PART XI

RIPARIAN HABITAT RESTORATION



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PART XI. RIPARIAN HABITAT RESTORATION

INTRODUCTION

Natural riparian habitat includes the assortment of native plants that occur adjacent to streams, creeks and rivers. These plants are well adapted to the dynamic and complex environment of streamside zones.

Approximately 95% of the historic riparian habitat has been lost in California, making way for cities, agriculture, mining and other development. The riparian area provides one of the richest habitats for large numbers of fish and wildlife species which depend on it for food and shelter. Many species, including coho and Chinook salmon, steelhead, yellow-billed cuckoo and the red-legged frog, are threatened or endangered in California. Others are rapidly declining.

Most landowners wish to protect their riparian resources while optimizing the value and productivity of their property. These two goals sometimes seem to conflict. An understanding of riparian habitat and stream processes can help landowners conserve riparian resources, and still manage their property productively, and even enhance their property value.

California residents, landowners, land managers, and agencies are increasingly interested in conserving and enhancing watersheds and implementing management practices that are more fish friendly. The riparian corridor is the critical interface between terrestrial and aquatic systems. Increasing numbers of individuals and community groups are involved in habitat conservation and restoration projects in riparian areas. Part XI is intended to encourage and help facilitate the stewardship and restoration of riparian habitat in California watersheds.

In addition to providing basic information about riparian corridors, this Part is intended to assist agencies, landowners, schools and community groups with the planning and implementation of native plant revegetation projects. A plant identification section at the end of Part XI provides detailed descriptions and photographs of plants commonly found along central and north coast California rivers and streams.



STREAM PROCESSES AND RIPARIAN HABITAT

The plant species found in riparian communities differ widely depending upon the character of the watershed and the stream's location within the watershed. The composition of a riparian community is determined by many things, including the reach type, stream slope (gradient), channel confinement, aspect, light availability, water availability, flooding and soil conditions.

For example, at the headwaters of a stream, the gradient is often steep and the riparian vegetation may not vary from the surrounding forest plant community. Further downstream, as the gradient



Different age classes and species of riparian habitat at different elevations

decreases, the riparian corridor begins to differ from the surrounding forest plant community. The riparian canopy is often dominated by trees such as alder, ash, maple, box elder, and oaks, while the surrounding forest may be dominated by conifers. In alluvial areas, sunny openings on gravel bars often provide habitat for species such as mulefat and willow.

Streams and their tributaries often cut through broad alluvial valleys. In these alluvial zones, where the substrate is dominated by sand, gravel and silt, the stream freely moves (meanders) back and forth over time, creating and removing riparian habitat naturally. The ability of the stream to move through this meander corridor is what allows the development of diverse riparian forests. Streams



in these alluvial areas may have historically included a broad floodplain mature forest with backwater sloughs, oxbow lakes and floodplain wetlands. These diverse habitat features are important for salmonids and other wildlife. Riparian corridors that are wide enough to allow for stream meandering should require little maintenance over the long term. A substantial riparian zone can help to reduce erosion damage to adjacent lands, as well as filter sediment and pollutants. However, due to the high value of agricultural lands as well as the proximity of urban development and other land uses, natural stream movement may not be possible in all managed watersheds.

Russian River meander corridor

RIPARIAN HABITAT RESTORATION

Within the bankfull channel (an area which is regularly flooded), plants are adapted to high levels of flood disturbance during the winter, while tolerating the hot, dry conditions of the gravel bars during the summer. Very few species have the ability to survive in this harsh channel environment;

those that do include alder, willow, cottonwood and mulefat. They are called pioneer species, because they colonize recently disturbed sites.

The seeds of cottonwood and willow float through the air in the spring just as the water level is beginning to recede. Millions of seeds land on moist gravel bars and germinate there. As the summer progresses, the roots of these tiny seedlings follow the receding water table. Those plants that cannot stay connected to the water table face certain death on the desert-like gravel



Bankfull channel with small seedlings of pioneer species

bar. Those plants that survive the summer drought and winter flood cycle will grow at incredible rates, up to 15 feet per year. As they grow, these pioneer species may begin to trap sediments, and can influence the movement of the stream.

The floodplain is elevated above the bankfull channel and is characterized by many more species than found in the bankfull channel. Floodplain areas support plants that are less adapted to flood scour and do not require as much summer moisture.

