

Native Plants Recommended for Use
at the University of California, Berkeley

Along Strawberry Creek

Pacific Open-Space, Inc.

Prepared by:

David Kaplow and John Cloud

March 14, 1988

Objective

The purpose of this report is to provide specific recommendations for California native plant species to be planted on the central campus in or adjacent to both forks of Strawberry Creek. The use of natives can be used for a number of objectives, including the following:

- (1) Structural protection and support for streambanks as part of a process of long-term restoration of creeks.
- (2) A return to Frederick Law Olmsted's original conception of the campus by establishment of a 'managed wildscape' of native species assemblages on areas adjacent to the streambanks which are now revegetated, or dominated by non-native species such as English Ivy.
- (3) Introduction of appropriate native vegetation on newly created structures such as runoff catchment basins, permeable pavements, and vegetated berms built for long-term stabilization of the watershed.

Challenges of the Site

The South Fork of Strawberry Creek is a fourth order stream with a third order tributary (North Fork), in a watershed which drops over 500 meters from the top of the canyon to the lower end of campus. The creeks have a history of profound disturbance which predates recent human impact. Repeated movement along the Hayward Fault as at various times wrenched the creeks out of their old channels, causing them to downcut rapidly through unconsolidated alluvial deposits. Both forks presently flow through campus down young, steep sided channels with narrow flood plains, which accentuates the erosive force of peak runoff events, and also increases the gradient of growing conditions between the four vegetation zones (Described Below). Recent human impact has further destabilized the creeks and accelerated downcutting, converted portions of the recent floodplain into undercut terraces, and altered or replaced the original vegetation.

We must contend with four rigorous challenges to restoration of the creeks:

- (1) Water and Soils – Slopes in the floodplain and terrace are characteristically steep and unstable. Soils have adequate nutrients for plant growth and have high levels of organic matter. The soils have a high clay content, which limits the growth of certain species of plants. In the plant lists, we have shown those species that grow well in the soils of the East Bay. The high clay content also allows for widespread soil compaction by trampling. Cultivation may be required in given locations where compaction will adversely affect vegetative growth.

The riparian zone has an adequate water supply to support a lush vegetation. Plant productivity on many undercut terrace and woodland/prairie sites may be limited by low soil

moisture, but most of the landscape can be cared for with minimal irrigation.

Episodic channel scouring has severely impacted the Emergent and Floodplain zones (Described Below). In the case of South Fork, appropriate emergent vegetation has been almost entirely eliminated. The streambanks will continue to be plagued by damaging runoff flows.

(2) Impact of Existing Vegetation – For most of their lengths through the central campus, both forks flow under the closed canopy of a mature riparian forest, underplanted with a complex mixture of native and introduced species. The existing vegetation is sparse in those areas of deep shade, but can be quite dense where direct sun can reach the surface. The establishment of native vegetation in the areas of sparse vegetation will have great value for erosion control. Extensive areas are dominated by a groundcover of English Ivy. Revegetating with appropriate natives will, in some cases, require removal of the present cover.

(3) Physical and Visual Human Access -- Some of the (few) virtues of an English Ivy groundcover are that it provides excellent visual access to landscape interiors, and requires little maintenance. Reintroduction of diverse native species to the forest understory will greatly increase the texture and complexity of the landscape. However, the plants will grow differently (see Light Intensity) and this will affect sight lines and access. Understory shrubs will require occasional pruning. An increasingly diverse and interesting understory will also invite closer human presence. This will oblige creative methods to discourage disturbance from trampling.

(4) Light Intensity -- There is, for the most part, a pronounced gradient in light at ground level, with a maximum available in the woodland/prairie, and a minimum in the emergent zone and floodplain. This represents a significant challenge, as the areas most in need of vigorous growth have the least available light. Two answers to this challenge are: 1. Prune the overstory canopy in critical areas to increase light penetration to the streambanks, 2. Use a selection of plants which grow efficiently and vigorously under subdued light levels.

Vegetation Zones

Our recommended plant species inhabit four distinct but interrelated areas along the creeks: (1) the Emergent Zone, (2) the Flood Plain, (3) the Terrace, and (4) the Woodland/Prairie. The gradients of soil quality, light intensities, etc. for each of the zones are described in the following sections.

