perennial and A = Annual).

SPECIES NAME COMMON NAME	A COLD WET	B COLD MOIST	C COLD DRY	D WARM WET	E WARM MOIST	F WARM DRY	G HOT WET	H HOT MOIST	I HOT DRY	ELEVATION RANGE /1 (Feet)
<i>Umbellularia californica</i> California bay - shrub form	-	-	-	-	+	X	-	+	+	0 - 5,000
MEDIUM SHRUBS (> 2 ft. & < 5 ft.)										
<i>Adenostoma fasciculatum</i> chamise	-	-	-	-	-	+	-	-	X	0 - 5,000
<i>Amelanchier alnifolia</i> service-berry	-	-	-	-	+	X	-	-	-	0 - 5,000
<i>Arctostaphylos canescens</i> hoary manzanita	-	-	-	-	-	+	-	-	X	1,000 - 5,000
<i>Arctostaphylos columbiana</i> hairy manzanita	-	-	-	-	-	+	-	-	X	0 - 2,500
<i>Arctostaphylos glandulosa</i> eastwood manzanita	-	-	-	-	-	+	-	-	X	1,000 - 6,000
<i>Arctostaphylos hispidula</i> Gasquet manzanita	-	-	-	-	-	+	-	-	X	1,000 - 4,000
<i>Arctostaphylos patula</i> greenleaf manzanita	-	-	-	-	-	+	-	-	X	2,000 - 9,000
<i>Arctostaphylos viscida</i> whiteleaf manzanita	-	-	-	-	-	+	-	-	X	500 - 5,000
<i>Calycanthus occidentalis</i> spice-bush	-	-	-	+	+	-	X	-	-	0 - 4,000
<i>Castanopsis sempervirens</i> bush chinquapin	-	-	X	-	-	+	-	-	+	2,500 - 11,000
<i>Ceanothus cuneatus</i> buck brush (*)	-	-	+	-	-	+	-	-	X	0 - 6,000
<i>Cercis occidentalis</i> western redbud (*)	-	-	-	-	+	+	-	X	-	0 - 4,500
<i>Cercocarpus betuloides</i> mountain mahogany (*)	-	-	-	-	-	+	-	-	X	0 - 6,000
<i>Eriodictyon californicum</i> yerba santa	-	-	-	-	-	X	-	-	X	0 - 5,500
<i>Garrya buxifolia</i> silk-tassel	-	-	-	-	-	+	-	-	X	1,500 - 4,600
<i>Heteromeles arbutifolia</i> toyon	-	-	-	-	-	+	-	+	X	0 - 4,000

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<i>Ledum glandulosum</i> ssp. <i>columbianum</i> labrador-tea	-	-	-	X	-	-	+	-	-	0 - 2,000
<i>Lithocarpus densiflora</i> var. <i>echinoides</i> tanoak-shrub form	-	-	-	-	+	X	-	+	+	2,000 - 8,000
<i>Pickeringia montana</i> chaparral pea /3 (*)	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Quercus durata</i> leather oak	-	-	-	-	-	X	-	-	X	0 - 5,000
<i>Quercus sadleriana</i> sadler oak	-	X	-	-	+	-	-	-	-	3,100 - 7,000
<i>Quercus vaccinifolia</i> huckleberry oak	-	-	X	-	-	X	-	-	-	3,000 - 10,000
<i>Rhamnus californica</i> ssp. <i>occidentalis</i> coffeeberry	-	-	+	-	-	X	-	-	-	0 - 7,500
<i>Rhododendron occidentale</i> western azalea	+	-	-	X	X	-	-	-	-	0 - 7,500
<i>Vaccinium ovatum</i> California huckleberry	-	-	-	-	X	-	-	-	-	0 - 2,500
<i>Vaccinium parvifolium</i> red huckleberry	-	-	-	X	X	-	-	-	-	0 - 5,000
LOW SHRUBS (< 2 ft.)										
<i>Arctostaphylos nevadensis</i> pinemat manzanita	-	-	-	-	X	X	-	-	-	2,000 - 10,000
<i>Berberis piperiana</i> barberry	-	-	-	-	X	-	-	-	-	3,000 - 5,000
<i>Berberis pumila</i> barberry	-	-	-	-	X	-	-	-	-	1,000 - 4,000
<i>Berberis repens</i> barberry	-	-	-	-	+	X	-	-	-	0 - 4,000
<i>Ceanothus prostratus</i> squaw carpet (*)	-	-	+	-	-	+	-	-	X	3,000 - 6,500
<i>Ceanothus pumilus</i> ceanothus (*)	-	-	-	-	-	+	-	-	X	2,000 - 5,700
<i>Eriogonum umbellatum</i> sulfer flowered buckwheat	-	-	X	-	-	X	-	-	-	2,500 - 10,000

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<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	-	-	-	-	-	X	-	-	X	0 - 5,400
<i>Juniperus communis</i> dwarf juniper	-	-	-	-	+	X	-	+	X	3,000 - 7,000
FORBS										
<i>Achillea lanulosa</i> yarrow	-	+	X	-	+	X	-	-	-	2,500 - 8,000
<i>Horkelia sericata</i> Howell's horkelia	-	-	-	-	-	X	-	-	-	1,500 - 3,600
<i>Xerophyllum tenax</i> beargrass	-	-	-	+	X	+	-	-	-	0 - 6,000
GRASSES										
<i>Agrostis hallii</i> bent grass	-	-	-	-	-	X	-	-	-	0 - 4,000
<i>Bromus mollis</i> soft chess /2 (A)	-	-	-	-	-	X	-	X	-	0 - 4,000
<i>Elymus glaucus</i> rye grass	-	+	X	-	+	X	-	-	-	0 - 7,500
<i>Festuca californica</i> California fescue	-	-	-	-	+	X	-	-	-	0 - 6,000
<i>Festuca idahoensis</i> Idaho fescue	-	-	-	-	+	X	-	+	X	0 - 5,000
<i>Festuca occidentalis</i> western fescue	-	-	-	-	+	X	-	+	X	0 - 6,500

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PLANT SPECIES SUITABILITY AND CULTURE

The following section provides information on the suitability and culture of plant species useful for revegetation projects in the Trinity River watershed. Ideally, the best plant to use for revegetation would be a native that is readily available, easy to grow, easy to handle, environmentally adapted, with a root system that is strong and capable of rapidly stabilizing soil. It would provide food, cover and nesting habitat for wildlife and, in addition, would not have any allelopathic or inhibitory effect on other desirable plant species that invade later but instead would facilitate the natural recolonization of the site by native species adjacent to the site while keeping out other undesirable "weed" type plants. Unfortunately, there are few if any species that meet all of these criteria. It may also be ironic that some non-natives may meet more of these requirements than native species.

SUITABILITY

The suitability of a species for use in revegetation projects varies considerably depending on a number of factors. A species that is suitable for one site may be unsuitable for many other sites depending on the conditions of the site and the goals of the project. The following is a list of some of the factors that may affect suitability with a short discussion each. Important characteristics related to these factors are listed for each plant species in Table 7. Most of the information in Table 7 was obtained from the various publications referenced in the bibliography of this report.

- **Preferred site** - Includes information on where the species is most environmentally adapted. It is usually best to use a species that is the most environmentally adapted to the site. In some instances however, it may be necessary or desirable to use a species that is not ideally adapted. An example of this would be a species that can survive just long enough for the local native species to colonize the site.
- **Native Community (Native vs. non-native species)**. Includes information on which Trinity River watershed plant communities each species is native to. Plant community abbreviations and definitions follow Table 2. Additional information is provided as a footnote on species origin. Definitions of species origin categories used in the tables of this report are as follows. The primary source of information for species origin was Munz and Keck (1959).
 - **Native species** - Native species were defined as species that are known to occur naturally (not introduced) in northwest California. All species in this report are native unless noted.
 - **Non-native naturalized species** - Non-native naturalized species were defined as species that were introduced by man to northwest California and have become naturalized or a part of the natural communities.

- o **Non-native exotic species** - Non-native exotic species were defined as species that are not known to occur in northwest California except possibly in landscape plantings or botanical gardens. Native species are always preferable to non-native species for use in revegetation projects. If a non-native species is being considered, a good rule to remember is that the "species should in a sense act as a semipermeable membrane, letting desirable native species gradually recolonize [the site] while holding the soil and shutting the door on noxious weed invasion" (Mulroy 1988). The introduction of non-native species may lead to unanticipated adverse consequences on the surrounding flora by the displacement of native species or changing native species genetic and physical makeup through hybridization. For these reasons, caution should be used when selecting non-native species for revegetation projects. A good discussion of the use of native vs. non-native species may be found in the article by Millar and Libbey (1989) listed in the bibliography.

- **Range** - Includes information on the species natural range or distribution. This information would be useful for determining species adaptability.

- **Nitrogen-fixing species** - Nitrogen-fixing species are generally essential for adding nitrogen and building soils on landslides or other disturbed areas that have shallow or undeveloped soils. Most nitrogen-fixing species require inoculation and may benefit from phosphorous fertilization. Inoculation involves the introduction of the specific nitrogen-fixing bacteria to the roots or seed of the plant before planting. One common practice is to collect and use the soil duff or litter adjacent to the same species growing in the field to inoculate the roots or seed before planting. All nitrogen-fixing species listed in the tables of this report are highlighted with an asterix (*).

- **Habit** - All species were grouped by whether they are a tree, tall shrub (> 5 ft.), medium shrub (> 2 ft. & < 5 ft.), low shrub (< 2 ft.), forb or grass. This information would be useful for selecting species that meet specific vegetation height or cover requirements. Other information provided includes whether species are deciduous or evergreen, information on species flammability and other information that may influence species selection.

- o **Deciduous vs. evergreen** - Deciduous species may provide more organic matter to the soil and have higher soil building capability than evergreen species. The leaves of deciduous species also provide food for fish indirectly by providing food and habitat for insects along streams or rivers.

- **Growth** - Includes information on growth rate, invasiveness, dissemination, etc.

- o **Growth rate** - Growth rate may be important where rapid vegetation establishment is desired. Rapid growing species are generally shorter lived however.

- o **Invasiveness** - Invasive species are generally not desirable for use in revegetation projects. The ideal species is one that is easy to establish but is non-invasive and will allow the eventual colonization of native species adjacent to the site.
- **Roots** - Includes information on root depth, structure and strength. Deep-rooted woody perennial species are generally more desirable for stabilizing slopes since their root systems provide greater strength for holding soils at deeper levels. A diffuse, fibrous root system however, is better suited for binding loose sandy soils (e.g. decomposed granite), retarding gullying and limiting sheet erosion.
- **Perennial vs. annual or biennial** - Information on whether the species is perennial, annual or biennial is important in determining efficacy in erosion control and soil building effectiveness. All plants listed in this report are perennial unless noted as "A" for annuals or "B" for biennials.
- o **Erosion control** - In most cases, perennial species are preferable to annual or biennial species for long-term erosion control. With grasses, most annual or biennial species consist of non-natives which are better adapted to lower elevations below the commercial forest zone. The use of annual or biennial grass species at lower elevations, however, can result in a dense, self-reseeding, difficult-to-control grass cover that strongly competes with conifer seedlings for soil water and can promote fire control problems (Ratliff and McDonald 1987). For these reasons, annual and biennial grass species are generally better suited for erosion control at higher elevations where they are less adapted and less likely to prevent establishment of more desirable perennial shrub or tree species.
- o **Soil building** - Short-lived species generally provide more organic matter above and below ground than longer-lived species.
- **Disease** - Includes information on whether the species is susceptible to disease or acts as a host for disease transmittal.

LAWS AND REGULATIONS

Laws and regulations governing the selection of plant species for revegetation projects generally relate to the need to maintain the biological diversity and genetic integrity of plant species and their communities. Biological diversity is defined as the variety of life in an area which includes the variety of genes, species, plant and animal communities, ecosystems and processes through which individual organisms interact with one another and their environments. The biological diversity issue reflects increasing concerns over the increasing rate of species extinctions, reductions in genetic richness

within species, simplification of ecological systems and the environmental, social and economic impacts these factors may have on current and future generations of people. The need to conserve biological diversity has given more impetus to the selection and use of plant species that are not only native but are also grown from locally-collected seed or plant stock.

Laws and regulations governing potential environmental impacts due to revegetation projects vary depending on whether the project will occur on Federal land or State and private lands. The following is a short summary of some of the laws and regulations that relate to each. Due to the complexity of this issue, the list of laws should not be considered complete and may require certain additions or modifications.

Federal Lands

Projects that may potentially have an environmental impact on Federal land are initially governed by the National Environmental Protection Act (NEPA). Agencies within the Federal government are further governed by other laws, regulations and policies which give more specific direction on the planning and implementation of revegetation projects. Since the major portion of land within the Trinity River watershed is managed by the U.S. Forest Service, the following includes only those laws, regulations and policies that govern revegetation projects located on land managed by the Forest Service.

- **National Environmental Protection Act (NEPA)** - NEPA directs federal agencies to interpret and administer the policies, regulations and public laws of the United States in accordance with the methods and policies in the act. Considerations related to revegetation projects and the selection of suitable plant stock include:
 - The environmental impact of the proposed action.
 - Any adverse environmental effects which cannot be avoided should the project be implemented.
 - The responsible federal agency shall consult with and obtain the comments of any other state or federal land management entity of any action which may have significant impact. If there is any disagreement on such impacts, the agency shall prepare a written assessment of such impacts and views. The written assessment may be in the form of an environmental impact statement (EIS), environmental assessment (EA) or, for some projects, a decision memo.
 - The initiation and utilization of ecological information in the planning and development of resource-oriented projects.

- **Categorical Exclusions** - The following categories of routine administrative and maintenance actions normally do not individually or cumulatively have a significant effect (40 CFR 1508.22) on the quality of the human environment and, therefore, may

be categorically excluded from documentation in an Environmental Impact Statement (EIS) or Environmental Assessment (EA):

- 1) Administrative actions, such as road and area closures; restrictions on travel or use, such as camping, boating, or hunting; and posting signs and markers.
- 2) Construction of low-impact facilities or improvements, such as auxiliary support buildings or other structures; picnic areas and campgrounds; temporary and other low-standard roads, such as traffic service level "D" roads (FSH 7709.56); and trails.
- 3) Repair and maintenance activities, such as on buildings, grounds, trails, rights-of-way, and range improvements.

- **Categories Where a Decision Memo and Project File Are Required:** A project file should be maintained and a Decision Memo should be prepared for the following categories of proposed actions. The following is a partial list of only those categories related to revegetation projects.

- 1) Low-impact silvicultural activities that are limited in size and duration and that primarily use existing roads and facilities, such as site preparation, planting or seeding.
- 2) Low-impact range management activities, such as seeding.
- 3) Issuance or modification of authorizations or agreements for such uses of lands or facilities as road maintenance and additional use of existing roads, rights-of-way, and easements.
- 4) Fish and wildlife management activities, such as improving habitat, installing fish ladders, and stocking native or established species.

- **Content of a Project File:** As a minimum, a project file on a proposed action should include:

- 1) A list of the names of interested and affected people, groups, and agencies contacted during scoping;

- 2) The results of scoping and the subsequent environmental analysis;
- 3) A copy of the Decision Memo;
- 4) A list of the people, agencies, and groups notified of the decision;
- 5) Other notice used to inform interested and affected persons of the decision to proceed with or to implement an action that has been categorically excluded.

- **Decision Memo Format and Content:** Generally, Decision Memos should conform to the following format and content although sections may be combined or rearranged in the interest of clarity and brevity.

1) **Heading** - The heading consists of the following elements:

- a) Title of document - "Decision Memo"
- b) The title of the proposed action.
- c) The location of the proposed action (including the Forest Service administrative unit, County, and State). In some cases, including the legal land description is appropriate.

2) **Proposed Action** - Describe the proposed action, the decision to be implemented, and reasons for making the decision.

3) **Scoping and Public Involvement** - Describe the scoping process used and the issues identified. It may be appropriate to identify or refer to the interested and affected agencies, organizations, and persons contacted.

4) **Reasons for Categorically Excluding the Proposed Action** - This section includes:

- a) Identification of the category into which the proposed action falls.
- b) Finding that no extraordinary circumstances exist that might cause the action to have significant effects.

5) **Findings Required by Other Laws** - Include any findings required by any other laws. For example, findings of consistency with the forest plan, suitability, and vegetation management required by the National Forest Management Act (FSM 1922.41 and FSH 1909.12, sec. 5.3).

6) **Implementation Date** - Include the date when the responsible official intends to implement the decision.

7) **Administrative Review or Appeal Opportunities** - State whether the decision is subject to review or appeal, cite the applicable regulations, and identify when and where to file a request for review or appeal.

8) **Contact Person** - Include the name, address, and phone number of the Forest Service employee who can supply further information about the decision.

9) **Signature and Date** - The responsible official must sign and date the Decision Memo on the date the decision is made.

- **Notice and Distribution of Decision Memo** - Distribute the Decision Memo in a manner designed to inform agencies, organizations, and persons interested in or affected by the proposed action.

- **Forest and Rangeland Renewable Resources Planning Act of 1974** - Governs Forest Service managed lands. Requires National Forests to provide for diversity of plant and animal species and, where possible, to maintain the diversity of tree species similar to that existing in the planning area.
- **National Forest Management Act of 1976 (NFMA)** - Governs Forest Service managed lands. This act substantially amended the Forest and Rangeland Renewable Resources Planning Act of 1974. The act requires National Forests to maintain the diversity of tree species similar to that existing in the area to be managed. The following are specific sections related to the selection of species for revegetation.
 - **Reforestation** - Sec. 4 (d) *"It is the policy of the Congress that all forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans."*
 - **National Forest System Resource Planning** - Sec. 6 (g) 3-B *"provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, . . . for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan."*
- **National Forest Policy** - Most of the National Forest regulations relate to the reforestation of areas managed for timber or the use of commercial conifer species. The regulations may have limited application to the use of non-commercial species for the revegetation of landslides or riparian areas but they are useful for providing guidance in the selection of suitable plant stock. The following are sections taken from Forest Service Manual (FSM) 2474.

o **Policy - FSM 2474.03**

1. *"All seed used in forestation should meet the standards of the Base Level Tree Improvement Program. Acceptable levels of adaptability, genetic diversity, and performance in economic traits should be achieved for each seed lot."*

2. *Seed Origin. "Only use seed of known origin for forestation. Do not use seed collected from plantations of unknown or questionable origin. Use seed of local origin (collected within the same seed zone and 500 foot elevation band as the planting site) when available, to ensure adaptability. . . ."*

3. **Seed Transfer Rules:**

a. *"Seed origin should be as close as possible to the planting site of use."*

b. *"Seed origin must be within the same physiographic and climatic region and within 1,000 feet elevation to the planting site of use." (see Figure 2)*

c. *"When seed from the local zone is not available, favor either an adjacent 500 foot elevation band or an adjacent zone within the subregion first "*

4. *Exotic Introduction. "Use seed of minor species such as giant sequoia, Afghanistan pine and so forth, outside of their natural range in small quantities only where needed to meet land management objectives and where experience shows a high probability of success."*

- **National Forest System Resource Management Plan -** Provides National Forest planning regulations as required by the Forest and Rangeland Renewable Resources Planning Act of 1974. The following is a specific section related to vegetation management and the maintenance of diversity.

- o **Diversity - (FSM - Part 219.26)** *"Management prescriptions, where appropriate and to the extent practicable, shall be prescribed to enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that it is at least as great as that which would be expected in a natural forest and the diversity of tree species similar to that existing in the planning area. Reductions in diversity of plant and animal communities and tree species from that which would be expected in a natural forest, or from that similar to the existing diversity in the planning area, may be prescribed only where needed to meet overall multiple-use objectives."*

State and Private Lands

Projects that may potentially have an environmental impact on State or private lands are governed by the California Environmental Quality Act (CEQA). In general, the California Environmental Quality Act requires the production of an Environmental Impact Report (EIR) for projects that may have an



Figure 2. Seed collection zones for California. Map taken from Seeds of Woody Plants of the United States (USDA Forest Service 1974).

environmental impact. Most revegetation projects however, would not require the production of an Environmental Impact Report unless the project is associated with a timber harvest or type conversion. Projects of this nature also require a Timber Harvest Plan written by a Registered Forester.

Projects that may involve any type of earth moving activities especially within a riparian area may require an Environmental Impact Report and notification of the California Department of Fish and Game and possibly other authorities.

CULTURE

Information on the culture or propagation of plant species was obtained primarily from the following publications:

- **Emery, D.** 1988. Seed propagation of native California plants.
- **Munz, P.A. and D.D. Keck** 1959. A California flora.
- **USDA Forest Service** 1974. Seeds of woody plants in the United States.

The information obtained from these publications is contained in Table 7 and includes information on ease of culture and propagation, seed weight, flowering period, fruiting period, seed stratification requirements, seed treatment requirements and information on species propagation.

- **Seeds** - Includes information on seed germination requirements, average seed per pound and ranges in seed per pound. Seed weight was taken from various publications including USDA Forest Service (1974) and others listed in the bibliography.

The germination requirements of a plant species may have a significant effect on their suitability for use in revegetation projects. Species that require substantial treatment or stratification of their seed to achieve proper germination may be too expensive or inefficient for most revegetation projects.

- **Treatment requirements** - Many species require specific seed treatment in order to break their seed coat or stimulate germination. Seed treatment should be determined as accurately as possible before selecting a species for revegetation. The following is a list of some of the treatments that may be required.

- **Mechanical scarification** - May be accomplished by rupturing the seed coat with sandpaper, a file, a pin, a knife or even a vise. Care should be taken not to injure the embryo (Emery 1988).

- **Hot water treatment** - May be accomplished by dropping seed in about six times their volume of 180°-200°F. water. Seed should be left to cool and soak in the water for 12 to 24 hours (Emery 1988).
 - **Dry heat treatment** - May be accomplished by placing seed in a shallow container in a preheated incubator or oven at a specified temperature (Emery 1988).
 - **Charate treatment** - Studies have shown that some seed associated with chaparral fires achieve better germination with the addition of the burned remains (charate) of chamise (*Adenostoma fasciculatum*) stems to the sown seeds (Emery 1988).
 - **Fire treatment** - May be accomplished in the fall by placing seed in a slightly moist medium with a 4-6 inch layer of pine needles over the top and then igniting the needles (Emery 1988).
 - **Acid treatment** - May be accomplished by placing the seed in concentrated sulfuric acid (H_2SO_4) for a specified length of time and temperature. Extreme care should be taken when using acid to treat seed (Emery 1988).
- o **Stratification requirements** - Many species require stratification of their seed in order to stimulate germination. Stratification requirements are usually very specific for each species and should be determined as accurately as possible before selecting species for revegetation projects. The following are only a few of the possible stratifications that may be required.
- **Cold stratification** - Many seeds with internal dormancy require cold winter temperatures to stimulate germination. This may be accomplished by soaking the seed for a few hours first, then placing the wet seed in a sealed container in a refrigerator at a temperature of 35°-41°F. for a specified period of time (Emery 1988).
 - **Warm stratification** - May be accomplished by placing the seed in a moist medium in a sealed plastic bag or glass jar and placing this mixture in a location that stays warm both night and day for a specified period of time (Emery 1988).
- o **Seed viability** - Some seeds are extremely short-lived (e.g. *Salix* and *Populus*) and remain viable for only a few hours. Other species (e.g. *Quercus*, *Aesculus*, *Chrysolepis*, *Corylus*, *Acer* and *Styrax*) also have short-lived seeds (approximately 1 month) that must be sown before they dry out (Emery 1988). Care should be taken to get fresh seed when selecting species that have short-lived seeds.

- **Propagation** - Includes information on propagation of plant species by means other than seed such as cuttings from roots or stems.
- **Flowers** - Includes information on flowering period as given by Munz and Keck (1959), USDA Forest Service (1974) and various other references listed in the bibliography. Flowering period may vary depending on location and differences in environmental conditions. Flowering periods may be useful for estimating the proper time for collecting seed in the field.
- **Fruits** - Includes information on fruiting period as given by USDA Forest Service (1974) and various other references as listed in the bibliography. Fruiting period may vary depending on location and climate fluctuations. Fruiting periods are probably most important for knowing when to collect seed in the field.

Table 7. Species list with information on suitability and cultural requirements. Suitability summarizes information on efficacy and use of each species for revegetation. Culture includes information on seed treatment, seed stratification, propagation, flowering time and fruiting time. (* = Nitrogen fixer, B = Biennial, A = Annual, ‡ = Good bet as plug or bareroot. † = Good bet as seed).

SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
TREES		
<i>Abies concolor</i> white fir	Preferred Site: Best in deep, rich, moist loam but also tolerant of coarse, dry soils. Needs good drainage (Labadie 1978). Native communities: RF, WF, MF	Seeds: 1 mo. stratification (Emery 1988). 11,100 seeds/lb (8,600-17,720 seeds/lb); Flowers: May-Jun; Fruits: Sep-Oct
<i>Abies grandis</i> grand fir	Range: Occurs on low hills and valleys near the coast from Sonoma, CA to British Columbia (Munz and Keck 1959). Native communities: Not native to Trinity River watershed.	Seeds: 28-42 days stratification in a moist medium at 34-41 deg. F. may increase germination (USDA Forest Service 1974). 18,400 seeds/lb (11,900-28,800 seeds/lb); Flowers: Mar-Apr
<i>Abies magnifica</i> var. <i>shastensis</i> Shasta red fir	Preferred Site: Requires moist, well-drained soil from 5,000-9,000 feet. Light: Not too shade tolerant (Labadie 1978). Native communities: RF, WF	Seeds: 28-42 days stratification in a moist medium at 34-41 deg. F. (USDA Forest Service 1974). 7,300 seeds/lb (5,100-11,200 seeds/lb) Fruits: Sep.
<i>Acer macrophyllum</i> big leaf maple (‡)	Preferred Site: Requires moist site; Light: Shade tolerant (Labadie 1978). Native communities: Riparian or moist north aspects.	Seeds: 1-2 mos. stratification; use fresh seed (Emery 1988). Generally only 20-30% of fruits contain fertile seeds. 3,250 seeds/lb (2,700-4,000 seeds/lb) Fruits: Sep-Oct
<i>Alnus oregana</i> red alder (*, ‡)	Preferred Site: Excellent for restoration of wet sites. Range: Grows from sea-level to 500 feet (Munz and Keck 1959). Native communities: Riparian	Seeds: 1-3 mos. stratification may improve germination. Seeds may have very low percent viability (Emery 1988). 666,000 seeds/lb (383,000-1,087,000 seeds/lb) Flowers: Feb-May; Fruits: Aug-Oct.
<i>Alnus rhombifolia</i> white alder (*, ‡)	Preferred Site: More tolerant to cold than red alder (Labadie 1978). Roots: Has invasive roots. Native communities: Riparian	Seeds: No treatment. Seeds may have very low percent viability (Emery 1988). 650,000 seeds/lb (613,000-687,000 seeds/lb); Flowers: Mar; Fruits: Sep-Oct
<i>Arbutus menziesii</i> Pacific madrone	Preferred Site: Doesn't tolerate poorly drained soils or air pollution (Kruckeberg 1982). Allelopathy: May produce allelopathic or inhibitory chemicals that alter growth potential of adjacent plants. Native communities: DP, DF, TM	Seeds: 2-3 mos. stratification in moist medium at 33-40 deg. F. (USDA Forest Service 1974). 255,000 seeds/lb (197,000-320,000 seeds/lb), (2,000 fruits/pound dry weight); Flowers: Mar; Fruits: Sep-Oct
<i>Calocedrus decurrens</i> incense cedar (‡)	Preferred Site: Thrives under many different conditions of soils, moisture and exposure (Kruckeberg 1982). Native communities: WF, MF, MP, JP, DP, DF	Seeds: 2 mos. stratification; no treatment may give good germination (USDA Forest Service 1974). 17,000 seeds/lb (13,500-20,200 seeds/lb); Flowers: Dec-May, Fruits: Sep-Nov
<i>Castanopsis chrysophylla</i> golden chinquapin	Roots: Has very robust and deep-growing roots even as seedlings. Young seedlings should be set out in large containers or planted to prevent coiling of its aggressive root system (Kruckeberg 1982). Native communities: DF, DP	Seeds: No treatment; use fresh seeds (Emery 1988). (830-1,100 seeds/lb); Flowers: Jun-Feb; Fruits: Aug-Sep
<i>Chamaecyparis lawsoniana</i> Port-Orford cedar	Preferred Site: Performs best in cool coastal areas. Not tolerant of hot, dry winds or extreme cold (Labadie 1978). Disease: Very susceptible to Port-Orford cedar root disease. Native communities: MF, DF	Seeds: No treatment; Stratification may improve germination (USDA Forest Service 1974). 210,000 seeds/lb (80,000-600,000 seeds/lb)

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Chamaecyparis nootkatensis</i> Alaska cedar /2	Native communities: Not native to the Trinity River watershed.	Seeds: 2.5 mos. stratification (Babb 1959). 108,000 seeds/lb (66,000-180,000 seeds/lb); Propagation: May be propagated from cuttings; Flowers: May-Jun; Fruits: Sep
<i>Cornus nuttallii</i> mountain dogwood (‡)	Preferred site: Commonly found on moist sites on lower slopes and canyons. Light: Shade tolerant. Wildlife: Infrequently browsed by deer and livestock (Sampson and Jespersen 1963). Native communities: DF, DP	Seeds: 3-4 mos. stratification. Scarification or soaking in concentrated H ₂ SO ₄ 1 hr. first may improve germination. Fresh seeds may need no pre-treatment (USDA Forest Service 1974). 4,700 seeds/lb (4,000-6,100 seeds/lb); Flowers: Apr-May; Fruits: Sep-Oct
<i>Fraxinus latifolia</i> Oregon ash	Preferred Site: Best for revegetating wet, low lying areas (Kruckeberg 1982). Native communities: Riparian	Seeds: 3 mos. stratification (Emery 1988). 5,000 seeds/lb
<i>Juniperus occidentalis</i> western juniper	Range: Widely distributed throughout California from 3,000-10,500 feet (Sampson and Jespersen 1963). Native communities: MP	Seeds: 12,300 seeds/lb (8,000-15,860 seeds/lb); Flowers: Apr-May; Fruits: Sep
<i>Lithocarpus densiflora</i> tanoak	Light: Shade tolerant (Kruckeberg 1982). Native communities: DP, DF, TM	Seeds: No treatment; use fresh seed (Emery 1988). 90 seeds/lb (57-110 seeds/lb); Propagation: Young, container-grown plants transplant better than field grown specimens (Kruckeberg 1982). Flowers: Jun-Aug; Fruits: Sep-Nov
<i>Picea sitchensis</i> Sitka spruce	Preferred Site: Prefers moist or swampy areas below 1,200 feet; Not recommended for inland sites. Range: Occurs near the coast from Mendocino County to Alaska (Munz and Keck 1959). Native communities: Not native to the Trinity River watershed.	Seeds: No treatment (USDA Forest Service 1974). 1 mo. stratification (Babb 1959).; 210,000 seeds/lb (155,000-400,000 seeds/lb); Flowers: May; Fruits: Aug-Sep
<i>Pinus attenuata</i> knobcone pine (‡)	Preferred Site: Prefers dry, barren or rocky places below 4,000 feet. Highly recommended for serpentine sites. Range: Widely distributed from southern California to Siskiyou County (Munz and Keck 1959). Native communities: MP, JP, DP	Seeds: 2 mos. stratification (USDA Forest Service 1974). 25,400 seeds/lb (15,200-32,400 seeds/lb); Flowers: Apr; Fruits: Jan-Feb
<i>Pinus contorta</i> ssp. <i>contorta</i> shore pine /2	Preferred Site: Tolerates dry, gravelly soils; Range: Most common below 5,000 feet (Labadie 1978). Native communities: Not native to the Trinity River watershed.	Seeds: Fresh seeds no treatment; stored seeds 1 mo. stratification (USDA Forest Service 1974). 135,000 seeds/lb (111,000-165,000 seeds/lb); Flowers: May-Jun; Fruits: Sep-Oct
<i>Pinus contorta</i> ssp. <i>murrayana</i> lodgepole pine (‡)	Preferred Site: Tolerates a wide range of moisture conditions ranging from dry slopes to moist meadows 5,000-11,000 feet elevation. Range: Occurs from southern California to Alaska (Munz and Keck 1959). Native communities: MP, JP, DP	Seeds: Fresh seeds no treatment; stored seeds 1 mo. stratification (USDA Forest Service 1974). 117,000 seeds/lb (116,000-119,000 seeds/lb); Flowers: May-Jun; Fruits: Sep-Oct
<i>Pinus jeffreyi</i> jeffrey pine (‡)	Preferred Site: Prefers dry slopes 3,000-9,000 feet. Highly recommended for use on serpentine sites. Range: Southern California north to Oregon. Native communities: JP, MP, DP	Seeds: Fresh seeds no treatment; stored seeds 1-2 mos. stratification may improve germination (USDA Forest Service 1974). 3,700 seeds/lb (2,650-5,300 seeds/lb); Flowers: Jun-Jul; Fruits: Aug-Sep

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Pinus lambertiana</i> sugar pine	Range: Occurs 2,500-9,000 feet from southern California north to Oregon. Native communities: MP, DP, JP	Seeds: 2-3 mos. stratification (USDA Forest Service 1974). 2,100 seeds/lb (1,500-2,700 seeds/lb); Flowers: Jun-Jul; Fruits: Aug-Sep
<i>Pinus monticola</i> western white pine	Range: Occurs from Sierra Nevada to Siskiyou County, California 2,000-9,800 feet (Munz and Keck 1959). Native communities: MP, JP, DP	Seeds: 1-4 mos. stratification (USDA Forest Service 1974). 27,000 seeds/lb (14,000-32,000 seeds/lb); Flowers: Jun-Jul; Fruits: Aug
<i>Pinus ponderosa</i> ponderosa pine	Preferred Site: Tolerant of most soils (except serpentine) below 9,000 feet elevation. Native communities: MP, DP	Seeds: Fresh seeds no treatment; stored seeds 1-2 mos. stratification (USDA Forest Service 1974). 12,000 seeds/lb (6,900-23,000 seeds/lb); Flowers: Mar-Apr; Fruits: Fall
<i>Pinus sabiniana</i> digger pine (‡)	Preferred Site: Does well on dry, shallow, coarse, gravelly soils. Needs little water. Requires full sun (Labadie 1978). Native communities: MP, JP, DP	Seeds: 2-4 mos. stratification; for small lots, cracking seed coats first gives quicker germination (USDA Forest Service 1974). 5,600 seeds/lb (3,100-11,300 seeds/lb); Flowers: Mar-Apr; Fruits: Oct
<i>Populus fremontii</i> Fremont cottonwood (‡)	Preferred Site: Very valuable for revegetating moist sites; Recommended for use up to 5,000 feet. Native communities: Riparian	Seeds: No treatment. Use fresh seeds, usually viable only a few days. Seeds should not be covered or pressed into medium; seedbed should be kept saturated for first mo. (Emery 1988). Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: Feb-Mar; Fruits: Mar-Apr
<i>Populus tremuloides</i> quaking aspen	Preferred Site: Requires moderate moisture (Kruckeberg 1982). Native communities: RF, WF	Seeds: No treatment. Use fresh seeds, usually viable only a few days. Seeds should not be covered or pressed into medium; seedbed should be kept saturated for first mo. (Emery 1988). 2,500,000-3,000,000 seeds/lb. Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: Apr-May; Fruits: Jun
<i>Populus trichocarpa</i> black cottonwood (‡)	Preferred Site: Especially valuable for revegetating periodically flooded lands or other wet habitats. Range: Occurs in wet areas from San Diego County north to Alaska below 9,000 feet (Munz and Keck 1959). Growth: Largest of the North American cottonwoods; has an astounding rate of growth (Kruckeberg 1982). Native communities: Riparian	Seeds: No treatment. Use fresh seeds, usually viable only a few days. Seeds should not be covered or pressed into medium; seedbed should be kept saturated for first mo. (Emery 1988). Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: Apr-Jun; Fruits: May-Jul
<i>Pseudotsuga menziesii</i> Douglas-fir	Preferred Site: Prefers somewhat moist sites to 5,000 feet (Labadie 1978). Native communities: MF, DP, DF	Seeds: 3-6 wks. stratification. No treatment may give satisfactory germination (USDA Forest Service 1974). 32,546 seeds/lb (15,400-53,000 seeds/lb) Flowers: Mar; Fruits: Aug
<i>Quercus chrysolepis</i> canyon live oak	Preferred Site: Common on dry, rocky sites. Native communities: QC, TM, MC, DF, DP, MP	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing. If started indoors or in glasshouse should be stratified first 0-2 mos. (USDA Forest Service 1974). Seedlings should be transplanted to gallon containers or planted when they have 2-3 leaves (Kruckeberg 1982). 150 seeds/lb Flowers: Feb-May; Fruits: Aug-Dec

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Quercus douglasii</i> blue oak	Preferred Site: Prefers dry, well drained Growth: Growth rate is slow (Labadie 1978). Native communities: QC, MP	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing. If started indoors or in glasshouse should be stratified first 1.5 mos. (USDA Forest Service 1974). 100 seeds/lb (55-180 seeds/lb) Flowers: Feb-May; Fruits: Aug-Dec
<i>Quercus garryana</i> Oregon white oak	Preferred Site: Recommended on dry, porous, gravelly soils (Kruckeberg 1982). Native communities: QC, QG, QK	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing (USDA Forest Service 1974). 85 seeds/lb (75-100 seeds/lb) Flowers: Feb-May; Fruits: Aug-Dec
<i>Quercus kelloggii</i> California black oak	Preferred Site: Commonly grows on dry, gravelly soils up to 5,000 feet. Drought resistant. Growth: Slow growing (Kruckeberg 1982). Native communities: QK, QG, QC	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing. If started indoors or in glasshouse should be stratified first 1-2 mos. (USDA Forest Service 1974). 95 seeds/lb (52-147 seeds/lb); Flowers: Feb-May; Fruits: Aug-Dec
<i>Robinia pseudo-acacia</i> black locust /1 (*)	Range: Native to eastern US. Planted extensively in the Scott Valley and various locations throughout the watershed. Growth: Fast growing shrub with long, sharp thorns. Roots: Spreads by roots; Sprouts readily after cutting. Native communities: Not native to the Trinity River watershed.	Seeds: 24,000 seeds/lb Flowers: May-Jun; Fruits: Sep-Oct
<i>Salix lasiandra</i> willow (‡)	Preferred site: Streambanks below 8,000 feet. Range: Northern Mexico to Alaska. Native communities: Riparian	Seeds: No treatment; use fresh seeds (seed usually viable only for a few days). (Emery 1988). Propagation: Easily propagated from cuttings (Emery 1988).
<i>Salix laevigata</i> willow (‡)	Range: along streams below 8,000 feet (Emery and Keck 1959). Native communities: Riparian	Seeds: No treatment; use fresh seeds (seed usually viable only for a few days) (Emery 1988). Propagation: Easily propagated from cuttings (Emery 1988).
<i>Sequoiadendron giganteum</i> giant sequoia /1	Preferred Site: Tolerant to cold. Grows in relatively humid environment from 4,000-8,000 feet. Prefers deep, well-drained soils (Labadie 1978). Native communities: Not native to the Trinity River watershed. Planted extensively near Trinity Lake, CA.	Seeds: No treatment; 1 mo. stratification may improve germination. Store seeds in polyethylene bag in freezer until ready to use. Usually low percent viable seed (Emery 1988). 80,000 seeds/lb (62,000-100,000 seeds/lb) Flowers: Apr-May; Fruits: Sep
<i>Sequoia sempervirens</i> coast redwood	Preferred Site: Best in humid environment. Grows naturally to 30 miles inland (Labadie 1978). Roots: Shallow rooted (Labadie 1978). Native communities: Not native to the Trinity River watershed.	Seeds: No treatment; 1 mo. stratification may improve germination. Usually a low percent viable seeds (Emery 1988). 120,000 seeds/lb (59,000-300,000 seeds/lb) Flowers: Nov-Mar; Fruits: Sep
<i>Taxus brevifolia</i> Pacific yew	Preferred Site: Prefers moist to wet sites. Growth: Slow growing. Allelopathy: May produce allelopathic or inhibitory chemicals that alter growth potential of adjacent plants. Native communities: Riparian DF	Seeds: No treatment. Sow in early summer. Very slow germination. (USDA Forest Service 1974). 15,600 seeds/lb (14,700-16,400 seeds/lb) Propagation: Can be propagated from cuttings. Flowers: Jun; Fruits: Aug-Oct

Table 7. Species list with information on suitability and cultural requirements. Suitability summarizes information on efficacy and use of each species for revegetation. Culture includes information on seed treatment, seed stratification, propagation, flowering time and fruiting time. (* = Nitrogen fixer, B = Biennial, A = Annual, ‡ = Good bet as plug or bareroot. † = Good bet as seed).

SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Thuja plicata</i> western red cedar	Preferred Site: Best in cool, humid areas. Allelopathy: May produce allelopathic or inhibitory chemicals that alter growth potential of adjacent plants. Roots: Has shallow root system (Labadie 1978). Native communities: DF	Seeds: 1-2 mos. stratification or soak in 0.2% potassium nitrate overnight (Association of Official Seed Analysts 1981). No treatment may give satisfactory germination (USDA Forest Service 1974). 414,000 seeds/lb (203,000-592,000 seeds/lb) Flowers: May-Jun; Fruits: Aug
<i>Tsuga heterophylla</i> western hemlock	Range: Occurs on wooded slopes below 2,000 feet from Sonoma County north to Alaska (Munz and Keck 1959). Native communities: DF	Seeds: 3 wks. to 3 mos. stratification. No treatment may give satisfactory germination (USDA Forest Service 1974). 260,000 seeds/lb (189,000-508,000 seeds/lb) Flowers: Apr-May; Fruits: Sep-Oct
<i>Tsuga mertensiana</i> mountain hemlock	Range: Occurs on wooded slopes 6,000-11,000 from Fresno County north to Alaska (Munz and Keck 1952). Native communities: RF	Seeds: 3 mos. stratification (USDA Forest Service 1974). 114,000 seeds/lb (60,000-208,000 seeds/lb); Flowers: Jun-Jul; Fruits: Aug
<i>Umbellularia californica</i> California bay-laurel	Preferred Site: Not recommended for extremely dry sites (Kruckeberg 1982). Shrub form is tolerant to dry, serpentine soils. Light: Shade tolerant. Native communities: Riparian DF, DP, MP, QK, QG	Seeds: 3-4 mos. stratification (Hidreth and Johnson 1976); No treatment may give satisfactory germination of fresh seeds (Emery 1988). 240 seeds/lb Propagation: Can be propagated from cuttings; Flowers: Mar-May; Fruits: Sep
TALL SHRUBS (> 5 ft.)		
<i>Acer circinatum</i> vine maple (‡)	Preferred Site: Requires a moist site Allelopathy: May produce allelopathic or inhibitory chemicals that alter growth potential of adjacent plants. Light: Shade tolerant (Kruckeberg 1982). Native communities: Riparian DF	Seeds: Scarification, 1-2 mos. warm, and 3-6 mos. cold stratification; when periodic checks during cold stratification indicate incipient germination, the whole lot should be sown (USDA Forest Service 1974). Use fresh seed (Emery 1988). 4,620 seeds/lb (3,490-5,530 seeds/lb) Flowers: Mar-Jun, Fruits: Sep-Oct
<i>Acer glabrum</i> var. <i>torreyi</i> Rocky Mountain maple	Preferred Site: More cold-tolerant than <i>A. circinatum</i> . Range: Sierra Nevada, North Coast Ranges. Native communities: RF, WF, MF	Seeds: 6 mos. warm, then 6 mos. cold stratification (Heit 1971). 13,430 seeds/lb (7,820-20,300 seeds/lb); Fruits: Aug-Oct
<i>Aesculus californica</i> California buckeye	Preferred Site: Dry sites (Labadie 1978). Native communities: MC, QG	Seeds: No treatment; use fresh seeds (Emery 1988). 12 seeds/lb (8-16 seeds/lb) Propagation: Can be propagated from cuttings; Flowers: Apr-Jun; Fruits: Sep-Oct
<i>Alnus sinuata</i> Sitka alder (*, ‡)	Preferred Site: Recommended for high elevation, wet sites. Habit: Commonly forms shrubby thickets or groves of small trees (Kruckeberg 1982). Branches close to ground. Comments: Good for controlling streambank erosion and providing wildlife food and habitat (Darris 1988). Native communities: RF, WF, MF	Seeds: 1-3 mos. stratification may improve germination. Seeds have a very low percent viability (Emery 1988). 2,021,000 seeds/lb Flowers: Mar-May; Fruits: Aug-Oct
<i>Alnus tenuifolia</i> mountain alder (*, ‡)	Preferred Site: Recommended for high elevation, moist or wet sites (3,800-8,000 feet). Habit: Commonly forms shrubby thickets or groves of small trees. Native communities: Riparian RF, WF, MF, MF,DF, JP	Seeds: 1-3 mos. stratification may improve germination. Seeds have a very low percent viability (Emery 1988). 675,000 seeds/lb (air dried); Flowers: Mar-Apr; Fruits: Aug-Sep

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Betula occidentalis</i> water birch	Preferred Site: Valuable for revegetating moist areas from 2,000-6,000 feet. Native communities: Riparian MF, WF	Seeds: 3 mos. stratification. No treatment with light during germination may give equally good results (Association of Official Seed Analysts 1981, USDA Forest Service 1974). 4,000,000 seeds/lb Flowers: Apr-Jun; Fruits: Aug-Sep
<i>Ceanothus thyrsiflorus</i> blue blossom (*)	Preferred Sites: Not cold tolerant (Kruckeberg 1982). Not recommended for inland sites. Native communities: MC	Seeds: Hot water and 2-3 mos. stratification (Emery 1988). 48,000-181,400 seeds/lb Flowers: Jan-Jun; Fruits: Apr-Jul
<i>Ceanothus velutinus</i> snow brush (*)	Preferred Site: Requires full sun. Open, wooded slopes from 3,500-10,000 feet; Range: Occurs from Tulare County to Trinity and Humboldt Counties (Munz and Keck 1959). Native communities: DF, MF, WF	Seeds: Hot water and 23 mos. stratification (USDA Forest Service 1974). 94,000 seeds/lb (61,400-152,000 seeds/lb) Flowers: May-Jul; Fruits: Jul-Sep
<i>Cephalanthus occidentalis</i> var. <i>californicus</i> California buttonbush	Preferred Site: Preferred habitat is marshes, swamps or other wet places (Martin, Zim and Nelson 1951). Tolerates immersion in water for up to 6 mos. (Personal observation). Native communities: Riparian DF, DP, MP GA, GP	Seeds: No treatment (Emery 1988). 265,000 seeds/lb (236,000-320,000 seeds/lb) Flowers: Jun-Sep; Fruits: Sep-Oct
<i>Cercocarpus ledifolius</i> curled-leaf mtn.-mahogany (*)	Preferred Site: Recommended for use on arid, rocky slopes and flats. Native communities: MC	Seeds: 2-3 mos. stratification (Emery 1988). 51,900 seeds/lb (48,200-56,600 seeds/lb) Flowers: May-Jun; Fruits: Aug-Sep
<i>Cornus californica</i> dogwood	Preferred Site: Recommended for use on damp sites. Wildlife: Not palatable to deer (Sampson and Jespersen 1963). Native communities: DF	Seeds: 33,400 seeds/lb Flowers: Apr-Aug; Fruits: Jul-Nov
<i>Cornus sessilis</i> dogwood	Preferred Site: Prefers moist ravines or drainages from 1,800 feet to 4,000 feet. Native communities: Riparian DF, DP, MP	-
<i>Cornus stolonifera</i> American dogwood (‡)	Preferred Site: Prefers boggy areas or streamside areas (Kruckeberg 1982). Occurs in moist places below 9,000 feet (Munz and Keck 1959). Recommended for revegetating streambanks and wet areas at high elevations. Habit: Growth habit is commonly a thicket-forming shrub. Native communities: Riparian RF, WF, MF	Seeds: Soak in concentrated H ₂ SO ₄ 1 hr. and 3-4 mos. stratification (USDA Forest Service 1974). 2 mos. warm stratification in lieu of acid bath may give equally good germination. 3 mos. stratification only may also give good germination (Peterson 1953). 18,500 seeds/lb (13,800-26,700 seeds/lb) (173,000 seeds/lb Granite Seed Inc.) Flowers: May-Jul; Fruits: Jul-Oct
<i>Corylus cornuta</i> var. <i>californica</i> California hazel	Preferred site: Grows on damp wooded slopes and streambanks below 7,000 feet (Munz and Keck 1959). Light: Shade tolerant. Habit: Deciduous shrub. Dissemination: Readily reproduces by suckering or layering. Comments: Useful for controlling bank erosion. Wildlife: Good food and cover. Communities: DF, DP, MP, QK, QG, MC, MF, WF	Seeds: 2-3 (-6) mos. stratification; use fresh seed (Emery 1988). Seedlings may be transplanted from other locations in the field (Kruckeberg 1982). 400 seeds/lb Fruits: Sep-Oct
<i>Holodiscus discolor</i> var. <i>delnortensis</i> creambush oceanspray	Preferred Site: Prefers sunny sites. Ranges from moist woods to rocky, semi-arid places up to 4,000 feet (Munz and Keck 1959). Habit: Deciduous shrub 3-12 ft. tall with slender, arching branches. Native communities: DF, MC, TM	Seeds: 4.5 mos. stratification (USDA Forest Service 1974). 5,340,000 seeds/lb (very small percent of seed is sound); Flowers: May-Jun; Fruits: Aug-Sep

/1 = Non-native naturalized species

/2 = Non-native exotic species.

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Myrica californica</i> California wax-myrtle	Preferred Site: Tolerant to salt spray (Kruckeberg 1982). Not recommended for interior valleys or hot, dry climates. Native communities: DF	Seeds: 2-3 mos. stratification (Emery 1988). 22,000 seeds/lb; Fruits: Sep
<i>Osmaronia cerasiformis</i> oso berry (‡)	Preferred Site: Moist canyons below 5,600 feet (Kruckeberg 1982). Highly recommended for revegetation projects. Native communities: DF	Seeds: 4 mos. stratification; sporadic germination occurs during this period. Remove and pot germinating seeds biweekly (USDA Forest Service 1974). 4,630 seeds/lb (1,800-?? seeds/lb); Propagation: Easy to grow from seed. May be propagated from cuttings (Kruckeberg 1982).; Flowers: Jan-May; Fruits: May-Sep
<i>Philadelphus lewisii</i> mock-orange	Preferred Site: Rocky slopes and canyons Native communities: DP, MP, QG, QK	Seeds: 2-3 mos. stratification (Emery 1988). 8,000,000 seeds/lb; Fruits: Sep-Oct
<i>Physocarpus capitatus</i> ninebark	Preferred Site: Prefers moist sites up to 4,500 feet (Labadie 1978). Native communities: DF, WF, MF, RF	Seeds: No treatment gives poor germination; 2-3 mos. stratification may improve germination.; Propagation: Easily propagated from stem cuttings (Emery 1988). 45,000 seeds/lb for <i>P. opulifolius</i> ; Fruits: Sep-Oct
<i>Prunus emarginata</i> bitter cherry	Preferred Site: Tolerates droughty decomposed granite soils up to 7,000 feet. Native communities: RF, WF, MF	Seeds: Soak in water at room temperature for 8 days, and stratify at 45 deg. F for 5 mos. Fresh seeds give better results (Sorrell 1981). 7,020 seeds/lb (4,120-8,790 seeds/lb) Flowers: Apr-Jun; Fruits: Jul-Sep
<i>Quercus garryana</i> var. <i>breweri</i> Brewer oak	Preferred Site: Tolerates dry, rocky, south exposures. Occurs on mountain slopes from 2,000-6,000 feet. Range: Lake County to Siskiyou County. Habit: Commonly a spreading shrub 3-15 feet tall. Native communities: QC, QG, QK	-
<i>Quercus wislizenii</i> interior live oak	Preferred Site: Tolerates dry, undeveloped soils from 2,000-5,000 feet; Requires full sun; Growth: Slow growth rate (Labadie 1978). Native communities: QC, MC	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing. If started indoors or in glasshouse should be stratified first 0-2 mos. (USDA Forest Service 1974). 100 seeds/lb; Fruits: Sep-Oct
<i>Rhamnus purshiana</i> cascara sagrada	Preferred Site: Ranges from moist sites to ponderosa pine belt (Sampson and Jespersen 1963). Native communities: DF, DP, MP	Seeds: 3 mos. stratification (Emery 1988). 12,300 seeds/lb (5,000-19,000 seeds/lb); Flowers: Apr-Jul; Fruits: Jul-Sep
<i>Rhododendron macrophyllum</i> rhododendron	Preferred Site: Requires acid soil (Kruckeberg 1982). Native communities: DF	Seeds: No treatment. Best sown on milled sphagnum moss (Emery 1988). 2,000,000 seeds/lb; Propagation: May be propagated from cuttings (Kruckeberg 1982); Flowers: Apr-May; Fruits: Aug-Sep

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Rubus spectabilis</i> salmon berry	Preferred Site: Requires a very moist site. Native communities: DF	Seeds: Three mos. stratification may give satisfactory germination. Soaking in either 1% sodium hypochlorite (Household bleach) 7 days, or concentrated H ₂ SO ₄ 20-60 mins., then 3 mos. warm (diurnal fluctuation from 68 to 86 deg. F.) and 3 mos. cold stratification may improve germination (USDA Forest Service 1974). 143,000 seeds/lb; Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: Mar-Jun; Fruits: May-Jul
<i>Salix lasiolepis</i> arroyo willow	Preferred Site: Tolerates summer-dry arroyos. Grows to 5,000 feet (Sampson and Jespersen 1963). Native communities: Riparian (wide-spread)	Seeds: No treatment. Use fresh seeds (usually viable only a few days). Propagation: Easily propagated from cuttings (Emery 1988).
<i>Salix scouleriana</i> Scouler's willow (‡)	Preferred Site: Prefers moist to wet sites but tolerates coarse, dry soils and warm southern slopes below 10,000 feet. Growth: Its rapid invasion into disturbed habitats and rapid sprouting after fire or when cut makes it among the choicest of native willows in California and perhaps the entire west (Sampson and Jespersen 1963). Native communities: DF, MF, WF, RF	Seeds: No treatment. Use fresh seeds (usually viable only a few days). 6,500 seeds/lb; Propagation: Easily propagated from cuttings (Emery 1988). Flowers: Mar-Jun; Fruits: May-Jul
<i>Sambucus caerulea</i> blue elderberry	Preferred Site: Prefers well-drained, moist soil (Labadie 1978). Growth: Vigorous colonizer; Widely spread by birds; Grows rapidly as a seedling (Kruckeberg 1982). Native communities: DF	Seeds: Soak in concentrated H ₂ SO ₄ 10-15 mins. and 2-3 mos. stratification; 4-5 mos. warm (60 deg. F.) and 3-5 mos. cold stratification may also give satisfactory results. Germination apt to be low due to high percentage empty or improperly developed seed (Heit 1971). For fresh seeds 2-3 mos. stratification may give good results (Emery 1988). 210,000 seeds/lb; Propagation: Easily propagated from stem cuttings (Emery 1988).
<i>Sambucus callicarpa</i> elderberry	Preferred Site: Prefers open, well-drained moist soil at low elevations along the coast. Growth: Vigorous colonizer; Widely spread by birds; Grows rapidly as a seedling (Kruckeberg 1982). Native communities: DF	Seeds: Fresh seeds 3 mos. stratification may give satisfactory but sporadic germination. Stored seeds soak in concentrated H ₂ SO ₄ 5 mins. (or scarify), 2-day water bath, then 1 mo. warm and 3 mos. cold stratification (USDA Forest Service 1974). 212,000 seeds/lb (163,170-261,500 seeds/lb); Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: Jun; Fruits: Jul-Aug
<i>Sorbus californica</i> mountain-ash	Preferred Site: Highly recommended for moist sites 5,000-10,900 feet. Native communities: MF, WF, RF, DF, DP, MP	Flowers: May-Jun
<i>Sorbus cascadiensis</i> mountain-ash	Preferred Site: Highly recommended for moist sites 4,000-6,000 feet. Native communities: DP, MP	Seeds: 3 mos. stratification (USDA Forest Service 1974). 66,400 seeds/lb (66,000-175,000 seeds/lb) Flowers: May-Jul; Fruits: Aug-Sep
<i>Umbellularia californica</i> California bay - shrub form	Preferred Site: Shrub form is tolerant of dry soils including soils derived from serpentine. Native communities: JP, MP	Seeds: 3-4 mos. stratification (Hildreth and Johnson 1976). No treatment may give satisfactory germination of fresh seeds (Emery 1988). 240 seeds/lb; Flowers: Mar-May; Fruits: Sep

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
MEDIUM SHRUBS (> 2 ft. & < 5 ft.)		
<i>Adenostoma fasciculatum</i> chamise	Preferred Site: Prefers hot, dry sites with full sun. Habit: Plant is very flammable (Labadie 1978). Sprouts readily following fire. Native communities: MC	Seeds: Seeds collected from plants, no treatment. Seeds collected from duff, hot water. Alternative treatments: burn a 1 in. thick layer of pine needles or excelsior over the seed bed, oven heat of 212 deg. F. for 5 mins. (Stone and Juhren 1953), or soak in 10% H ₂ SO ₄ for 15 mins. (Emery 1988). 413,000 seeds/lb
<i>Amelanchier alnifolia</i> service-berry	Preferred Site: Prefers moist, well drained sites in full sun or part shade below 5,000 ft. Highly recommended for revegetation projects. Range: From south Alaska to NW CA. Native communities: MP	Seeds: 4-6 mos. stratification (USDA Forest Service 1974). 4 mos. warm then 4 mos. cold stratification (Heit 1971) may improve germination (Emery 1988). 82,000 seeds/lb (36,300-113,800 seeds/lb) Flowers: May-Jun; Fruits: Jul-Aug
<i>Amelanchier pallida</i> pallid service-berry	Preferred Site: Prefers dry, gravelly or rocky slopes to 11,000 feet (Munz and Keck 1959). Native communities: MF	Seeds: 2.5-3 mos. stratification then germinate at low temperature, i.e. outdoors in early spring (Emery 1988).
<i>Amelanchier pumila</i> dwarf service-berry	Preferred Site: Prefers damp woods 4,000-6,000 feet elevation. Native communities: RF, MF	Seeds: 4 mos. warm and 4 mos. cold stratification (Heit 1971, Emery 1988).
<i>Arctostaphylos canescens</i> hoary manzanita	Preferred Site: Prefers dry, gravelly to rocky slopes (Munz and Keck 1959). Native communities: MC	-
<i>Arctostaphylos cinerea</i> Del Norte manzanita	Preferred Site: Commonly occurs on dry, open places below 2,500 feet; Range: Del Norte County north to southwest Oregon (Munz and Keck 1959). Native communities: MC	-
<i>Arctostaphylos columbiana</i> hairy manzanita	Preferred Site: Prefers sunny, dry locations. Prefers rocky or clay slopes below 2,500 feet (Munz and Keck 1959). Habit: May reach 10-15 feet tall (Kruckeberg 1982). Native communities: MC	Propagation: Can be propagated from cuttings.
<i>Arctostaphylos glandulosa</i> eastwood manzanita	Preferred Site: Requires dry, gravelly to rocky slopes and ridges (Munz and Keck 1959). Native communities: MC	Seeds: Soak in concentrated H ₂ SO ₄ for 4-15 hrs. (USDA Forest Service 1974). Flowers: Feb-Apr; Fruits: Apr-Aug
<i>Arctostaphylos glauca</i> bigberry manzanita	Range: Naturally occurs north to Contra Costa County (Munz and Keck 1959). Native communities: MC	Seeds: Soak in concentrated H ₂ SO ₄ for 4-15 hrs. (USDA Forest Service 1974). 795 seeds/lb (500-1,090 seeds/lb)
<i>Arctostaphylos hispidula</i> Gasquet manzanita	Preferred Site: Prefers open, shrubby places on rocky, serpentine soils (Munz and Keck 1959). Native communities: MC	-
<i>Arctostaphylos intricata</i> manzanita	Preferred Site: Commonly found on rocky places below 2,500 feet. Native communities: MC	-

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Arctostaphylos manzanita</i> Parry manzanita	Preferred Site: Occurs on dry slopes or canyons up to 4,000 feet elevation (Munz and Keck 1959). Native communities: MC	-
<i>Arctostaphylos parvifolia</i> manzanita	Preferred Site: Prefers dry, gravelly slopes (Munz and Keck 1959). Native communities: MC	-
<i>Arctostaphylos patula</i> greenleaf manzanita	Preferred Site: Commonly occurs in open forests 2,000-9,000 feet elevation (Munz and Keck 1959). Native communities: MC	Seeds: Soak seed in concentrated H ₂ SO ₄ for 2 hrs. then 3 mos. stratification (Carlson and Sharp 1975); or concentrated H ₂ SO ₄ for 4 hrs. then 4 mos. stratification (USDA Forest Service 1974). 18,000 seeds/lb; Flowers: Apr-Jun; Fruits: Jul-Sep
<i>Arctostaphylos viscida</i> whiteleaf manzanita	Preferred Site: Commonly occurs on dry slopes 500-5,000 feet (Munz and Keck 1959). Native communities: MC	-
<i>Baccharis pilularis</i> var. <i>consanguinea</i> coyote brush	Preferred Site: Tolerates droughty to poorly drained soil conditions. Native communities: DF, DP	Seeds: 7,350,000 seeds/lb; Propagation: May be rooted from cuttings;
<i>Baccharis pilularis</i> var. <i>pilularis</i> dwarf coyote brush	Preferred Site: Tolerates droughty to poorly drained soil conditions. Native communities: DF, DP	Seeds: No treatment (Emery 1988). 8,200,000 seeds/lb; Propagation: May be rooted from cuttings;
<i>Berberis aquifolium</i> Oregon grape	Preferred Site: Commonly grows up to 7,000 feet. Light: Tolerates sun or shade (Kruckeberg 1982). Roots: Has deep roots (Labadie 1978). Native communities: DF, RF	Seeds: 4-6 mos. warm then 3-4 mos. cold stratification (Heit 1971). Three mos. stratification may give satisfactory results (Emery 1988). 48,000 seeds/lb
<i>Calycanthus occidentalis</i> spice-bush	Preferred Site: Grows in moist places, along streams and ponds below 4,000 feet (Munz and Keck 1959). Native communities: Riparian QG, QK, MC	Seeds: 3 mos. stratification (Emery 1988). 8,000 seeds/lb; Propagation: May be propagated from cuttings (Labadie 1978); Flowers: Apr-Aug; Fruits: Sep-Oct
<i>Castanopsis sempervirens</i> bush chinquapin	Preferred Site: Prefers dry, rocky ridges (Kruckeberg 1982). Native communities: RF, WF, MF, DP, MP, MC, QC	Seeds: No treatment; use fresh seed (Emery 1988). 1,200 seeds/lb; Fruits: Sep-Oct
<i>Ceanothus cordulatus</i> mountain whitethorn (*)	Preferred Site: Commonly occurs on dry, open slopes and flats 3,000-9,500 feet; Range: San Jacinto Mtns. north to Oregon (Munz and Keck 1959). Native communities: MF	Seeds: Hot water and 3 mos. stratification (Emery 1988). 166,000 seeds/lb (41,000-179,000 seed/lb); Flowers: May-Jun; Fruits: Jul-Sep
<i>Ceanothus cuneatus</i> buck brush (*)	Preferred Site: Commonly occurs on dry slopes and fans below 6,000 feet (Munz and Keck 1959). Native communities: JP, QC, MC	Seeds: Hot water and 3 mos. stratification (Emery 1988). 49,000 seed/lb (36,000-56,000 seed/lb).
<i>Ceanothus integerrimus</i> var. <i>californicus</i> deer brush (* ‡)	Preferred Site: Commonly found on dry slopes and ridges 1,000-5,000 feet (Munz and Keck 1959). Native communities: DF, DP, MP, QG, QK, TM, MC	Seeds: Hot water and 2.5-3 mos. stratification (Emery 1988). 70,000 seeds/lb (58,000-81,000 seed/lb); Propagation: May be propagated from cuttings (Kruckeberg 1982); Flowers: Apr-Aug; Fruits: Jun-Aug
<i>Ceanothus lemmonii</i> Lemmon's ceanothus (*)	Preferred Site: Open slopes 1,200-3,500 feet. Range: Tuolumne County to Shasta County, California (Munz and Keck 1959). Native communities: TM, QK, MP, DP	Seeds: Hot water and 3 mos. stratification. (Emery 1988).

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Ceanothus leucodermis</i> chaparral whitethorn (*)	Preferred Site: Commonly occurs on dry, rocky slopes below 6,000 feet. Range: Baja California north to Alameda County, California (Munz and Keck 1959). Native communities: MC, DP	Seeds: Hot water and 1-3 mos. stratification. Hot water only may give satisfactory germination (Emery 1988).
<i>Ceanothus sanguineus</i> red stem ceanothus (*)	Preferred Site: Commonly occurs on dry slopes. Range: Trinity County north to British Columbia (Munz and Keck 1959). Native communities: DF	Seeds: Hot water and 2-3 mos. stratification (Emery 1988). 130,000 seeds/lb (128,000-132,000 seeds/lb); Flowers: Apr-Jun; Fruits: Jun-Jul
<i>Cercis occidentalis</i> western redbud (* ‡)	Preferred Site: Prefers dry sites; Requires good drainage (Labadie 1978). Native communities: MC, TM	Seeds: Hot water and 2 mos. stratification (Emery 1988). 20,000 seeds/lb (12,000-20,000 seeds/lb); Flowers: Feb-May; Fruits: Jul-Aug
<i>Cercocarpus betuloides</i> mountain mahogany (*, ‡)	Preferred Site: Commonly occurs on rocky, arid sites. Highly recommended for revegetation projects. Native communities: MC, QK, QG	Seeds: No treatment. 1-1.5 mos. stratification may improve germination (Heit 1971, Hildreth and Johnson 1976). 30,000 seeds/lb; Flowers: Mar-May
<i>Crataegus douglasii</i> hawthorn	Preferred Site: Occurs near streams and meadows 2,500-5,500 feet (Munz and Keck 1959). Wildlife: Recommended for wildlife enhancement. Native communities: Riparian DF, DP, QK, QG, MP, WF	Seeds: Scarify or soak in concentrated H ₂ SO ₄ for 2-3 hrs. and stratify 3-4 mos. For fresh dried fruit, soak in water 2-3 days to soften, remove pulp and sow immediately; this has given fair germination (Heit 1971, Emery 1988). 22,600 seeds/lb (21,500-23,700 seeds/lb); Flowers: May-Jun; Fruits: Jul-Sep
<i>Eriodictyon californicum</i> yerba santa	Preferred Site: Occurs on dry, rocky slopes and ridges up to 5,500 feet elevation (Munz and Keck 1959). Native communities: MC, MP, DF, TM	-
<i>Eriodictyon trichocalyx</i> hairy yerba santa	Preferred Site: Commonly occurs on dry, rocky slopes up to 8,000 feet Range: San Bernardino Mtns., San Gabriel Mtns. north to Ventura County (Munz and Keck 1959). Native communities: MC, MP	Seeds: Oven heat at 194 deg. F. for 5 mins. (Went et al. 1952).
<i>Euonymus occidentalis</i> western burning bush	Preferred Site: Commonly occurs on damp, wooded stream banks and canyons below 5,200 feet elevation (Munz and Keck 1959). Native communities: Riparian DF, DP, MP	Seeds: 3 mos. stratification (Emery 1988).
<i>Garrya buxifolia</i> silk-tassel	Preferred Site: Prefers serpentine soils (Kruckeberg 1982). Occurs on rocky slopes to 4,600 feet (Munz and Keck 1959). Native communities: DF, DP, MP, JP, TM, MC	Seeds: 3 mos. stratification (Emery and Frey 1971); 29,000 seeds/lb; Propagation: May be propagated from cuttings (Kruckeberg 1982); Fruits: Sep-Oct
<i>Garrya elliptica</i> silk-tassel	Preferred Site: Commonly found from sea-level to 2,000 feet. Prefers moist soils (Labadie 1978). Native communities: MC, DF	Seeds: 3 mos. stratification (Emery 1988). 18,000 seeds/lb; Propagation: May be propagated from cuttings; Fruits: Oct-Dec
<i>Garrya fremontii</i> silk-tassel	Preferred Site: Commonly occurs on dry, brushy slopes mostly below 7,500 feet (Munz and Keck 1959). Native communities: MC, DF, DP, MP, MF, WF, RF	Seeds: 3 mos. warm and 3 mos. cold stratification (USDA Forest Service 1948). 26,000 seeds/lb; Fruits: Oct-Dec

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Gaultheria ovatifolia</i> slender salal	Preferred Site: Prefers a moist peaty site with shade (Kruckeberg 1982). Occurs in wet places to 5,500 feet (Munz and Keck 1959). Native communities: DF	-
<i>Gaultheria shallon</i> salal	Preferred Site: Prefers a moist, peaty site with shade. Once established, spreads aggressively (Kruckeberg 1982) Native communities: DF	Seeds: No treatment. Best sown on milled sphagnum moss (Emery 1988). +4,000,000 seeds/lb (3,208,000-5,000,000 seeds/lb) Propagation: May be propagated from cuttings; Flowers: May-Oct; Fruits: Jun-Aug
<i>Heteromeles arbutifolia</i> toyon	Preferred Site: Tolerant of drought, poor soils and air pollution. Wildlife: Good source of nectar for bees. Native communities: MC, TM	Seeds: Fresh seeds no treatment; stored seed 3 mos. stratification (Emery 1988). 14,000 seeds/lb (14,000-68,000 seeds/lb); Propagation: May be propagated from cuttings.
<i>Ledum glandulosum</i> ssp. <i>columbianum</i> labrador-tea	Preferred Site: Occurs in moist or wet seeps and swales. Competes with cultivated cranberries (Kruckeberg 1982). Native communities: DF	Seeds: No treatment. Germination in shade; keep seed bed quite moist (Emery 1988).
<i>Lithocarpus densiflora</i> var. <i>echinoides</i> tanoak-shrub form	Preferred Site: Commonly occurs on sunny, well-drained soils (Kruckeberg 1982). Prefers serpentine soils. Native communities: JP, MP	Seeds: 110 seeds/lb; Flowers: Jul-Aug; Sep 20-Nov 1
<i>Lonicera involucrata</i> twinberry	Preferred Site: Prefers moist, open sites. Native communities: DF, DP, MP, WF, MF, RF	Seeds: 326,500 seeds/lb (227,000-477,000 seeds/lb); Propagation: May be propagated from cuttings; Flowers: Apr-Aug
<i>Lotus yollabolliensis</i> bird's foot trefoil (*)	Preferred Site: Occurs on dry, barren slopes 5,500-7,000 feet; Range: Trinity and Humboldt Counties, California. Native communities: RF, WF, MF	Flowers: Jun - Aug
<i>Lupinus</i> spp. lupine (*)	-	Seeds: Fresh seed no treatment; stored seeds scarification or hot water (Emery 1988).
<i>Lupinus albicaulis</i> Sickle-keeled lupine (*)	Preferred Site: Recommended for use on open, well-drained soils and disturbed areas. Fixes high rates of nitrogen making it valuable for restoration and erosion control. Growth: Fast growing, short-lived perennial. Native communities: DP, MP, RF, WF	Seeds: 30,000 seeds/lb; Flowers: May - Aug
<i>Lupinus albiifrons</i> lupine (*)	Preferred Site: Commonly occurs on sandy to rocky sites below 5,000 feet; Range: Ventura County to Humboldt and Shasta Counties, California (Munz and Keck 1959). Native communities: MC, MP, DP	Flowers: Mar - Jun
<i>Lupinus luteolus</i> lupine (*, A)	Preferred Site: Commonly occurs on dry slopes and flats below 6,000 feet; Range: Ventura County to Humboldt and Siskiyou Counties, California (Munz and Keck 1959). Roots: Deep rooted. Native communities: MP, QK, QG	Seeds: 5,300 seeds/lb; Flowers: May - Aug

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Lupinus polyphyllus</i> lupine (*)	Preferred Site: Commonly occurs on moist sites up to 7,500 feet elevation; Range: Santa Cruz to Siskiyou Counties, California (Munz and Keck 1959). Native communities: DF, MF, WF, RF	Flowers: May - Aug
<i>Mimulus aurantiacus</i> monkey-flower	Preferred Site: Commonly occurs on rocky sites below 3,000 feet elevation; Range: Santa Barbara north to Del Norte County, California (Munz and Keck 1959). Native communities: QK, QG, DF	Seeds: No treatment (Emery 1988). 375,000 seeds/lb (375,000-10,000,000 seeds/lb)
<i>Pickeringia montana</i> chaparral pea /2 (*)	Preferred Site: Commonly occurs on dry slopes and ridges below 5,000 feet; Range: Sierra Nevada from Butte County north to Nevada County, California. Roots: Often spreads by underground stems especially after fire (Munz and Keck 1959). Native communities: Not native to the Trinity River watershed.	Seeds: Hot water and 1 mo. stratification (Emery 1988); Fruits: Rarely fruiting
<i>Prunus virginiana</i> western choke cherry	Preferred Site: Prefers cold-moist sites. Native communities: RF, WF, MF	Seeds: 3 mos. stratification; 2 wks. warm stratification may improve germination (Emery 1988). 4,790 seeds/lb (3,010-8,400 seeds/lb);
<i>Quercus dumosa</i> scrub oak	Preferred Site: Common on dry slopes below 5,000 feet (Munz and Keck 1959). Native communities: MC, QC, QK, QG	Seeds: Sow fresh seeds in fall outdoors or stratify to hold for spring sowing. If started indoors or in glasshouse should be stratified first 1-3 mos. (USDA Forest Service 1974). 100 seeds/lb; Flowers: Jun-Sep
<i>Quercus durata</i> leather oak	Preferred Site: Prefers dry, serpentine soils (Kruckeberg 1982). Native communities: MC, QC	Seeds: 100 seeds/lb; Flowers: Aug-Sep
<i>Quercus sadleriana</i> sadler oak	Preferred Site: Commonly occurs on dry slopes and ridges 3,100-7,000 feet; Range: Trinity County north to southwest Oregon (Munz and Keck 1959). Native communities: DF, MF, WF, RF, DP, MP	Seeds: 250 seeds/lb
<i>Quercus vaccinifolia</i> huckleberry oak	Preferred Site: Prefers dry, serpentine soils; Thrives on south-facing slopes (Kruckeberg 1982). Native communities: JP, DF, DP, MP, QC	Seeds: 1,030 seeds/lb (740-1,320 seeds/lb) Flowers: May-Jul
<i>Rhamnus californica</i> ssp. <i>occidentalis</i> coffeeberry (‡)	Preferred Site: Drought and wind tolerant; Grows naturally on rocky or heavy soils up to 4,000 feet elevation (Munz and Keck 1959). Native communities: DF, MF, WF, RF, DP, MP	Seeds: Fresh seeds no treatment; stored seeds 3 mos. stratification (Emery 1988). 4,000 seeds/lb Flowers: May-Jul
<i>Rhododendron occidentale</i> western azalea	Preferred Site: Requires a damp, acid soil (Kruckeberg 1982). Native communities: JP, MP, DP, DF, MF, WF, RF	Seeds: No treatment. Best sown on milled sphagnum moss (Emery 1988). Propagation: May be propagated from cuttings (Kruckeberg 1982); Flowers: May-Jul
<i>Rhus trilobata</i> squaw bush	Preferred Site: Recommended for dry, sunny locations. Native communities: MC, QK, QG, DF, TM, DP, MP	Seeds: Hot water soak in concentrated H ₂ SO ₄ 1-3 hrs. then 2-3 mos. stratification (Emery 1988). 20,300 seeds/lb (10,600-30,000 seeds/lb); Flowers: Mar-Apr; Fruits: Aug-Sep