Floodplain riparian forests are some of the most important, *and the most impacted*, habitats in California. Intact riparian forests tend to be a dense tangle of large trees in the over-story, and smaller trees, vines, downed wood, and various herbs and fungi in the under-story. The diversity of plants and complexity of habitats in these mature riparian forest zones supports an incredible number of animal species.



Representative cross-section of riparian area

FISH AND WILDLIFE VALUES OF RIPARIAN HABITAT

Salmonids (including coho, Chinook and steelhead) rely on healthy riparian habitat. Riparian trees shade the stream channel, helping to cool the water and retain high levels of dissolved oxygen.



Salmonid

Native streamside vegetation provides leaf litter which is eaten by many aquatic insects. These insects are in turn consumed by fish. Roots of riparian plants provide fish with shelter from predators. When large riparian trees fall into the stream, they supply an important structural element in creeks and rivers which helps form pools, sort the substrate, and provide shelter for fish and other aquatic organisms.



Salmonid

Riparian zones along intermittent streams also provide salmonid habitat. Coho salmon and steelhead spawn in the upper reaches of streams and their tributaries while they are flowing in winter. The fry emerge and migrate down to the perennial reaches before the tributaries dry up in summer. These tributaries also serve as important sources of food, spawning gravel, and woody debris that are flushed into the mainstem of a stream during storms. Therefore, alterations to the riparian zones of these seasonal tributaries can have a significant impact on salmonids.



Pacific tree frog (Hyla regilla)

In addition to the important role they play in the salmonid life cycle, riparian areas support an abundance of other wildlife species. Over half of the reptiles and three-fourths of the amphibians in California, including the western pond turtle, red-legged frog and various tree frogs, live in riparian areas. Large numbers of migratory and resident birds rely on streamside habitat. Over one-hundred native species of land mammals are dependent on the riparian zone, including raccoons, ringtails, and river otters. Black-tailed deer utilize riparian zones for fawning.

In an intact riparian corridor, there is a layering effect of plant sizes, shapes and ages that promotes wildlife diversity. A mature riparian forest has a low layer of groundcover, an intermediate layer of shrubs and small trees, and a high canopy of trees and vines. These different layers provide many

sites for shelter and food for birds, insects and mammals. In addition, large trees will mature and die, leaving standing snags that provide habitat for cavity nesting birds and other terrestrial wildlife.

Finally, riparian areas act as wildlife corridors, providing important routes for the movement of aquatic species (fish, amphibians, insects), land animals (reptiles and mammals), and birds within a watershed. Stream corridors can be thought of as the circulatory system of the watershed, allowing terrestrial wildlife and fish to migrate up and downstream.



Bobcat

HUMAN VALUES OF RIPARIAN HABITAT

Riparian habitat provides many benefits to streamside landowners. For example, a wide strip of riparian vegetation can offset flood damage to adjacent agricultural lands by acting as a filter for trees and other debris that may wash in during large floods. Riparian vegetation also traps fine sediments and other pollutants contained in terrestrial runoff, thereby preserving instream water quality. Because of their deep roots and dense growth, riparian trees, shrubs, and grasses provide excellent protection against bank erosion, helping to stabilize streambanks.

In addition to assisting with flood protection and erosion control, riparian vegetation may play a role in integrated pest management. Cavity nesting riparian bird species such as kestrels and owls prey on rodents. Other cavity nesting birds such as wrens, tree swallows, oak titmice and bluebirds may help reduce populations of pest insects. Bobcats, coyotes and foxes also use riparian areas to prey on rodents.

Indigenous cultures have relied upon riparian plants for thousands of years, using streamside and wetland plants for basketmaking, as a source of food, and for medicinal purposes.



HUMAN IMPACTS TO RIPARIAN HABITAT

More than 95% of the historic riparian forests in California have been lost due to land use change since European settlement. Logging, urban development, dams, water diversions, gravel mining, and agriculture have all contributed to this loss.

The straightening of creeks for commercial, residential and agricultural activities, and floodplain development, has reduced the width and maturity of the riparian zone, and accordingly changed the river's form through erosional and depositional processes. Dams retain sediment, cut off critical salmonid spawning habitat and may either augment or reduce the natural flow regime. These changes have contributed to the decline of wild salmonids. California rivers once meandered across their forested floodplains, overflowing their banks as a result of winter rains, thus creating a complexity of habitat types. Currently many rivers and creeks have been severely confined, degraded and simplified, resulting in a significant loss of salmonid habitat and biological diversity in general.