Emergent Zone

This zone consist of plants growing in the creek or on its margins. There is persistent high soil moisture year-round, but also episodic profound disturbance during runoff events. Light levels are characteristically low, although openings in the forest canopy over the creek allow 'sunflecks' which sustain surprisingly active photosynthetic rates. Both forks of the creek have some stretches which receive essentially full sunlight. Emergent zone species are typically monocots, both seasonal and perennial. The plants commonly have dense, matted root systems and supple, whip-like foliage adapted to periodic flooding. They serve as critical food sources and habitat for aquatic incertebrates and fish.

Carex spp.

Eleocharis sp.

Juncus sp.

Sagittaria latifolia

Scirpus robustus

Sedge

Spike Rush

Rush

Arrowhead

Alkali Bulrush

Flood Plain

This zone shows the greatest variation in light levels and in soil moisture, structure and fertility. Slopes are characteristically steep, and often unstable. It is perched just above the immediate creekside (Emergent) zone. It generally floods twice every three years. This zone sustains the greatest damage from flooding and the most serious trampling by humans. Most of the work involved in rehabilitating the creeks will take place in this zone, and many species suggestions for this zone are geared to their use in bioengineering projects. Species for the initial phase include quick rooting, resilient, vigorous growing deciduous shrubs. With time and increasing distance above the stream channel, we recommend a transition to slower growing, more erect deciduous and evergreen shrubs. We have also given a variety of appropriate species for their attractive foliage and flowers.

TREES

Aesculus californica

California Buckeye

Alnus oregona

Red Alder

Platanus racemosa

California Sycamore

Prunus ilicifolia

Coast or Holly-Leaved Cherry

Umbellularia californica

California Bay Laurel

SHRUBS TOLERANT TO FILTERED SUN AND SHADE

Medium to Tall:

Cornus californica

Creek Dogwood

Cornus glabrata

Brown Dogwood

Cornus occidentalis

Dogwood

Dirca occidentalis

Leatherwood

Holodiscus discolor

Ocean Spray, Cream Bush

Mahonia aquifolium

Oregon Grape

Osmaronia cerasiformis

Oso Berry

Physocarpus capitatus

Ninebark

Ribes sanguineum glutinosum

Currant

Rubus leucodermis

Western Raspberry

Low to Prostrate

<u>Lonicera hispidula californica</u>	Honeysuckle
<u>Lonicera involucrata</u>	Honeysuckle
<u>Physocarpus capitatus</u> (pros. form)	Ninebark
<u>Ribes menziesii</u>	Currant
<u>Ribes viburnifolium</u>	Currant
<u>Rosa californica</u>	California Rose
<u>Symphorocarpus mollis</u>	Snowberry
<u>Symphorocarpus rivularis</u>	Snowberry

SHRUBS FOR FULL SUN

Medium to Tall:

<u>Salix lasiandra</u>	Willow
<u>Salix lasiolepis</u>	Willow
<u>Sambucus caerulea</u>	Elderberry

HERBACEOUS PERENNIALS

Tolerant to Filtered Sun and Shade

<u>Aristolochia californica</u>	Dutchman's Pipe
<u>Fragaria californica</u>	Strawberry
<u>Horkelia californica</u>	Horkelia
<u>Horkelia cuneata</u>	Horkelia
<u>Iris douglasiana</u>	Iris
<u>Lonicera hispidula californica</u>	Honeysuckle
<u>Polystichum munitum</u>	Sword Fern

Grows Well in Full Sun

<u>Iris douglasiana</u>	Iris
<u>Juncus spp.</u>	Rush
<u>Sisyrinchium bellum</u>	Blue-Eyed Grass

Terrace

The terrace is an abandoned floodplain that had been deposited before the stream downcut into its present channel. Soil structure and fertility tend to be more consistent in this zone than elsewhere. Generally, slopes are gentle. Light levels tend to be much higher than at lower zones, and soil moisture is moderate. While people might seek out and recall glimpses of the creek itself, the Terrace vegetation is the most visible, and most appropriately managed in compliance with Olmsted's original vision of 'buildings in a park'. Accordingly, we propose a rich mixture of deciduous and evergreen shrubs, herbaceous perennials, which will provide year-round foliage displays, spring and summer flowers, and autumn fruits and nuts. The species vary in size, habit and texture.