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Ribes bracteosum</i> stink gooseberry	Preferred Site: Occurs along canyon bottoms and streams north to Del Norte County (Munz and Keck 1959). Disease: Alternate host for white pine blister rust disease. Native communities: Riparian DF, TM	Seeds: 3 mos. stratification (Emery 1988). Flowers: Feb-Jun
<i>Ribes lobbii</i> Lobb's gooseberry	Preferred Site: Commonly occurs on dryish slopes below 6,500 feet elevation. Range: Lake County north to Humboldt County, California (Munz and Keck 1959). Disease: Alternate host for white pine blister rust disease. Native communities: RF, WF, MF	Flowers: May-Jul
<i>Ribes marshallii</i> aplegate gooseberry	Preferred Site: Occurs on forested slopes 5,000-7,000 feet elevation. Range: Humboldt County north to southern Oregon (Munz and Keck 1959). Disease: Alternate host for white pine blister rust disease. Native communities: RF, WF, MF	Flowers: Jun-Jul
<i>Ribes sanguineum</i> red flowering current	Preferred Site: Tolerant of sun or shade 2,000 - 6,000 feet elevation. Disease: Alternate host for white pine blister rust disease. Native communities: DF, MF, WF, RF, DP	Seeds: 3.5-5 mos. stratification (USDA Forest Service 1974). 284,000 seeds/lb; Propagation: May be propagated from cuttings; Flowers: Apr-May; Fruits: Jul-Aug
<i>Rosa californica</i> rose	Preferred Site: Commonly occurs on fairly moist sites below 6,000 feet throughout California and southern Oregon (Munz and Keck 1959). Native communities: QK, QG, DF, DP, MP, TM	Seeds: 3 mos. stratification (Emery 1988). 102,000 seeds/lb; Fruits: Aug-Nov
<i>Rosa gymnocarpa</i> wood rose	Preferred Site: Commonly occurs in shaded woods below 6,000 feet. Range: Monterey County north to Humboldt County, California (Munz and Keck 1959). Native communities: QK, QG, DF, DP, MP, TM	Seeds: 3 mos. stratification; preceding this by 2-3 mos. warm stratification may improve germination (USDA Forest Service 1974). 28,000 seeds/lb; Flowers: May-Jun; Fruits: Sep-Oct
<i>Shepherdia argentea</i> buffalo-berry /2 (*)	Preferred Site: Cold tolerant; Prefers dry sites (Kruckeberg 1982). Grows along streams 3,500-6,500 feet (Munz and Keck 1959). Native communities: Not native to Trinity River watershed	Seeds: Stratify 2-3 mos. (USDA Forest Service 1974) or soak in concentrated H ₂ SO ₄ 20-30 mins. (Heit 1971). No treatment may also give satisfactory germination (Emery 1988). 41,000 seeds/lb (18,000-67,000 seeds/lb); Propagation: May be propagated from cuttings (Kruckeberg 1982); Flowers: Apr-Jun; Fruits: Jun-Aug
<i>Styrax officinalis</i> var. <i>californica</i> snowdrop bush	Preferred Site: Extremely drought tolerant. Scattered in dry, rocky places below 3,000 feet (Munz and Keck 1959). Native communities: MC, MP	Seeds: 2 mos. stratification. Use fresh seeds (Emery 1988). 1,000 seeds/lb; Flowers: Aug-Oct
<i>Trichostema lanatum</i> wooly blue-curls /2 (*)	Preferred Site: Occurs on dry slopes, mostly below 3,500 feet. Range: San Diego County north to Monterey County (Munz and Keck 1952). Native communities: Not native to the Trinity River watershed.	Seeds: 2 mos. stratification (Hildreth and Johnson 1976). 3 mos. stratification at 32 deg. F. using old stored seeds (Mirov 1945). Difficult. Propagation: Easily propagated from stem cuttings (Emery 1988). Flowers: May - Aug.
<i>Trichostema lanceolatum</i> vinegar weed (*)	Preferred Site: Commonly occurs in dry fields and open places mostly below 3,500 feet elevation. Native communities: MC, QK, QG	Flowers: Aug - Oct

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Vaccinium membranaceum</i> thinleaf huckleberry	Preferred Site: Commonly occurs on shaded slopes and wet places 4,300-7,000 feet elevation. Native communities: RF, WF, MF	Seeds: No treatment. 3 mos. stratification may improve germination. Sow on milled sphagnum moss or peat moss and sand mix (Emery 1988).
<i>Vaccinium ovatum</i> California huckleberry	Preferred Site: Grows best in partial shade up to 2,500 feet elevation (Labadie 1978). Native communities: DF, TM	Seeds: No treatment; 1-2 mos. stratification may improve germination. Sow on milled sphagnum moss or peat moss and sand mix (Emery 1988). 8,000 seeds/lb; Propagation: Difficult to propagate from cuttings (Kruckeberg 1982); Flowers: Mar-Jul; Fruits: Aug-Sep
<i>Vaccinium parvifolium</i> red huckleberry	Preferred Site: Prefers partial shade (Kruckeberg 1982). Occurs in deep woods and moist places below 5,000 feet (Munz and Keck 1959). Native communities: DF, MF, WF, RF	Seeds: No treatment; 1-3 mos. stratification may improve germination. Sow on milled sphagnum moss or peat moss and sand mix (Emery 1988). 2,815,000 seeds/lb (2,390,000-3,240,000 seeds/lb); Flowers: Apr-Jun; Fruits: Aug-Sep
<i>Zauschneria californica</i> California fuschia	Preferred Site: Prefers dry, gravelly sites up to 3,500 feet elevation; Roots: Spreads by underground rhizomes (Kruckeberg 1982). Native communities: DF, DP, TM	Seeds: No treatment (Emery 1988). 1,000,000 seeds/lb; Propagation: May be propagated from cuttings; Flowers: Sep-Nov
LOW SHRUBS (< 2 ft.)		
<i>Arctostaphylos nevadensis</i> pinemat manzanita	Preferred Site: Habitat ranges from moist sites to dry, rocky slopes in woods primarily from 5,000-10,000 feet and occasionally to 2,000 feet elevation. Range: Lake County, California north to Washington (Munz and Keck 1959). Native communities: DF, WF, MF, RF, JP	Seeds: 41,000 seeds/lb
<i>Arctostaphylos uva-ursi</i> bearberry	Preferred Site: Cold tolerant. Excellent ground cover for sterile, dry sites. Roots: Easily forms roots along its prostrate stems (Kruckeberg 1982). Native communities: Occurs along the coast. Not native to the Trinity River watershed.	Seeds: Soak seed in concentrated H ₂ SO ₄ for 3-6 hrs. then 2-4 mos. warm and 2-3 mos. cold stratification (USDA Forest Service 1975); or 6 hrs. of concentrated acid and 2 mos. each of warm then cold stratification (McLean 1967). 58,000 seeds/lb; Flowers: Mar-May; Fruits: Jun-Aug
<i>Berberis nervosa</i> dwarf Oregon grape	Preferred Site: Commonly grows up to 6,000 feet elevation. Roots: Spreads by rhizomes (Labadie 1978). Native communities: DF, TM	Seeds: 3-7 mos. stratification may give satisfactory germination (Emery 1988). 23,000 seeds/lb; Propagation: May be propagated by cuttings (Labadie 1978); Flowers: Apr-May; Fruits: Aug
<i>Berberis piperiana</i> Piper barberry	Preferred Site: Commonly occurs on dry, open or wooded slopes 3,000-5,000 feet elevation. Tolerant of serpentine soils. Range: Lake County north to Siskiyou County, California. Native communities: DF, DP, JP	Seeds: 3 mos. stratification may give fair germination (Emery 1988).
<i>Berberis pumila</i> dwarf barberry	Preferred Site: Commonly occurs on rocky outcrops and clay slopes in sun or partial shade, 1,000-4,000 feet elevation (Munz and Keck 1959). Tolerant of serpentine soils Native communities: JP, DF	Seeds: 3-7 mos. stratification may give satisfactory germination (Emery 1988).

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Berberis repens</i> barberry	Preferred Site: Prefers dry, sunny sites. Tolerant of serpentine soils. Roots: Spreads by underground stems Native communities: JP	Seeds: 3-7 mos. stratification may give satisfactory germination. 62,000 seeds/lb (54,000-71,000 seeds/lb); Flowers: Apr-Jun; Fruits: Jun-Jul; Propagation: Easily propagated from divisions in spring or fall (Emery 1988).
<i>Ceanothus prostratus</i> squaw carpet (*)	Preferred Site: Recommended for harsh sites on well-drained soils of granitic or serpentine origin. Roots: Develops both a fibrous root and a taproot system; Stimulated by fire; Often the first woody species to move back into a burned area (Brown, Ruf and Farmer 1971) Native communities: JP, MP, DP	Seeds: Hot water and 3.5 mos. stratification (2.5 mos. may be sufficient). Boiling in water 0.5 min., cooling immediately, then 156 days stratification may give better germination (USDA Forest Service 1974); or 30 min. in concentrated H ₂ SO ₄ then 2 mos. stratification (Heit 1971). 41,000 seeds/lb (37,000-44,500 seeds/lb); Flowers: Apr-Jun; Fruits: Jul
<i>Ceanothus pumilus</i> ceanothus (*)	Preferred Site: Prefers serpentine soils from 2,000-5,700 feet (Munz and Keck 1959). Native communities: MC, JP, MP, DP	-
<i>Eriogonum umbellatum</i> suffer flowered buckwheat	Preferred Site: Commonly grows on dry slopes and ridges 2,500-10,000 feet elevation (Munz and Keck 1959). Recommended for revegetating droughty, decomposed granite and serpentine soils. Native communities: JP, MP, DP, WF, MF, RF	Seeds: 3 mos. stratification; no treatment may give fair germination (Emery 1988). 571,000 seeds/lb
<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	Preferred Site: Occurs on light or rocky soils on dry slopes (Munz and Keck 1959). Native communities: DF, JP, QG, QK, MC	Seeds: No treatment for <i>E. lanatum</i> var. <i>arachnoideum</i> (Everett 1957). +825,000 seeds/lb for <i>E. staechadifolium</i>
<i>Juniperus communis</i> dwarf juniper	Preferred Site: Commonly grows on dry, rocky, serpentine soils. Native communities: JP, MP	Seeds: 36,500 seeds/lb (25,450-54,500 seeds/lb) Flowers: Apr-May; Fruits: Aug-Oct
<i>Lonicera hispidula</i> var. <i>vacillans</i> honeysuckle	Preferred Site: Occurs along streams and on wooded slopes to 2,500 feet elevation. Habit: Habit is commonly a vine. Native communities: DF, QK, QG, TM	Seeds: 1 mo. stratification (Emery 1988). 27,000 seeds/lb; Flowers: Sep; Fruits: Oct
<i>Rubus leucodermis</i> western raspberry	Preferred Site: Commonly occurs on slopes and canyons below 7,000 feet elevation (Munz and Keck 1959). Native communities: MF, DF	-
<i>Rubus parviflorus</i> thimbleberry	Preferred Site: Commonly grows in wooded areas and canyons below 8,000 feet elevation (Munz and Keck 1959). Native communities: RF, WF, WF, DF	Seeds: 3 mos. stratification may give satisfactory germination. Soaking in either 1% sodium hypochlorite (Household bleach) 7 days, or concentrated H ₂ SO ₄ 20-60 mins., then 3 mos. warm and 3 mos. cold stratification may improve germination (USDA Forest Service 1974). Propagation: Easily propagated from stem cuttings (Emery 1988).
<i>Rubus ursinus</i> Pacific blackberry	Preferred Site: Commonly occurs in waste places, fields, canyons, etc. below 3,000 feet elevation (Munz and Keck 1959). Native communities: DF, QK, QG, TM	-

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Rubus vitifolius</i> California blackberry	Preferred Site: Occurs in woods and somewhat damp places below 4,000 feet elevation (Munz and Keck 1959). Native communities: DF, QK, QG, TM	-
<i>Salvia sonomensis</i> creeping sage	Preferred Site: Dry slopes below 6,500 feet. Range: San Diego to Siskiyou Counties, California. Native communities: MC, QK, QG, JP, MP, TM	Seeds: 3 mos. stratification or soak in 100 ppm GA ₃ 1 hr., then dry and sow within 1 wk. (Nord et al. 1971). If a longer storage period is needed between treatment and sowing, use either a longer soaking period or higher concentration of up to 500 ppm (USDA Forest Service 1974). Flowers:
<i>Symphoricarpos mollis</i> creeping snowberry	Preferred site: Shaded slopes up to 5,000 feet. Light: Requires shade. Roots: Spreads aggressively by rhizomes (Labadie 1978). Native communities: DF, QK, QG, MC	Seeds: Soak in concentrated H ₂ SO ₄ 1 hr. (or 3-4 mos. warm stratification) and 4-6 mos. cold stratification (Emery and Frey 1971). +80,000 seeds/lb; Fruits: Sep-Oct Propagation: Easily propagated from cuttings or divisions (Emery 1988).
<i>Symphoricarpos rivularis</i> snowberry	Preferred site: Grows on flats and near streams below 4,000 feet. Native communities: DF, QK, QG, DP, MP	Seeds: Soak in concentrated H ₂ SO ₄ 1 hr. (or 3-4 mos. warm stratification) and 4-6 mos. cold stratification (Emery and Frey 1971). 60,000 seeds/lb 39,000-113,000 seeds/lb; Propagation: Easily propagated from cuttings or divisions (Emery 1988). Flowers: May-Jul; Fruits: Sep-Oct
<i>Vitis californica</i> California wild grape	Preferred Site: Requires moderate moisture. Native communities: DF, DP, QK, QG, TM Highly recommended for enhancement of riparian areas below 3,000 feet. Growth: Aggressive growth; May strangle smaller trees adjacent to the plant.	Propagation: May be propagated from cuttings. Cuttings should be collected in March or April to avoid problems with bud dormancy (Robbins and Burger 1986).
<i>Whipplea modesta</i> yerba de selva	Preferred Site: Excellent ground cover. Roots: Roots freely as it travels along the ground (Kruckeberg 1982). Native communities: DF, DP, MP, TM	Seeds: No treatment (Emery 1988).
FORBS		
<i>Achillea borealis</i> ssp. <i>californica</i> yarrow	Preferred Site: Occurs on open grasslands below 2,500 feet elevation (Munz and Keck 1959). Native communities: GA, GP	Seeds: No treatment (Emery 1988). Flowers: Mar - Jun.
<i>Achillea lanulosa</i> yarrow	Preferred Site: Commonly occurs in meadows and dampish places generally between 2,500-8,000 feet elevation (Munz and Keck 1959). Native communities: GA, GP, RF, WF, MF	Flowers: Jun - Aug
<i>Achillea millefolium</i> yarrow /1	Preferred Site: Naturalized in meadows and grasslands. Common weed in lawns etc. (Munz and Keck 1959). Native communities: GA, GP	Seeds: 2,770,000; Flowers: Summer
<i>Anaphalis margaritacea</i> pearly everlasting	Preferred Site: Common most everywhere on open, sunny sites from lowlands to subalpine habitats (Kruckeberg 1982). Native communities: MC, QC, DF, DP, MP, TM, GA, GP	Seeds: No treatment (Emery and Frey 1971). 8,800,000 seeds/lb; Propagation: Easy to grow from rhizomes (Kruckeberg 1982).

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Aralia californica</i> spikenard	Preferred Site: Commonly occurs on moist or wet sites below 5,000 feet elevation. Native communities: Riparian DF, DP	-
<i>Calyptidium umbellatum</i> pussy paws	Preferred Site: Grows in open, loose, sandy or gravelly places, 2,500-11,000 feet. Native communities: DF, DP, MF, WF, RF	Seeds: 1 mo. stratification (Emery 1988). Flowers: May-Aug
<i>Epilobium angustifolium</i> fireweed	Preferred Site: Prefers dry sites. Growth: Invasive. Spreads quickly by seed. Roots: Pieces of underground stems transplant easily. Native communities: DF, MF, WF, RF	Seeds: No treatment; 1 mo. stratification may improve germination (McLean 1967). 8,500,000 seeds/lb
<i>Eschscholzia californica</i> California poppy	Preferred Site: Requires bare ground; Listed as a weed by grain growers in California. Roots: Has a relatively deep tap root. Native communities: GA, GP, MC	Seeds: No treatment (Emery 1988). 293,000-540,000 seeds/lb
<i>Gilia capitatus</i> gilia	Preferred Site: Commonly occurs on open, well drained slopes below 6,000 feet (Munz and Keck 1959). Native communities: DF, DP, MP, TM, MF, WF, MC	Seeds: No treatment. 2 wks. stratification improves germination (Grant 1949). 1,020,000 seeds/lb
<i>Helianthus annuus</i> sunflower	Preferred Site: Very widespread; Occurs along roadsides and wasteplaces occasionally up to 5,000 feet elevation (Munz and Keck 1959). Native communities: GA, GP, MC	Seeds: 58,500 seeds/lb.
<i>Horkelia sericata</i> Howell's horkelia	Preferred Site: Prefers open, dry woods (Kruckeberg 1982). Tolerant to serpentine. Native communities: JP, DF, DP, MP	-
<i>Ipomopsis aggregata</i> scarlet gilia	Preferred Site: Open places; Sandy flats and rocky ridges 3,500-10,300 feet (Munz and Keck 1959). Recommended for revegetating harsh sites. Native communities: DF, DP, MP, MF, WF, RF	-
<i>Lathyrus japonicus</i> pea (*)	Preferred Site: Recommended for stabilizing sand dunes (Kruckeberg 1982). Native communities: Coastal strand. Not native to the Trinity River watershed.	Seeds: 12,000 seeds/lb; Flowers: May - Jul
<i>Lathyrus polyphyllus</i> pea (*)	Preferred Site: Prefers well-drained soils (Kruckeberg 1982). Roots: Deep taproot. Native communities: DF, DP, MP, TM	Flowers: May - Jul
<i>Lathyrus torreyi</i> pea (*)	Preferred Site: Prefers well-drained soils (Kruckeberg 1982). Occurs in open woods below 1,500 feet (Munz and Keck 1959). Roots: Deep taproot. Native communities: DF, TM, MC	Flowers: May - Jun
<i>Lathyrus vestitus</i> wild sweet pea (*)	Preferred Site: Prefers well-drained soils (Kruckeberg 1982). Occurs on brushy and wooded places below 4,000 feet (Munz and Keck 1959). Native communities: DF, DP, MP, TM, MC	Seeds: No treatment (Emery 1988). Flowers: Apr - Jun.

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Linum perenne</i> ssp. <i>lewisii</i> western blue flax	Preferred Site: Prefers sunny sites (Kruckeberg 1982). Occurs on dry slopes and ridges, mostly 4,000-11,000 feet (Munz and Keck 1959). Recommended for dry sites. Native communities: DF, DP, TM, MF, WF, RF, QK, QG	Seeds: No treatment (Emery 1988). 293,000 seeds/lb
<i>Lotus crassifolius</i> big deervetch (*, †)	Preferred Site: Occurs on dry banks and flats 2,000-6,000 feet. Highly recommended for revegetation projects. Habit: Thick stemmed, erect or spreading perennial herb. Dissemination: Spreads by seeds or rhizomes (Darris 1988). Native communities: RF, WF, MF, DF, DP, MP	Seeds: Hot water treatment (Emery 1988). Flowers: May - Aug.
<i>Lotus micranthus</i> bird's foot trefoil (*, A †)	Preferred Site: Occurs in many plant communities on open plains and slopes, below 5,000 feet (Munz and Keck 1959). Native communities: Most communities	Flowers: Mar - May
<i>Lotus purshianus</i> Spanish clover (*, A)	Preferred Site: Common in dry fields and disturbed areas below 7,000 feet (Munz and Keck 1959). Native communities: GA, GP, MC, QG, QK	Seeds: Hot water treatment (Emery 1988). Flowers: May - Oct
<i>Lotus scoparius</i> deerweed (*)	Preferred Site: Occurs on dry slopes and fans especially after burns below 5,000 feet (Munz and Keck 1959). Native communities: GA, GP, QG, QK	Seeds: Hot water treatment for fruit or cleaned seed (Emery 1988). 450,000 seeds/lb; Flowers: Mar - Aug
<i>Lupinus</i> spp. lupine (*)	-	Seeds: Fresh seed no treatment; stored seeds scarification or hot water (Emery 1988).
<i>Lupinus bicolor</i> minature lupine (*, A, †)	Preferred Site: Occurs on sandy places along coast and inland in mixed evergreen forest, below 3,000 feet (Munz and Keck 1959). Native communities: DF, TM, DP	Seeds: Fresh seeds no treatment. Stored seeds scarification or hot water; no treatment may give fair germination (Emery 1988). 75,000 seeds/lb; Flowers: Mar - Jun
<i>Lupinus densiflorus</i> lupine (*, A)	Preferred Site: Occurs on grassy and open fields, hillsides and mixed evergreen forest, below 2,000 feet (Munz and Keck 1959). Native communities: GA, GP, DF, TM	Seeds: 12,800-13,500 seeds/lb; Flowers: Apr - Jun
<i>Lupinus nanus</i> lupine (*, A)	Preferred Site: Occurs in grassy and open fields, hillsides and brushy slopes below 3,000 feet (Munz and Keck 1959). Native communities: GA, GP, MC	Seeds: Fresh seeds no treatment. Stored seeds scarification or hot water; no treatment may give fair germination (Emery 1988). 15,600-45,000 seeds/lb; Flowers: Apr - May
<i>Lupinus succulentus</i> lupine (*, A)	Preferred Site: This species has been proven to be one of the best and most enduring of annual lupines where soil has become too rich from N-fixing bacteria. Seems to like disturbed soils (Roderick 1977). Native communities: GA, GP	Seeds: Hot water, scarification, or soak in concentrated H ₂ SO ₄ , 6-8 hrs. (Emery 1988). 16,000 seeds/lb; Flowers: Feb - May

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Mellilotus albus</i> white sweet-clover /1 (*, B, †)	Preferred Site: Tolerates a wide range of soils, drainage conditions and soil pH. However, it will not succeed on acid soils or very wet soils. Outstanding soil improver. Highly recommended for revegetation projects (USDA Forest Service 1988c). Wildlife: Valuable nectar source for bees. Native communities: Not native to the Trinity River watershed.	Seeds: 262,000 seeds/lb; Flowers: May-Sep
<i>Mellilotus officinalis</i> yellow sweet-clover /1 (*, B, †)	Preferred Site: More tolerant to heat, drought and cold than <i>M. albus</i> . Also more adaptable to poor soils (USDA Forest Service 1988c). Highly recommended for revegetation projects. Wildlife: Nectar is especially attractive to honeybees. Native communities: Not native to the Trinity River watershed. Less commonly naturalized in California than <i>M. albus</i> (Munz and Keck 1959).	Seeds: 262,000 seeds/lb; Flowers: May-Aug
<i>Mimulus guttatus</i> monkey flower	Preferred Site: Requires wet sites. Native communities: Riparian TM, QK, QG, DF, DP, MP, MC	Seeds: No treatment (Emery 1988). 6,000,000 seeds/lb; Flowers: Mar - Aug
<i>Polystichum munitum</i> sword fern	Preferred Site: Requires a moist site with at least partial shade. Grows to 2,500 feet (Labadie 1978). Native communities: DF, DP, TM	-
<i>Thermopsis gracilis</i> false-lupine (*)	Preferred Site: Occurs on dry to moist, stony flats, 1,000-5,000 feet. Range: Trinity to Del Norte County, California. Native communities: DF, TM, DP, MP	Flowers: Apr - Jun
<i>Thermopsis macrophylla</i> false-lupine (*) †)	Preferred Site: Occurs in open places below 4,500 feet. Range: Ventura County north to Del Norte County, California (Munz and Keck 1959). Native communities: DF, TM, QK, QG	Seeds: Hot water treatment for <i>Thermopsis macrophylla</i> var. <i>agnina</i> (Emery 1988). Flowers: Apr - Jun
<i>Trifolium beckwithii</i> Beckwith's clover /1 (*)	Preferred Site: Occurs in valleys and meadows 4,000-7,000 feet. Range: Nevada County, California to Oregon (Munz and Keck 1959). Native communities: RF, WF, MF, DF, DP, MP, QG, QK, GA, GP	Flowers: May - Aug
<i>Trifolium bifidum</i> clover (*, A)	Preferred Site: Occurs in grasslands below 2,000 feet. Range: Santa Clara County, California to Oregon (Munz and Keck 1959). Native communities: GA, GP, TM, DF	Flowers: Apr - Jun
<i>Trifolium ciliolatum</i> tree clover	Preferred Site: Occurs on open and grassy slopes below 5,000 feet (Munz and Keck 1959). Native communities: GA, GP	Flowers: Mar - Jun
<i>Trifolium dubium</i> clover /1 (*, A)	Preferred Site: Occurs in waste places, fields, lawns, etc. below 2,500 feet. Range: Santa Barbara County, California north to British Columbia (Munz and Keck 1959). Native communities: GA, GP	Flowers: May - Jul

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Trifolium hirtum</i> rose clover /1 (*, A)	Preferred Site: Recommended for dioritic soils (USDA Forest Service 1979). Tolerates a wide range of soils but is not cold hardy (Munz and Keck 1959). Native communities: GA, GP	Seeds: 136,500 seeds/lb; Flowers: Apr-May
<i>Trifolium incarnatum</i> crimson clover /1 (*, A)	Range: Native to Europe; Sparingly introduced to Mendocino and Butte Counties, California (Munz and Keck 1959). Native communities: GA, GP	Seeds: 160,000 seeds/lb; Flowers: May-Aug
<i>Trifolium longipes</i> long-stalked clover (*)	Preferred Site: Commonly occurs on moist sites up to 9,000 feet elevation. Range: Mendocino County north to Washington (Munz and Keck 1959). Native communities: DF, DP, MP, MF, WF, RF	Flowers: Jun - Sep
<i>Trifolium microcephalum</i> littlehead clover (*, A)	Preferred Site: Occurs on dry slopes and valleys 2,000-5,000 feet. Range: Siskiyou County, California north to British Columbia (Munz and Keck 1959). Native communities: GA, GP	Flowers: Apr - Aug
<i>Trifolium microdon</i> clover (*, A)	Preferred Site: Occurs in open valleys and slopes up to 2,500 feet. Range: San Luis Obispo to Del Norte Counties, California (Munz and Keck 1959). Native communities: GA, DF, TM	Flowers: Mar - Jun
<i>Trifolium oliganthum</i> clover (*, A)	Preferred Site: Occurs in open woods to 3,500 feet. Range: San Luis Obispo to Fresno Counties, California (Munz and Keck 1959). Native communities: DF, TM, DP, MP	Flowers: Mar - Jun
<i>Trifolium pratense</i> red clover /1 (*)	Preferred Site: Recommended for heavy, well-drained soils. Cold hardy; adapted to cool, moist sites. Growth: Species is a short-lived perennial. Easily established. Native communities: Not native to the Trinity River watershed. Planted extensively along roadsides.	Seeds: 281,000 seeds/lb; Flowers: Apr-Oct
<i>Trifolium repens</i> white clover /1 (*, A)	Preferred Site: Recommended for medium to clayey, shallow soils. Adapted to cool, moist sites. Easily established. Cold hardy. Roots: Shallow-rooted, creeping perennial. Native communities: Not native to the Trinity River watershed. Naturalized extensively in GA & GP communities.	Seeds: 800,000 seeds/lb; Flowers: Apr-Dec
<i>Trifolium subterraneum</i> sub clover /1 (*)	Preferred Site: Requires greater moisture than <i>T. hirtum</i> . Does not require fertilization. Range: Naturalized in Humboldt, Sonoma and Santa Cruz Counties from Europe. Native communities: Not native to the Trinity River watershed.	Seeds: 52,000-75,000 seeds/lb
<i>Trifolium tridentatum</i> clover (*, A)	Preferred Site: Common in mostly grassy places up to 5,000 feet. Range: California to British Columbia. Native communities: Most including GA, GP, QK, QG	Flowers: Mar - Jun

/1 = Non-native naturalized species

/2 = Non-native exotic species.

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Trifolium variegatum</i> clover (*, A)	Preferred Site: Prefers moist sites. Native communities: Most including GA, GP, QK, QG	Flowers: Apr - Jul
<i>Veronica americana</i> brooklime	Preferred Site: Commonly occurs in wet areas along streams from sea-level to 10,500 feet; southern California north to Alaska (Munz and Keck 1959). Native communities: Riparian	Seeds: No treatment (Emery and Frey 1971). Flowers: May - Aug
<i>Vicia americana</i> vetch (*)	Preferred Site: Occurs in grassland and open timber sites. Probably the most common of native vetches (Stechman 1986). Native communities: GA, GP, QK, QG, DF, DP, MP	Flowers: Apr - Jun
<i>Vicia californica</i> vetch (*)	Preferred Site: Occurs on open slopes, mostly 2,000-8,000 feet. Range: California to southern Oregon (Munz and Keck 1959). Native communities: MF, WF, RF, DF, TM, QK, QG	Flowers: Apr - Jul
<i>Vicia gigantea</i> vetch (*)	Preferred Site: Occurs in moist places; Range: San Luis Obispo County to Alaska (Munz and Keck 1959). Native communities: TM, DF	Seeds: No treatment (Emery 1988). Flowers: Mar - Jun
<i>Vicia villosa</i> winter vetch /1 (*, A & B)	Preferred Site: Tolerates a wide range of soils including poor, sandy sites. Drought tolerant; Easily established; Cold hardy Habit: Species is a slender, twining annual or short-lived perennial. Native communities: Not native to the Trinity River watershed.	Flowers: Apr - Jul
<i>Woodwardia fimbriata</i> chain fern	Preferred Site: Prefers wet sites; Tolerates sun (Kruckeberg 1982). Grows from 100-8,000 feet (Labadie 1978). Native communities: Riparian DF, TM, DP, QK, QG, MP	-
<i>Xerophyllum tenax</i> beargrass	Preferred Site: Occurs on open, dry slopes and ridges below 6,000 feet. Very tolerant to serpentine. Range: Widespread from California coast ranges to Rocky Mountains (Munz and Keck 1959). Native communities: TM, DF, DP, MP, JP, MF	Seeds: Soak in distilled water 24 hrs. and stratify 4 mos. in vermiculite. Remove germinating seeds at weekly intervals (Smart and Minore 1977). Flowers: May - Aug
GRASSES		
<i>Agropyron</i> sp. X <i>Triticum</i> sp. wheatgrass X wheat	Preferred Site: Somewhat drought tolerant Good as a mulch species. Grows and dies early in season.	Seeds: Sterile hybrid between wheat and wheatgrass. Doesn't self seed.
<i>Agropyron dasystachyum</i> northern thickspike wheatgrass	Growth: Easily established; Strongly rhizomatous, cool season grass. May be seeded alone for erosion control. Native communities: QK, QG, MP, DP	Seeds: No treatment (Emery 1988). 154,000 seeds/lb; Flowers: Jun - Jul

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Agropyron intermedium</i> intermediate wheatgrass	Preferred Site: Good stands develop on medium to highly fertile soils (Crampton 1974) Habit: Perennial spreading by creeping rhizomes. Comments: Useful for erosion control. Not competitive with planted seedlings (Lund and Barker 1982). Native communities: Not native to the Trinity River watershed. Introduced from Eurasia.	-
<i>Agropyron smithii</i> western wheatgrass	Growth: Aggressive and sod-forming grass used in range seeding, surface mine reclamation and soil stabilization. Native communities: DP, MP	Seeds: No treatment (Emery 1988). 110,000 seeds/lb; Flowers: Jun - Aug
<i>Agropyron trachycaulum</i> wheatgrass	Growth: Fast growing, cool-season grass; Short-lived alkali tolerant; Recommended for reclamation plantings and range seedings. Native communities:	Seeds: No treatment (Emery 1988). 159,000 seeds/lb; Flowers: Jun - Aug
<i>Agrostis alba</i> redtop /1	Preferred Site: Cool-season, sod-forming. Prefers moist to semi-wet soils. Useful for erosion control in poorly drained soils. Native communities: Not native to the Trinity River watershed.	Seeds: No treatment (Emery 1988). 5,000,000 seed/lb; Flowers: Jun - Sep
<i>Agrostis hallii</i> bent grass	Preferred Site: Occurs in woods near the coast from Oregon to Santa Barbara (Hitchcock 1951). Native communities: TM, DF, DP, MP	Flowers: May - Jul
<i>Arrhenatherum elatius</i> tall oatgrass /1	Preferred Site: Occurs in meadows, open ground and waste places (Hitchcock 1951). Range: Widespread from Newfoundland to California. Common in open grasslands in the western portion of the Trinity River watershed. Native communities: GA, GP	Flowers: May - Jul
<i>Avena sativa</i> cultivated oat /1	Range: Common grassland species in the western portion of the Trinity River watershed. Native communities: GA, GP	Flowers: Apr - Jun
<i>Briza maxima</i> quaking grass /1 (A)	Range: Introduced; More common in coastal grasslands. Native communities: GA, GP, QK, QG	Seeds: 185,000 seeds/lb; Flowers: Apr-Jul
<i>Briza minor</i> quaking grass /1 (A)	Range: Introduced; Occasionally forms an appreciable part of the spring forage in some parts of California (Hitchcock 1951). Native communities: GA, GP, QK, QG	-
<i>Bromus carinatus</i> California brome (A, †)	Preferred Site: Occurs on open ground, open woods at low and middle elevations (Hitchcock 1951). Range: Common in the Trinity River watershed. Growth: Short-lived perennial bunchgrass. Comments: Good erosion control. Competes against annual and perennial weeds. Good forage. Native communities: DF, DP, MP, GA, GP, QK, QG	Seeds: 61,000 seeds/lb; Flowers: Apr-Aug Fruits: Usually sets seed by first of July (Darris 1988).

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Bromus marginatus</i> mountain brome (†)	Growth: Short-lived and deep-rooted. Valuable cool-season erosion control plant. Growth: Declines with competition. Occupies disturbed sites (Lund and Barker 1982). Native communities: DF, DP, MP, GA, GP, QG, QK	Seeds: No treatment (Emery 1988). 90,000 seeds/lb; Flowers: Apr - Jul
<i>Bromus mollis</i> soft chess /1 (A)	Preferred Site: Recommended for hot and harsh sites, ultra basic and dioritic soils (USDA Forest Service 1979). Growth: Does not require fertilization and will naturalize and persist under harsh conditions (Popenoe 1982). Native communities: Not native to the Trinity River watershed.	Seeds: 265,000 seeds/lb; Flowers: Apr-Jul
<i>Calamagrostis canadensis</i> blue-joint reedgrass	Preferred Site: Occurs in marshes, wet places, open woods and meadows. Range: Widely distributed from Greenland to California. Native communities: RF, WF, MF	Seeds: No treatment; 5 days stratification may improve germination (Emery 1988). Flowers: Jul - Sep
<i>Calamagrostis koelerioides</i> fire reedgrass	Preferred Site: Occurs on dry hills, banks and meadows. Range: Wyoming to Washington south to southern California (Hitchcock 1951). Native communities: GA, GP	Flowers: Jun - Aug
<i>Calamagrostis nutkaensis</i> reedgrass	Preferred Site: Tolerates wet soils. Wildlife: Not utilized by livestock. Native communities: Riparian/ wet areas of DF, TM	Seeds: No treatment (Emery 1988). Flowers: May - Aug
<i>Carex bolanderi</i> sedge	Preferred Site: Common; Occurs in wet meadows along streams or near springs, 150-8,100 feet elevation. Range: Widespread from San Bernardino north to British Columbia (Munz and Keck 1959). Native communities: Riparian/ wet areas of DF, TM, RF, WF, MF, DP, MP	-
<i>Carex nudata</i> sedge	Preferred Site: Common along rocky stream beds 150-5,000 feet. Range: Santa Barbara to Del Norte Counties, California (Munz and Keck 1959). Native communities: Riparian areas of DF, TM, QK, QG, DP, MP	-
<i>Dactylus glomerata</i> orchard grass /1	Preferred Site: Cool-season, introduced grass. Requires a moderate amount of moisture. Growth: Able to perpetuate itself and spread on disturbed soil (Crampton 1974). Competes with planted seedlings (Lund and Barker 1982). Native communities: Not native to the Trinity River watershed. Naturalized in GA & GP.	Seeds: 540,000 seeds/lb; (200,000-654,000 seeds/lb); Flowers: May - Aug
<i>Danthonia californica</i> California oatgrass	Preferred Sites: Open meadows, coastal prairies to foothills and high elevation forests and meadows (Stechman 1986). Comments: High quality forage. Controls erosion and annual weed infestation (Darris 1988). Native communities: GA, GP, TM, QK, QG	Seeds: No treatment (Emery 1988). Flowers: May - Jul

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Deschampsia caespitosa</i> tufted hairgrass	Preferred Site: Valuable for reclaiming wet or moist, high elevation sites (Darris 1988). Tolerates grazing and wet soils. Native communities: MF, WF, RF	Seeds: No treatment (Emery 1988). 2,500,000 seeds/lb; Flowers: Jul-Aug
<i>Elymus glaucus</i> blue rye (†)	Preferred Site: Grows in grassy and woody places below 7,500 feet elevation. Does not compete with other planted seedlings but also has the ability to survive on harsh sites. (Lund and Barker 1982). Highly recommended for revegetation projects. Native communities: GA, GP, QK, QG, DF, DP, MP	Seeds: No treatment (Emery 1988). 100,000 seeds/lb; (90,000-131,000 seeds/lb); Flowers: Jun - Aug
<i>Elymus triticoides</i> alkali rye	Preferred Site: Cool-season, sod-forming grass. Tolerates dry to moist soils, alkaline or saline conditions. Native communities: GA, GP	Seeds: No treatment; germination may be poor (Emery 1988). 243,000 seeds/lb; Flowers: Jun - Sep
<i>Festuca californica</i> California fescue (†)	Range: Common species on serpentine and in oak woodlands in the Trinity River watershed. Excellent species for reclamation of dry disturbed sites. Habit: Densely tufted perennial bunch grass. Growth: Competes with young seedlings. Has the tendency to take over (Lund and Barker 1982). Native communities: DF, TM, QK, QG, GA, GP, DP, JP, MP	Seeds: No treatment (Emery 1988). Flowers: Apr - Jul
<i>Festuca idahoensis</i> Idaho fescue (†)	Preferred Site: Common on well-drained open slopes and flats in the Trinity River watershed. Tolerates dry, rocky soils. Growth: Competes with planted seedlings (Lund and Barker 1982). Native communities: GA, GP, DF, DP, MP, QK, QG, MF, WF	Seeds: No treatment (Emery 1988). 450,000 seeds/lb; Flowers: May - Jul
<i>Festuca occidentalis</i> western fescue	Preferred Site: Common on dry, wooded slopes and banks. Range: British Columbia to central California (Hitchcock 1951). Native communities: DF, TM, DP, MP, MF, WF, RF	Seeds: No treatment (Emery 1988). Flowers: May - Aug
<i>Festuca rubra</i> red fescue	Preferred Site: Prefers cool, moist sites. Growth: Cool-season, sod-forming grass. Valuable for erosion control; Light: Tolerates shade. Native communities: GA, GP	Seeds: No treatment; freshly harvested seeds need 5 days stratification (Association of Official Seed Analysts 1981) or dry storage for 1-2 mos. before sowing (Crocker and Barton 1957). 500,000 seeds/lb; Flowers: May - Jul
<i>Hierochloa occidentalis</i> vanilla grass	Range: Common in redwood forests. Occurs from Monterey, California north to Washington. Native communities: DF, TM	Seeds: No treatment (Emery 1988). Flowers: Jan - Jul
<i>Hordeum brachyantherum</i> barley	Preferred Site: Grows in meadows, bottom lands, salt marshes and grassy slopes up to 9,000 feet elevation. Habit: Short stature (8-24 in.) bunch grass. Range: Newfoundland to California (Hitchcock 1951). Native communities: RF, WF, MF, DF, DP, MP, GA, GP	Seeds: No treatment (Emery 1988). Flowers: May - Aug
<i>Hordeum californicum</i> California barley	Wildlife: 'Foxtail' spike may cause injury to eyes and mouths of cattle and sheep (Stechman 1986). Native communities: GA, GP, MC, DP, MP	Seeds: No treatment (Emery 1988). Flowers: Apr - Aug

/1 = Non-native naturalized species

/2 = Non-native exotic species.