Non-Native Invasive Plant Species

Humans have modified riparian areas throughout California in a variety of ways. One of the more serious impacts to native habitats is the introduction of non-native plant and animal species. Invasive plants are a topic of increasing concern for landowners and conservationists. Exotic or non-native plants, such as giant reed (*Arundo donax*) and tamarisk, have spread rapidly and taken over thousands of acres of streamside habitat. These invasive species exclude native vegetation, may increase fire danger and often use large amounts of water, decreasing available resources for fish, wildlife and humans.

Exotic plants usually do not support the same diversity of wildlife found in native riparian forests. If plants such as giant reed or periwinkle dominate the riparian zone, native riparian plants cannot become established. When this happens, the habitat values are often degraded or lost. For example, when an invasive grass such as giant reed becomes established in a riparian area, out-competing



Giant reed (Arundo donax)

native trees such as bay laurel, cottonwood and big leaf maple, the long term consequence is that the large woody debris, shade canopy and leaf litter provided by native species are lost. This results in changes in stream temperature and modification of instream structure and the aquatic food chain. The once complex riparian forest that provided shade, food and structure for salmonids and other species is transformed into a monoculture of grass with very little habitat value. Because riparian species are not especially long lived (20-80 years is typical) invasive species can have extremely negative effects on riparian areas in a relatively short period of time.

The following species are common exotic invasive plants found in northern and central California riparian areas, and are pictured in Appendix XI-B:

<u>Common Name</u>	<u>Latin Name</u>	<u>Plant Type</u>
acacia	Acacia spp.	tree
cape ivy	Delairea odorata	vine
English ivy	Hedera helix	vine
eucalyptus	Eucalyptus spp.	tree
fennel	Foeniculum vulgare	herb
floating primrose	Ludwigia peploides	emergent/aquatic
giant reed	Arundo donax	grass
Himalayan blackberry	Rubus discolor	vine
pampas grass	Cortaderia selloana	grass
pepperweed	Lepidium latifolium	herb
periwinkle	Vinca major	vine
poison hemlock	Conium maculatum	herb
tamarisk	<i>Tamarix</i> spp.	shrub/tree
teasel	Dipsacus fullonum	herb
tree of heaven	Ailanthus altissima	tree
yellow star thistle	Centaurea solstitialis	herb

Agricultural/Riparian Interface: Pierce's Disease

Pierce's Disease is a fatal disease of grapevines caused by the bacterium *Xylella fastidiosa* which is transmitted by the blue-green sharpshooter insect (*Graphocephela atropunctata*). Certain riparian plants are hosts for the bacteria as well as feeding and breeding hosts for the blue-green sharpshooter. These plants include both native and non-native species and are listed below. In the past, a common practice was to remove all riparian plants adjacent to vineyards in an effort to reduce the incidence of Pierce's Disease. Recent practices have changed to reflect a more surgical approach to removal that only focuses on those plants that are systemic hosts for the bacteria. In

systemic host plants, the *Xylella* bacteria spreads systematically throughout the plant after being bitten by the insect. However, in propagative host plants, the bacteria remain at the point of infection and do not spread systemically. Propagative host species are therefore not a high priority for removal. Species such as the invasive, nonnative periwinkle (*Vinca major*) are systemic hosts for the bacteria and a breeding/feeding host for the blue-green sharpshooter. These plants are a high priority for removal from an economic perspective, and their removal benefits native riparian habitat as well.



Periwinkle (Vinca major)

The following perennial plants are the major breeding hosts for the blue-green sharpshooter and most are systemic hosts of Pierce's Disease in Napa, Sonoma, and Mendocino counties. Removal of these species has been shown to significantly reduce the number of blue-green sharpshooters in riparian areas and adjacent vineyards (The Pierce's Disease/Riparian Habitat Workgroup, 2000):

NON-NATIVE HOST PLANT LIST

<u>Common name</u>	<u>Latin name</u>
Himalayan blackberry	Rubus discolor
periwinkle	Vinca major
wild grape*	Vitis sp.
* (escaped cultivar or Vitis cali	<i>ifornica</i> hybrid)

NATIVE HOST PLANT LIST

<u>Common name</u> blue elderberry California blackberry California grape mugwort mulefat stinging nettle Latin name Sambucus mexicana Rubus ursinus Vitis californica Artemisia douglasiana Baccharis salicifolia Urtica dioica



Himalayan blackberry (Rubus discolor)



Mugwort (Artemesia douglasiana)

For more information on the complex topic of Pierce's Disease in north coast streams, visit <u>www.cnr.berkeley.edu/xylella</u>, or call your local University of California Cooperative Extension office.