TREES

Acer macrophyllum
Aesculus californica
Alnus oregona
Juglans hindsii
Lithocarpus densiflora
Quercus agrifolia
Platanus racemosa
Prunus ilicifolia
Umbellularia californica

Bigleaf Maple
 California Buckeye
 Red Alder
 Black Walnut
 Tanoak
 Coast Live Oak
 California Sycamore
 Coast or Holly-Leaved Cherry
 California Bay Laurel

SHRUBS TOLERANT TO FILTERED SUN AND SHADE

Medium to Tall:

Berberis pinnata
Ceanothus griseus
Ceanothus papillosus
Ceanothus sorediatus
Ceanothus thyrsiflorus
Cornus californica
Cornus glabrata
Cornus occidentalis
Corylus cornuta californica

Barberry, Oregon Grape
 California Lilac
 California Lilac
 Jim Brush
 California Lilac
 Creek Dogwood
 Brown Dogwood
 Dogwood
 Hazelnut, Filbert

Terrace

Diplacus aurantiacus

Dirca occidentalis

Heteromeles arbutifolia

Holodiscus discolor

Mahonia aquifolium

Myrica californica

Osmaronia cerasiformis

Physocarpus capitatus

Rhamnus californica

Ribes sanguineum glutinosum

Rubus leucodermis

Rubus parviflorus

Monkeyflower

Leatherwood

Toyon

Ocean Spray, Cream Bush

Oregon Grape

Wax-Myrtle

Oso Berry

Ninebark

Coffeeberry

Currant

Western Raspberry

Thimbleberry

Low to Prostrate

Berberis nervosa

Lonicera hispidula californica

Lonicera involucrata

Physocarpus capitatus (pros. form)

Ribes menziesii

Ribes viburnifolium

Rosa californica

Symphorocarpus mollis

Symphorocarpos rivularis

Barberry, Oregon Grape

Honeysuckle

Honeysuckle

Ninebark

Currant

Currant

California Rose

Snowberry

Snowberry

SHRUBS FOR FULL SUN

Medium to Tall:

Calycanthus occidentalis

Ceanothus griseus

Ceanothus purpureus

Ceanothus thyrsiflorus

Rhamnus californica

Rhamnus crocea

Salix lasiandra

Salix lasiolepis

Sambucus caerulea

Spice Bush

California Lilac

California Lilac

California Lilac

Coffeeberry

Buckthorn, Cascara, Redberry

Willow

Willow

Elderberry

Low to Prostrate

Baccharis pilularis pilularis

Physocarpus capitatus

Baccharis

Ninebark

HERBACEOUS PERENNIALS

Tolerant to Filtered Sun and Shade

Aristolochia californica

Artemisia douglasiana

Dryopteris arguta

Fragaria californica

Horkelia californica

Horkelia cuneata

Iris douglasiana

Lonicera hispidula californica

Penstemon heterophylla

Penstemon rattannii

Phacelia californica

Polysticum munitum

Salvia spathacea

Whipplea modesta

Dutchman's Pipe

Mugwort

Shield Fern

Strawberry

Horkelia

Horkelia

Iris

Honeysuckle

Penstemon

Penstemon

Phacelia

Sword Fern

Crimson Sage

Whipplea

Grows Well in Full Sun

Achillea borealis

Anaphalis margaritaceae

Artemisia douglasiana

Aster chilense

Carex spp.

Diplacus aurantiacus

Eschscholzia californica

Iris douglasiana

Juncus spp.

Sisyrinchium bellum

Yarrow

Pearly Everlasting

Mugwort

Aster

Sedge

Monkeyflower

California Poppy

Iris

Rush

Blue-Eyed Grass

GRASSES

For Meadows

Agrostis diegoensisBromus carinatusDanthonia californicaFestuca rubraHordeum brachyantherumKoeleria macrantha

Bent Grass

Brome

California Oat Grass

Red Fescue

Meadow Barley

June Grass

For Specimen Plants

Muhlenberghia rigens

Muhly Grass

For Woodlands

Agrostis diegoensisElymus glaucus

Bent Grass

Blue Rye

Woodland/Prairie

This zone includes the margins of the riparian forest along the creek, adjacent swales, and other areas of the campus for which runoff-moderating structures have been proposed. Soil quality is variable, and soil moisture tends to be low, unless it is irrigated. Light levels vary, but tend to be high. Human trampling can be significant. For these areas we propose assemblages of native perennial bunchgrasses and annual flowers, and a variety of short and tall shrubs adapted to full sunlight and low soil moisture.