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SPECIES NAME COMMON NAME	SUITABILITY	CULTURE
<i>Hordeum jubatum</i> foxtail	Wildlife: 'Foxtail' spike may cause injury to eyes and mouths of cattle and sheep (Stechman 1986). Native communities: GA, GP	Flowers: May - Jul
<i>Phleum alpinum</i> mountain timothy	Preferred Site: Prefers wet meadows, bogs, etc, 5,000-11,500 feet elevation (lower in north coast ranges); Native communities: RF, WF, MF	Flowers: Jul - Aug
<i>Poa rhizomata</i>	Preferred Site: Occurs on deep soils in moist forest openings, 1,500-3,000 feet; Range: Southwestern Oregon to northwestern California; Uncommon (Hitchcock 1951). Native communities: DP, MP	Flowers: Apr - May
<i>Sitanion hystrix</i> squirreltail	Preferred Site: Valuable for revegetation of dry hills, plains and rocky slopes. Excellent for mined land revegetation. Growth: Cool-season bunchgrass. Native communities: GA, GP, MP, DP	Seeds: No treatment (Emery 1988). 192,000 seeds/lb
<i>Stipa occidentalis</i> western needlegrass	Preferred Site: Occurs on plains, rocky hills and open woods. Range: Washington south to California (Hitchcock 1951). Native communities: GP	Seeds: No treatment (Emery 1988). Flowers: Jun - Aug
<i>Stipa pulchra</i> purple needlegrass	Range: Occurs on open ground, primarily in the Coast Ranges of northern California (Hitchcock 1951). Formerly the principal bunchgrass in California where rain is 10-20 in. and no snow. Native communities: GA, GP, QK, QG	Seeds: No treatment (Emery 1988). Flowers: Mar - May
<i>Vulpia myuros</i> zoro fescue /2 (A)	Preferred Site: Cool season annual grass that is tolerant to acid or serpentine soils and low fertility. Will survive with as little as 10 inches rainfall. Growth: Aggressive, early-maturing annual grass with a high top-to-root growth ratio. Roots: Thick fibrous root system. Native communities: Not native to the Trinity River watershed although some sources indicate that <i>Vulpia myuros</i> may be native to California.	Flowers: Mar - May

WILDLIFE HABITAT ENHANCEMENT

The following section provides information on plant species that have potential for the enhancement of wildlife habitat. The information is primarily contained in Table 8 and includes relative values of each plant species to provide food to the following wildlife groups. Species listed for each group include only wildlife species that occur within the Trinity River watershed.

- **Water, Marsh and Shore Birds:** Geese, ducks, coots, gulls, rails, plovers, snipes and sandpipers. Although loons, grebes, pelicans, cormorants, mergansers, terns, herons, egrets and bitterns fit in this group, they were not included since they do not make use of any of the plants listed in this report.
- **Upland Game Birds:** Grouse, doves, wild turkey, pigeons and quail.
- **Non Game Birds:** Hummingbirds, nighthawks, woodpeckers (including flickers and sapsuckers), flycatchers, larks, swallows, jays, magpies, ravens, crows, nutcrackers, chickadees, titmice, nuthatches, creepers, wren-tits, wrens, mockingbirds, thrashers, robins, thrushes, bluebirds, townsend solitaires, kinglets, pipits, waxwings, starlings, vireos, warblers, sparrows, meadowlarks, blackbirds, orioles, cowbirds, tanagers, grosbeaks, buntings, finches, pine siskins, crossbills, towhees, sparrows and juncos. Although whip-poor-wills, swifts, kingfishers, dippers, shrikes fit into this wildlife grouping, they were not included since they do not utilize any of the plants listed in this report.
- **Omnivorous Mammals:** Bears, rabbits, foxes, skunks, squirrels, coyote, mink, marten, fisher, racoons, beaver, mountain beaver, porcupines. Although weasels, wolverines, otters, badgers, mountain lions and bobcats fit into this group, they were not included since they make only limited use of of the plants listed in this report.
- **Small Mammals:** Ground squirrels, rats, mice, chipmunks, gophers, kangaroo rats, moles, shrews and voles. Although bats fit into this wildlife group, they were not included since they do not utilize any of the plants listed in this report.
- **Large Mammals:** Deer and elk (bear have been included with omnivores).
- **Notes:** Includes information on other wildlife such as raptors, fish, amphibians and reptiles. Also includes information on species that are important for winter range enhancement, toxicity and other special attributes that may affect plant species selection.

Plant species utilization was estimated for each wildlife group listed in Table 8 using values and techniques given in Martin, Zim and Nelson (1951). Information on utilization, toxicity and other wildlife values was obtained from various other references listed in the bibliography of this report. Wildlife utilization categories include Fruit (FR), Browse (BR) or Nectar (NE) as follows:

FRUIT: Wildlife species utilize fruit, seed or nut portions of the plant.

BROWSE: Wildlife species utilize needles, leaves, buds, stems, flowers, wood or bark portions of the plant.

NECTAR: Wildlife species utilize flower nectar or sap portions of the plant.

The relative value of each plant species to provide fruit (FR), browse (BR) or nectar (NE) was determined for each wildlife group by multiplying the percentage of the annual diet the plant represents by the number of wildlife species that utilize the plant species in each wildlife group. This value was then used to produce an estimated value for each wildlife group of either high (H), medium (M) or low (L). The user should note that some of the plants listed in Table 8 may have beneficial uses to wildlife species that do not occur within the Trinity River watershed area and utilization is listed only for those wildlife species known or suspected to occur within the watershed area. Also, many of the plants benefit wildlife species in other ways not listed such as providing cover, nest sites or feeding substrates. These benefits were not listed since they are too general and apply to most of the plants listed.

Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
TREES							
<i>Abies concolor</i> white fir	-	BR-L	FR-L	FR-M	FR-M	BR-L	-
<i>Abies grandis</i> grand fir	-	BR-L	FR-L	FR-M	FR-M	BR-L	-
<i>Abies magnifica</i> var. <i>shastensis</i> Shasta red fir	-	BR-L	FR-L	FR-M	FR-M	BR-L	-
<i>Acer macrophyllum</i> big leaf maple	-	FR-M	FR-M	FR-L BR-L	FR-M	BR-L	-
<i>Alnus oregana</i> red alder (*)	-	FR-L	FR-M	BR-M	-	BR-M	-
<i>Alnus rhombifolia</i> white alder (*)	-	FR-L	FR-M	BR-M	-	BR-M	Note 36
<i>Arbutus menziesii</i> Pacific madrone	-	FR-M	FR-M NE-H	-	FR-L	BR-L	Note 37
<i>Calocedrus decurrens</i> incense cedar	-	FR-M	FR-M	FR-L	FR-M	BR-L	Note 35
<i>Castanopsis chrysophylla</i> golden chinquapin	-	-	-	FR-M	FR-M	BR-L	-
<i>Chamaecypris lawsoniana</i> Port-Orford cedar	-	-	-	-	-	-	-
<i>Chamaecypris nootkatensis</i> Alaska cedar /2	-	-	-	-	-	-	-
<i>Cornus nuttallii</i> mountain dogwood	-	FR-H	FR-H	FR-M	-	BR-L	-
<i>Fraxinus latifolia</i> Oregon ash	FR-L	FR-L	FR-L	FR-L	FR-L	BR-L	-
<i>Juniperus occidentalis</i> western juniper	-	FR-M	FR-H	FR-L	FR-M	BR-M	-
<i>Lithocarpus densiflora</i> tanoak	FR-H	FR-H	FR-M	FR-H	FR-H	FR-H BR-M	-
<i>Picea sitchensis</i> Sitka spruce	-	BR-M	FR-M	BR-L	FR-L	-	-
<i>Pinus attenuata</i> knobcone pine	-	-	FR-L	BR-L	FR-M	-	-

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Pinus contorta</i> ssp. <i>contorta</i> shore pine /2	-	-	FR-L	FR-L BR-L	-	-	-
<i>Pinus contorta</i> ssp. <i>murrayana</i> lodgepole pine	-	FR-M BR-M	FR-M	FR-L BR-L	FR-M	BR-M	-
<i>Pinus jeffreyi</i> jeffrey pine	-	BR-L	FR-M	FR-L BR-L	FR-M	BR-M	-
<i>Pinus lambertiana</i> sugar pine	-	FR-M BR-M	FR-M	FR-L BR-L	FR-M	BR-M	Note 25
<i>Pinus monticola</i> western white pine	-	FR-M BR-M	FR-M	FR-L BR-L	FR-M	BR-M	-
<i>Pinus ponderosa</i> ponderosa pine	-	-	FR-M	FR-L BR-L	-	BR-M	Note 25
<i>Pinus sabiniana</i> digger pine	-	-	FR-M	BR-L	-	BR-L	-
<i>Populus fremontii</i> cottonwood	-	BR-L	-	BR-M	FR-L	BR-M	Note 43
<i>Populus tremuloides</i> quaking aspen	-	FR-M BR-M	-	BR-H	BR-H	BR-H	-
<i>Populus trichocarpa</i> black cottonwood	-	FR-M	-	BR-L	BR-L	BR-M	Note 43
<i>Pseudotsuga menziesii</i> Douglas-fir	-	FR-H BR-H	FR-M	FR-L	FR-L	BR-H	Note 26
<i>Quercus chrysolepis</i> canyon live oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-H BR-H	Note 6
<i>Quercus douglasii</i> blue oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-H BR-H	Note 6
<i>Quercus garryana</i> Oregon white oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-M BR-M	Note 6
<i>Quercus kelloggii</i> California black oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-H BR-H	Note 6
<i>Robinia pseudo-acacia</i> black locust /1 (*)	-	FR-L	NE-L	FR-L	FR-L	-	Note 2
<i>Salix lasiandra</i> willow	-	BR-M	-	BR-L	BR-L	BR-M	Note 27
<i>Salix laevigata</i> willow	-	BR-M	NE-L	BR-L	BR-L	BR-M	Note 27

/1 = Non-native naturalized species
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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Sequoiadendron giganteum</i> giant sequoia /1	-	-	-	-	BR-L	-	-
<i>Sequoia sempervirens</i> coast redwood	-	-	-	-	-	-	Note 26
<i>Taxus brevifolia</i> Pacific yew	-	FR-L	FR-L	-	-	-	-
<i>Thuja plicata</i> western red cedar	-	-	FR-M	-	-	-	-
<i>Tsuga heterophylla</i> western hemlock	-	FR-M	FR-M	BR-M	-	-	-
<i>Tsuga mertensiana</i> mountain hemlock	-	FR-M	FR-M	BR-M	-	-	-
<i>Umbellularia californica</i> California bay-laurel	-	FR-L	FR-L	-	FR-L	BR-M	-
TALL SHRUBS (> 5 ft.)							
<i>Acer circinatum</i> vine maple	-	FR-L	FR-L	BR-L	FR-L	BR-M	-
<i>Acer glabrum</i> var. <i>torreyi</i> Rocky Mountain maple	-	FR-L	FR-L	BR-L	FR-L	BR-L	-
<i>Aesculus californica</i> California buckeye	-	-	-	FR-L	-	BR-M	Note 9
<i>Alnus sinuata</i> Sitka alder (*)	-	FR-M	FR-M	BR-L	-	BR-M	-
<i>Alnus tenuifolia</i> mountain alder (*)	-	-	-	-	-	-	-
<i>Betula occidentalis</i> water birch	-	FR-M	FR-M	BR-M	-	BR-M	Note 4
<i>Ceanothus thrysiflorus</i> blue blossom (*)	-	FR-L	-	BR-L	FR-L	BR-M	-
<i>Ceanothus velutinus</i> snow brush (*)	-	FR-L	-	BR-L	FR-L	BR-M	-

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Cephalanthus occidentalis</i> var. <i>californicus</i> California buttonbush	FR-L	-	-	-	-	-	Note 12
<i>Cercocarpus ledifolius</i> curled-leaf mtn. mahogany (*)	-	FR-L BR-L	-	-	FR-L	BR-H	Note 10
<i>Cornus californica</i> dogwood	-	FR-H	FR-H	FR-M	FR-M	BR-L	-
<i>Cornus sessilis</i> dogwood	-	FR-H	FR-H	FR-H	FR-H	BR-L	-
<i>Cornus stolonifera</i> American dogwood	-	FR-H	FR-H	FR-H	FR-H	BR-M	Note 28
<i>Corylus cornuta</i> var. <i>californica</i> California hazel	-	BR-M	-	FR-L	FR-L BR-L	BR-L	-
<i>Holodiscus discolor</i> var. <i>delnortensis</i> creambush oceanspray	-	-	-	-	-	BR-L	-
<i>Myrica californica</i> California wax-myrtle	-	-	FR-L	-	-	-	-
<i>Osmaronia cerasiformis</i> oso berry	-	-	FR-H	FR-L	FR-M	-	-
<i>Philadelphus lewisii</i> mock-orange	-	-	NE-?	-	-	BR-L	-
<i>Physocarpus capitatus</i> ninebark	-	-	-	-	-	BR-L	-
<i>Prunus emarginata</i> bitter cherry	-	FR-H	FR-H	FR-M BR-M	FR-M	BR-H	Note 1 Note 49
<i>Prunus virginiana</i> western choke cherry	-	-	-	-	-	-	Note 49
<i>Quercus garryana</i> var. <i>breweri</i> Brewer oak	-	FR-M	FR-L	FR-M	FR-M	FR-M BR-M	Note 6

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Quercus wislizenii</i> interior live oak	FR-L	FR-M	FR-L	FR-M	FR-M	FR-H BR-M	Note 6
<i>Rhamnus purshiana</i> cascara sagrada	-	FR-H	FR-H	FR-L	FR-L	BR-L	Note 30
<i>Rhododendron macrophyllum</i> rhododendron	-	-	-	BR-L	-	-	Note 29
<i>Rubus spectabilis</i> salmon berry	-	-	FR-L NE-M	-	-	-	Note 24
<i>Salix lasiolepis</i> arroyo willow	-	BR-M	NE-L	BR-L	BR-L	BR-M	Note 40
<i>Salix scouleriana</i> Scouler's willow	-	BR-M	-	BR-L	BR-L	BR-M	-
<i>Sambucus caerulea</i> blue elderberry	-	FR-H	FR-H NE-M	FR-L	FR-L	BR-M	Note 3
<i>Sambucus callicarpa</i> elderberry	-	FR-M	FR-H NE-M	FR-L	FR-L	BR-M	Note 3
<i>Sorbus californica</i> mountain-ash	-	FR-H	FR-H	FR-L	FR-L	BR-M	Note 39
<i>Sorbus cascadiensis</i> mountain-ash	-	FR-H	FR-H	FR-L	FR-L	BR-M	Note 39
<i>Umbellularia californica</i> California bay - shrub form	-	FR-L	FR-L	-	FR-L	BR-M	-
MEDIUM SHRUBS (> 2 ft. & < 5 ft.)							
<i>Adenostoma fasciculatum</i> chamise	-	-	FR-L	-	FR-L	BR-L	Note 30
<i>Amelanchier alnifolia</i> service-berry	-	FR-L	FR-H	FR-H	FR-H	BR-M	Note 46 Note 49
<i>Amelanchier pallida</i> service-berry	-	-	-	-	-	-	Note 49
<i>Amelanchier pumila</i> service-berry	-	-	-	-	-	-	Note 49

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SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Arctostaphylos canescens</i> hoary manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos cinerea</i> hoary manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos columbiana</i> hairy manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos glandulosa</i> eastwood manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos glauca</i> bigberry manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos hispidula</i> Gasquet manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos intricata</i> manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos manzanita</i> Parry manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos parvifolia</i> manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Arctostaphylos patula</i> greenleaf manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-M	-
<i>Arctostaphylos viscida</i> whiteleaf manzanita	-	FR-L	FR-M NE-M	FR-M	FR-M	BR-L	-
<i>Baccharis pilularis</i> var. <i>consanguinea</i> coyote brush	-	-	-	-	-	BR-L	-
<i>Baccharis pilularis</i> var. <i>pilularis</i> dwarf coyote brush	-	-	-	-	-	BR-L	-
<i>Berberis aquifolium</i> Oregon grape	-	FR-L	FR-L	-	FR-L	BR-H	Note 18
<i>Calycanthus occidentalis</i> spice-bush	-	-	FR-L	-	-	-	-
<i>Castanopsis sempervirens</i> bush chinquapin	-	-	-	FR-M	FR-M	BR-L	-
<i>Ceanothus cordulatus</i> mountain whitethorn (*)	-	FR-L	-	BR-L	FR-L	BR-H	-

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Ceanothus cuneatus</i> buck brush (*)	-	FR-L	-	BR-L	FR-L	BR-H	-
<i>Ceanothus integerrimus</i> var. <i>californicus</i> deer brush (*)	-	FR-L	-	BR-L	FR-L	BR-H	Note 14
<i>Ceanothus lemmonii</i> Lemmon's ceanothus (*)	-	-	-	-	-	-	-
<i>Ceanothus leucodermis</i> chaparral whitethorn (*)	-	FR-L	-	BR-L	FR-L	BR-H	-
<i>Ceanothus sanguineus</i> red stem ceanothus (*)	-	FR-L	-	BR-L	FR-L	BR-M	-
<i>Cercis occidentalis</i> western redbud (*)	-	-	-	-	-	BR-L	-
<i>Cercocarpus betuloides</i> mountain mahogany (*)	-	BR-L	-	-	-	BR-H	Note 10
<i>Crataegus douglasii</i> hawthorn	-	FR-L	FR-M NE-L	FR-L	FR-L	BR-L	-
<i>Eriodictyon californicum</i> yerba santa	-	-	-	-	-	BR-L	-
<i>Eriodictyon trichocalyx</i> hairy yerba santa	-	-	-	-	-	-	-
<i>Euonymus occidentalis</i> western burning bush	-	-	-	-	-	-	-
<i>Garrya buxifolia</i> silk-tassel	-	BR-L	-	-	-	BR-M	-
<i>Garrya elliptica</i> silk-tassel	-	BR-L	-	-	-	BR-M	-
<i>Garrya fremontii</i> silk-tassel	-	BR-L	-	-	-	BR-M	-
<i>Gaultheria ovatifolia</i> slender salal	-	FR-M BR-M	FR-L	FR-L	-	BR-M	-
<i>Gaultheria shallon</i> salal	-	FR-M BR-M	FR-L	FR-L	-	BR-M	Note 34
<i>Heteromeles arbutifolia</i> toyon	-	FR-L	FR-L	-	FR-L	BR-M	Note 11

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SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Ledum glandulosum</i> ssp. <i>columbianum</i> labrador-tea	-	-	-	-	-	-	Note 16
<i>Lithocarpus densiflora</i> var. <i>echinoides</i> tanoak-shrub form	FR-H	FR-H	FR-M	FR-H	FR-H	FR-H BR-H	-
<i>Lonicera involucrata</i> twinberry	-	FR-M	FR-M NE-H	FR-M	FR-M	BR-H	-
<i>Lotus yollabolliensis</i> bird's foot trefoil (*)	-	FR-M	FR-?	-	FR-M BR-M	BR-H	Note 13
<i>Lupinus albifrons</i> lupine (*)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Lupinus luteolus</i> lupine (*, A)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Lupinus polyphyllus</i> lupine (*)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Mimulus aurantiacus</i> monkey-flower	-	-	NE-M	-	-	BR-?	-
<i>Pickeringia montana</i> chaparral pea /2 (*)	-	-	-	-	-	BR-H	-
<i>Quercus dumosa</i> scrub oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-H BR-H	Note 6
<i>Quercus durata</i> leather oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-? BR-?	Note 6
<i>Quercus sadleriana</i> sadler oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-? BR-?	Note 6
<i>Quercus vaccinifolia</i> huckleberry oak	FR-M	FR-M	FR-L	FR-H	FR-H	FR-H BR-M	Note 6
<i>Rhamnus californica</i> ssp. <i>occidentalis</i> coffeeberry	-	FR-H	FR-L	-	FR-L	BR-M	Note 5
<i>Rhododendron occidentale</i> western azalea	-	-	-	-	-	-	Note 17
<i>Rhus trilobata</i> squaw bush	-	FR-M	FR-M	-	FR-L	BR-L	-
<i>Ribes bracteosum</i> stink gooseberry	-	FR-L	FR-M NE-M	FR-L	FR-M	BR-L	Note 22 Note 33

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Ribes lobbii</i> Lobb's gooseberry	-	FR-L	FR-M NE-M	FR-L	FR-M	BR-L	Note 22
<i>Ribes marshallii</i> applegate gooseberry	-	FR-L	FR-M NE-M	FR-L	FR-M	BR-L	Note 22
<i>Ribes sanguineum</i> red flowering currant	-	FR-L	FR-M NE-M	FR-L	FR-M	BR-L	Note 22
<i>Rosa californica</i> rose	-	FR-H	FR-L	-	FR-L	FR-M BR-M	Note 38
<i>Rosa gymnocarpa</i> wood rose	-	FR-H	FR-L	-	FR-L	FR-L BR-L	Note 38
<i>Shepherdia argentea</i> buffalo-berry /2 (*)	-	FR-L	FR-L	-	FR-L	-	-
<i>Styrax officinalis</i> var. <i>californica</i> snowdrop bush							
<i>Trichostema lanatum</i> wooly blue-curly /2 (*)							
<i>Trichostema lanceolatum</i> vinegar weed (*)							
<i>Vaccinium membranaceum</i> thinleaf huckleberry	-	FR-H	FR-H	FR-L	FR-L	FR-L BR-M	-
<i>Vaccinium ovatum</i> California huckleberry	-	FR-H	FR-H	FR-L	FR-L	FR-L BR-L	-
<i>Vaccinium parvifolium</i> red huckleberry	-	FR-H	FR-H	FR-L	FR-L	FR-L BR-L	-
<i>Zauschneria californica</i> California fuschia	-	-	NE-H	-	-	-	-
LOW SHRUBS (< 2 ft.)							
<i>Arctostaphylos nevadensis</i> pinemat manzanita	-	FR-L	FR-M NE-L	-	-	-	-
<i>Arctostaphylos uva-ursi</i> bearberry	-	-	-	-	-	-	-
<i>Berberis nervosa</i> dwarf Oregon grape	-	FR-L	FR-L	-	-	BR-H	Note 18
<i>Berberis piperiana</i>	-	FR-L	FR-L	-	-	BR-H	Note 18

/1 = Non-native naturalized species
/2 = Non-native exotic species.

Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual):

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Berberis pumila</i>	-	FR-L	FR-L	-	-	BR-H	Note 18
<i>Berberis repens</i> barberry	-	FR-L	FR-L	-	-	BR-H	Note 18
<i>Ceanothus prostratus</i> squaw carpet (*)	-	FR-L	-	-	FR-L	BR-M	Note 15
<i>Ceanothus pumilus</i> ceanothus (*)	-	FR-L	-	-	FR-L	BR-M	-
<i>Eriogonum umbellatum</i> sulfer flowered buckwheat	-	BR-M	FR-L	-	FR-L BR-L	BR-M	Note 31
<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	-	-	-	-	-	-	-
<i>Juniperus communis</i> dwarf juniper	-	-	-	-	-	-	-
<i>Lonicera hispidula</i> var. <i>vacillans</i> honeysuckle	-	FR-M	FR-M NE-H	FR-M	FR-M	BR-L	-
<i>Rubus leucodermis</i> western raspberry	-	FR-H	FR-H NE-M	FR-M	FR-L	BR-L	-
<i>Rubus parviflorus</i> thimbleberry	-	FR-H	FR-H	FR-M	FR-L	BR-L	-
<i>Rubus ursinus</i> Pacific blackberry	-	FR-H	FR-H	FR-M	FR-L	BR-L	-
<i>Rubus vitifolius</i> California blackberry	-	FR-H	FR-H	FR-M	FR-L	BR-L	-
<i>Salvia sonomensis</i> creeping sage	-	-	-	-	-	-	Note 48
<i>Symphoricarpos mollis</i> creeping snowberry	-	FR-H	FR-M	FR-L	FR-L	BR-H	Note 49
<i>Symphoricarpos rivularis</i> snowberry	-	FR-H	FR-M	FR-L	FR-L	BR-H	Note 49
<i>Vitis californica</i> California wild grape	FR-L	FR-H	FR-H	FR-M	FR-M	BR-L	Note 41
<i>Whipplea modesta</i> yerba de selva	-	-	-	-	-	-	-

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SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
FORBS							
<i>Achillea borealis</i> ssp. <i>californica</i> yarrow	-	-	-	-	-	-	-
<i>Achillea lanulosa</i> yarrow	-	-	-	-	-	-	-
<i>Achillea millefolium</i> yarrow /1	-	-	-	-	-	-	-
<i>Anaphalis margaritacea</i> pearly everlasting	-	-	-	-	-	-	-
<i>Aralia californica</i> spikenard	-	FR-L	-	-	-	-	-
<i>Calyptridium umbellatum</i> pussy paws	-	-	-	-	-	-	-
<i>Epilobium angustifolium</i> fireweed	-	-	NE-M	-	FR-M	BR-L	Note 19
<i>Eschscholzia californica</i> California poppy	-	FR-L	FR-L	-	FR-L	-	Note 23
<i>Gilia capitata</i> gilia	-	FR-L	NE-H	-	FR-L	-	-
<i>Helianthus annuus</i> sunflower	FR-L	FR-H	FR-H	-	FR-H	FR-L	-
<i>Horkelia sericata</i> Howell's horkelia	-	-	-	-	-	-	-
<i>Ipomopsis aggregata</i> scarlet gilia	-	-	-	-	-	-	-
<i>Lathyrus</i> spp. pea (*)	-	-	-	-	BR-?	BR-?	-
<i>Lathyrus japonicus</i> pea (*)	-	-	-	-	BR-?	BR-?	-
<i>Lathyrus polyphyllus</i> pea (*)	-	-	-	-	BR-?	BR-?	-
<i>Lathyrus torreyi</i> pea (*)	-	-	-	-	BR-?	BR-?	-
<i>Lathyrus vestitus</i> pea (*)	-	-	-	-	BR-?	BR-?	-

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Table 8. Species list with information on wildlife utilization. Relative values of each plant species to provide-fruit (FR), browse (BR) or nectar (NE) were rated as high (H), medium (M) or low (L) based on its percent of each groups annual diet and the number of species that utilize the plant. Notes on other wildlife, toxicity, etc. are listed at the end of the table. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Linum perenne</i> ssp. lewisii western blue flax	-	-	-	-	-	-	-
<i>Lotus crassifolius</i> big deervetch (*)	-	FR-M	-	-	FR-M BR-M	BR-H	Note 13
<i>Lotus micranthus</i> bird's foot trefoil (*, A)	-	FR-M	-	-	FR-M BR-M	BR-H	Note 13
<i>Lotus purshianus</i> Spanish clover (*, A)	-	FR-M	-	-	FR-M BR-M	BR-H	Note 13
<i>Lotus scoparius</i> deerweed (*)	-	FR-M	-	-	FR-M BR-M	BR-H	Note 13
<i>Lupinus albicaulis</i> lupine (*)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7, 32 Note 47
<i>Lupinus bicolor</i> minature lupine (*, A)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Lupinus densiflorus</i> lupine (*, A)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Lupinus nanus</i> sky lupine (*, A)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Lupinus succulentus</i> lupine (*, A)	-	FR-H	-	FR-L	FR-L	BR-L	Note 7
<i>Melilotus albus</i> white sweet-clover /1 (*, B)	-	FR-L	-	BR-L	FR-L	BR-H	Note 20
<i>Melilotus officinalis</i> yellow sweet-clover /1 (*, B)	-	FR-L	-	BR-L	FR-L	BR-H	Note 21
<i>Mimulus guttatus</i> monkey flower	-	-	NE-L	-	-	BR-L	-
<i>Polystichum munitum</i> sword fern	-	-	-	-	BR-L	BR-L	-
<i>Thermopsis gracilis</i> false-lupine (*)	-	-	-	-	-	-	-
<i>Thermopsis macrophylla</i> false-lupine (*)	-	-	-	-	-	-	-
<i>Trifolium beckwithii</i> Beckwith's clover /1 (*)	-	-	FR-L	BR-L	-	-	-

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SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Trifolium bifidum</i> clover (*, A)	-	-	FR-L	-	-	-	-
<i>Trifolium ciliolatum</i> tree clover (*, A)	BR-L	FR-M	FR-L	BR-L	FR-L BR-L	BR-L	-
<i>Trifolium dubium</i> clover /1 (*, A)	-	-	-	-	-	-	-
<i>Trifolium hirtum</i> rose clover /1 (*, A)	-	-	-	-	-	-	-
<i>Trifolium incarnatum</i> crimson clover /1 (*, A)	-	-	-	-	-	-	-
<i>Trifolium longipes</i> long-stalked clover (*)	-	-	-	-	-	-	-
<i>Trifolium microcephalum</i> littlehead clover (*, A)	-	-	-	-	-	-	-
<i>Trifolium microdon</i> clover (*, A)	-	-	-	-	-	-	-
<i>Trifolium oliganthum</i> clover (*, A)	-	-	-	-	-	-	-
<i>Trifolium pratense</i> red clover /1 (*)	BR-L	FR-M	FR-L	BR-L	FR-L BR-L	BR-L	-
<i>Trifolium repens</i> white clover /2 (*)	BR-L	FR-M	FR-L	BR-L	FR-L BR-L	BR-L	-
<i>Trifolium subterraneum</i> sub clover /1 (*)	-	-	-	-	-	-	Note 8
<i>Trifolium tridentatum</i> clover (*, A)	BR-L	FR-M	FR-L	BR-L	FR-L BR-L	BR-L	-
<i>Trifolium variegatum</i> clover (*, A)	-	-	-	-	-	-	-
<i>Veronica americana</i> brooklime	-	-	-	-	-	-	-
<i>Vicia americana</i> vetch (*)	-	FR-L	-	-	FR-L BR-L	BR-H	-
<i>Vicia californica</i> vetch (*)	-	FR-L	-	-	FR-L BR-L	BR-H	-
<i>Vicia gigantea</i> vetch (*)	-	FR-L	-	-	FR-L BR-L	BR-H	-

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<i>Vicia villosa</i> winter vetch /1 (*, A, B)	-	FR-L	-	-	FR-L BR-L	BR-H	-
<i>Woodwardia fimbriata</i> chain fern	-	-	-	-	-	-	-
<i>Xerophyllum tenax</i> beargrass	-	-	-	-	-	-	-
GRASSES							
<i>Agropyrons</i> sp. X <i>Triticum</i> sp. wheatgrass X wheat	-	-	-	-	-	-	-
<i>Agropyron dasystachyum</i> northern wheatgrass	-	FR-L BR-L	-	BR-L	FR-L BR-L	BR-L	-
<i>Agropyrons intermedium</i> intermediate wheatgrass /1	-	-	-	-	-	BR-M	Note 44
<i>Agropyron smithii</i> western wheatgrass	-	FR-L BR-L	-	BR-L	-	BR-L	-
<i>Agropyron trachycaulum</i> slender wheatgrass	-	FR-L BR-L	-	BR-L	-	BR-L	-
<i>Agrostis alba</i> redtop /1	-	-	-	-	-	-	-
<i>Agrostis hallii</i> bent grass	-	-	-	-	-	-	-
<i>Arrhenatherum elctius</i> tall oatgrass /1	BR-M	FR-M	FR-H	FR-L	FR-L	BR-L	-
<i>Avena sativa</i> cultivated oat /1	BR-M	FR-M	FR-H	FR-L	FR-L	BR-L	-
<i>Briza maxima</i> quaking grass /1 (A)	-	-	-	-	-	-	-
<i>Briza minor</i> quaking grass /1 (A)	-	-	-	-	-	-	-
<i>Bromus carinatus</i> California brome (A)	-	FR-L	FR-L	-	FR-M	BR-L	-
<i>Bromus marginatus</i> mountain brome	-	FR-L	FR-L	-	FR-M	BR-L	-
<i>Bromus mollis</i> soft chess /1 (A)	-	FR-L	FR-L	-	FR-M	BR-L	-

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SPECIES NAME COMMON NAME	WATER, MARSH & SHORE BIRDS	UPLAND GAME BIRDS	NON- GAME BIRDS	OMNI- VOROUS MAMMALS	SMALL MAMMALS	LARGE MAMMALS	NOTES
<i>Calamagrostis canadensis</i> blue-joint reedgrass	-	-	-	-	-	-	-
<i>Calamagrostis koelerioides</i> fire reedgrass	-	-	-	-	-	-	-
<i>Calamagrostis nutkaensis</i> reedgrass	-	-	-	-	-	-	-
<i>Carex bolanderi</i> sedge	FR-H	FR-M	FR-H	FR-L	FR-L BR-L	-	-
<i>Carex nudata</i> sedge	FR-H	FR-M	FR-H	FR-L	FR-L BR-L	-	-
<i>Dactylus glomerata</i> orchard grass /1	-	-	FR-L	-	-	-	-
<i>Danthonia californica</i> California oatgrass	-	-	-	-	-	-	-
<i>Deschampsia caespitosa</i> tufted hairgrass	-	-	-	-	-	-	-
<i>Elymus glaucus</i> blue rye	-	-	-	-	-	-	-
<i>Elymus triticoides</i> alkali rye	-	-	-	-	-	-	-
<i>Festuca californica</i> California fescue	-	-	FR-M	FR-L	FR-L BR-L	-	-
<i>Festuca idahoensis</i> Idaho fescue	-	-	FR-M	FR-L	FR-L BR-L	-	-
<i>Festuca occidentalis</i> western fescue	-	-	FR-M	FR-L	FR-L BR-L	BR-M	-
<i>Festuca rubra</i> red fescue	-	-	FR-M	FR-L	FR-L BR-L	BR-M	-
<i>Hierochloa occidentalis</i> vanilla grass							
<i>Hordeum brachyantherum</i> barley	FR-M BR-M	FR-M	FR-M	FR-L	FR-L	FR-L BR-L	-
<i>Hordeum californicum</i> California barley	FR-M BR-M	FR-M	FR-M	FR-L	FR-L	FR-L BR-L	-
<i>Hordeum jubatum</i> foxtail	FR-M BR-M	FR-M	FR-M	FR-L	FR-L	FR-L BR-L	-

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<i>Phleum alpinum</i> mountain timothy	-	-	-	-	-	BR-M	-
<i>Poa rhizomata</i>	-	FR-L	FR-L	FR-L	-	BR-L	-
<i>Sitanion hystrix</i> squirreltail	-	-	-	-	-	BR-L	-
<i>Stipa occidentalis</i> western needlegrass	-	-	FR-M	FR-L	FR-L	BR-L	-
<i>Stipa pulchra</i> purple needlegrass	-	-	FR-M	FR-L	FR-L	BR-L	Note 45
<i>Vulpia myuros</i> zoro fescue	-	-	FR-M	FR-L	FR-L BR-L	BR-M	-

Table 8. Notes

- Note 1:** *Prunus emarginata* (bitter cherry) The leaves and twigs are very poisonous to livestock at certain growth stages (Sampson and Jespersen 1963). May harbor western X disease which can infest peach and cherry trees. Not recommended for use near or upstream of fruit orchards (USDA Forest Service 1971).
- Note 2:** *Robinia pseudo-acacia* (black locust) Seeds, bark and leaves are toxic to humans and livestock (Fuller and McClintock 1986). Has large, sharp thorns.
- Note 3:** *Sambucus* spp. (elderberry) Uncooked berries, leaves or stems are poisonous to humans. Certain species are browsed by wildlife little or not at all until the first killing frost in the fall has blackened and killed the succulent vegetation. Throughout the spring and summer months the plant has a disagreeable odor which largely disappears after a heavy frost (Sampson and Jespersen 1963). It is a favorite plant food of pileated woodpeckers (Martin, Zim and Nelson 1951).
- Note 4:** *Betula* spp. (birch) Sapsuckers drill wells in birch trees that may attract warblers, hummingbirds or kinglets which feed on the sap (Ehrlich, Dobkin and Wheye 1988).
- Note 5:** *Rhamnus californica* (california coffeeberry) Berries are a favorite food of both band-tailed pigeons and pileated woodpeckers (Martin, Zim and Nelson 1951).
- Note 6:** *Quercus* spp. (oak) Acorns are readily eaten by wood ducks, mallards, band-tailed pigeons and wild turkeys (Martin, Zim and Nelson 1951). Tannin in leaves, acorns and sprouts may poison cattle, sheep and deer. Poisoning of cattle and occasionally sheep by browsing on oaks (particularly buds and young leaves) causes annual economic losses in the southwest. Such losses are rare in California, but serious poisonings of cattle have occurred (Fuller and McClintock 1986). Poisoning of cattle, sheep and deer appears to be restricted to periods when little other forage is available.
- Note 7:** *Lupinus* spp. (lupine) May cause birth defects in infant cows, sheep and goats via mother's milk. Cows that eat lupine with high concentrations of the alkaloid anagryne while in the first 40 to 70 days of pregnancy may develop deformed calves with a condition called "crooked calf disease." Seeds, pods, stems and leaves are considered toxic to livestock and humans. Unless known to be specifically harmless, it is best to regard all species of lupines as toxic (Fuller and McClintock 1986).
- Note 8:** *Trifolium subterraneum* (sub clover) Plants and seeds contain phytoestrogens which, when grazed upon, greatly reduce egg production in quail. Stunted plants of drought years have a higher phytoestrogen content than do plants with the luxuriant growth of high rainfall years. Sub clover is a naturalized non-native species which originated in the Mediterranean region of Europe and is being used increasingly as a forage crop in California. It is possible that this human-induced change will reduce breeding in California quail even in places and years with more than adequate rainfall (Ehrlich, Dobkin and Wheye 1988). The phytoestrogen content of the sub clover cultivar "Yarloop" may be 200 times greater than that of other cultivars. This amount exceeds the level that is considered the cause of infertility in ewes. Although California has no records of infertility in animals feeding exclusively on such legumes with phytoestrogens, animals fed exclusively on such legumes should be watched for infertility (Fuller and McClintock 1986).
- Note 9:** *Aesculus californica* (California buckeye) Both the fruits and leaves of California buckeye are reported to be poisonous to domestic livestock during certain seasons of the year if large amounts are ingested. It has also been reported that the unhulled fruit causes cows to abort. Losses from poisoning among honey bees and their larvae have also been reported to occur from the toxic effects of the nectar in the flowers (Sampson and Jespersen 1963).
- Note 10:** *Cerocarpus* spp. (mountain mahogany) Seed and leaves contain toxins that may cause death in livestock if eaten in large amounts (Fuller and McClintock 1986).
- Note 11:** *Heteromeles arbutifolia* (toyon) Seed and leaves contain toxins that may cause death in livestock if eaten in large amounts (Fuller and McClintock 1986).
- Note 12:** *Cephalanthus occidentalis* var. *californicus* (California buttonbush) Waterfowl are the principal user of its seeds (Martin, Zim and Nelson 1951). This species functions as a "living reef" in ponds and reservoirs and can provide cover protection from predators and serve as a nursery area for juvenile bass and other fish species. Buttonbush tolerates submersion in water for up to 6 months per year and requires an extremely wet site (Personal communication, Jerry Barnes, Six Rivers National Forest, California). Buttonbush may be poisonous to animals when eaten in large quantities producing spasms and paralysis. The plant is also listed as a fairly important source of honey for bees (Fuller and McClintock 1986).
- Note 13:** *Lotus crassifolius* (big deervetch), *Lotus corniculatus* (birdsfoot trefoil) and *Lotus tenuis* (narrow birdsfoot trefoil) Important forage for elk, deer and livestock. Seed is relished by quail and small mammals (Darris 1988). Most of the trefoil grown or naturalized in California is *Lotus tenuis*. The entire plant is presumably toxic and contains linamarin and lotaustralin which are cyanogenic glycosides. Natural populations of these plants contain both cyanogenic and noncyanogenic plants which may only be differentiated genetically. For this reason some plants test positive for hydrocyanic acid while the toxicity of others is doubtful. Cases have been suspected in England and in Australia and have been confirmed in the USSR. No cases have been recorded in California however (Fuller and McClintock 1986).