CONSERVATION AND MANAGEMENT OF RIPARIAN HABITAT



Riparian zone in winter with leafless deciduous trees

Many landowners already have intact, healthy riparian corridors on their properties and simply want to preserve these areas in their present state. Others may have riparian areas that are in need of management, due to problems with invasive plants, Pierce's Disease or changes from upstream and downstream land uses. Many landowners are also interested in active restoration of native riparian habitats. The following sections discuss methods for preserving, managing and restoring healthy riparian corridors.

Conserving Riparian Habitat

Healthy riparian corridors require little maintenance over the long term. A stream system that has enough room to move around will sustain a diversity of plant and animal species. Leaving the stream enough elbow room may also protect adjacent land uses from excessive erosion or flood damage.

For those landowners who wish to preserve the integrity of their riparian zones, regular monitoring is recommended. Monitoring can be as simple as walking the stream yearly or seasonally, assessing changes in the stream after a storm or checking for invasive plants or trash that may have been carried in during a flood. More detailed habitat inventory methods are described in Part III of the *California Salmonid Stream Habitat Restoration Manual*.

Conservation of riparian habitat can also be accomplished by placing an easement over the stream corridor. Some conservation easements provide permanent deed guidelines for riparian land uses. Placement of a conservation easement may also provide a tax benefit to the landowner. Some land trust organizations purchase easements from willing sellers.

For more information about conservation easements and land trust organizations, visit the Land Trust Alliance website at <u>www.lta.org</u>.

Managing Riparian Habitats

Vegetation Management

In some cases, active management of the riparian zone may be required. Landowners who have concerns about Pierce's Disease may choose to remove certain plants from the riparian areas



Manual cutting of giant reed biomass



Riparian forest invaded by periwinkle

adjacent to their farming operation. Additionally, invasive plants, such as giant reed, ivy or tamarisk, should be removed before they become a significant problem.

Surgical removal of native and non-native plants along with re-planting of natives is preferred to the wholesale removal of all riparian habitat. While planning for any riparian vegetation project, contact the Department of Fish and Game for technical assistance. Depending on the project, permits may be required from several different local, state or federal agencies. See Part VI for more information on permits.

The following non-toxic treatments require a significant commitment of time and labor. These treatments need to be based on an understanding of each plant's physiology (i.e., timing of flowering, size and structure of the root system, etc.). For example, a species such as yellow star thistle may be partially controlled by mowing, but the mowing treatment must take place prior to seed development, or it will cause seed dispersal and make the problem worse. Root removal options will vary according to the species. Young tamarisk or tree of heaven seedlings can be pulled using hand tools, but mature plants may require heavy equipment, potentially a cause of excessive disturbance and siltation in the riparian zone. Disturbed areas should be treated to prevent siltation to the stream. Species such as Himalayan blackberry and periwinkle may have extensive root

systems that are difficult to track down and remove. Burning may be accomplished with a backpack torch, but can only take place when there is no threat of wildfire. Tarping is usually implemented after the rainy season has ended. Tarps are then removed prior to the next rainy season. Removal of undesirable plants should be followed with a revegetation program using appropriate native plants which may help to prevent recolonization by other invaders.

There are a variety of non-toxic ways to remove unwanted plant species, and each option should be thoroughly evaluated. Listed below are some non-toxic control options for a variety of invasive non-native plant species. In general, invasive species control will take several years, and will require very careful monitoring and removal of re-growth to ensure success.