TREES

<u>Acer macrophyllum</u>	Bigleaf Maple
<u>Aesculus californica</u>	California Buckeye
<u>Alnus oregona</u>	Red Alder
<u>Arbutus menziesii</u>	Madrone
<u>Juglans hindsii</u>	Black Walnut
<u>Lithocarpus densiflora</u>	Tanoak
<u>Quercus agrifolia</u>	Coast Live Oak
<u>Platanus racemosa</u>	California Sycamore
<u>Prunus ilicifolia</u>	Coast or Holly-Leaved Cherry
<u>Umbellularia californica</u>	California Bay Laurel

SHRUBS TOLERANT TO FILTERED SUN AND SHADE

Medium to Tall:

<u>Berberis pinnata</u>	Barberry, Oregon Grape
<u>Ceanothus griseus</u>	California Lilac
<u>Ceanothus papillosus</u>	California Lilac
<u>Ceanothus soledadensis</u>	Jim Brush
<u>Ceanothus thyrsiflorus</u>	California Lilac
<u>Cornus californica</u>	Creek Dogwood
<u>Cornus glabrata</u>	Brown Dogwood
<u>Cornus occidentalis</u>	Dogwood
<u>Corylus cornuta californica</u>	Hazelnut, Filbert
<u>Diplacus aurantiacus</u>	Monkeyflower
<u>Dirca occidentalis</u>	Leatherwood
<u>Heteromeles arbutifolia</u>	Toyon

Woodland/Prairie

Holodiscus discolor

Mahonia aquifolium

Myrica californica

Osmaronia cerasiformis

Rhamnus californica

Ribes sanguineum glutinosum

Rubus parviflorus

Ocean Spray, Cream Bush

Oregon Grape

Wax-Myrtle

Oso Berry

Coffeeberry

Currant

Thimbleberry

Low to Prostrate

Berberis nervosa

Ribes menziesii

Ribes viburnifolium

Rosa californica

Symphorocarpus mollis

Symphorocarpos rivularis

Barberry, Oregon Grape

Currant

Currant

California Rose

Snowberry

Snowberry

SHRUBS FOR FULL SUN

Medium to Tall:

Arctostaphylos densi (H. McMinn)

Artemisia californica

Calycanthus occidentalis

Carpenteria californica

Ceanothus griseus

Ceanothus purpureus

Ceanothus thyrsiflorus

Cercis occidentalis

Eriogonum arborescens

Eriogonum giganteum

Fremontodendron californicum

Rhamnus californica

Rhamnus crocea

Rhus ovata

Salvia clevelandii

Salvia leucophylla

Salvia mellifera

Sambucus caerulea

Manzanita

Coast Sagebrush

Spice Bush

Bush Anemone

California Lilac

California Lilac

California Lilac

Western Redbud

Catalina Buckwheat

St. Catherine's Lace

Fremontia

Coffeeberry

Buckthorn, Cascara, Redberry

Sugar Bush

Cleveland Sage

Purple Sage

Black Sage

Elderberry

Low to Prostrate

Arctostaphylos 'Emerald Carpet'

Baccharis pilularis pilularis

Salvia sonomensis

Manzanita

Baccharis

Sonoma Sage

HERBACEOUS PERENNIALS

Tolerant to Filtered Sun and Shade

Artemisia douglasiana

Dryopteris arguta

Fragaria californica

Horkelia californica

Horkelia cuneata

Iris douglasiana

Lonicera hispidula californica

Penstemon heterophylla

Penstemon rattannii

Phacelia californica

Polysticum munitum

Salvia spathacea

Whipplea modesta

Mugwort

Shield Fern

Strawberry

Horkelia

Horkelia

Iris

Honeysuckle

Penstemon

Penstemon

Phacelia

Sword Fern

Crimson Sage

Whipplea

Grows Well in Full Sun

Achillea borealis

Anaphalis margaritaceae

Artemisia californica

Artemisia douglasiana

Aster chilense

Diplacus aurantiacus

Eschscholzia californica

Iris douglasiana

Sisyrinchium bellum

Yarrow

Pearly Everlasting

Coast Sagebrush

Mugwort

Aster

Monkeyflower

California Poppy

Iris

Blue-Eyed Grass

GRASSES

For Meadows

Agrostis diegoensis
Bromus carinatus
Danthonia californica
Festuca rubra
Hordeum brachyantherum
Koeleria macrantha
Melica californica
Stipa lepida

Bent Grass
 Brome
 California Oat Grass
 Red Fescue
 Meadow Barley
 June Grass
 Melic
 Needle Grass

For Specimen Plants

Festuca californica
Muhlenbergia rigens
Stipa pulchra

California Fescue
 Muhly Grass
 Needle Grass

For Woodlands

Agrostis diegoensis
Bromus carinatus
Elymus glaucus
Festuca californica
Melica torreyana

Bent Grass
 Brome Grass
 Blue Rye
 California Fescue
 Melic