Table 8. Notes

- Note 14:** *Ceanothus integriramus* (deer brush) Preferred summer forage species for deer (Sampson and Jespersen 1963).
- Note 15:** *Ceanothus prostratus* (squaw carpet) Important winter forage for deer (Sampson and Jespersen 1963).
- Note 16:** *Ledum glandulosum* (labrador tea) This species is slightly toxic to livestock (Fuller and McClintock 1986).
- Note 17:** *Rhododendron occidentale* (western azalea) This species is poisonous to stock and honey is poisonous to humans (Fuller and McClintock 1986).
- Note 18:** *Berberis* spp. or *Mahonia* spp. (Oregon grape) The entire plant is toxic except for the berries. The roots are especially toxic. Oregon grape spines are sharp and can cause annoying mechanical injury. The spines may also introduce fungal organisms into the skin, a condition sometimes referred to as "barberry poisoning" by nursery employees (Fuller and McClintock 1986).
- Note 19:** *Epilobium angustifolium* (fireweed) Serves as a valuable nectar source for beekeeping operations (Martin, Zim and Nelson 1951).
- Note 20:** *Melilotus albus* (white sweetclover) Will tolerate a wide variety of soils, drainage conditions and soil pH. However, it will not succeed on acid soils or very wet soils. This species is a valuable source of nectar for bees (USDA Forest Service 1988c).
- Note 21:** *Melilotus officinalis* (yellow sweetclover) This species has a greater tolerance to heat, drought, cold and is more adapted to poor soils than white sweetclover. This species is a valuable source of nectar for bees (USDA Forest Service 1988c).
- Note 22:** *Ribes* spp. (currant, gooseberry) These shrubs serve as an alternate host for the fungus (*Cronartium ribicola*) which causes white pine blister rust in 5-needled white pines. This disease is of considerable importance in forestry in all parts of the United States where white pines are important timber trees. The disease is common over much of the eastern United States and has now become established in many parts of the west. The only practical method of controlling the disease is to eradicate all currants and gooseberries in the vicinity of stands of white pine. Such control methods have been initiated in parts of the country where white pines are important timber trees (USDA Forest Service 1988c).
- Note 23:** Species provides fruit for mourning dove, meadow lark and ground squirrel (Martin, Zim and Nelson 1951).
- Note 24:** *Rubus spectabilis* (salmon berry) No information was available to confirm use of the berries. The tall habit of this species may limit the use of its berries by other wildlife.
- Note 25:** Mature trees provide important nest tree habitat for raptors.
- Note 26:** Mature trees provide important nest tree habitat for raptors and den habitat for bear and certain other mammals.
- Note 27:** Species provides browse for beaver and wood rat (Martin, Zim and Nelson 1951). Wintering Anna's hummingbirds make use of the sap during periods where flowering plants are unavailable (Bent 1989).
- Note 28:** Species provides fruit for mountain beaver and browse for deer (Martin, Zim and Nelson 1951).
- Note 29:** Species provides browse for mountain beaver (Martin, Zim and Nelson 1951).
- Note 30:** Species provides fruit for wood rat (Martin, Zim and Nelson 1951).
- Note 31:** Species provides browse for blue grouse (Martin, Zim and Nelson 1951).
- Note 32:** Species provides fruit for mountain beaver (Martin, Zim and Nelson 1951).
- Note 33:** Species provides fruit for coyote and fruit for blue grouse (Martin, Zim and Nelson 1951).
- Note 34:** Species provides fruit for wrentit and Douglas chickaree (Martin, Zim and Nelson 1951).
- Note 35:** Fruits are utilized by coyote (Martin, Zim and Nelson 1951).
- Note 36:** Species provides browse for beaver (Martin, Zim and Nelson 1951).
- Note 37:** Berries are a favorite food of many songbirds and band-tailed pigeons (Martin, Zim and Nelson 1951). Flowers provide nectar for several species of hummingbirds (Bent 1989).

Table 8. Notes

- Note 38:** Rose hips are a very important winter wildlife food. The hips remaining on the shrubs throughout the winter and into the following year are available as food when other preferable sources of nourishment are covered with snow (Martin, Zim and Nelson 1951).
- Note 39:** Birds (especially grosbeaks, cedar waxwings and various species of grouse) are regular feeders on mountain-ash berries. Fruits are persistent which makes them especially valuable to wildlife during the winter when other food is unavailable (Martin, Zim and Nelson 1951).
- Note 40:** Wintering Anna's hummingbirds make use of the sap during periods where flowering plants are unavailable. Anna's hummingbirds use borings made by sapsuckers and consume both the sap and those insects attracted to the sap (Bent 1989).
- Note 41:** Wood ducks utilize the fruit. The fruit is also a favorite food of game birds, song birds and some fur bearers. The yield of wild grapes varies greatly from year to year; Some years the grape crop is a complete failure. In the summer, the dense foliage provides good escape and shelter cover as well as nesting sites for song birds. In addition, the bark of the grape vines is often used in nest building (Martin, Zim and Nelson 1951).
- Note 42:** The California tent caterpillar feeds on cottonwoods, oaks, madrone, poplar, ash, willow and other trees and shrubs (Doane, Van Dyke, Chamberlin and Burke 1936). Tent caterpillars are a favorite food of many bird species including the western yellow-billed cuckoo which is listed by the state of California as a threatened species. An excellent example of riparian restoration can be found at the Nature Conservancy's Kern River Preserve where approximately 90 acres were planted with cottonwood cuttings with the goal of expanding the existing riparian forest by as many as 300 acres to enhance yellow-billed cuckoo habitat (Holing 1988).
- Note 43:** *Prunus* spp. (cherry) Seed and leaves contain toxins that may cause death in livestock if eaten in large amounts (Fuller and McClintock 1986).
- Note 44:** *Agropyron intermedium* (intermediate wheatgrass) Valuable forage grass in Modoc and Lassen Counties. Used in range seeding. (Crampton 1974).
- Note 45:** *Stipa pulchra* (purple needlegrass) Formed the foundation of California's original biota. Leaves were used by wildlife for food and habitat and the seeds harvested by insects and small mammals for food.
- Note 46:** *Amelanchier alnifolia* (service-berry) Potential for adding diversity to stream corridors and wildlife habitat plantings. Fruit is particularly useful as food for songbirds and upland game. Twigs are browsed by deer (Darris 1988).
- Note 47:** *Lupinus albicaulis* (sickle-keeled lupine) Seeds are eaten by many birds and stemmy growth provides wildlife cover.
- Note 48:** *Salvia sonomensis* (creeping sage) Cuttings performed remarkably well in stabilizing harsh decomposed granite sites in Whiskeytown National Recreation Area (Powers and Sundahl 1974).
- Note 49:** The stems of *Prunus* spp. (cherry), *Amelanchier* spp. (serviceberry) and *Symphoricarpos* spp. (snowberry) show an increase in protein from fall to winter. The comparatively high protein level in *Prunus* spp. winter stems may be an important factor in its high use by deer during fall and winter. Only *Prunus*, spp., *Artemesia frigida* (fringed sagebrush) and *Amelanchier* spp. provide the seven percent protein level during winter months found to be the minimum requirement for deer during winter months.

AVAILABILITY OF PLANT MATERIALS

The following section contains information on the availability of plant materials, services and supplies necessary for watershed restoration and wildlife habitat improvement. The information was obtained from a survey of approximately 160 nurseries and experts in the field. The survey requested information on the species they provide, what form they are provided in (i.e. plug, bareroot, seed or container) and the methods used to sell the plant stock. Information was also requested on the percent success nurseries have experienced growing each species and the estimated potential for using the species for revegetation projects as a plug, bareroot or seed. Information was also obtained from other sources including Hortus Northwest (Shank 1989), Saratoga Horticultural Foundation (19??), Soil Conservation Society (1982), Paula Oliver (1985) and various other publications listed in the bibliography of this report.

Information from the survey and publications is summarized in Tables 9 and 10 of this report. Table 9 contains information on the availability of each plant species. Sources of plant materials were given a three letter code which corresponds to private and government sources listed in Table 10. Based on the survey results, each species was rated for the average percent success (SUC) nurseries have experienced growing the species as plug or bareroot stock. Each species was also rated for its potential (POT) for use in revegetation projects as plug, bareroot or seed stock. Potential was rated: 1 = Good, 2 = Moderate, 3 = Marginal, 4 = Bad.

PLANT MATERIAL STOCK TYPES

Plant stock may be planted in many different forms including plug, liner, bare root, container, cutting or seed. The type of plant stock used generally depends on the quantities needed, accessibility to the planting area and the species used. In general, forb and grass species are best planted as seed while tree and shrub species are best planted as plug, liner, bare root or container. Some species have characteristics that may prevent their establishment if the wrong type of stock is selected. Some examples include:

- Species that have strict stratification or scarification requirements may not be suitable for use as seed stock.
- Species that are used as food by rodents may be unsuitable or too expensive for use as seed stock.
- Species that form long taproots may be unsuitable for growing in relatively small plugs or tubes.

The following are definitions of most of the plant stock types used in this report with some considerations on their use for planting projects.

- **Plug or liner stock** - Plug and liner stock are used synonymously in this report. This type commonly consists of a tube like container that may vary in size and planting medium. Seedlings are commonly grown in a sterile potting soil mix for one or two years before planting in the field. Generally, the larger the plug, the better the chances are for survival when planted in the field. Plug and liner stock are less susceptible to planting shock than bareroot and are more likely to survive since their roots are held intact and undisturbed within a container until the planting time. This stock type is also more likely to survive on harsh sites than bareroot. The following is a list of the types of stock included under this category.
 - **Tube** - Commonly measures 1" X 6"
 - **Super cell** - Commonly measures 1.5" X 8"
 - **Styroblock** - Styrofoam block with 25-50 plugs commonly measuring 1" X 6" each.
 - **Dee pot** - Commonly measures 2.5" X 10"
 - **Tree pot** - Commonly measures 4" X 12"

- **Bare root stock** - Includes plant stock grown in the ground for one or two years. Stock is commonly "pulled" from the ground in early spring and bundled and packaged for shipment. The use of bare root stock is more appropriate in large scale revegetation projects using woody, perennial species that are resistant to planting shock. Use of bareroot stock generally requires a sufficient supply of moisture to support root growth immediately following planting. These conditions often exist for only a few weeks in the spring or fall.

- **Container stock** - Includes gallon size or larger containers. Also includes ball and burlap stock and some smaller plastic containers. The use of container stock is generally too expensive in large scale revegetation projects. Container stock may be appropriate for planting smaller areas where quick establishment of larger stock is required.

- **Cuttings** - Cuttings include rooted cuttings of stems or roots which may be obtained from some nurseries for a limited number of species. Cuttings also include unrooted cuttings obtained in the field. The use of cuttings for revegetation projects (field projects) is limited to a select number of species (e.g. *Salix*, *Populus*, etc.) that readily sprout roots from stem or root cuttings.

- **Seed stock** - Seed stock includes bulk seed and smaller seed packets. The use of seed stock for revegetation projects (field projects) is generally limited to forbs, grasses and some shrub and tree species that do not have strict stratification or scarification requirements. Seed stock may also be too expensive for species that are hard to collect or palatable to small mammals. On steep slopes, it may be necessary to mulch the seed bed to prevent the seed from washing away and to help maintain adequate soil moisture. Effective seeding generally

requires optimum environmental conditions and is usually most successful on moist protected locations. Harsh, exposed sites generally produce conditions too severe for young seedlings and high mortality rates frequently occur.

DEVELOPMENT OF LOCAL PLANT STOCK

The need to develop local sources of plant stock was one of the most frequent suggestions received in the survey of plant material sources. The advantages of doing this are both biological and economical. The most important advantage would be the maintenance of biological diversity for both the plant species and plant communities. The primary economic advantage is the savings in cost of procuring plant stock.

The development of local stock would require responsible agencies to locate areas that contain sources of seed stock or other propagation material within the local watershed or as close to the proposed planting sites as possible. Sources should have easy access and should be mapped at a large enough scale that they can be located again. Local stock development would also require the development of a program to set aside and protect these areas. An additional method for utilizing local stock would include the transplanting of available plants located on the actual planting site. This method would be especially useful where commercial sources of plant stock are unavailable.

Table 9. Species list with information on sources. List includes information on percent success (SUC) nurseries have experienced growing each species and potential (POT) for using each species in revegetation projects. Potential (POT) was rated: 1 = Good, 2 = Moderate, 3 = Marginal, 4 = Bad. Source abbreviations are listed in Table 10. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
TREES				
<i>Abies concolor</i> white fir	Nap; Clo; For; Fow; Fut; Geo; Lyo; Gra; Sim; Tse; Chr; Col; Law; PIW; Wap; Sil; (74/2)	BeL; Mag; Fow; Lav; Cli; Day; Law; Wel; Wap; Sil; (88/1)	Cal; Car; Cly; FoS; Tse; Kel; Mis; PaC; Law; The; Sil; TrB; Sup; She; (3)	Gra; Yer; Law
<i>Abies grandis</i> grand fir	For; Lyo; Day; Cli; Law; NaN	BeL; Lav; Law; NaN; DLP	Nor; Abu; Cal; Law; NaS; Nor; Sil	Law; Day; Cli; For; NaN; AnV
<i>Abies magnifica</i> var. <i>shastensis</i> Shasta red fir	For; Lyo	Mag; Lav	Car; FoS; Mis; Sil	Daw
<i>Acer macrophyllum</i> big leaf maple	App; Nap; Cir; Clo; Fro; LaP; Lar; Sim; Tse; NaN; PaO; TrL; Bar; Blu; Chr; For; Wil; Wap; (84/1)	App; Bar; Blu; NaN; New; Sto; TrL; WeN; (60/1)	Abu; Cal; Fos; Fro; Lar; Tse; Nas; PaO; She; Mis; Sup; She; (3)	AnV; App; Nap; LaP; For; NaN; PaO; Sto; TrL; WeN; Yer; Boe
<i>Alnus oregana</i> red alder (*)	App; Nap; Cir; Clo; For; Lar; LaP; Sim; Tse; PaO; PIW; Wil; Fro; (92/1)	New; Sto	Abu; Cal; Car; FoS; Fro; Lar; Nor; PaC; Tse; PaO; PIW; Sim; Sil; TrB; (2)	Nap; For; LaP; Sim; App; Fer; PaO; PaW; PIW; Sto; Yer
<i>Alnus rhombifolia</i> white alder (*)	App; Nap; Cir; Cor; Fut; LaP; Lyo; Sim; Blu; For; TrL; Wap; CaF; (90/1)	Blu; TrL; Wel; WeN; Str	Cal; Car; FoS; Har; Fro; Kel; Mis; Nor; PaC; CaF; Str; Sup; The; TrB; (50/1)	AnV; App; Boe; Nap; LaP; Oki; For; PaO; TrL; Wel; WeN; Yer; AnV; (2)
<i>Arbutus menziesii</i> Pacific madrone	App; Nap; Cir; For; LaP; Tse; Blu; Chr; Col; Her; PaO; TrL; Wil; (53/3)	Blu; Her; TrL	Abu; Cal; Cly; FoS; Nor; Tse; Fro; PaO; Mis; Sup; (3)	Nap; Col; For; PaO; TrL; Yer
<i>Calocedrus decurrens</i> incense cedar	Nap; Mor; Clo; For; Fow; Fut; LaP; Lyo; Sim; Tse; Ald; Bar; Blu; Col; TrL; Str; Wap; Pin; (84/1)	BeL; Mag; Fow; Ald; Bar; Blu; TrL; (80/1)	Abu; Cal; Car; FoS; Har; Kel; Mis; PaC; Tse; Str; She; Sil; The; TrB; Sup; (2)	AnV; App; Boe; Nap; LaP; Ald; Col; For; TrL; Yer; Str; Oki
<i>Castanopsis chrysophylla</i> golden chinquapin	Tse; Bar; Bur; PaO; Wil; (50/1)	Bar; Bur	Cal; Tse; Abu; PaO; She; Mis; Sup; (3)	Bur; PaO; Yer; Fro
<i>Chamaecyparis lawsoniana</i> Port-Orford cedar	Nap; Clo; For; Sim; Tse; Bar; Blu; Col; Fro; Law; Mar; Sar; Woo; Wil; (75/2)	Bar; Blu; Gre; Law; Mar	Abu; Cal; FoS; Fro; Tse; Gre; Law; She; Sil; (2)	Col; For; Gre; Law; Mar; Woo; Yer
<i>Chamaecyparis nootkatensis</i> Alaska yellow cedar /2	For; Col		Cal; Sil	Mo1; Col; For; Yer;

/1 = Non-native naturalized species

/2 = Non-native exotic species.

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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Cornus nuttallii</i> mountain dogwood	Nap; Cir; Clo; Cor; For; Sim; Chr; Col; Her; Mar; Bar; TrL; Blu; Bur; Wil; Woo; NaN; PIW; Sar; Wap; (66/2)	Bar; Blu; Bur; Cli; Fro; Her; Mar; NaN; TrL; Wel; (7/2)	Abu; Cal; Cly; FoS; TrB; Fro; Nor; Law; PIW; The; Sup; She; (3)	Nap; Cor; Bur; Cli; Col; For; Mar; TrL; Boe; Wel; NaN
<i>Fraxinus latifolia</i> Oregon ash	App; Nap; Cir; For; LaP; Tse; Bar; Col; Daw; PaO; PIW; Wil; Wap; (92/1)	Bar; Sto; WeN; Fro	Cal; Fro; Tse; PaO; PIW; (2)	Nap; LaP; App; Col; Daw; For; PaO; PIW; Woo; Paw; Sto; WeN; Yer
<i>Juniperus occidentalis</i> western juniper	For; LaP; Wap		Cal; Fos; Fro	For
<i>Lithocarpus densiflora</i> tanoak	App; Nap; Clo; For; LaP; Tse; TrL; Bur; Col; Daw; PaO; Wap; (85/2)	Bar; TrL	Car; Cal; Tse; Fos PaO; Sup; Mis; (2)	Nap; LaP; Col; Daw; For; PaO; TrL; Yer
<i>Picea sitchensis</i> Sitka spruce	Nap; App; Bar; For; Law; Sar	Bar; Day; Fer; Law; DLP	Cal; Abu; Law; Sil	App; Day; Fer; For; Law; Yer
<i>Pinus attenuata</i> knobcone pine	Nap; Cir; Clo; For; Fut; LaP; Lyo; Tse; Blu; Col; PaO; TrL; Wap; Pin; (85/1)	Mag; Fow; Blu; TrL; (90/1)	Cal; FoS; Kel; Mis; Law; PaO; She; The; Sup; (2)	LaP; Col; For; PaO; TrL; Yer
<i>Pinus contorta</i> ssp. <i>contorta</i> shore pine /2	App; Clo; LaP; Sim; Ald; Bar; Chr; For; Law; NaN; PaO Sar; Val; Wap; Sil; (87/2)	Fow; Lav; Ald; Bar; Cli; Day; Fer; Law; NaN; DLP; Val; Wel; WeN; (7/1)	Cal; Cly; FoS; Mis; Nor; Abu; Law; The; TrB; Sup; She; PaO; (1)	AnV; App; LaP; Oki; Ald; App; Cli; Day; Fer; For; Law; Nan; PaO; Sky; Val; Wel; WeN; Yer; AnV
<i>Pinus contorta</i> ssp. <i>murrayana</i> lodgepole pine	Cir; For; Bar	Bar	NaS; Sil; Car; Mis	LaP
<i>Pinus jeffreyi</i> jeffrey pine	Nap; Cir; Clo; Fut; Geo; LaP; Lyo; Sim; Tse; Blu; Chr; For; Law; Sar; Sil; Pin; (88/1)	Mag; Fow; Lav; Blu; Law; DLP; (90/1)	Cal; Cly; FoS; Mis; PaC; TrB; Tse; Law; Sim; She; Sil; Sup; The; (2)	Nap; LaP; Oki; Sim; For; Boe; Law; Yer
<i>Pinus lambertiana</i> sugar pine	App; Cir; Clo; For; Fut; Geo; LaP; Lyo; Sim; Bar; Blu; Bur; Law; Sil; (52/2)	App; Mag; Fow; Bar; Blu; Bur; Law; DLP; (60/2)	Abu; Cal; Cly; FoS; Sup; The; She; Mis; Law; (2)	Bur; For; Law; Yer
<i>Pinus monticola</i> western white pine	Cir; For; LaP; Lyo; Sar; Sim; Ald; Col; Law; NaN; PIW; Sar; Sil; (72/2)	Mag; Lav; Ald; Cli; Law; NaN; Sil; (77/1)	Abu; Cal; Fro; Nor; Sup; Law; NaS; PIW; She; Sil; Mis; (1)	Ald; Cli; Col; For; Law; NaN; PIW; Yer

/1 = Non-native naturalized species
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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Pinus ponderosa</i> ponderosa pine	App; Nap; Mor; Cir; Clo; Fow; Fut; Geo; LaP; Lyo; Sim; Tse; Bar; Blu; Chr; Col; For; Law; PIW; Sar; Val; Sil; (87/1)	App; BeL; Mag; Fow; Lav; Bar; Blu; Cli; Law; DLP; Val; WeN; Sil; (90/1)	Abu; Cal; Clo; Cly; The; Sup; FoS; Kel; Mis; Nor; NPI; PaC; Tse; Law; NaS; PIW; She; Sil; (1)	Nap; LaP; Oki; App; Cli; Col; For; Law; PIW; Val; WeN; Yer
<i>Pinus sabiniana</i> digger pine	Nap; Cir; Clo; For; Pin; Fut; LaP; Lyo; Tse; Blu; Bur; Law; PaO; TrL; Wap; (80/1)	BeL; Mag; Blu; Bur; Bur; Law; TrL; (70/2)	Cal; Cly; FoS; Kel; The; Sup; Mis; Abu; Law; PaO; She; (2)	AnV; Nap; LaP; Bur; For; Law; PaO; AnV; TrL; Yer
<i>Populus fremontii</i> cottonwood	Cir; LaP; Gra; App; (90/1)			App; Boe; Nap; LaP Oki
<i>Populus tremuloides</i> quaking aspen	For; Gra; Law; PIW; Val	Blu; Cli; Law; Sto; Val; WeN	Nor; Law; NaS; PIW	Mo2; Gra; Cli; Fer; Law; PIW; Sto; Val; WeN; Mol; Yer
<i>Populus trichocarpa</i> black cottonwood	Nap; Cir; For; Fut; Wap; LaP; Bar; PIW; TrL; Val; (90/1)	Bar; Cli; New; Sto; TrL; Val; WeN	PIW	LaP; Cli; For; PaW; PIW; Sto; TrL; Val; WeN; Yer
<i>Pseudotsuga menziesii</i> Douglas-fir	App; Nap; Cir; Clo; Fow; Fut; LaP; Lyo; Mo2; Gra; Tse; Ald; Bar; Chr; For; Law; Sar; PIW; Val; Geo; Sim; Sil; (90/1)	App; BeL; Mag; Fow; Lav; Ald; Bar; Cli; Day; Gre; Law; NaN; DLP; WeN; Sto; Val; Wel; Sil; (86/1)	Cal; Cly; FoS; Fro; TrB; Sup; Kel; Mis; Nor; NPI; PaC; Tse; Abu; Gre; Law; NaS; PIW; Sim; She; Sil; (2)	AnV; Nap; LaP; Mo2; Sim; App; Cli; Day; For; Gre; Law; NaN; PIW; Sto; Val; Wel; WeN; Yer
<i>Quercus chrysolepis</i> canyon live oak	Nap; Mor; Cir; For; Wap; Lar; LaP; Tse; Bar; Blu; Col; Her; (95/1)	BeL; Mor; Bar; Blu; Her; TrL; (70/2)	Cal; Har; Lar; Tse; Sup; Mis; (4)	Nap; LaP; Col; For; Sky; TrL; Yer; Str
<i>Quercus douglasii</i> blue oak	App; Nap; Cir; Cor; Wap; LaP; Lar; Sim; (82/1)	Mag; (70/2)	Cal; FoS; Har; Kel; Sup; She; Lar; Mis; (2)	Nap; LaP; Oki
<i>Quercus garryana</i> Oregon white oak	Nap; Cir; For; LaP; Sim; Bar; Col; Daw; PIW; Wil; (77/1)	Bar; WeN; Fro	Cal; FoS; Fro; PIW	Col; Daw; For; PIW; WeN
<i>Quercus kelloggii</i> California black oak	Nap; Cir; For; Fut; Wap; LaP; Tse; Sim; Bar; Blu; Col; Daw; PaO; Sar; TrL; Wil; (90/1)	Mag; Bar; Blu; TrL; (70/2)	Cal; FoS; Har; Kel; Sup; Mis; Tse; PaO; She; (3)	Nap; LaP; Oki; Col; Daw; For; PaO; Sky; TrL; Yer
<i>Robinia pseudo-acacia</i> black locust (*)	Gra		Mis; Nor	Gra
<i>Salix</i> spp. willow	Cir; Tse; Fut; Bar; Wil; Fut; Wap; PIW; Fro; (95/1)	Bar; New; (80/1)	CoP; Cuttings: App; CoP; Tse; Str	CoP

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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Salix lasiandra</i> willow	Nap; Cir; LaP: PIW; Fro; Wap; App; Col; For; PaO; TrL; (97/1)	New; TrL; WeN	PaO; PIW; CoP	Nap; App; Col; For; PaO; PaW; PIW; TrL; CoP; WeN
<i>Salix laevigata</i> willow	Nap; (95/1)			
<i>Sequoiadendron giganteum</i> giant sequoia /1	Nap; Mor; Clo; Fow; Fro; Pin; Fut; LaP; Lyo; Sim; Tse; Str; Wil; (71/1)	BeL; Mag; Fow; (75/2)	Cal; Car; FoS; Har; Mis; PaC; Str; TrB; She; Sil; (3)	AnV; Boe; Nap; LaP; Oki; Str
<i>Sequoia sempervirens</i> coast redwood	App; Nap; Mor; Cir; Clo; For; LaP; Lyo; Mo1; Tse; Bar; Blu; Chr; Col; NaN; Sar; (75/2)	BeL; Bar; Blu; NaN;	Cal; Car; FoS; Lar; Alb; The; TrB; Mis; Tse; Abu; PaO; Sil; (2)	AnV; App; Boe; Nap; LaP; Mo1; Mo2; Oki; App; Col; For; NaN; PaO; Sky; Yer; Str
<i>Taxus brevifolia</i> Pacific yew	Tse	Gre	Nor; Tse; Cal; Gre; Nor; (4)	Gre
<i>Thuja plicata</i> western red cedar	For; LaP; Tse; Bar; PIW; Sar; Blu; Col; For; NaN; (?/2)	Bar; Blu; Cli; Day; NaN; DLP; Sto; WeN	Cal; Car; Nor; Tse; The; Abu; Fro; Law; PIW; Sil; (3)	Oki; Cli; Col; Day; For; NaN; PIW; Sto; WeN; Yer
<i>Tsuga heterophylla</i> western hemlock	For; Tse; Ald; Bar; Col; For; NaN; PIW; Sar; (?/2)	Ald; Bar; Day; Fer; NaN; DLP; Sto; WeN	Cal; Car; Nor; Tse; TrB; Abu; Fro; Law; PIW; Sil; (2)	Ald; Col; Day; Fer; For; NaN; PIW; Sto; WeN; Yer
<i>Tsuga mertensiana</i> mountain hemlock	For; LaP; Blu; For	Blu; Day	Cal; Law; NaS; Nor; Sil; TrB	Day; For
<i>Umbellularia californica</i> California bay-laurel	App; Nap; Cir; LaP; Wap; Lar; Tse; Bar; Blu; Bur; Chr; Col; For; PaO; Sar; TrL; Daw; Wil; (70/2)	Bar; Blu; Bur; TrL	Cal; Car; Cly; FoS; Sup; Fro; Har; Kel; Lar; Mis; PaC; Tse; PaO; (2)	AnV; Boe; Nap; LaP; App; Bur; Col; Daw; For; PaO; Sky; TrL; Yer
TALL SHRUBS (> 5 ft.)				
<i>Acer circinatum</i> vine maple	For; LaP; Gra; Tse; Mol; Bar; Blu; Col; Fro; Her; Mar; NaN; PIW; Woo; Wil; (40/2)	Bar; Blu; Day; Fer; SiR; Gre; Her; Mar; NaN; New; Sto; Wel	Abu; Cal; Nor; Tse; Fro; Gre; NaS; PIW; She; (2)	Mo2; Oki; Yer; Day; Boe; Mol; Col; Fer; For; Gre; Woo; Mar; NaN; PIW; Sto; Boe; Wel; WeN
<i>Acer glabrum</i> var. <i>torreyi</i> Rocky Mountain maple	For; Gra; Col; For; Wap; Her; Law; NaN; PIW; Val; NPI	Day; Her; Law; NaN; Val	Cal; Nor; Gra; Fro; Law; NaS; Nor	Gra; Col; Day; For; Law; NaN; PIW; Val; Yer
<i>Aesculus californica</i> California buckeye	App; Nap; Cir; LaP; Lar; (84/1)		Cal; FoS; Fro; Har; Lar; PaC; She; Mis; (4)	App; AnV; Boe; Nap LaP; Har

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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Alnus sinuata</i> Sitka alder (*)	For; Col; For; PIW Wil; (90/1)	Fro; (?/2)	Cal; Fro; Nor; CoP; PIW; (1)	Col; For; CoP; PIW
<i>Alnus tenuifolia</i> Sitka alder (*)	For; NPI		Wap; Nor	
<i>Betula occidentalis</i> water birch	For; LaP; Gra; PIW; Val	Cli; Val	Cal; Nor; PIW	LaP; Gra; Cli; For; PIW; Val; Yer
<i>Ceanothus thrysiflorus</i> blue blossom (*)	Nap; Cir; LaP; Daw; PaO; TrL; Wil; (89/3)	Fer; TrL	Cal; PaC; PaO	AnV; Nap; Cor; LaP; Daw; Fer; PaO; TrL; Yer
<i>Ceanothus velutinus</i> snow brush (*)	Cir; For; Tse; For; Wap; Law; PIW; (100/1)	Law	Cal; Fro; Nor; NPI; Sup; PaC; Tse; Law; NaS; PIW; (2)	LaP; For; Law; PIW; Yer
<i>Cephalanthus occidentalis</i> var. <i>californicus</i> California buttonbush	Cir; For		Sup?	Nap; LaP
<i>Cercocarpus ledifolius</i> curled-leaf mtn.-mahogany (*)	LaP; Gra; For; Law; PIW; (100/2)	Law	Nor; NPI; PaC; Cal; Sup; Law; PIW; Mis; (2)	Gra; For; Law; PIW; Yer
<i>Cornus californica</i> dogwood	App; (90/2)			App
<i>Cornus sessilis</i> dogwood	LaP; Wap; (90/1)		Cal	LaP
<i>Cornus stolonifera</i> American dogwood	Nap; Cir; LaP; Mo2; PIW; Gra; Bar; Blu; For; Her; Law; NaN; PaO; Wil; Wap; (91/1)	Bar; Blu; Cli; Her; Fro; Law; NaN; New; (?/2)	Abu; Cal; Fro; Nor; NPI; PaO; Law; NaS; She; (3)	Gra; Cli; For; Law; NaN; Boe; PaO; Yer; Str
<i>Corylus cornuta</i> var. <i>californica</i> California hazel	Lar; LaP; App; Bar; Wap; Blu; Bur; Law; NaN; PaO; (63/2)	Bar; Blu; Bur; Law; NaN; Sto	Cal; CoP; Law; PaO	App; Bur; Law; NaN; PaO; Sto; Yer
<i>Holodiscus discolor</i> var. <i>delnortensis</i> creambush oceanspray	For; LaP; NaN; PaO; PIW; Wap; (90/1)	Fer; NaN; New; Sto; WeN	Lar; Nor; Abu; Fro; Sup; CoP; Law; NaS; PaO; PIW; Mis; (2)	Fer; For; NaN; PaO; PIW; Sto; WeN; Yer

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<i>Myrica californica</i> California wax-myrtle	App; Nap; Cir; LaP; Chr; Col; Daw; For; PaO; Sar; TrL; (81/1)	Fer; Nor; TrL	Cal; Fro; PaO	AnV; Boe; Nap; App; Col; Daw; Fer; For; PaO; Sky; AnV; TrL; Yer
<i>Osmaronia cerasiformis</i> oso berry	LaP; For; Wil; (50/2)	Sto; WeN	Abu; Cal	For; PaW; Sto; WeN
<i>Philadelphus lewisii</i> mock-orange	LaP; Blu; Col; For; Wap; PIW; TrL; Wil; (100/2)	Blu; Cli; Sto; TrL; WeN	Nor; Law; Nor; PIW	LaP; Cli; Col; For; PIW; Sto; TrL; WeN; Yer
<i>Physocarpus capitatus</i> ninebark	LaP; For; (100/1)	New; Sto; WeN	Fro	LaP; For; PaW; Sto; Yer
<i>Prunus emarginata</i> bitter cherry	For; LaP; Bar; PIW; Wap; (10/3)	Bar; New; Sto; WeN	Cal; Nor; PIW; (2)	For; PIW; Sto; WeN
<i>Prunus virginiana</i> western choke cherry				LaP
<i>Quercus garryana</i> var. <i>breweri</i> Brewer oak				
<i>Quercus wislizenii</i> interior live oak	App; Nap; Cir; Lar; Sar; (92/1)	BeL; Mag; (70/2)	Cal; Har; Nor; Mis; Oki; (4)	LaP; Nor; App
<i>Rhamnus purshiana</i> cascara sagrada	For; Bar; Her; Wil	Bar; Fer; Her; Sto	Cal; Nor	Fer; For; Sto; Yer
<i>Rhododendron macrophyllum</i> rhododendron	Cir; Tse; Bar; Wil; (70/1)	Bar; Fer; Sto	Abu; Fro; Tse; (4)	Fer; Sto; Yer
<i>Rubus spectabilis</i> salmon berry	Fro; Wap; (?/2)		Abu; Fro	
<i>Salix lasiolepis</i> arroyo willow	LaP; (100/1)			LaP
<i>Salix scouleriana</i> Scouler's willow	Cir; Gra; For; PIW Fro; Wap; (50/1)	Sto; WeN	PIW; CoP	Gra; For; PIW; Sto; CoP; WeN
<i>Sambucus caerulea</i> blue elderberry	Nap; Cir; For; LaP; Gra; App; For; Law; PaO; PIW; Wil; (86/1)	Law; WeN	Abu; Fro; Har; Lar; Nor; NPI; PaC; Law; NaS; PaO; PIW; She; (3)	Nap; LaP; App; For; Law; PaO; PIW; WeN; Yer