<u>Common Name</u>	<u>Latin Name</u>	<u>Removal Options</u>
acacia	Acacia spp.	root removal
cape ivy	Delairea odorata	root removal
English ivy	Hedera helix	root removal, burning
eucalyptus	Eucalyptus spp.	root removal
fennel	Foeniculum vulgare	root removal, mowing, burning
giant reed	Arundo donax	tarping, hand removal (gravel bars)
Himalayan blackberry	Rubus discolor	root removal, burning
pampas grass	Cortaderia selloana	root removal
pepperweed	Lepidium latifolium	root removal, mowing
periwinkle	Vinca major	root removal, tarping
poison hemlock	Conium maculatum	root removal, mowing, burning
tamarisk	<i>Tamarix</i> spp.	root removal, burning
teasel	Dipsacus fullonum	root removal, mowing
tree of heaven	Ailanthus altissima	root removal
yellow star thistle	Centaurea solstitialis	root removal, mowing, burning

If herbicide is being used for the control of invasive plants, extra care should be taken to avoid impacts to the aquatic environment, as well as overspray onto native vegetation. Soils in the riparian zone are very porous. The absolute minimum effective amount of herbicide (per the label) should be used, as excess herbicide is likely to be transported through the air or soils into the stream. Certain herbicides are specially formulated to be less toxic to aquatic organisms and are more appropriate for use in or near aquatic environments. Consultation with your local Agricultural Commissioner's office is required by law.

The following websites provide additional information about invasive species and control options:

<u>http://www.caleppc.org</u> (California Exotic Pest Plant Council) <u>http://www.cdfa.ca.gov/phpps/ipc/noxweedinfo/</u> (California Department of Food and Agriculture) <u>http://ceres.ca.gov/tadn/</u> (Team Arundo del Norte) <u>http://endeavor.des.ucdavis.edu/weeds/</u> (CalWeed Database)

Large Woody Debris

Riparian trees that fall into the stream play an important role in the aquatic system. They provide structure to the stream environment, helping to form pools as well as habitat for a variety of organisms. Large woody debris is an important factor in the recovery of salmonid populations. It is, therefore, desirable to retain a wide riparian corridor with large trees that may be recruited into the stream.

Historically, the approach by many agencies and landowners has been to keep the stream channel clean and open, by removing any log debris accumulation. It was believed that these large trees presented a passage problem for fish. It has since been recognized that fish, especially salmonids,



Large woody debris creates pool habitat



Large woody debris provides structure to the stream environment

are capable of passing over or through most debris accumulation. Substantial retention of sediment above debris accumulation may indicate a potential fish passage problem. Streams with large woody debris provide good quality salmon habitat.

Streamside landowners are understandably concerned that large fallen trees may divert the stream towards their banks, causing massive erosion and loss of land. In these cases, large trees are often removed from the system prior to the next flood event. In recent years, there has been a trend towards modification of large debris accumulation, rather than complete removal. An example of this might include pruning tree limbs and allowing the trunk to remain in the stream. This approach allows for the habitat benefits associated with large woody debris, while resolving problems such as fish passage. Contact the California Department of Fish and Game for more information on this topic. See Part VII on barrier modification and log structures for habitat enhancement.

RESTORATION OF NATIVE RIPARIAN HABITATS

Natural Regeneration and Exclusionary Fencing

Riparian systems are often capable of rapid natural regeneration after a disturbance such as a flood, fire or other event causing modification to the landscape. The gravel bars and banks in the bankfull channel will often revegetate on their own within a year or two, provided there is an upslope or

upstream source of seeds or plant material. Floodplain areas may take significantly longer and may warrant active revegetation to jump start the natural regeneration process.

In areas that are being grazed by livestock or are heavily impacted by other native grazing herbivores, exclusionary fencing can give the streambank enough protection to recreate healthy stands of native vegetation. Fencing may be temporary, maintained just long enough to allow native trees and shrubs to re-establish (ten years is often adequate).

If fencing is used to allow for the regeneration of riparian habitat, it should be set back far enough to allow the stream to meander and create a diversity of habitat. Fences placed too close to the stream corridor may be damaged during high flows, wasting time and money.

Fencing design, including type of wire, gauge and spacing must be specific to the types of animals you are attempting to exclude. Many fencing supply stores have this



Stream floodplain being grazed by livestock



Exclusionary fencing along stream headwaters

information and can help you with construction specifics. Alternative water sources for livestock should be devloped to keep them out of the stream channel. If conditions require that livestock access the stream for pasturing or crossing between pastures, use specialized floating fences (which span the channel) to limit such access. When funding restoration projects, the Department of Fish and Game requires a riparian management plan to be developed and signed by the landowner. For more detailed information on exclusionary fencing, see Part VII.

Erosion Control

Large flood events may create the need for erosion control work in the riparian zone to prevent excess siltation into the stream or loss of land. Whenever possible, a vegetative method for



Installation of erosion control

reducing erosion such as bioengineering is preferable to a structural approach such as riprap. Structural approaches to stream bank erosion such as riprap tend to fix the stream in one place, exclude riparian vegetation, and prevent the natural movement that creates diverse habitats. Structural approaches are often more expensive, require permits, and may damage neighboring properties. Over the long term, structural approaches tend to fail or require excessive maintenance. If a structural approach is unavoidable, native vegetation should be incorporated into the structure. Bioengineering will increase the effectiveness of the erosion control method and provide some habitat value as well. See Part VII for descriptions of bioengineering.

Planning and Implementing a Successful Revegetation Project

Revegetation using native plants is effective for enhancing habitat for numerous fish and wildlife species, as well as reducing upslope erosion and sedimentation to streams. Revegetation may include:

- broadcast seeding of native grass or forbs on hillslopes
- instream sprigging of dormant willow cuttings to increase cover and reduce bank erosion
- installation of plants propagated in a native plants nursery
- transplanting of emergent species such as rush, tule or sedge
- direct seeding of native species such as oaks or buckeyes.

The landowner, project personnel, or watershed organization should become acquainted with the stream processes and natural habitat of the area to create a plan that works within the local riparian



Tree shelter installation

ecosystem. While planning for any riparian vegetation project, contact the Department of Fish and Game or the Natural Resources Conservation Service for technical assistance. Depending on the project, permits may be required from several different local, state or federal agencies.

Creating and implementing a revegetation project can be a complex process, taking four to six months for design and approval, and several additional months for implementation. In some cases, involving a consultant or watershed group with expertise in the process can save time and be more cost effective. See Part VI for more information on permits.

Riparian Revegetation Project Planning

A successful revegetation project will:

- establish a diversity of native plant types and plant species in the riparian area
- provide fish and wildlife habitat
- reduce erosion
- require minimal annual management.

Revegetation should attempt to replicate the natural system.

In the riparian zone, different species are adapted to distinct microsites, often based on elevation and proximity to the stream. Planning of a riparian revegetation project should take into account where each species occurs in the natural system. It can be helpful to draw a cross-sectional diagram of the riparian zone showing where different species occur. This can help determine planting sites based on elevation above the bankfull channel.

In general, container planting in the bankfull channel is not recommended.

If there is a severe bank erosion problem, or the system has lost all upstream sources of seed, some active channel revegetation may be warranted. Since the bankfull channel is



Diverse riparian and upland habitat

subject to regular flooding, installed plants are likely to wash out prior to establishing a root system. Willows, whether as sprigs, a willow mattress or willow wall, are adapted to this flood prone environment, and can be an effective, relatively inexpensive way to stabilize a streambank or introduce cover to the stream. Plants installed in the bankfull channel should not have protective hardware, as it will likely be lost to flooding.

Seeds, cuttings or transplants should be collected as close as possible to the project site. Local collection of plant material ensures that only genetically appropriate plants (i.e., those that are adapted to local conditions) will be used on site. Introduction of plant material from outside of the project watershed is not recommended. The use of local plant material usually results in higher survival rates.



Valley oak (Quercus lobata) an important native seed

Sources for Native Plant Material

Appropriate, site specific native plants are one of the most important aspects of a successful riparian restoration project. Project planning may need to begin up to 18 months in advance to obtain those species that must be grown in containers. For example, a particular species may have seed that ripens in July. After treatment of the seed and propagation in the nursery, the plant may not be ready for outplanting until the following fall/winter. This is often the most important phase of planning a successful restoration project. If you are not in a position to grow the plants yourself, it is a good idea to order plants from a local native plants nursery as soon as you have selected a restoration site.

Bare-root stock can also be used instead of container stock. However, bareroot stock is often difficult to locate because few nurseries produce it. Spacing of plants depends on the species, the goals of the project, desired densities, and many other factors. General spacing recommendations are included in Table XI-1, page XI-26.

Nurseries specializing in California native plants do things differently than typical landscape nurseries. California native plant nurseries usually custom collect site specific material for particular restoration projects, or at minimum, they track where the plant material was collected. This ensures that you can purchase plant material suitable for your project site.