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<i>Sambucus callicarpa</i> elderberry	For		FoS; Fro	
<i>Sorbus californica</i> mountain-ash				
<i>Sorbus cascadiensis</i> mountain-ash			Nor	
<i>Umbellularia californica</i> California bay - shrub form	For; Lar		Har; Mis; Wap; Lar; (4)	
MEDIUM SHRUBS (> 2 ft. & < 5 ft.)				
<i>Adenostoma fasciculatum</i> chamise	Cir; LaP; (92/1)		The; Sup; PaC; Mis; (3)	LaP
<i>Amelanchier alnifolia</i> service-berry	For; LaP; Gra; Blu; Mol; Bur; Law; PIW; Sis; Val; Wil; (75/2)	Blu; Bur; Cli; Law; New; Sis; Sto; Val; WeN	Abu; Fro; Nor; NPI; Sup; PaC; CoP; Law; NaS; PIW; She; Mis; (3)	LaP; Gra; Bur; Cli; Mol; For; Law; PIW; Sto; Val; WeN
<i>Amelanchier pallida</i> service-berry				
<i>Amelanchier pumila</i> service-berry				
<i>Arctostaphylos canescens</i> hoary manzanita	For; Col		Cal	LaP; Col; For
<i>Arctostaphylos cinerea</i> hoary manzanita	Clo		Fro	
<i>Arctostaphylos columbiana</i> hairy manzanita	Woo	Fer	Abu; Cal	Fer; Woo; Yer
<i>Arctostaphylos glandulosa</i> eastwood manzanita	Cir; LaP; (48/2)			LaP
<i>Arctostaphylos glauca</i> bigberry manzanita	For		Cal	LaP
<i>Arctostaphylos hispidula</i> Gasquet manzanita	Nap; (70/1)			
<i>Arctostaphylos intricata</i> manzanita				
<i>Arctostaphylos manzanita</i> Parry manzanita	Nap; Cir; LaP; (83/2)		Cal; Cly	AnV; Nap; LaP

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<i>Arctostaphylos parvifolia</i> manzanita	Sar; Wap			
<i>Arctostaphylos patula</i> greenleaf manzanita	Cir; For; LaP; Col; Wil; Wap; (55/2)		Cal; Cly; Nor; PaC; Sup; Mis; (3)	Col; For; Yer
<i>Arctostaphylos viscida</i> whiteleaf manzanita	Cir; For; LaP; Blu; Col; For; Wil; Wap; (50/2)	Blu	Cal; Har; PaC;	Col; For
<i>Arunco vulgaris</i> goatsbeard	Mo2?; Wap		Gra?	
<i>Baccharis pilularis</i> var. <i>consanguinea</i> coyote brush	Nap; Cir; Clo; LaP; App; Blu; Daw; For; Wap; PaO; TrL; (83/1)	Mag; Blu; Fer; TrL (50/2)	Alb; Car; Cly; PaC; PaO; Mis; The; (2)	Nap; LaP; App; Yer; AnV; Daw; Fer; For; PaO; Oki; TrL
<i>Baccharis pilularis</i> var. <i>pilularis</i> dwarf coyote brush	Nap		Alb; Cly; Mis	AnV; Nap; Cor; Oki
<i>Berberis aquifolium</i> Oregon grape	Nap; LaP; Mo1; Mo2; Fro; Tse; Bar; Blu; For; PaO; PIW; TrL; Chr; Law; Mar; (90/2)	Bar; Blu; Cli; Day; Law; Mar; TrL; WeN	Abu; Cal; Fro; Nor; TrB; Tse; Law; NaS; PaO; PIW; She; (3)	AnV; Boe; Cor; Gra; Mol; Oki; Cli; Day; For; Law; Mar; PaO; PIW; Sky; TrL; WeN; Yer; Str; Mis
<i>Calycanthus occidentalis</i> spice-bush	Nap; Cir; LaP; Wap; (95/2)		Cal; Lar	AnV; Boe; Nap; LaP
<i>Castanopsis sempervirens</i> bush chinquapin	LaP; Wil; (50/2)		Har	
<i>Ceanothus cordulatus</i> mountain whitethorn (*)	Cir; For; LaP; Tse; Wap; (100/2)	(70/?)	Cly; Har; Nor; PaC; The; TrB; Sup; Tse; Wap; Mis; (3)	
<i>Ceanothus cuneatus</i> buck brush (*)	Nap; Cir; For; LaP; Wap; Tse; Wil; (92/1)	(80/?)	Cal; Cly; Har; Nor; Sup; The; PaC; Tse; Wap; Mis; (2)	Nap; LaP
<i>Ceanothus integerrimus</i> var. <i>californicus</i> deer brush (*)	Nap; Cir; For; LaP; Blu; Daw; For; Law; Wap; PaO; Wil; (90/1)	Blu; Law; (80/?)	Cal; Car; Cly; Fro; Har; Nor; PaC; Law; Mis; The; Sup; TrB; Alb; PaO; (2)	Nap; LaP; Daw; For; Law; PaO
<i>Ceanothus lemmonii</i> Lemmon's ceanothus (*)				
<i>Ceanothus leucodermis</i> chaparral ceanothus (*)			Cal; The	LaP
<i>Ceanothus sanguineus</i> red stem ceanothus (*)	For; Law; PIW; Wil	Law	Cal; Cly; Fro; Nor; NPI; Law; NaS; Mis; TrB; Sup	Law; Yer

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<i>Cercis occidentalis</i> western redbud (*)	Nap; Mor; Cir; Clo; Cor; For; Lar; LaP; Mo1; Tse; Blu; Col; For; Law; PaO; Sar; Wil; Wap; (70/1)	Blu; Law; TrL	Abu; Cal; Car; Cly; Fro; Alb; Har; Lar; Mis; Nor; OaC; Tse; The; Sup; TrB; Law; PaO; She; Mis; (3)	Nap; LaP; Oki; Col; Boe; For; Law; PaO; TrL; Mol; Yer
<i>Cercocarpus betuloides</i> mountain mahogany (*)	Nap; Cir; LaP; Wap; (92/2)		Cal; Har; Nor; PaC; The; Sup; Alb; Mis; (2)	Nap; LaP
<i>Crataegus douglasii</i> hawthorn	Cir; For; Bar; Col; Law; PIW	Bar; Law; Sto	Nor; Abu; Cal; Law; PIW	Col; For; Law; PIW; Sto
<i>Eriodictyon californicum</i> yerba santa	Cir; LaP; (100/1)		Sup; Mis	LaP
<i>Eriodictyon trichocalyx</i> hairy yerba santa			The	
<i>Euonymus occidentalis</i> western burning bush				Yer
<i>Garrya buxifolia</i> silk-tassel	For		Cal	For
<i>Garrya elliptica</i> silk-tassel	Cir; LaP; Blu; Chr; For; Mar; PaO; Sar; (50/1)	Blu; Fer; Mar	Cal; Fro; PaO	LaP; Fer; For; Mar; PaO; Sky; Yer
<i>Garrya fremontii</i> silk-tassel	For; Sar; Wap		Cal	For; Yer
<i>Gaultheria ovatifolia</i> slender salal		SiR		
<i>Gaultheria shallon</i> salal	For; LaP; Mo2; Tse; Bar; Col; For; Mol; NaN; PaO; TrL; (6/3)	Bar; Fer; NaN; New; Sto; TrL	Abu; Fro; Lar; Mis; The; Sup; Nor; Tse; Law; NaS; Nor; PaO; She; Mis; (2)	Col; Fer; For; NaN; Mol; PaO; Sky; Sto; TrL; Yer
<i>Heteromeles arbutifolia</i> toyon	Nap; Mor; Cir; Clo; LaP; Lyo; Wap; (83/1)		Cal; Cly; Lar; PaC; The; Sup; Mis; Alb; (4)	Boe; Nap; LaP; AnV
<i>Ledum glandulosum</i> ssp. <i>columbianum</i> labrador-tea	For			For
<i>Lithocarpus densiflora</i> var. <i>echinoides</i> tanoak-shrub form	For; Col; Wap		Cal; Lar	Col; For
<i>Lonicera involucrata</i> twinberry	For; LaP	New	Nor	
<i>Lotus yollabolliensis</i> bird's foot trefoil (*)				

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<i>Lupinus albilfrons</i> lupine (*)	Nap; Cir; LaP; (90/1)		Lar; PaC	Nap
<i>Lupinus luteolus</i> lupine (*)			Cly; Mis; PaC; (1)	
<i>Lupinus polyphyllus</i> lupine (*)	For		Mis	
<i>Mimulus aurantiacus</i> monkey-flower	Nap; Cor; LaP; Blu; Wap; Daw; For; PaO; TrL; (92/1)	Blu; TrL	Cly; PaC; PaO; Mis; Sup; Alb; (1)	Nap; Cor; Daw; For; PaO; TrL; Yer
<i>Pickeringia montana</i> chaparral pea /2 (*)	Cir; For			
<i>Quercus dumosa</i> scrub oak	Nap; Cir; LaP; Wap; (93/1)		Cal; Mis; Sup; (4)	LaP
<i>Quercus durata</i> leather oak	Cir; Col; Daw; For		Cal	LaP; Col; Daw; For
<i>Quercus sadleriana</i> sadler oak	For; LaP; Col; Wil; (92/1)		Cal	Col; For
<i>Quercus vaccinifolia</i> huckleberry oak	Cir; For; Blu; Wap; (95/1)	Blu; SiR	Cal; PaC	For; SiR; Yer
<i>Rhamnus californica</i> ssp. <i>occidentalis</i> coffeeberry	Nap; Cir; LaP; Tse; Col; Daw; For; PaO; Sar; TrL; Wil; Wap; (91/1)	Blu; TrL	Cal; Cly; Har; Lar; The; Mis; PaC; PaO; (3)	AnV; Boe; Nap; LaP; Col; Daw; For; PaO; Sky; TrL; Yer
<i>Rhododendron occidentale</i> western azalea	Nap; For; Tse; For; Mar; Wap; Wil; (50/3)	Fer; Mar; Sto; SiR	Tse; Wap; (4)	Fer; For; Mar; Sto; Yer
<i>Rhus trilobata</i> squaw bush	For; LaP; Gra; Law PIW; (100/2)	Law	NPI; Nor; Law; Mis; The; Sup; (3)	LaP; Gra; Law
<i>Ribes bracteosum</i> stink gooseberry				
<i>Ribes lobbii</i> Lobb's gooseberry	For	WeN		For; WeN
<i>Ribes marshallii</i> aplegate gooseberry				
<i>Ribes sanguineum</i> red flowering current	Cir; Cor; For; Blu; Chr; Daw; For; Mar; PaO; TrL; Wil; (95/1)	Blu; Fer; Mar; New; Sto; TrL; WeN	Abu; AnV; PaO	LaP; Daw; Fer; For; Mar; PaO; PaW; Sky; Sto; TrL; WeN; Yer
<i>Rosa californica</i> rose	For; LaP; Sar			Nap; LaP

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<i>Rosa gymnocarpa</i> wood rose	Nap; For; LaP; Tse; Wap; Wil; (72/2)		Car; Tse; Lar; Nor; (3)	For; Yer
<i>Shepherdia argentea</i> buffalo-berry /2 (*)	For; LaP; Gra		Cal; Nor; NPI; NaS	LaP
<i>Styrax officinalis</i> var. <i>californica</i> snowdrop bush	For; LaP		Cal	LaP
<i>Trichostema lanatum</i> wooly blue-curls /2 (*)	LaP		Cly; The	LaP
<i>Trichostema lanceolatum</i> vinegar weed (*)			Lar	
<i>Vaccinium membranaceum</i> thinleaf huckleberry	For; Fro; PIW; SiS; (7/3)	SiS	Abu; Nor; NaS; (3)	
<i>Vaccinium ovatum</i> California huckleberry	For; LaP; Bar; Col; Fro; Mar; PaO; (7/3)	Bar; Fer; Mar; SiR; Sto; WeN	Abu; Cly; Fro; Lar; Nor; PaO	Nap; Col; Fer; For; Mar; PaO; SiR; Sto; WeN; Yer
<i>Vaccinium parvifolium</i> red huckleberry	Nap; Bar; Col; For; Fro; NaN; Wil (70/2)	Bar; Fer; NaN; Sto	Abu; Fro; Law	Col; Fer; For; NaN; Sto; Yer
<i>Zauschneria californica</i> California fuschia	Nap; Cor; For; LaP; Wap; Wil; (85/1)	SiR		AnV; Nap; Cor; LaP;
LOW SHRUBS (< 2 ft.)				
<i>Arctostaphylos nevadensis</i> pinemat manzanita	Col; For; Wil; Wap		Cal; Cly; Nor; (3)	Col; For
<i>Arctostaphylos uva-ursi</i> bearberry	Blu; Chr; Col; For; Law; NaN; PaO; PIW; Sar; SiS; Tis	Blu; Cli; Fer; Gre; Law; NaN; SiS; SiR; Sto	Abu; Cal; Fro; Gre; Law; NaS; Nor; PaO; PIW; Sta; Tis	Cli; Col; Fer; For; Gre; Law; NaN; PaO; PIW; Oki; SiR; Sky; Sta; Sto; Tis; Yer
<i>Berberis nervosa</i> dwarf Oregon grape	Blu; Col; For; Rus; Law; Mar; NaN; Woo; (7/4)	Blu; Day; Fer; Rus; Gre; Law; Mar; NaN; WeN	Abu; Cal; Fro; Nor; TrB; Sup; Law; She; Mis; (2)	Col; Day; Fer; For; Gre; Law; Mar; NaN; WeN; Woo
<i>Berberis piperiana</i>				
<i>Berberis pumila</i>	Wap	SiR	Cal; Fro	
<i>Berberis repens</i> barberry	LaP; Mo1; Mo2; Gra; For; Mar; PIW; SiS; (90/1)	Mar; SiS	Abu; Cal; Fro; Nor; TrB; NaS; PIW; She; (3)	AnV; Gra; For; Mar; Mol; PIW; AnV; Str
<i>Ceanothus prostratus</i> squaw carpet (*)	Cir; For; LaP; SiS Wil; Wap; (65/2)	SiS; SiR	Cal; Cly; Nor; Mis; Sup; (3)	Cor; LaP

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<i>Ceanothus pumilus</i> ceanothus (*)	For	Sir		
<i>Eriogonum umbellatum</i> sulfer-flowered buckwheat	Nap; Cly; For; LaP; PIW; Wap; (90/1)		Cly; Nor; NPI; PaC; Sup; Wap; Mis; WiS; (3)	Nap; LaP
<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	Nap; For; LaP; (50/1)		Cly	LaP
<i>Juniperus communis</i> dwarf juniper	For; Wap		Cal	
<i>Lonicera hispidula</i> var. <i>vacillans</i> honeysuckle	For; LaP		Lar	
<i>Rubus leucodermis</i> western raspberry	Cir; Fro; LaP; PIW; (95/1)		Abu; Fro; Nor; PIW (2)	PIW
<i>Rubus parviflorus</i> thimbleberry	Nap; For; Gra; Bar; Bur; Daw; Fro; PIW; (60/2)	Bar; Bur; Fer; New; Sto; WeN	Abu; Fro; Nor; PIW (2)	Gra; Bur; Daw; Fer; For; PIW; Sto; WeN; Yer
<i>Rubus ursinus</i> Pacific blackberry	Fro; PIW; Nap; Wil; (75/1)		Abu; Fro; Nor; (2)	
<i>Rubus vitifolius</i> California blackberry	Cir			
<i>Salvia sonomensis</i> creeping sage	LaP; Sky; Wap; Yer	Wap	Mis; Wap	LaP; Sky; Wap; Yer
<i>Symphoricarpos mollis</i> creeping snowberry	Cir; For; Bar; (90/1)	Bar	Nor; NPI; Mis; (3)	
<i>Symphoricarpos rivularis</i> snowberry	Nap; Cir; LaP; (72/2)		Sup	
<i>Vitis californica</i> California wild grape				
<i>Whipplea modesta</i> yerba de selva	Clo; For; Tse; Yer; (90/1)		Tse; (1)	
FORBS				
<i>Achillea borealis</i> ssp. <i>californica</i> yarrow				
<i>Achillea lanulosa</i> yarrow	LaP; (100/1)		Cly; Nor; Mis; Sup; (1)	LaP
<i>Achillea millefolium</i> yarrow /2	Nap; (100/1)		Alb; AnV; Car; Lar; Env; Mis; PaC; The; Wis	

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<i>Anaphalis margaritacea</i> pearly everlasting		NaG	Abu; Fro; Nor	NaG
<i>Aralia californica</i> spikenard	Cor			
<i>Calyptidium umbellatum</i> pussy paws				
<i>Epilobium angustifolium</i> fireweed			Abu; Fro; Nor; Wis	
<i>Eschscholzia californica</i> California poppy	Clo		Abu; Alb; Cly; Env; Sup; Mis; Kel; Lar; LaP; Nor; NPI; PaC; Wis	Yer
<i>Gilia capitata</i> gilia			NPI; Env; Lav	
<i>Helianthus annuus</i> sunflower			Nor; NPI; Mis	
<i>Horkelia sericata</i> Howell's horkelia				
<i>Ipomopsis aggregata</i> scarlet gilia			Abu; Fro; Wis	
<i>Lathyrus</i> spp. pea	Cir; (95/1)		Cly; Fro; Kel	
<i>Lathyrus japonicus</i> pea (*)			Fro; CoP	
<i>Lathyrus polyphyllus</i> pea (*)			Fro	
<i>Lathyrus torreyi</i> pea (*)				
<i>Lathyrus vestitus</i> pea (*)				
<i>Linum perenne</i> ssp. lewisii western blue flax			Sta; Alb; Cly; Env Mis; PaC; Lar; Wis	Rus
<i>Lotus</i> spp. bird's foot trefoil (*)			Car; Cly; NPI; Nor; PaC	
<i>Lotus crassifolius</i> big deervetch (*)			CoP	
<i>Lotus micranthus</i> bird's foot trefoil (*, A)				

/1 = Non-native naturalized species
/2 = Non-native exotic species.

Table 9. Species list with information on sources. List includes information on percent success (SUC) nurseries have experienced growing each species and potential (POT) for using each species in revegetation projects. Potential (POT) was rated: 1 = Good, 2 = Moderate, 3 = Marginal, 4 = Bad. Source abbreviations are listed in Table 10. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Lotus purshianus</i> Spanish clover (*, A)				
<i>Lotus scoparius</i> deerweed (*)	Nap; Cir; LaP; (82/1)		Alb; Car; Cly; Kel; PaC; Sup; Mis; (1)	
<i>Lupinus albicaulis</i> lupine (*)			Abu; Fro; Kel; Nor; CoP; PaC; (2)	CoP
<i>Lupinus bicolor</i> minature lupine (*, A)			Alb; Cly; Fro; Kel; Lar; PaC; Mis; Wis; (1)	
<i>Lupinus densiflorus</i> lupine (*, A)			Cly; EnV; Lar; NPI; Sup; PaC; Mis; (1)	
<i>Lupinus nanus</i> sky lupine (*, A)			Cly; Lar; PaC; Alb; Mis	
<i>Lupinus succulentus</i> lupine (*, A)			CLy; Env; Kel; Lar; Alb; Sup; The; Mis; NPI; PaC; Wis	
<i>Melilotus albus</i> white sweet-clover /1 (*, B)			Alb; NPI	
<i>Melilotus officinalis</i> yellow sweet-clover /1 (*, B)			Alb; PaC; NPI	
<i>Mimulus guttatus</i> monkey flower	For; Lar; Wil		Abu; Cly; Fro; Lar; Wis	
<i>Polystichum munitum</i> sword fern				Boe; Mol; Rus
<i>Thermopsis gracilis</i> false-lupine (*)				
<i>Thermopsis macrophylla</i> false-lupine (*)			Sup	
<i>Thermopsis montana</i> false-lupine (*)			Fro; Nor	
<i>Trifolium</i> spp. clover (*)			Car; Cly; Kel; Nor; NPI; Ste; Yol	
<i>Trifolium beckwithii</i> Beckwith's clover /1 (*)				
<i>Trifolium bifidum</i> clover (*, A)				
<i>Trifolium ciliolatum</i> tree clover (*, A)				

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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Trifolium dubium</i> clover /1 (*, A)				
<i>Trifolium hirtum</i> rose clover /1 (*, A)			Cly; Env; PaC; Ste; Con; Alb	
<i>Trifolium incarnatum</i> crimson clover /1 (*, A)			Alb; Cly; Nor; PaC; Bou	
<i>Trifolium longipes</i> long-stalked clover (*)				
<i>Trifolium microcephalum</i> littlehead clover (*, A)				
<i>Trifolium microdon</i> clover (*, A)				
<i>Trifolium oliganthum</i> clover (*, A)				
<i>Trifolium pratense</i> red clover /1 (*)			Bou; NPI; PaC	
<i>Trifolium repens</i> white clover /1 (*)			Alb; Nor; NPI; PaC Bou	
<i>Trifolium subterraneum</i> sub clover /1 (*)			Alb; Bou; Cly; PaC	
<i>Trifolium tridentatum</i> clover (*, A)				
<i>Trifolium variegatum</i> clover (*, A)				
<i>Veronica americana</i> brooklime			Fro	
<i>Vicia</i> spp. vetch (*)			Car; Cly; Fro; Nor; Alb; Bou; PaC	
<i>Vicia americana</i> vetch (*)			Fro	
<i>Vicia californica</i> vetch (*)	Cir; For; LaP			Nap; LaP
<i>Vicia gigantea</i> vetch (*)			Abu	
<i>Vicia villosa</i> winter vetch /1 (*, A & B)			Bou; NPI	
<i>Woodwardia fimbriata</i> chain fern				Boe; LaP; Rus

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Table 9. Species list with information on sources. List includes information on percent success (SUC) nurseries have experienced growing each species and potential (POT) for using each species in revegetation projects. Potential (POT) was rated: 1 = Good, 2 = Moderate, 3 = Marginal, 4 = Bad. Source abbreviations are listed in Table 10. (* = Nitrogen fixer, B = Biennial, A = Annual).

SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Xerophyllum tenax</i> beargrass	For; PIW; Tse; (?/1)		Abu; Fro; Nor; Tse; (3)	
GRASSES				
<i>Agropyron</i> spp. wheatgrass			Alb; AnS; Cly; Nor; NPI; CoP; Rou; Yol	
<i>Agropyron</i> sp. X <i>Triticum</i> sp. wheatgrass X wheat			AnS	
<i>Agropyron dasystachyum</i> northern wheatgrass			AnS	
<i>Agropyron intermedium</i> intermediate wheatgrass /1				
<i>Agropyron smithii</i> western wheatgrass			AnS	
<i>Agropyron spicatum</i> wheatgrass	Daw		PaC; Nor; PIW; Daw; Rou; AnS	
<i>Agropyron trachycaulum</i> slender wheatgrass			PaC; AnS	
<i>Agrostis alba</i> redtop /1			AnS; Nor	
<i>Agrostis hallii</i> bent grass			Cly; PaC	
<i>Arrhenatherum elatius</i> tall oatgrass /1				
<i>Avena sativa</i> cultivated oat /1			Bou	
<i>Briza maxima</i> quaking grass /1 (A)			Cly; Mis	
<i>Briza minor</i> quaking grass /1 (A)			Mis	
<i>Bromus carinatus</i> California brome (A)	Nap; Cir; (97/1)		AnS; Lar; PaC; Ste; Con; Cop; PaO; Mis; PIW; Sup; Alb; (1)	
<i>Bromus marginatus</i> mountain brome	Cir; (100/1)		PIW; Nor; NPI; AnS; Ste; (1)	
<i>Bromus mollis</i> soft chess/1 (A)			Cly; Mis; NPI; Ste; Con	

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SPECIES NAME COMMON NAME	PLUG/ LINER SOURCES (SUC/POT)	BAREROOT SOURCES (SUC/POT)	SEED SOURCES (POT)	CONTAINER SOURCES
<i>Calamagrostis canadensis</i> blue-joint reedgrass				
<i>Calamagrostis koelerioides</i> fire reedgrass				
<i>Calamagrostis nutkaensis</i> reedgrass	Cir; Lar; (92/1)		Lar; Sup	
<i>Carex</i> spp. sedge	CaF; Rus; Wil	SiR	PaC; CaF; Mis; (1)	Mol
<i>Carex bolanderi</i> sedge				
<i>Carex nudata</i> sedge	Nap; (80/2)			
<i>Dactylus glomerata</i> orchard grass /1			Alb; Cly; Nor; NPI; Con; AnS; Ste; Yol	
<i>Danthonia californica</i> California oatgrass	Nap; Cir; Lar; PaO Wil; (75/1)		Lar; PaC; CoP;	PaO; Yer
<i>Deschampsia caespitosa</i> tufted hairgrass	Kli?; PaO?; Sta?; Tis?		CoP; The; Lar	Kli; PaO; Sta; Tis; Yer
<i>Elymus glaucus</i> blue rye	Nap; Cir; Lar; Daw?; Kli?; PaO?; Tis?; TrL?; Wil; Wap; (95/1)		Con; Lar; PaC; Ste; Fro; CoP; Sup; PIW; Mis; (1)	Daw; Kli; PaO; Tis; TrL; Yer
<i>Elymus triticoides</i> alkali rye	Cir; Wap; (92/1)		NPI; Ste; Mis; Sup; PIW; (1)	
<i>Festuca californica</i> California fescue	Nap; Cir; Lar; (95/1)		Lar; Sup; Mis; (1)	
<i>Festuca idahoensis</i> Idaho fescue	Lar; PaO?; Wil		Kel; Lar; NPI; Ste; AnS; PIW; AnS	PaO; Yer
<i>Festuca occidentalis</i> western fescue	CCB; (80/1)		Ste; CoP	
<i>Festuca rubra</i> red fescue	Nap; Lar; PaO; Wap; (90/1)		Con; Kel; Lar; NPI; PaC; AnS; Sup; Ste; PIW; Mis; (1)	PaO; Yer
<i>Hierochloe occidentalis</i> vanilla grass	Lar; (45/1)		Lar	
<i>Hordeum brachyantherum</i> barley	Nap; Cir; Lar; Wap; (95/1)		PaC; Ste; PaO; Mis; Con; Sup; (1)	

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<i>Hordeum californicum</i> California barley				
<i>Hordeum jubatum</i> foxtail			PaC; Mis; (1)	
<i>Phleum alpinum</i> mountain timothy			AnS	
<i>Poa rhizomata</i>	Nap; (80/1)			
<i>Sitanion hystrix</i> squirreletail			NPI	
<i>Stipa occidentalis</i> western needlegrass				
<i>Stipa pulchra</i>	App; Nap; Cir; Lar; Wil; Wap; (90/1)		Cly; Lar; PaC; Ste; Con; The; Sup; Mis; (1)	
<i>Vulpia myuros</i> zoro fescue			Con; Ste	

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Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Abundant Life Seed Foundation (Abu) P.O. Box 772 Port Townsend, WA 98368 Forest Shomer 206-385-5660 Plant Materials: Trees, Shrubs, Forbs (Native, Non-native) Type: Seed, Seed mixtures Services: Erosion control, Stream restoration Ordering: Mail order, Retail, Wholesale Comments: <i>Non-profit corporation whose purpose is to acquire, propagate and preserve native and naturalized plants of the North Pacific rim.</i></p>	<p>Anderson Valley Nursery (AnV) 18151 Mountain View Rd., P.O. Box 504 Boonville, CA 95415 Ken Montgomery 707-895-3853 Plant Materials: Trees, Shrubs, Forbs (Native, Non-native) Type: Gallon Services: Erosion control Ordering: Mail order, Wholesale, Retail</p>
<p>Albright Seed Company (Alb) 5143 C Port Chicago Hwy. Concord, CA 94520 Sharon Landes 415-671-2822 Plant Materials: Trees, Shrubs, Forbs, Grasses (Native, Non-native) Type: Seed, Seed mixtures Services: Erosion control, Consulting Ordering: Mail order, Wholesale, Retail Comments: <i>Also located in Sacramento and San Jose.</i></p>	<p>Appleton Forestry (App) 1369 Tilton Rd. Sebastopol, CA 95472 Harold Appleton 707-823-3776 Plant Materials: Trees, Shrubs, Grasses (Native) Type: Bareroot, Plug, Supercell, Dee pot, Tree pot, Gallon, Seed Services: Seed collection, Cutting collection, Erosion control, Stream restoration, Revegetation, Consulting Ordering: Contract, Retail, Wholesale Comments: <i>Large orders require 1/3 deposit with contract. Requires 1.5 yr. prior notification (by July) for stock from seed. Cuttings require 1 yr. (by December) prior notification.</i></p>
<p>Aldrich Berry Farm & Nursery, Inc. (Ald) 190 Aldrich Rd. Mossyrock, WA 98564 Glenn Aldrich 206-983-3138 Plant Materials: Trees (Natives) Types: Bareroot, Liner, Container Ordering: Retail, Wholesale</p>	<p>Arcata Lumber (Arc) P.O. Box 250 Smith River, CA 95567 Bill Ross 707-487-3775 Plant Materials: Trees (Native, Non-native) Types: Bareroot Ordering: Contract Comments: <i>Now owned by Simpson Timber Company.</i></p>
<p>Anderson Seed Company (AnS) P.O. Box 2252 Greeley, CO 80632 Sam Smyrl 303-356-7400 Plant Materials: Grasses (Native, Non-native) Type: Seed, Seed mixtures Services: Revegetation, Consulting Ordering: Mail order, Wholesale, Retail Comments: <i>Large selection of non-native grasses.</i></p>	<p>Barber Nursery (Bar) 23561 Vaughn Rd. Veneta, OR 97487 William Barber 503-935-7701 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Liner Ordering: Mail order, Retail, Wholesale</p>
<p>Anderson Seed Company (AnS) P.O. Box 1017 Lamar, CO 81052 719-336-2226, 800-456-0169 Plant Materials: Grasses (Native, Non-native) Type: Seed, Seed Mixtures Ordering: Mail order, Wholesale, Retail Comments: <i>Large selection of non-native grasses.</i></p>	<p>Ben Lomond Nursery (BeL) California Department of Forestry 13655 Empire Grade Bonnie Doon Rt. Santa Cruz, CA 95060 Harold Wells 408-423-6551 Plant Materials: Trees (Natives, Non-natives) Types: Bareroot Ordering: Contract Comments: <i>Bareroot orders will not be filled prior to December 15 or later than May 1. Sell only in California to private or government for specific purposes only.</i></p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Blue Oak Nursery (Blu) 2731 Mountain Oak Lane Rescue, CA 95672 Eileen Beegle 916-677-2111 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Liner, Rooted cuttings Ordering: Mail order, Retail, Wholesale</p>	<p>Carter's Seeds (Car) 475 Mar Vista Dr. Vista, CA 92083 800-624-5700 Plant Materials: Trees, Shrubs, Forbs, Grasses (Native, Non-native) Type: Seed, Seed mixtures Ordering: Mail order, Wholesale</p>
<p>Boething Treeland Farms (Boe) 2923 Alpine Rd. Portola Valley, CA 94025 Bill Pramuk 415-851-4770 Plant Materials: Trees, Shrubs (Native, Non-native) Type: Gallon or large container stock only Ordering: Mail order, Wholesale, Retail Comments: <i>Minimum order \$500.</i></p>	<p>Chico Tree Improvement Center (Chi) USDA Forest Service 2741 Kramer Lane Chico, CA 95926 Hank Switzer 916-895-1176 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Plug Ordering: Contract Comments: <i>Stock available for use only on National Forest land. Stock production for reforestation on a limited space-available basis. Requests for stock should be received by December 1 with stratified seed.</i></p>
<p>Bountiful Gardens (Bou) 5798 Ridgewood Road Willits, CA 95490 Bill Bruneau Plant Materials: Forbs, Grasses (Native, Non-native) Type: Seed Ordering: Mail order</p>	<p>Christensen Nursery Co. (Chr) 16000 Sanborn Rd. Saratoga, CA 95070-9707 Albert Sotelo 408-867-4181 Plant Materials: Trees, Shrubs (Natives) Types: Liner, Rooted cuttings Ordering: Wholesale</p>
<p>Burnt Ridge Nursery (Bur) 432 Burnt Ridge Rd. Onalaska, WA 98570 Michael Dolan 206-985-2873 Plant Materials: Trees (Natives) Types: Bareroot, Container, Liner Ordering: Mail order, Retail, Wholesale</p>	<p>Circuit Rider Productions, Inc. (Cir) 9619 Old Redwood Hwy. Windsor, CA 95492 707-838-6641 Judy Bowser Plant Materials: Trees, Shrubs, Grasses (Native) Type: Plug, Seed Services: Seed collection, Cutting collection, Tree planting, Erosion control, Stream restoration, Revegetation, Consulting Ordering: Contract Comments: <i>Contract grow wetland plants. Willing to collect site specific cuttings or seed.</i></p>
<p>Cal Forest Nursery (CaF) 1838 Eastside Rd., P.O. Box 719 Etna, CA 96027 Tom Jopson 916-467-5211 Plant Materials: Trees, Shrubs (Native, Non-native) Type: Bareroot, Styroblock Services: Consulting Ordering: Contract</p>	<p>Clifty View Nursery (CII) Route 1, Box 509 Bonners Ferry, ID 83805 Lon Merrifield Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container, Rooted cutting Ordering: Wholesale</p>
<p>Callahan Seeds (Cal) 6045 Foley Lane Central Point, OR 97502 Frank Callahan 503-855-1164 Plant Materials: Trees, Shrubs (Native, Non-native) Type: Seed Ordering: Mail order, Wholesale, Retail Comments: <i>Specialize in tree and shrub seeds of western North American species.</i></p>	

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Clotilde Merlo Forest Nursery (Clo) Louisiana-Pacific Corporation 1508 Crannell Rd. Trinidad, CA 95570 Dominic Bongio 707-677-0911 Plant Materials: Trees, Shrubs, Forbs (Native, Non-native) Type: Styroblock Ordering: Contract Comments: <i>Should submit contract by October to allow for seed treatment and sowing by mid-winter.</i></p>
<p>Clyde Robin Seed Company (Cly) 25670 Nickel Place Hayward, CA 94545 415-785-0425 Plant Materials: Trees, Shrubs, Forbs, Grasses (Native, Non-native) Type: Seed, Seed mixtures Services: Erosion control, Consulting Ordering: Wholesale Comments: <i>Sell seed mixtures designed for the Forest Service.</i></p>
<p>Colvos Creek Farm (Col) 1931 2nd Ave., #215 Seattle, WA 98101 Mike Lee 206-441-1509 Plant Materials: Trees, Shrubs (Native) Types: Container, Liner Ordering: Mail order, Retail, Wholesale</p>
<p>Conservaseed (Con) P.O. Box 455 Rio Vista, CA 94571 Scott Stewart 916-775-1676 Plant Materials: Grasses (Native, Non-native) Type: Seed Ordering: Wholesale Comments: <i>Sell seed mixtures designed for the Forest Service.</i></p>
<p>Cornflower Farms (Cor) P.O. Box 896 Elk Grove, CA 95624 916-689-1015 Plant Materials: Trees, Shrubs (Native, Non-native) Type: Liners, Tree pots, Rose pots, Gallon Ordering: Wholesale</p>