The California Native Plant Society website,

<u>http://www.cnps.org/links/grow links.htm</u> includes a variety of resources about California flora, including a list of native plant nurseries.





Common container sizes found in native plants nurseries are listed below:

Container Name	<u>Size</u>	<u>Uses</u>
6" and 8" supercell	1 1/8" x 6" 1 1/8" x 8"	Best for plants with fibrous root systems
deepots	2 1/2" x 10"	Good for trees and shrubs
treepot	4" x 14"	Generally used for trees
treebands	2 1/2" x 5"	Good for trees and shrubs

Native plants nurseries also use unique containers like treepots, deepots or supercells (shown to the left) to develop an optimum root-to-shoot ratio (see example photo, above right). This approach provides plants with a well established root system prior to outplanting at the revegetation site.

Revegetation Techniques

Emergent Transplant Installation

Plants such as rushes, sedges and tules are commonly called emergent plants, because they are often associated with creeks, wetlands and lakes, where they emerge from the water. They may reproduce from seed or from the spreading of underground rhizomes. This vegetative form of reproduction makes emergent species ideal candidates for transplantation into revegetation sites. These species are widely adapted to a range of environments, including high velocity bankfull channels, slow moving backwaters, seeps on hillslopes, and stable, relatively dry floodplains. It is important to identify the species to use and transplant them in an appropriate location. There are also some non-native species of emergents that should not be transplanted into riparian zones. Care should be taken to sensitively harvest these plants so the existing population is not seriously degraded. It is a good idea to take several small clumps from a variety of larger clumps, leaving the majority of each population intact to ensure genetic diversity.

Steps required to transplant emergent species:

- In the winter or early spring, carefully harvest rhizomes and the above-ground portions of the plant with a mattox, sharp trowel or shovel. Make sure one to several intact rhizomes remain for each transplant.
- Store the collected plant in a cool moist location until time for transplanting. Ideally, plants should be stored in moist soil, and should be transplanted as soon as feasible after collection.
- Dig a hole for the transplant that is large enough to accommodate the extended rhizome without bending or breaking it. Place dirt around the rhizome, pack it down, and water it in thoroughly to close any air holes around the rhizome.
- Trim back the above ground portions of the plant in order to stimulate rhizome growth.



Collecting emergent vegetation



Emergent vegetation, rhizomes exposed



Installation of emergent vegetation

Dormant Willow or Cottonwood Sprig Installation

Willows and cottonwoods are in the willow family (Salicaceae) and are generally adapted to bankfull channel environments. Species in this family form specialized roots along their stems, allowing for vegetative reproduction in riparian corridors. This feature makes them good candidates for installation as sprigs or dormant cuttings. In general, willows need significant amounts of light and a year-round source of moisture. They are good candidates for revegetation as long as their root zone remains moist during the summer. Because of their ability to withstand flood flows, they are often a good choice for bank stabilization projects in bankfull channel areas. There are many varieties of willow and cottonwood in California. Some (such as the curly willow and Lombardy poplar) are not native and should never be planted in riparian areas. They may not supply the same habitat values as the native plants, and may hybridize with them. Cuttings should be harvested from a variety of parent plants in order to avoid outplanting genetically identical material. These techniques result in a more successful project, will ensure genetic diversity, and do the least damage to the collection site.

Steps required to install dormant willow and cottonwood cuttings:

• Harvest cuttings during the winter months when plants are dormant (usually December-January). Although willows and cottonwoods will grow from cuttings at other times of the year, dormant cuttings are more resistant to disease, have higher survival rates, and do not require irrigation if planted in the appropriate location. Sprigs may be harvested using sharp, clean loppers, hand shears, or a chainsaw. The cuttings



Sharp, clean loppers produce high quality sprigs and cuttings



Typical dimensions for willow and cottonwood sprigs



Store cuttings in a moist environment

may be collected at a range of sizes (i.e., $\frac{1}{2}$ inch to 4 inches diameter and up to 8 feet long). It is important to select material that has not become too woody, and that has several viable buds along the stem.

- Cuttings may be used immediately, stored on-site in the stream, or stored off-site in a bucket of cool water. Ideally, material should be harvested and installed the same day.
- Sprigs should be installed with buds pointing up, with approximately ³/₄ of the cutting in the soil, and ¹/₄ exposed. Holes may be dug with a pick, with a piece of rebar, with an auger, or a backhoe (for large material). In areas with soft soil, you may avoid digging a hole by cutting the bottom at an angle and pounding it into the ground with a small sledge hammer. If the top is damaged by the hammer, cut off the top of the sprig to allow for clean healing or place a driving shield over the top to drive in the sprig.