<p>Corvallis Plant Materials Center (CoP) USDA Soil Conservation Service 3420 NE Grainger Ave. Corvallis, OR 97330 Dale Darris 503-757-4812 Plant Materials: Trees, Shrubs, Grasses (Natives) Types: Container, Rooted cutting, Seed Services: Consulting Ordering: Contract Comments: <i>Develop and evaluate plants and techniques for streambank and coastal sand dune stabilization, living mulch systems, woodland and roadside erosion control, and rangeland improvement. Stock includes various species of grasses, shrubs, legumes and willow.</i></p>
<p>DAWN (Daw) 1442a Walnut St. Box 101 Berkeley, CA 94709 Jane Andrews 415-644-1315 Plant Materials: Trees, Shrubs (Natives) Types: Container, Liner Ordering: Retail</p>
<p>Daybreak Gardens (Day) 25321 NE 72nd Ave. Battleground, WA 98604 Dave or Donna Burnett 206-687-5641 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container Ordering: Retail, Wholesale</p>
<p>Del Norte Center (DNC) California Conservation Corps Klamath, CA Dave Muraki 707-482-2941 Services: Seed collection, Cutting collection, Tree planting Ordering: Contract Comments: <i>Provide services to public agencies or public organizations only.</i></p>
<p>Environmental Seed Producers, Inc. (Env) P.O. Box 5904 El Monte, CA 91734 Jack Bodger 818-442-3330 Plant Materials: Forbs, Grasses (Native, Non-native) Type: Seed, Seed mixtures Ordering: Wholesale Comments: <i>Provide seed for non-woody plant species only. Minimum order 25 lbs.</i></p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Ferris Landscaping (Fer) P.O. Box 258 Newport, OR 97365 Rennie Ferris 503-867-4100 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container Ordering: Wholesale</p>	<p>Frosty Hollow Nursery (Fro) P.O. Box 53 Langley, WA 98260 Marianne Edain Steve Erickson 206-221-2332 Plant Materials: Trees, Shrubs, Forbs (Natives, Non-natives) Type: Seed Services: Erosion control, Stream restoration, Revegetation, Consulting Ordering: Contract, Mail order, Retail, Wholesale Comments: <i>Order before May 15 for most seed.</i></p>
<p>Ferry-Morse Seed Company (Fer) 111 Ferry-Morse Way Mountain View, CA 94039 415-967-6973 Plant Materials: Trees, Shrubs (Non-native) Type: Seed Ordering: Mail order, Wholesale</p>	<p>Future Forest Nursery (Fut) 17110 Mockingbird Cyn. Rd. Riverside, CA 92504 Gale Connick 714-780-8946 Plant Materials: Trees, Shrubs (Natives, Non-natives) Type: Supercell "Conetainer" (1.5"x 8.5"), "Big Pots", "Pine Cells" Ordering: Contract, Wholesale Comments: <i>Need 8 months lead time for contract growing.</i></p>
<p>Forest Seeds of California (FoS) 1100 Indian Hill Rd. Placerville, CA 95667 Robert Graton 916-621-1551 Plant Materials: Trees, Shrubs (Native, Non-native) Type: Seed Services: Seed collection, Cutting collection Ordering: Contract, Retail, Wholesale Comments: <i>Will provide seed from local sources on contract.</i></p>	<p>Georgia-Pacific Corporation (Geo) 90 West Redwood Ave. Fort Bragg, CA 95437 Michael Peterson 707-964-5651 Plant Materials: Trees (Natives) Type: Styroblock Ordering: Contract</p>
<p>Forestfarm (For) 990 Tetherow Rd. Williams, OR 97544 Ray or Peg Prag 503-846-6963 Plant Materials: Trees, Shrubs (Natives, Non-natives) Type: Plug (2"x2"x6" biodegradable tubes), Gallon & larger Ordering: Contract, Mail order, Retail, Wholesale Comments: <i>Willing to grow most plants with 1-2 yrs. lead time. Catalog \$2.00.</i></p>	<p>Germain's Seed (Ger) P.O. Box 12447 Fresno, CA 209-233-8823 Plant Materials: Types: Seed Ordering: Wholesale</p>
<p>Fowler Nurseries, Inc. (Fow) 525 Fowler Rd. Newcastle, CA 95658 Everett Johnson 916-645-8191 Plant Materials: Trees (Natives, Non-natives) Type: Bareroot, Plug, Styroblock (No. 4 styroblock w/160 seedlings) Ordering: Contract, Mail order, Wholesale Comments: <i>Best to order 30-40 days before spring sowing depending on stratification and treatment requirements.</i></p>	<p>Granite Seed, Inc. (Gra) 1697 West 2100 North, P.O. Box 177 Lehi, UT 84043 Scott Spackeen 801-768-4422; 801-531-1456 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Wholesale Comments: <i>Sell native and reclamation species seed. Formerly: Native Plants, Inc. - Seed Division.</i></p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Green Hills Nursery (Gre) 40805 Upper Nestucca Rd. Beaver, OR 97108 Les Helgeson 503-398-5965 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container, Rooted cuttings, Seed Ordering: Wholesale</p>	<p>Karen Theiss and Associates (KaT) P.O. Box 3005 Mckinleyville, CA 95521 Karen Theiss 707-839-0681 Services: Seed collection, Consulting, Environmental documents Comments: <i>Has seed collecting and drying equipment.</i></p>
<p>Hardscrabble Seed Company (Har) Route 2 Box 225 Springville, CA 93265 Larry Otter 209-539-3593 Plant Materials: Trees, Shrubs (Natives) Types: Seed Services: Seed collection Ordering: Mail order, Wholesale Comments: <i>Willing to collect seed on order.</i></p>	<p>Kellogg's Seed Service (Kel) 3367 Neal Rd. Paradise, CA 95968 Bill Kellogg 916-877-5366 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Wholesale</p>
<p>Heritage Seedlings, Inc. (Her) 4199 75th Ave. SE Salem, OR 97301-9242 Mark Krautmann 503-585-9835 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Liner Ordering: Wholesale</p>	<p>Kline Nursery Company (Kli) 17401 SW Bryant Rd. Lake Grove, OR 97035 Phil Parker 503-636-3923 Plant Materials: Forbs, Grasses (Natives) Types: Bareroot Ordering: Mail order, Retail, Wholesale</p>
<p>J.L. Hudson, Seedsman (Hud) P.O. Box 1058 Redwood City, CA 94064 Plant Materials: Types: Seed Ordering:</p>	<p>Larner Seeds (Lar) 235 Fern Rd., P.O. Box 407 Bolinas, CA 94924 415-868-9407 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Services: Seed collection Ordering: Wholesale Comments: <i>Don't collect in seed zone 300.</i></p>
<p>Humboldt Center (HuC) California Conservation Corps Hwy 36 Forest Glen, CA Mel Krebs 707-946-2362 Services: Seed collection, Cutting collection, Tree planting, Erosion control, Revegetation Ordering: Contract Comments: <i>Provide services to public agencies or public organizations only.</i></p>	<p>Las Pilitas Nursery (LaP) Star Route Box 23X Santa Margarita, CA 93453 Bert Wilson 805-438-5992 Plant Materials: Trees, Shrubs, Forbs (Natives, Non-natives) Types: 3' Pots, Flats, 1-15 Gallon Ordering: Contract, Wholesale, Retail Comments: <i>Wholesale to other nurseries, contractors and government agencies only. Retail Saturdays only. 30% extra for shipping 1 gallon or larger.</i></p>
<p>Humboldt Nursery (Hum) USDA Forest Service 4886 Cottage Grove Ave. McKinleyville, CA 95521 Tony Rameriz, Dan O'Connell 707-839-3256 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Bareroot Ordering: Contract</p>	<p>Lava Nursery, Inc. (Lav) 5301 Culbertson Rd., P.O. Box 370 Parkdale, OR 97041 Jeffery Snyder 503-352-7303 Plant Materials: Trees (Natives, Non-natives) Types: Bareroot Ordering: Contract, Wholesale Comments: <i>Specialize in bareroot conifers.</i></p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Lawyer Nursery, Inc. (Law) 950 Highway 200 West Plains, MT 59859-9706 John Lawyer 406-826-3881 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container, Liner, Rooted cutting, Seed Ordering: Mail order, Wholesale</p>	<p>Mistletoe Sales - S & S Seeds (Mis) P.O. Box 1275 Carpinteria, CA 93013 Susan Schaff 805-684-0436 FAX 805-684-2798 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Wholesale</p>
<p>Lyon Tree Farm of Carmel (Lyo) 2 Scarlett Rd. Carmel Valley, CA 93924 800-888-3196 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Supercell, Gallon and larger Ordering: Contract, Mail order, Wholesale Comments: <i>Best to order stock in Fall.</i></p>	<p>Monrovia Nursery Company (Mo1) 18331 E. Foothill Blvd., P.O. Box Q Azusa, CA 91702 213-334-9321 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Dee pot, Tree pot (2.25' x 5'), Flat, Gallon and larger Ordering: Wholesale Comments: <i>Only orders > \$450.00 will be taken.</i></p>
<p>Mad River Gardens (Mad) 3384 Janes Rd. Arcata, CA 95521 707-822-7049 Plant Materials: Trees Shrubs Forbs (Natives, Non-natives) Types: Container Ordering: Retail Comments: <i>Sales limited to larger stock and to only a few natives.</i></p>	<p>Monrovia Nursery Company (Mo2) 12600 S.E. Alderman Rd. Dayton, OR 97114 503-868-7941 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: T pots (2.25' x 5'), Dee pots, Flats, Gallon and larger Ordering: Wholesale Comments: <i>Only orders > \$450.00 will be taken.</i></p>
<p>Magalia Nursery (Mag) California Department of Forestry 6640 Steiffer Rd. Magalia, CA 95954 William Krelle 916-873-0400 Plant Materials: Trees (Natives, Non-natives) Types: Bareroot Ordering: Contract Comments: <i>Sell only in California to private or government for specific purposes only.</i></p>	<p>L.A. Moran Reforestation Center (Mor) California Department of Forestry 5800 Chiles Rd., P.O. BOX 1590 Davis, CA 95617 Lahman Hartzell 916-753-2441 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Plug Ordering: Contract, Mail order Comments: <i>Order stock November 1 - May 31. Sell only in California to private or government for specific purposes only.</i></p>
<p>Mar-Lyn Farms (Mar) 10227 S. Macksburg Rd. Canby, OR 97013 Mardee Femrite 503-266-2112 Plant Materials: Shrubs (Natives) Types: Bareroot, Container, Liner, Rooted cutting Ordering: Retail, Wholesale</p>	<p>Napa Native Plant Nursery (Nap) California Conservation Corps P.O. Box 7199 Napa, CA 94558 Chris Sauer 707-253-7783 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Plug, Tree pot, Gallon Services: Seed collection, Cutting collection, Tree planting, Erosion control, Stream restoration, Revegetation, Consulting Ordering: Contract Comments: <i>Provide plants and services to public agencies or public organizations only.</i></p>
<p>Miller Farms Nursery (Mil) 1828 Central Ave. McKinleyville, CA 95521 Dick Miller 707-839-1571 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Container Ordering: Retail Comments: <i>Own a tree cooler which is available for rent.</i></p>	

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Native Plants, Inc. (NPI) NPI-Corporate Offices 417 Wakura Way Salt Lake City, UT 84108 800-582-0144 800-992-5040 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Plug (13 cu.in. & 17 cu.in. tubes), Flat, Gallon Services: Erosion control, Consulting Ordering: Contract, Wholesale Comments: Take orders over \$750.00 minimum. Grow tubing and liner materials on contract.</p>	<p>Northwest Seed Products, Inc. (NoS) 38050 Hwy 228 Brownsville, OR 97327 Tom Smallman 503-367-5767 Plant Materials: Types: Seed Ordering: Wholesale</p>
<p>Native Seed Foundation (NaS) Star Route Moyie Springs, ID 83845 David Ronniger 208-267-7938 Plant Materials: Trees, Shrubs (Natives) Types: Seed Ordering: Mail order, Retail, Wholesale</p>	<p>Ok! Nursery Company (OkI) 8649 Kiefer Blvd., P.O. Box 7188 Sacramento, CA 95826 Mike Keller 916-383-5665 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Tree pot, Flat, Gallon Ordering: Wholesale Comments: Provide larger container stock only.</p>
<p>Natives Northwest Co. (NaN) 190 Aldrich Rd. Mossyrock, WA 98564 Chris Aldrich 206-983-3138 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container, Liner Ordering: Wholesale</p>	<p>Pacific Coast Seed Company (PaC) 7074 D Commerce Circle Pleasanton, CA 94566 David Gilpin 415-463-1188 FAX 415-463-1941 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed, Seed mixtures Services: Erosion control Ordering: Contract, Wholesale Comments: Willing to custom collect seed for large contracts.</p>
<p>Nature's Garden (NaG) Rt. 1, Box 488 Beaverton, OR 97007 Fred Held 503-649-6772 Plant Materials: Forbs (Natives) Types: Bareroot, Container Ordering: Mail order, Retail, Wholesale</p>	<p>Pacific Forest Seeds (PaF) 1075 Meridian Brownsboro Eagle Point, OR 97524 503-826-6900 Plant Materials: Types: Seed Ordering: Wholesale</p>
<p>Newell Wholesale Nursery (New) P.O. Box 372 Ethel, WA 98542 Tom Newell 206-985-2460 Plant Materials: Trees, Shrubs, Forbs (Natives) Types: Bareroot Ordering: Contract, Wholesale</p>	<p>Pacific Open-Space, Inc. (PaO) P.O. Box 744 Petaluma, CA 94953-0744 David Kaplow 707-769-1213 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives) Types: Container, Liner, Seed Ordering: Wholesale</p>
<p>Northplan Mountain Seed (Nor) P.O. Box 9107 Moscow, ID 83843 Loring Jones 208-882-8040 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Mail order, Retail, Wholesale</p>	<p>Pacific Wetland Nursery (PaW) 7035 Crawford Dr. Kingston, WA 98346 Ron Vanbianchi 206-297-7575 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives) Types: Container Ordering: Retail, Wholesale</p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Peterson Landscape Services (Pet) 3250 NW Deer Run Corvallis, OR 97330 William Peterson 503-753-0724 Plant Materials: Trees (Natives) Types: Bareroot, Container Ordering: Wholesale</p>	<p>Ramsey Seed, Inc. (Ram) 260 S. Main, P.O. Box 352 Manteca, CA 95336 209-823-1721 Plant Materials: Types: Seed Ordering:</p>
<p>D.L. Phipps State Forest Nursery (Phl) Oregon Dept. of Forestry 2424 Wells Rd. Elkton, OR 97436 Paul Morgan 503-584-2214 Plant Materials: Trees (Natives) Types: Bareroot Ordering: Contract, Retail, Wholesale</p>	<p>Rancheria Seed (Ran) H.C. Rt.2, Box 278-A Springville, CA 93265 Plant Materials: Trees (Natives) Types: Seed Ordering: Wholesale</p>
<p>Pierson Garden Shop and Nursery (Pie) 4100 S. Broadway Eureka, CA 95501 707-443-6376 Plant Materials: Trees Shrubs Forbs (Natives, Non-natives) Types: Container Ordering: Retail Comments: Sales limited to larger stock and only a few natives.</p>	<p>Redwood City Seed Company (Red) P.O. Box 361 Redwood City, CA 94064 Craig Dremann 415-325-7333 Plant Materials: Grasses (Natives) Types: Seed Services: Seed collection Ordering: Wholesale</p>
<p>Pinery Seedlings (Pin) 12450 Highland Valley Rd. Escondido, CA 92025 Richard Bailey 619-487-5942 Plant Materials: Trees (Natives, Non-natives) Types: Supercell, "Multi pot trays" (1.5" x 6.5" - 96 tray), Gallon Ordering: Wholesale Comments: Specialize in container-grown pines.</p>	<p>Redwood Community Action Agency (RCA) Natural Resources 904 G Street Eureka, CA 95501 707-445-0881 Services: Erosion control, Watershed restoration, Vegetation management, Consulting Comments: Locally based, nonprofit organization.</p>
<p>Placerville Nursery (PIN) USDA Forest Service 2375 Fruitridge Rd. Camino, CA 95709 Pat Malone 916-622-9600 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Plug Ordering: Contract</p>	<p>Round Butte Seed Growers, Inc. (Rou) P.O. Box 117 Culver, OR 97734 Pat Holechek Britt Spaulding 503-546-5222 Plant Materials: Grasses (Natives) Types: Seed Ordering: Retail, Wholesale</p>
<p>Plants of the Wild (PIW) P.O. Box 866 Tekoa, WA 99033 Kathy Hutton 509-284-2848 Plant Materials: Trees, Shrubs, Grasses (Natives, Non-natives) Types: Plug (4, 7 & 10 cu.in. tubes), Seed Ordering: Contract, Wholesale, Retail</p>	<p>Russell Graham, Nursery (Rus) 4030 Eagle Crest Rd. N.W. Salem, OR 97304 Russell Graham 503-362-1135 Plant Materials: Forbs (Natives, Non-natives) Types: Bareroot, Liner, Rooted cutting Ordering: Contract, Mail order, Retail, Wholesale Comments: Provide ferns, forbs and some groundcover species.</p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>S & S Seeds (SSS) P.O. Box 4093 San Marcos, CA 92069 Victor Schaff 619-756-1347 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Wholesale</p>	<p>Siskiyou Center (SIC) California Conservation Corps Montague, CA Bill Vogel 916-459-3462 Services: Seed collection, Cutting collection, Tree planting, Erosion control, Stream restoration, Revegetation, Consulting Ordering: Contract Comments: <i>Provide services to public agencies or public organizations only.</i></p>
<p>Saratoga Horticultural Foundation (Sar) 15185 Murphy Ave. San Martin, CA 95046 Barbara Coe Lowell Cordas 408-779-3303 Plant Materials: Shrubs (Natives) Types: Liner Ordering: Wholesale Comments: <i>Also sell publications related to revegetation.</i></p>	<p>Siskiyou Rare Plant Nursery (SiR) 2825 Cummings Rd. Medford, OR 97501 Baldassare Mineo 503-772-6846 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives) Types: Bareroot, Container Ordering: Mail order, Retail</p>
<p>Sheffield's Seed Co., Inc. (She) 273 Auburn Rd., Route 34 Locke, NY 13092 Richard Sheffield 315-497-1058 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Seed Ordering: Mail order, Wholesale</p>	<p>Skylark Wholesale Nursery (Sky) 6735 Sonoma Hwy. Santa Rosa, CA 95409 Chris Clarke 707-539-1565 Plant Materials: Trees, Shrubs, Forbs (Natives) Types: Container Ordering: Wholesale</p>
<p>Silvaseed Company (Sil) P.O. Box 118 Roy, WA 98580 David Gerdes 206-843-2246 Plant Materials: Trees (Natives, Non-natives) Types: Bareroot, Plug, Styrobloc Services: Seed collection Ordering: Contract, Wholesale</p>	<p>Janet Starnes Nursery (Sta) 11002 S. Mt. Hope Rd. Molalla, OR 97038 Janet Starnes 503-829-6245 Plant Materials: Forbs, Grasses (Natives) Types: Container, Seed Ordering: Wholesale</p>
<p>Silver Springs Nursery (SIS) HCR 62, Box 86 Moyie Springs, ID 83845 James Kraemer 208-267-5753 Plant Materials: Types: Bareroot, Liner Ordering: Contract, Wholesale</p>	<p>James M. Stewart, Inc. (Ste) P.O. Box 455 Rio Vista, CA 94571 Scott Stewart 916-755-1676 Plant Materials: Grasses, (Natives, Non-natives) Types: Seed Ordering: Contract, Wholesale Comments: <i>Will grow most grass seed on contract. Best to order Summer or Fall.</i></p>
<p>Simpson Timber Company Nursery (Sim) P.O. Box 68 Korbel, CA 95550 Glen Lehar 707-668-5621 Plant Materials: Trees (Natives, Non-natives) Types: Plug, Seed Ordering: Contract</p>	<p>Storm Lake Growers (Sto) 21809 89th SE Snohomish, WA 98290 Dan McCain 206-794-4842 Plant Materials: Trees, Shrubs, Forbs (Natives) Types: Bareroot, Container, Rooted cuttings Ordering: Wholesale</p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Stribling's Nurseries, Inc. (Str) 6529 East Maraposa Way, P.O. Box 793 Merced, CA 95341 209-722-4106 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Bareroot, Plug (2.25' Liner pots), Seed Ordering: Wholesale</p>	<p>Tsemeta Forest Nursery (Tse) Hoopa Valley Tribe P.O. Box 727 Hoopa, CA 95546 Paul Abbott, Bill Wilkinson 916-625-4284 916-625-4206 Plant Materials: Trees, Shrubs, Forbs (Natives, Non-natives) Types: Plug (6' & 10' Leach tubes - all stock), Dee pot Ordering: Contract Comments: <i>Have large amount of seed from seed zone 303.</i></p>
<p>Superior Seeds (Sup) P.O. Box 1175 Pasco, WA 99301 Plant Materials: Types: Seed Ordering: Wholesale</p>	<p>Valley Nursery (Val) P.O. Box 4845 Helena, MT 59601 Clayton Berg 406-442-8460 Plant Materials: Trees, Shrubs (Natives) Types: Bareroot, Container, Liner, Rooted cutting Ordering: Mail order, Retail, Wholesale</p>
<p>Theodore Payne Foundation, Inc. (The) 10459 Tuxford Street Sun Valley, CA 91352 Mira Lighthart 213-768-1802 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Gallon and larger, Seed Services: Erosion control, Stream restoration, Revegetation, Consulting Ordering: Wholesale, Retail</p>	<p>Wapumne Native Plant Nursery (Wap) 3807 Mt. Pleasant Rd. Lincoln, CA 95648 Evert Butts 916-645-9737 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Bareroot, Plug Ordering: Wholesale</p>
<p>Tissues & Liners, Inc. (Tis) P.O. Box 1421 Woodinville, WA 98072 Susan Foster 206-885-5050 Plant Materials: Shrubs, Forbs, Grasses (Natives) Types: Container, Liner, Rooted cuttings, Seed Ordering: Wholesale</p>	<p>D. Wells Farms (Wel) 6992 S. Oster Rd. Woodburn, OR 97071 Diane or Daniel Wells 503-982-1017 Plant Materials: Trees (Natives) Types: Bareroot, Container Ordering: Wholesale</p>
<p>Tree Builders, Inc. (TrB) P.O. Box 501 Stayton, OR 97383 John Pope 503-769-2368 Plant Materials: Trees, Shrubs (Natives, Non-natives) Types: Seed Services: Seed collection Ordering: Wholesale</p>	<p>Westgate Gardens Nursery (Wen) 751 Westgate Dr. Eureka, CA 95501 707-442-1239 Plant Materials: Trees, Shrubs, (Natives, Non-Natives) Types: Container Ordering: Wholesale, Retail Comments: <i>Specialize in Rhododendrons, azaleas and conifers of all kinds.</i></p>
<p>Tree of Life Nursery (TrL) P.O. Box 736 San Juan Capistrano, CA 92693 Mike Evans 714-728-0685 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives) Types: Bareroot, Container, Liner, Rooted cutting Ordering: Wholesale</p>	<p>Wetlands Northwest (WeN) 9912 Barnes Lane Tacoma, WA 98444 Diane Robbins 206-846-2774 Plant Materials: Trees, Shrubs, Forbs (Natives) Types: Bareroot, Container Ordering: Wholesale Comments: <i>Also located at 1514 Muirhead, Olympia, WA 98502 (206-943-0127).</i></p>

Table 10. List of private and government sources which may provide plant materials, supplies or services necessary for revegetation projects located within the Trinity River watershed, California.

<p>Weyerhaeuser Co. (Wey) Rochester Greenhouse 7935 Hwy 12 SW Rochester, WA 98579 Michael Pfaff 206-273-5527 Plant Materials: Types: Ordering: Retail, Wholesale</p>	<p>Wood's Native Plants (Woo) 5740 Berry Dr. Parkdale, OR 97041 Patrick Wood 503-352-7497 Plant Materials: Trees, Shrubs (Natives) Types: Container, Liner, Rooted cuttings Ordering: Mail order, Retail, Wholesale</p>
<p>Wild Plant Nursery (Wil) 5088 Ole Melrose Rd., P.O. Box 1223 Roseburg, OR 97470 Ken Carloni 503-672-7263 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Plug (10 cu.in. Ray leach tube), Rooted cuttings Ordering: Contract, Wholesale</p>	<p>Yerba Buena Nursery (Yer) 19500 Skyline Blvd. Woodside, CA 94062 Bart O'Brien 415-851-1668 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Container, Seed Ordering: Retail</p>
<p>Wild Seed (WIS) P.O. Box 27751 Tempe, Az 85285 Rita Jo Anthony 602-968-9751 967-8263 Plant Materials: Trees, Shrubs, Forbs, Grasses (Natives, Non-natives) Types: Seed Ordering: Contract, Wholesale Comments: <i>Willing to collect seed in most locations.</i></p>	<p>Yolo Traders, Inc. (Yol) 30 Main St. Winters, CA 95694 Leo Schrupp 916-795-4114 Plant Materials: Grasses (Natives, Non-natives) Types: Seed Services: Erosion control Ordering: Wholesale</p>

PROJECT PLANNING

The following section provides an outline of the steps required for the planning of a revegetation project with a short discussion of some of the considerations that must be made. The outline is also shown graphically with reference to the approximate time of year each step should occur (Figure 3). The timing of each step is approximate and may vary considerably depending on the location to be planted, the species used, the type of stock used, the availability of the plant materials and many other factors.

● DETERMINE PLANTING SITES

- **Inventory** - After preliminary identification of sites and projects to determine where revegetation is needed, a detailed inventory should be done using a field sample form specifically designed for collecting needed data (Appendix E). Data required includes parent material (geology), soil, elevation, aspect, topographic position, native plant community, moisture conditions, plantability and acres of plantable ground.
- **Determine access** - Determine access to planting sites. Access will affect planting method and logistics, species selection and the stock type that is most appropriate.
- **Prioritize** - Determine priority of potential planting sites. A priority list of the potential planting sites will ensure a more efficient use of available resources. Factors that should be considered include:
 - **Fish and wildlife habitat enhancement** - Sites that are in close proximity and are damaging or have the potential to damage or enhance fish or wildlife habitat areas should be given higher priority. Sites where revegetation will enhance habitat for sensitive species and species listed as rare, threatened or endangered, should be given special priority.
 - **Chances of success** - Sites that are most likely to be stabilized by vegetation should be given higher priority. Evaluation of success potential will require an interdisciplinary approach to determine the potential for stabilizing landslides in steep mountainous terrain.

● SELECT SUITABLE SPECIES

- **Environmental conditions** - Species selection requires consideration of environmental conditions such as moisture, elevation, plant community, parent material, slope, aspect and topographic position. Tables 5 and 6 are designed to aid in the selection of species for various environmental conditions.
- **Species suitability** - Requires consideration of project objectives as well as species characteristics such as roots, soil building characteristics, biodiversity, etc.
- **Species availability** - Availability depends on stock type, species, and origin of seed or propagation materials.
 - **Stock type** - Plug, bareroot, seed, etc. (see Tables 9 and 10).
 - **Origin** - Seed origin or origin of propagation materials. It is always best to acquire stock grown from locally collected seed/ cuttings or from a local seed zone (see Figure 2).

● PROCURE PLANTING STOCK

- **Contract procurement** - Contract purchases commonly require 1.5 - 2 years lead time. Next year planting projects could be too late for setting up a contract with a nursery.
- **Wholesale, retail and mail order procurement** - Commonly used for current year planting projects. Selection will be limited to available stock (see Tables 9 and 10).
- **Seed procurement** - Seed may be collected locally or purchased from existing stock at various nurseries (see Tables 9 and 10).

PROJECT STEPS	Jun-Aug	Sep-Nov	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb	Mar-May
Locate and Inventory Seed Collection Sites	XXX	XXX										
Locate and Inventory Planting Sites	XXX	XXX	XXX	XXX	XXX							
Write Contract to Collect Local Seed Stock			XXX	X								
Advertise and Award Contract to Collect Local Seed Stock /1				XX								
Collect Local Seed Stock /2					XXX	XXX	XXX					
Write Contract to Grow Plant Materials				X	XXX							
Advertise and Award Contract to Grow Plant Materials /1						XX						
Scarify and Stratify Seed /2						X	XXX					
Grow Plant Materials /3								XXX	XXX	XXX	XXX	
Write Planting Contract								X	XXX			
Advertise and Award Planting Contract /1										XX		
Implement Planting Project										X	XXX	XX

Figure 3. Simplified project scheduling diagram. Depicts steps and time required for the successful planning and implementation of a revegetation project. /1 = Forest Service timeframe, /2 = Timeframe varies with species, /3 = Add one year for 2-0 stock.

- **Seed collection** - Locally-collected seed must be collected at specific times of the year (commonly early summer thru winter). Contract seed collection should be planned several months prior to collection to allow sufficient time for contract negotiation.
- o **Transplanting** - In some instances, plant stock may be acquired by transplanting available stock that occurs adjacent to the planting site. When this method is used however, care should be taken not to expose other areas to further erosion.

- **PROJECT IMPLEMENTATION**

- o **Tree planting** - Methods for planting purchased stock should be determined well in advance of the planting project. Tree planting may be accomplished by contract tree planters, California Conservation Corps or by make-shift workparties for smaller projects (Table 10).
- o **Seed planting** - Methods for seed planting include aerial and hand seeding. Aerial seeding is usually accomplished with the use of a helicopter and may be limited to selected seed types.

DISCUSSION

The primary goal of the Trinity River Basin Fish and Wildlife Management Program Act (Public Law 98-541) is to provide for the restoration of fish and wildlife in the Trinity River Basin to pre-reservoir levels (circa 1960). To accomplish this goal, the act provides for the creation of an interagency advisory group called the Trinity River Basin Fish and Wildlife Task Force (Appendix A) which is responsible for the formulation and implementation of a Trinity River Basin Fish and Wildlife Management Program. A major objective of the Program will be to reduce the rate of sedimentation into the Trinity River and its tributaries in order to accelerate the effectiveness of fish and wildlife habitat restoration (Trinity River Task Force 1989). A proposed method for achieving this objective is the development of revegetation prescriptions for riparian areas, landslides and other barren areas. This method is complementary to additional objectives which include the enhancement of fish and wildlife habitat and the enhancement of forest resource productivity.

The planning and implementation of a revegetation project that will meet these goals requires access to a large amount of information that is generally difficult to find. The successful implementation of a project also requires the precise timing and coordination of a number of variables. This study was initiated in an effort to provide information necessary for the successful planning and implementation of revegetation projects in the Trinity River watershed. Most of the information is contained in various tables which were designed to be used for revegetation projects over a wide range of environmental conditions. Additional sources of information are provided in the bibliography and appendixes of the report. Information that should be considered when planning a revegetation project includes:

- **Environmental suitability:** Determine which plant species are adapted to the environmental conditions of the site. Important environmental factors include geologic type, moisture and temperature. Where the geologic type is uniform, moisture and temperature have the most influence on vegetation growth. Moisture and temperature are complexly related to slope, aspect, elevation and topographic position.
- **Biodiversity:** Determine which plant species will have the lowest impact on the natural biodiversity of the site. This includes considerations of the diversity of genes and the diversity of plant species on and adjacent to the site. The maintenance of biodiversity would require the use of native species that have been grown from locally-collected seed or propagation stock. Biodiversity may also be maintained by the use of some non-native species that are not invasive or persistent but will allow the natural recolonization of the site by native species adjacent to the site.
- **Plant species suitability:** Determine which plant species have physical characteristics that make them more appropriate for the reduction of erosion on the site. This includes considerations of physical characteristics such as root structure, above ground structure, soil building characteristics (eg. nitrogen fixing capability, or deciduous vs. evergreen).
- **Plant species culture:** Determine which plant species have strict cultural requirements that make them difficult to propagate and grow.
- **Fish and wildlife habitat enhancement:** Determine which plant species provide fruit or browse to various wildlife species. Also includes considerations of plant species that provide food during winter.
- **Availability of plant materials:** Determine where species may be obtained in a form that is suitable for large or small scale revegetation projects.

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Appendix A. A supplemental list of agencies, foundations, societies and private organizations that can provide information on watershed and wildlife habitat improvement of areas within the Trinity River watershed, California. (§ = Trinity River Task Force member).

<p>California Conservation Corps Napa Native Plant Nursery P.O. Box 7199 Napa, CA 94558 (707) 253-7783 Chris Sauer</p>
<p>Hoopa Valley Business Council Forestry Division P.O. Box 727 Hoopa, CA 95546 (916) 625-4284 Paul A. Abbott, Silviculturist</p>
<p>Hoopa Valley Tribe (§) P.O. Box 36 Salyer, CA 95536 (916) 629-2385 Delphine Fountain, Technical Coordinating Committee Member Mike Orcutt, Technical Coordinating Committee Member</p>
<p>Hortus Northwest P.O. Box 955 Canby, OR 97013 (503) 266-7968 Dale Shank</p>
<p>Humboldt County (§) Department of Public Works 1106 Second Street Eureka, CA 95501 Natural Resources, (707) 445-7741 Lori Holden, Technical Coordinating Committee Member Don Tuttle, (707) 445-7491</p>

<p>Humboldt State University Arcata, CA 95521 Natural Resource Department (707) 826-4147 Biology Department (707) 826-3245</p>
<p>L.A. Moran Reforestation Center 5800 Chiles Road, P.O. Box 1590 Davis, CA 95617 (916) 753-2441 Laurie Lippitt</p>
<p>USDA Forest Service Lake Tahoe Basin Management Unit P.O. Box 731002 South Lake Tahoe, CA 95731 (916) 573-2681 Julie Perrochet, Ecologist Kathy Vanzuuk</p>
<p>Oregon State University Extension Service Ballard Extension Hall 101 Corvallis, OR 97331 (503) 737-2711</p>
<p>National Marine Fisheries Service (§) Santa Rosa Federal Building, Room 325 777 Sonoma Avenue Santa Rosa, CA 95404 (707) 578-7513 Roger Wolcott, Jr., Technical Coordinating Committee Member</p>
<p>Nitrogen Fixing Tree Association P.O. Box 680 Waimanalo, Hawaii 96795 (808) 259-8555 Bill Macklin, Research Associate</p>

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<p>North Coast Regional Water Quality Control Board (§) 1000 Coddington Center Santa Rosa, CA 95401 (707) 545-2620 Mike Heinz, Technical Coordinating Committee Member</p>	<p>State of California Department of Fish and Game (§) 1701 Nimbus Road Rancho Cordova, CA 95670 (916) 355-7045 Paul M. Hubbell, Technical Coordinating Committee Member</p>
<p>Pacific Gas and Electric San Ramon, CA Information, (415) 972-7000 Donna Lindquist, (415) 820-2000</p>	<p>State of California Department of Fish and Game 601 Locust Street Redding, CA 96001 (916) 246-6274</p>
<p>Pacific Gas and Electric 20880 Geyserville Rd. Box 26 Geyserville, CA 95441 (707) 857-3577 Frank Chan</p>	<p>State of California Department of Fish and Game 619 Second Street Eureka, CA 95501 (707) 445-6493 Herb Pierce, Wildlife Biologist</p>
<p>Rancho Santa Ana Botanic Garden 1500 N. College Avenue Claremont, CA 91711</p>	<p>State of California Department of Fish and Game P.O. Box 131 Lewiston, CA 96052 Pat Mclaughlin, (916) 778-3503</p>
<p>Redwood Community Action Agency 904 G Street Eureka, CA 95501 Natural Resources, (707) 445-0881 Nancy Reichard Steven Madrone</p>	<p>State of California Department of Forestry (§) Drawer AU Weaverville, CA 96093 (916) 623-5681 Steve Dunlap, Technical Coordinating Committee Member Kathleen Shoree, (916)623-5681</p>
<p>Santa Barbara Botanic Garden 1212 Mission Canyon Road Santa Barbara, CA 93105 (805) 682-4726</p>	
<p>Saratoga Horticultural Foundation 15185 Murphey Avenue San Martin, CA 95046 (408) 779-3303</p>	

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<p>State of California Department of Forestry and Fire Protection 1416 9th Street P.O. Box 944246 Sacramento, CA 94244-2460 (916) 322-9101 Lynn Huntsinger, Range Ecology and Management</p>
<p>State of California Department of Forestry Division of Mines, Fortuna, CA Oscar Huber, (707) 725-4413</p>
<p>State of California Department of Transportation 1657 Riverside Drive Redding, CA 96001 Ed Flores, (916) 225-3328 Vicki Bacon, (916) 225-3476</p>
<p>State of California Department of Transportation Revegetation Lab, Sacramento, CA Tom Hoover, (916) 739-2400</p>
<p>State of California Department of Transportation District 1 Office 1656 Union Street Eureka, CA 95501 (707) 445-6600 Mike Yancheff, Landscape Arch. (707) 445-6403</p>

<p>State of California Department of Water Resources (‡) Northern District 2440 N. Main Street Red Bluff, CA (916) 527-6530 Doug Denton, Technical Coordinating Committee Member Joyce Lacy, Vegetation Jerry Boles, Revegetation</p>
<p>State of California Water Resources Control Board 1440 Guerneville Rd. Santa Rosa, CA (707) 576-2220</p>
<p>Society for Ecological Restoration and Management (SERM) University of Wisconsin - Arboretum 1207 Seminole Highway Madison, WI 53711 (608) 263-7888</p>
<p>Trinity County (‡) Drawer AK Weaverville, CA 96093 (916) 623-1365 Howard Myrick, Technical Coordinating Committee Member (Current Chairperson)</p>
<p>Trinity County Resource Conservation District P.O. Box 81 Weaverville, CA 96093 (916) 623-2542 Pat Truman, Chairman</p>
<p>University of California Berkeley Berkeley, CA (415) 643-8074 Joe McBride, Ecologist</p>

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<p>UC Extension Service 3179 Bechelli Lane Street, 206 Redding, CA 96002 (916) 225-5509 Gary Nakamura</p>	<p>USDA Forest Service Placerville Nursery 2375 Fruitridge Road Camino, CA 95709 (916) 622-9600 Bill Scheuner, Head Nurseryman Dave Alicea Jim Campini, Head of Seed Dept. Pat Malone, Vegetation</p>
<p>USDA Forest Service Humboldt Nursery 4886 Cottage Grove Avenue Mckinleyville, CA 95521 (707) 839-3256 Tony Rameriz, Nursery Manager Dan O'Connell, Head Gardener</p>	<p>USDA Forest Service Shasta-Trinity National Forest (‡) 2400 Washington Avenue Redding, CA 96001 (916) 246-5222 Irl Everest, Technical Coordinating Committee Member Don Haskins, Geologist Richard Irrizary, Fisheries Biologist Sheila Long, Ecologist Ken Lanspa, Soils</p>
<p>USDA Forest Service Intermountain Forest and Range Experiment Station Forestry Science Laboratory (208) 334-1457 Nancy Shaw</p>	<p>USDA Forest Service Shasta-Trinity National Forest Big Bar Ranger District Laurie Newman, Hydrologist (916) 623-6106</p>
<p>USDA Forest Service Klamath National Forest 1312 Fairlane Road Yreka, CA 96097 (916) 842-6131 Barbara Williams, Botanist</p>	<p>USDA Forest Service Shasta-Trinity National Forest Hayfork Ranger District (916) 628-5227 Bob Hawkins, Hydrology John Veevaert, Geology Ron Torone, Fisheries Biologist</p>
<p>USDA Forest Service Pacific Southwest Range and Forest Experiment Station 1700 Bayview Drive Arcata, CA 95521 (707) 822-3691 Tom Lisle, Geomorphologist Leslie Reid, Geologist</p>	

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<p>USDA Forest Service Shasta-Trinity National Forest (‡) Weaverville Ranger District (916) 623-2121 Dave Cross, Fisheries Biologist Irl Everest, Technical Coordinating Committee Member Jack Holcomb, Resource Officer Carrie Lucacic, Hydrology</p>	<p>USDA Soil Conservation Service 5630 S. Broadway Eureka, CA 95501 (707) 444-9708</p>
<p>USDA Forest Service Shasta-Trinity National Forest Yolla Bolla Ranger District (916) 352-4211 George Cruz, Hydrologist</p>	<p>USDA Soil Conservation Service (‡) Weaverville Field Office P.O. Box 1414 Weaverville, CA 96093 (916) 623-3991 Jan Dybdahl, Technical Coordinating Committee Member</p>
<p>USDA Forest Service Six Rivers National Forest 507 F Street Eureka, CA 95501 (707) 442-1721 Michael Furniss, Hydrologist/ Soil Scientist Jerry Barnes, Fisheries Biologist Stephen Matthews, Ecologist Bill Jones, Silviculturist</p>	<p>USDA Soil Conservation Service Corvallis Plant Material Center 3420 NE Grainger Ave. Corvallis, OR 97330 (503) 757-4812 Dale Darris</p>
<p>USDA Forest Service Six Rivers National Forest Lower Trinity Ranger District Willow Creek, CA (916) 629-2118 Judy McHugh, Hydrologist Tom Leskiw, Forestry Tech</p>	<p>USDI Bureau of Indian Affairs (‡) 2800 Cottage Way Sacramento, CA 95825 (916) 484-4391 Donald B. Knapp, Technical Coordinating Committee Member</p>
<p>USDA Soil Conservation Service (‡) 2121-C Second Street Davis, CA 95616 Robert Slayback, Plant Material Specialist</p>	<p>USDI Bureau of Land Management 16th & J Arcata, CA 95521 (707) 822-7648</p>
	<p>USDI Bureau of Land Management (‡) 355 Hemsted Drive Redding, CA 96001 (916) 246-5325 Dick Johnson, Technical Coordinating Committee Member</p>

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<p>USDI Bureau of Reclamation (‡) 2800 Cottage Way Sacramento, CA 95825 (916) 484-4101</p>
<p>USDI Bureau of Reclamation Trinity River Basin Field Office P.O. Box 1450 Weaverville, CA 96093 (916) 623-3434 Ed Solbos</p>
<p>USDI Fish and Wildlife Service 2800 Cottage Way, Room E-2727 Sacramento, CA 95825 (916) 484-4731</p>
<p>USDI Fish and Wildlife Service (‡) Trinity River Field Office Horseshoe Lane Weaverville, CA 96093 (916) 623-2508 Charles Lane, Technical Coordinating Committee Member Mike Stempel Joe Krakker, Fisheries Biologist Bill Brock, Trinity River Watershed Restoration and Wildlife Project Coordinator</p>

<p>USDI National Park Service Redwood National Park 1125 16th St. Room 205 Arcata, CA 95521 (707) 822-7611 Danny Hagans, Geologist Maryann Madej, Geologist Orick Office P.O. Box 7 Orick, CA 95555 (707) 488-2911 Mary Hektner, Botanist Crescent City Office (707) 464-6101</p>
<p>USDI National Park Service Whiskeytown Unit P.O. Box 188 Whiskeytown, CA 96095 Bud Ivy</p>

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

TREE SPECIES	COMMON NAME
<i>Abies concolor</i>	white fir
<i>Abies grandis</i>	grand fir
<i>Abies magnifica</i> var. <i>shastensis</i>	Shasta red fir
<i>Acer macrophyllum</i>	big leaf maple
<i>Alnus oregana</i>	red alder
<i>Alnus rhombifolia</i>	white alder
<i>Arbutus menziesii</i>	Pacific madrone
<i>Calocedrus decurrens</i>	incense cedar
<i>Castanopsis chrysophylla</i>	golden chinquapin
<i>Chamaecypris lawsoniana</i>	Port-Orford cedar
<i>Chamaecypris nootkatensis</i>	Alaska cedar
<i>Cornus nuttallii</i>	mountain dogwood
<i>Fraxinus latifolia</i>	Oregon ash
<i>Juniperus occidentalis</i>	western juniper
<i>Lithocarpus densiflora</i>	tanoak
<i>Picea sitchensis</i>	Sitka spruce
<i>Pinus attenuata</i>	knobcone pine
<i>Pinus contorta</i> ssp. <i>contorta</i>	shore pine
<i>Pinus contorta</i> ssp. <i>murrayana</i>	lodgepole pine
<i>Pinus jeffreyi</i>	jeffrey pine
<i>Pinus lambertiana</i>	sugar pine
<i>Pinus monticola</i>	western white pine
<i>Pinus ponderosa</i>	ponderosa pine
<i>Pinus sabiniana</i>	digger pine
<i>Populus fremontii</i>	cottonwood
<i>Populus tremuloides</i>	quaking aspen
<i>Populus trichocarpa</i>	black cottonwood
<i>Pseudotsuga menziesii</i>	Douglas-fir
<i>Quercus chrysolepis</i>	canyon live oak
<i>Quercus douglasii</i>	blue oak
<i>Quercus garryana</i>	Oregon white oak
<i>Quercus kelloggii</i>	California black oak
<i>Robinia pseudo-acacia</i>	black locust
<i>Salix lasiandra</i>	willow
<i>Salix laevigata</i>	willow
<i>Sequoiadendron giganteum</i>	giant sequoia
<i>Sequoia sempervirens</i>	coast redwood
<i>Taxus brevifolia</i>	Pacific yew

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

<i>Thuja plicata</i>	western red cedar
<i>Tsuga heterophylla</i>	western hemlock
<i>Tsuga mertensiana</i>	mountain hemlock
<i>Umbellularia californica</i>	California bay-laurel
TALL SHRUB SPECIES (> 5 ft.)	COMMON NAME
<i>Acer circinatum</i>	vine maple
<i>Acer glabrum</i> var. <i>torreyi</i>	Rocky Mountain maple
<i>Aesculus californica</i>	California buckeye
<i>Alnus sinuata</i>	Sitka alder
<i>Alnus tenuifolia</i>	mountain alder
<i>Betula occidentalis</i>	water birch
<i>Ceanothus thrysiflorus</i>	blue blossom
<i>Ceanothus velutinus</i>	snow brush
<i>Cephalanthus occidentalis</i> var. <i>californicus</i>	California buttonbush
<i>Cercocarpus ledifolius</i>	curled-leaf mountain mahogany
<i>Cornus californica</i>	dogwood
<i>Cornus sessilis</i>	dogwood
<i>Cornus stolonifera</i>	American dogwood
<i>Corylus cornuta</i> var. <i>californica</i>	California hazel
<i>Holodiscus discolor</i> var. <i>delnortensis</i>	creambush oceanspray
<i>Myrica californica</i>	California wax-myrtle
<i>Osmaronia cerasiformis</i>	oso berry
<i>Philadelphus lewisii</i>	mock-orange
<i>Physocarpus capitatus</i>	ninebark
<i>Prunus emarginata</i>	bitter cherry
<i>Prunus virginiana</i>	western choke cherry
<i>Quercus garryana</i> var. <i>breweri</i>	Brewer oak
<i>Quercus wislizenii</i>	interior live oak
<i>Rhamnus purshiana</i>	casacara sagrada
<i>Rhododendron macrophyllum</i>	rhododendron
<i>Salix lasiolepis</i>	arroyo willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Sambucus caerulea</i>	blue elderberry
<i>Sambucus callicarpa</i>	elderberry
<i>Sorbus californica</i>	mountain-ash
<i>Sorbus cascadiensis</i>	mountain-ash
<i>Umbellularia californica</i>	California bay - shrub form

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

MEDIUM SHRUB SPECIES (> 2 ft. & < 5 ft.)	COMMON NAME
<i>Adenostoma fasciculatum</i>	chamise
<i>Amelanchier alnifolia</i>	service-berry
<i>Amelanchier pallida</i>	service-berry
<i>Amelanchier pumila</i>	service-berry
<i>Arctostaphylos canescens</i>	hoary manzanita
<i>Arctostaphylos cinerea</i>	hoary manzanita
<i>Arctostaphylos columbiana</i>	hairy manzanita
<i>Arctostaphylos glandulosa</i>	eastwood manzanita
<i>Arctostaphylos glauca</i>	bigberry manzanita
<i>Arctostaphylos hispidula</i>	Gasquet manzanita
<i>Arctostaphylos intricata</i>	manzanita
<i>Arctostaphylos manzanita</i>	Parry manzanita
<i>Arctostaphylos parvifolia</i>	manzanita
<i>Arctostaphylos patula</i>	greenleaf manzanita
<i>Arctostaphylos viscida</i>	whiteleaf manzanita
<i>Baccharis pilularis</i> var. <i>consanguinea</i>	coyote brush
<i>Baccharis pilularis</i> var. <i>pilularis</i>	dwarf coyote brush
<i>Berberis aquifolium</i>	Oregon grape
<i>Calycanthus occidentalis</i>	spice-bush
<i>Castanopsis sempervirens</i>	bush chinquapin
<i>Ceanothus cordulatus</i>	mountain whitethorn
<i>Ceanothus cuneatus</i>	buck brush
<i>Ceanothus integerrimus</i> var. <i>californicus</i>	deer brush
<i>Ceanothus lemmonii</i>	Lemmon's ceanothus
<i>Ceanothus leucodermis</i>	chaparral whitethorn
<i>Ceanothus sanguineus</i>	red stem ceanothus
<i>Cercis occidentalis</i>	western redbud
<i>Cercocarpus betuloides</i>	mountain mahogany
<i>Crataegus douglasii</i>	hawthorn
<i>Eriodictyon californicum</i>	yerba santa
<i>Eriodictyon trichocalyx</i>	hairy yerba santa
<i>Euonymus occidentalis</i>	western burning bush
<i>Garrya buxifolia</i>	silk-tassel
<i>Garrya elliptica</i>	silk-tassel
<i>Garrya fremontii</i>	silk-tassel
<i>Gaultheria ovatifolia</i>	slender salal
<i>Gaultheria shallon</i>	salal

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

<i>Heteromeles arbutifolia</i>	toyon
<i>Ledum glandulosum</i> ssp. <i>columbianum</i>	labrador-tea
<i>Lithocarpus densiflora</i> var. <i>echinoides</i>	tanoak-shrub form
<i>Lonicera involucrata</i>	twinberry
<i>Lotus yollabollensis</i>	bird's foot trefoil
<i>Lupinus albifrons</i>	lupine
<i>Lupinus luteolus</i>	lupine
<i>Lupinus polyphyllus</i>	lupine
<i>Mimulus aurantiacus</i>	monkey-flower
<i>Pickeringia montana</i>	chaparral pea
<i>Quercus dumosa</i>	scrub oak
<i>Quercus durata</i>	leather oak
<i>Quercus sadleriana</i>	sadler oak
<i>Quercus vaccinifolia</i>	huckleberry oak
<i>Rhamnus californica</i> ssp. <i>occidentalis</i>	coffeeberry
<i>Rhododendron occidentale</i>	western azalea
<i>Rhus trilobata</i>	squaw bush
<i>Ribes bracteosum</i>	stink gooseberry
<i>Ribes lobbii</i>	Lobb's gooseberry
<i>Ribes marshallii</i>	applegate gooseberry
<i>Ribes sanguineum</i>	red flowering current
<i>Rosa californica</i>	rose
<i>Rosa gymnocarpa</i>	wood rose
<i>Rubus spectabilis</i>	salmon berry
<i>Shepherdia argentea</i>	buffalo-berry
<i>Styrax officinalis</i> var. <i>californica</i>	snowdrop bush
<i>Trichostema lanatum</i>	wooly blue-curly
<i>Trichostema lanceolatum</i>	vinegar weed
<i>Vaccinium membranaceum</i>	thinleaf huckleberry
<i>Vaccinium ovatum</i>	California huckleberry
<i>Vaccinium parvifolium</i>	red huckleberry
<i>Zauschneria californica</i>	California fuschia
LOW SHRUB SPECIES (< 2 ft.)	COMMON NAME
<i>Arctostaphylos nevadensis</i>	pinemat manzanita
<i>Arctostaphylos uva ursi</i>	bearberry
<i>Berberis nervosa</i>	dwarf Oregon grape
<i>Berberis piperiana</i>	
<i>Berberis pumila</i>	

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

<i>Ceanothus prostratus</i>	squaw carpet
<i>Ceanothus pumilus</i>	ceanothus
<i>Eriogonum umbellatum</i>	sulfer flowered buckwheat
<i>Eriophyllum lanatum</i> var. <i>achillaeoides</i>	
<i>Juniperus communis</i> var. <i>jackii</i>	dwarf juniper
<i>Lonicera hispidula</i> var. <i>vacillans</i>	honeysuckle
<i>Rubus leucodermis</i>	western raspberry
<i>Rubus parviflorus</i>	thimbleberry
<i>Rubus ursinus</i>	Pacific blackberry
<i>Rubus vitifolius</i>	California blackberry
<i>Salvia sonomensis</i>	creeping sage
<i>Symphoricarpus mollis</i>	creeping snowberry
<i>Symphoricarpus rivularis</i>	snowberry
<i>Vitis californica</i>	California wild grape
<i>Whipplea modesta</i>	yerba de selva

FORB SPECIES

Achillea borealis ssp. *californica*
Achillea lanulosa
Achillea millefolium
Anaphalis margaritacea
Aralia californica
Aralia californica
Calyptridium umbellatum
Epilobium angustifolium
Eschscholzia californica
Gilia capitata
Helianthus annuus
Horkelia sericata
Ipomopsis aggregata
Lathyrus japonicus
Lathyrus polyphyllus
Lathyrus spp.
Lathyrus torreyi
Lathyrus vestitus
Linum perenne ssp. *lewisii*
Lotus crassifolius
Lotus micranthus
Lotus purshianus

COMMON NAME

yarrow
yarrow
yarrow
pearly everlasting
spikenard
spikenard
pussy paws
fireweed
California poppy
gilia
sunflower
Howell's horkelia
scarlet gilia
pea
pea
pea
pea
pea
western blue flax
big deervetch
bird's foot trefoil

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

<i>Lotus scoparius</i>	bird's foot trefoil
<i>Lotus</i> spp.	bird's foot trefoil
<i>Lupinus albicaulis</i>	lupine
<i>Lupinus bicolor</i>	minature lupine
<i>Lupinus densiflorus</i>	lupine
<i>Lupinus nanus</i>	sky lupine
<i>Lupinus succulentus</i>	lupine
<i>Melilotus albus</i>	white sweet-clover
<i>Melilotus officinalis</i>	yellow sweet-clover
<i>Mimulus guttatus</i>	monkey flower
<i>Polystichum munitum</i>	sword fern
<i>Thermopsis gracilis</i>	false-lupine
<i>Thermopsis macrophylla</i>	false-lupine
<i>Trifolium beckwithii</i>	Beckwith's clover
<i>Trifolium bifidum</i>	clover
<i>Trifolium ciliolatum</i>	tree clover
<i>Trifolium dubium</i>	clover
<i>Trifolium hirtum</i>	rose clover
<i>Trifolium incarnatum</i>	crimson clover
<i>Trifolium longipes</i>	long-stalked clover
<i>Trifolium microcephalum</i>	littlehead clover
<i>Trifolium microdon</i>	clover
<i>Trifolium oliganthum</i>	clover
<i>Trifolium pratense</i>	red clover
<i>Trifolium repens</i>	white clover
<i>Trifolium subterraneum</i>	sub clover
<i>Trifolium tridentatum</i>	clover
<i>Trifolium variegatum</i>	
<i>Vicia americana</i>	vetch
<i>Vicia californica</i>	vetch
<i>Vicia gigantea</i>	vetch
<i>Vicia villosa</i>	winter vetch
<i>Woodwardia fimbriata</i>	chain fern
<i>Xerophyllum tenax</i>	beargrass
GRAMINOID SPECIES	COMMON NAME
<i>Agropyron</i> sp. X <i>Triticum</i> sp.	wheatgrass X wheat
<i>Agropyron dasystachyum</i>	northern wheatgrass
<i>Agropyron intermedium</i>	intermediate wheatgrass

Appendix B. List of plant species which have potential for revegetating landslides and riparian areas located within the Trinity River watershed, California.

<i>Agropyron smithii</i>	western wheatgrass
<i>Agropyron trachycaulum</i>	slender wheatgrass
<i>Agrostis alba</i>	redtop
<i>Agrostis hallii</i>	bent grass
<i>Arrhenatherum elatius</i>	tall oatgrass
<i>Avena sativa</i>	cultivated oat
<i>Briza maxima</i>	quaking grass
<i>Briza minor</i>	quaking grass
<i>Bromus carinatus</i>	California brome
<i>Bromus marginatus</i>	
<i>Bromus mollis</i>	soft chess
<i>Calamagrostis canadensis</i>	blue-joint reedgrass
<i>Calamagrostis koelerioides</i>	fire reedgrass
<i>Calamagrostis nutkaensis</i>	reedgrass
<i>Carex bolanderi</i>	sedge
<i>Carex nudata</i>	sedge
<i>Dactylus glomerata</i>	orchard grass
<i>Danthonia californica</i>	California oatgrass
<i>Deschampsia caespitosa</i>	tufted hairgrass
<i>Elymus glaucus</i>	blue rye
<i>Elymus triticoides</i>	alkali rye
<i>Festuca californica</i>	California fescue
<i>Festuca idahoensis</i>	Idaho fescue
<i>Festuca occidentalis</i>	western fescue
<i>Festuca rubra</i>	red fescue
<i>Hierochloe occidentalis</i>	vanilla grass
<i>Hordeum brachyantherum</i>	barley
<i>Hordeum californicum</i>	California barley
<i>Hordeum jubatum</i>	foxtail
<i>Phleum alpinum</i>	mountain timothy
<i>Poa rhizomata</i>	
<i>Sitanion hystrix</i>	squirreltail
<i>Stipa occidentalis</i>	western needlegrass
<i>Stipa pulchra</i>	purple needlegrass
<i>Vulpia myuros</i>	zoro fescue

Appendix C. List of the primary and secondary noxious weeds of Humboldt Co. and Trinity Co., CA. This list may exclude other species which the Director of the California Department of Agriculture finds and declares to be a primary or secondary noxious weed. (Categories: 1 = primary noxious weed; 2 = secondary noxious weed).

SPECIES NAME	COMMON NAME	CATEGORY
<i>Agropyron repens</i>	quackgrass	1
<i>Alhagi camelorum</i>	camelthorn	1
<i>Cardaria draba</i>	pepperweed whitetop	1
<i>C. pubescens</i>	hairy whitetop	1
<i>Cenchrus pauciflorus</i>	sandbur grass	2
<i>Centaurea solstitialis</i>	yellow star thistle	2
<i>C. calcitrapa</i>	purple star thistle	1
<i>C. repens</i>	russian knappweed	1
<i>Cirsium arvense</i>	Canada thistle	1
<i>Convolvulus arvensis</i>	wild morning glory	2
<i>Cuscuta epilinum</i>	flax dodder	2
<i>C. epithymum</i>	clover dodder	2
<i>C. indecora</i>	big-seed alfalfa dodder	2
<i>C. pentagona</i>	field dodder	2
<i>C. planiflora</i>	little seed alfalfa dodder	2
<i>C. racemosa var. chiliana</i>	Chilean dodder	2
<i>Cynodon dactylon</i>	bermuda grass	2
<i>Cyperus esculentus</i>	yellow nutgrass	2
<i>C. rotundus</i>	purple nutgrass	2
<i>Euphorbia esula</i>	leafy spurge	1
<i>Gaura coccinea</i>	scarlet gaura	1
<i>G. odoreta</i>	scented gaura	1
<i>G. sinusta</i>	wavy-leaf gaura	1
<i>G. villosa</i>	hairy gaura	1
<i>Helianthus ciliaris</i>	blueweed	1
<i>Hypericum perforatum</i>	Klamath weed	1
<i>Iva axillaris</i>	poverty weed	2
<i>Lepidium latifolium</i>	perennial peppergrass	1
<i>Rorippa austriaca</i>	Austrian fieldcress	1
<i>Salsola kali L. var. tenuifolia</i>	Russian thistle	1
<i>Sida hederacea</i>	alkali mallow	2
<i>Solanum carolinense</i>	Carolina horsenettle	1
<i>Solanum elaeagnifolium</i>	white horsenettle	1
<i>Sonchus arvensis</i>	perennial sowthistle	1
<i>Sorghum halepense</i>	Johnson grass	2
<i>Tribulus terrestris</i>	puncture vine	2

Appendix D. List of species which are specifically NOT recommended for watershed and wildlife habitat restoration for areas located within the Trinity River watershed, California.

SPECIES NAME	COMMON NAME	COMMENTS
<i>Acacia</i> spp.	acacia	Non-native. Invasive.
<i>Ailanthus altissima</i>	tree of heaven	Non-native. Invasive.
<i>Cytisus</i> spp.	broom	Non-native. Invasive
<i>Cytisus monspessulanus</i>	French broom	Non-native. Invasive
<i>Cytisus scoparius</i>	Scotch broom	Non-native. Invasive
<i>Cortaderia selloana</i>	pampas grass	Non-native. Somewhat invasive, especially on the coast. Produces seed without pollination.
<i>Cortaderia jubata</i>	pampas grass	Non-native. Highly invasive, especially on the coast. Produces seed without pollination.
<i>Cotoneaster</i> spp.	cotoneaster	Non-native. Invasive, especially on the coast.
<i>Erica</i> spp.	heather	Non-native. Invasive, especially on the coast.
<i>Eucalyptus</i> spp.	eucalyptus	Non-native. Most species are invasive, allelopathic, and highly flammable.
<i>Hypericum perforatum</i>	Klamath weed	Non-native. Very invasive.
<i>Lolium multiflorum</i>	ryegrass	Non-native. Competes with native species and prevents establishment of other seedlings.
<i>Lolium perenne</i>	perennial ryegrass	Non-native. Very persistent. Competes with native vegetation and prevents establishment of planted seedlings.
<i>Pinus radiata</i>	Monterey pine	Not native to northwest California. Competes with native species. Disease prone.
<i>Spartium junceum</i>	Spanish broom	Non-native. Invasive, competes with native vegetation.
<i>Tamarix ramosissima</i>	tamarisk	Non-native. Especially aggressive in desert riparian areas.
<i>Ulex europaeus</i>	gorse	Non-native. Invasive.
<i>Vinca major</i>	periwinkle	Non-native. Persistent on shady, moist sites.

Appendix E. Sample watershed revegetation inventory data sheet (next two pages).

WATERSHED REVEGETATION INVENTORY DATA SHEET

SITE NO.: _____ OBSERVER: _____

DATE: _____ PRELIMINARY WATERSHED INVENTORY DATA SHEET DATE: _____

PHOTOS: Roll No: _____ Photo No: _____ Format: _____

AERIAL PHOTO: Line: _____ Year: _____ Scale: _____ Type: _____

LOCATION: _____

____ 1/4, ____ 1/4, SEC ____ , T ____ , R ____ , QUAD: _____ 7.5' ____ 15' ____

LAT.: ____ , DEG. ____ , MIN. ____ , SEC. ____ (____ mm) LONG.: ____ , DEG. ____ , MIN. ____ , SEC. ____ (____ mm)

ACCESS ROUTE: _____

Driveable? Y / N, Walking Distance & Difficulty: _____

WATERSHED: _____ ; STREAM: _____ Order: ____ Perennial? Y / N

OWNERSHIP: _____ COUNTY: _____

SITE CHARACTERISTICS: ELEVATION (Range): ____ - ____ ft.; ASPECT: ____ deg.; SLOPE (Range): ____ - ____ %

SLOPE POSITION: Valley bottom: ____ ; Lower slope: ____ ; Mid-slope: ____ ; Upper slope: ____ ; Summit/ Ridge: ____

SITE MOISTURE (No. Months): Wet: ____ , + Moist: ____ , + Dry: ____ = 12 months; Mean Precipitation: ____ in.

SITE TEMPERATURE (No. Months): Cold: ____ , + Warm: ____ , + Hot: ____ = 12 months; Temp. (Range): ____ - ____ °F.

SITE DESCRIPTION (sketch on back): _____

HISTORY: _____

CAUSE: _____

GEOLOGIC TYPE: Ultramafic: ____ , Mafic: ____ , Sedimentary: ____ , Metasedimentary: ____ , Igneous: ____ ,

Meta-Igneous: ____ , Other: _____

SOIL: CLASSIFICATION: _____ , Soil pH: _____

SURFACE FRAGMENTS: Rock: ____ % + Soil: ____ = 100 %; ROCK DEPTH: ____ in.

ROOTABILITY: Good: ____ , Moderate: ____ , Poor: ____ ; DRAINAGE: Good: ____ , Moderate: ____ , Poor: ____

VEGETATION: NATIVE COMMUNITY (Adjacent to site): Red Fir: ____ , White Fir: ____ , Mixed Fir: ____ ,

Douglas-fir: ____ , Douglas-fir-Pine: ____ , Mixed Pine: ____ , Jeffrey Pine: ____ , Tanoak-Madrone: ____ ,

Oak Woodland: ____ , Oak Chaparral: ____ , Mixed Chaparral: ____ , Grassland: ____ , Other: _____

VEGETATION COVER (On site): _____

TREE SPECIES

____ % +

SHRUB SPECIES

____ % +

FORB SPECIES

____ % +

GRAMINOID SPECIES

____ % + Bare% = 100%

WATERSHED REVEGETATION INVENTORY DATA SHEET (continued)

SITE NO.: _____ DATE: _____ OBSERVER: _____

DIMENSIONS (sketch below): Length: _____ ft., Width: _____ ft., Total area: _____ acres

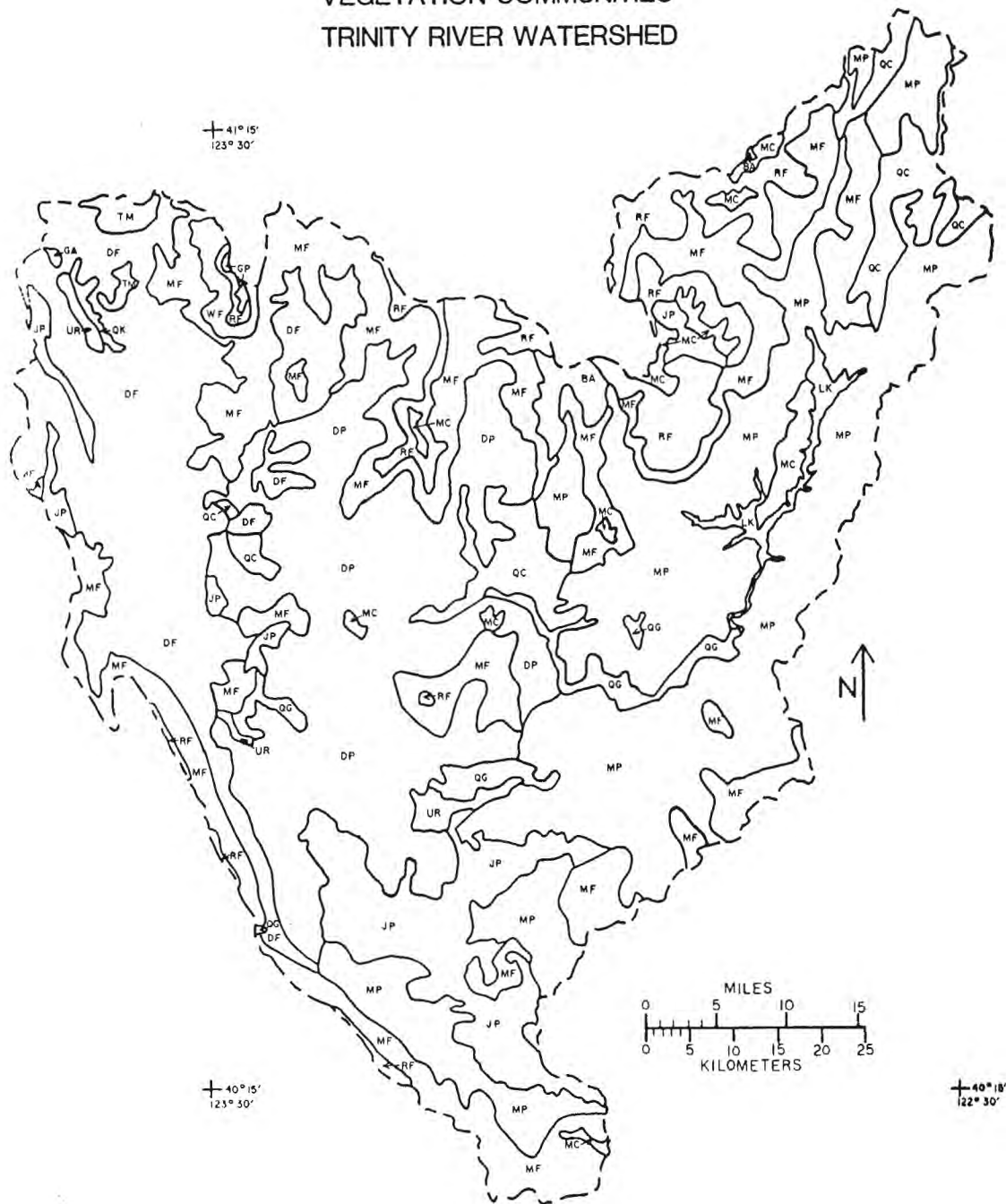
PERCENT PLANTABLE: (Less talus, rock outcrops, inaccessible areas, etc.): _____% (_____ acres)

PLANTING PRESCRIPTION: _____

SKETCH BELOW: (Include locations for photo points, planting prescriptions, wet areas, rock areas etc.
Wet areas should include information on period and quantity.)



VEGETATION COMMUNITIES TRINITY RIVER WATERSHED



LEGEND

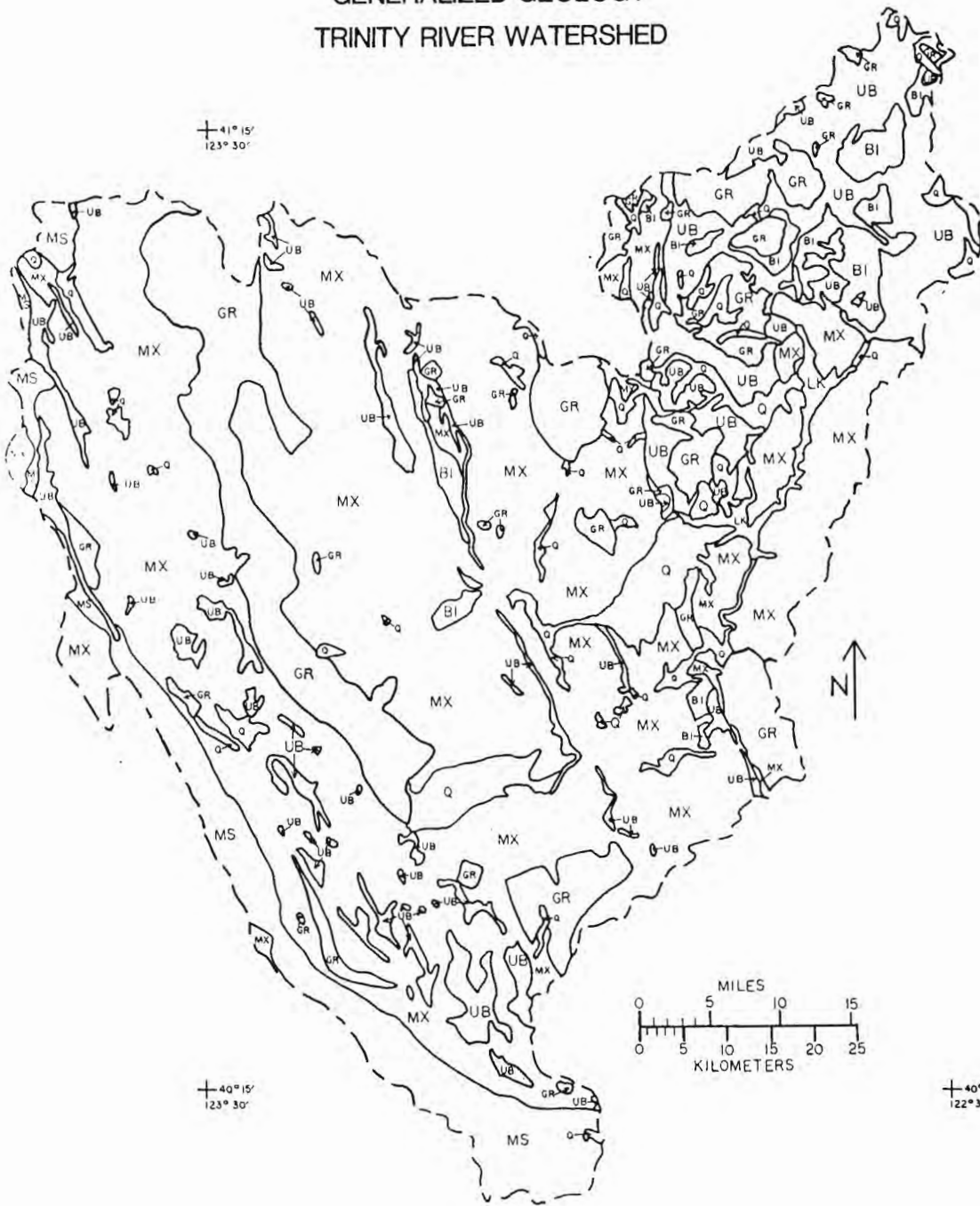
MAP CODE	VEGETATION COMMUNITY *
RF	Red Fir Forest
WF	White Fir Forest
MF	Mixed Fir Forest
MP	Mixed Pine Forest
JP	Jeffrey Pine Forest
DP	Douglas-fir - Pine Forest
DF	Douglas-fir Forest
QC	Oak Chaparral

MAP CODE	VEGETATION COMMUNITY *
QG	Oregon White Oak Woodland
QK	California Black Oak Woodland
TM	Tanoak - Madrone Forest
MC	Mixed Chaparral
GA	Annual Grassland
GP	Perennial Grassland
LK	Lake
UR	Urban

* Vegetation Communities follow Toth, 1982.

Figure 4.

GENERALIZED GEOLOGY TRINITY RIVER WATERSHED



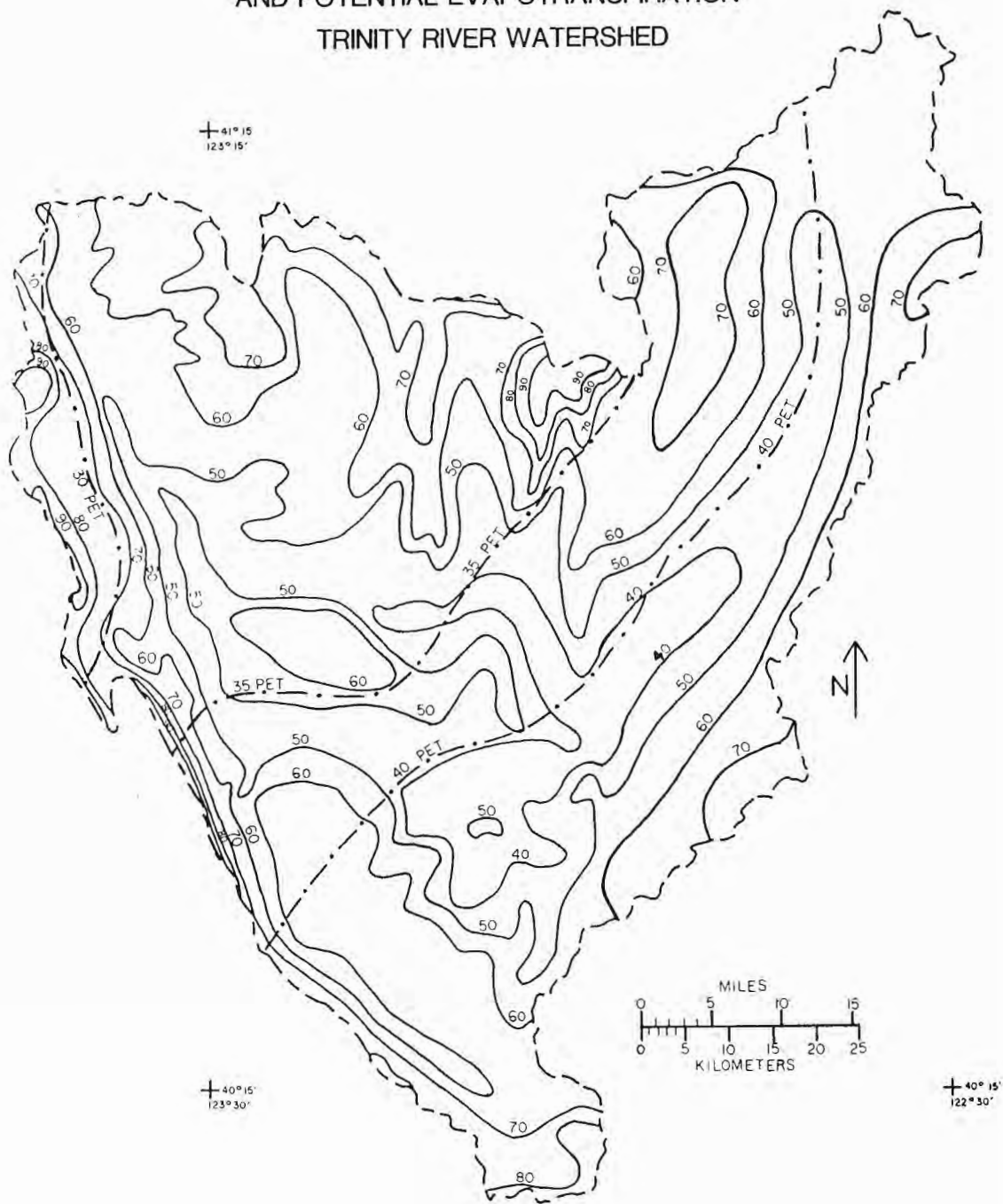
LEGEND

MAP CODE	GENERALIZED GEOLOGY *
UB	Ultra Basic (Serpentine)
BI	Basic Igneous
MX	Mixed Metamorphic and Non-Metamorphic
MS	South Fork Mountain Schist
GR	Granitics
Q	Quaternary (Sedimentary)
LK	Lake

* Geology follows a generalized version of Strand 1962 and Strand 1963.

Figure 5.

MEAN ANNUAL PRECIPITATION
AND POTENTIAL EVAPOTRANSPIRATION
TRINITY RIVER WATERSHED



MEAN ANNUAL PRECIPITATION AND POTENTIAL EVAPOTRANSPIRATION

- 1) Contour lines are in inches.
- 2) Mean Annual Precipitation follows Ott 1979 and Rantz 1969.
- 3) Potential Evapotranspiration follows Ott 1979 and Rantz 1969.

Figure 6.