Auger used for planting holes



Small sledge hammer for installing sprig



Clean, sharp loppers cut off damaged top of sprig

Container Plant Installation with Shelters

Container plants need to be ordered or propagated months in advance and may be grown by a native plants nursery or an individual practitioner (see page XI-16). Although the installation of container plant material requires more up-front planning than sprigging, emergent transplants and direct seeding, it also allows for the installation of a more diverse plant palette. Some projects use a two-phased approach, with cuttings, emergents and direct seeded species installed the first year, followed by installation of container plants the second year.

Steps required for installing container plants with shelters:

- Plants should be installed during the winter. Plants that will not be irrigated should be planted from December through February, after rains have thoroughly saturated the ground. Plants that will be drip irrigated can be installed at other times during the year. Because of the dangers of planting on the bank of a stream during high flow periods, when stream banks are slippery and the current swift, it may be best to delay some projects until conditions are safe.
- When installing plants, dig holes to twice the depth of the root-ball of the plant to be installed, crumbling any large soil clumps. Partially refill the hole, firmly tamping the soil to create a firm base for the new plant. Place the plant so the top of the root-ball is slightly above finish grade, to allow for future settling. Fill the hole and tamp firmly to remove any air pockets. Irrigate immediately, ensuring the water soaks deeply, unless the ground is already saturated.



Remove weeds from the planting area



Dig the planting hole twice the depth of the root ball



Water the plant immediately, ensuring that the water soaks deeply. If planting in low moisture conditions, plants should be watered during the planting process and therafter until rains begin.

- Where damage from domestic animals and wildlife is a concern, consider protecting plants with shelters (except those that will be in flood-scoured areas). Shelters should be firmly staked and tied so they will remain upright. There are a variety of shelters available, ranging from chicken wire enclosures (screen and collar, shown in photo at bottom) to plastic tubes (a.k.a., supertubes, shown in photo at right). All of these methods have proven successful, if they are maintained and weeds are controlled. Shelters should be removed as soon as the plants begin to outgrow them (3-5 years is typical for riparian plants).
- Weeds should be carefully controlled in revegetation areas before and after installation. Plants can become lost in the weeds, increasing maintenance costs and reducing project success. Mow tall weeds before installation, and consider using weed mats (3-foot-diameter sheets of specially designed woven or perforated plastic) around each new plant.



Installation of supertube on newly planted native seedling



Installation of weed mat



Installation of screen and collar protective hardware

Direct Seed Installation

Several riparian species are good candidates for direct seeding. These include large seeded species such as buckeye, native California black walnut, California bay laurel and the native oaks. Large seeds provide these species with a reserve of nutrients that can sustain them during the early phases of seedling development. Although some other seed producing species can be direct seeded under ideal conditions (including weed free environments with good soil moisture), it is generally not a successful technique. Additionally, many seeds are adapted to very specific conditions prior to germination, and may require treatment such as cold stratification or seed coat scarification. In order to ensure genetic diversity and maximize project success, seeds should be collected from several source plants.

Steps required for direct seeding:

- Collect the buckeye, bay, walnut or oak seeds when ripe (fall or winter, depending on the species). Ideally, seeds should be collected from the trees, rather than the ground in order to reduce damage from insects and bacteria. Seeds should come off easily. Check each seed for large numbers of insect holes or mechanical damage, and discard those that appear diseased or feel lighter than the others.
- Store seeds in a cool place until ready for out-planting. If seeds will be stored for more than a few days, they should be placed in plastic bags with perlite and refrigerated.
- Plant seeds in the winter, when soil moisture has reached a depth of 10 inches or more. Dig a shallow hole at each planting location, and cover seeds with one to two inches of soil. If seeds have begun to germinate, care should be taken to protect the tender new root. For buckeye, only one seed should be required, whereas for the other species you will want to install three to five seeds per planting spot. Once they have germinated, you can select the strongest seedling and clip the others with shears.
- If you choose to protect seedlings from deer browse, the techniques described on the following pages may be used.



Buckeye seed with developing root



Careful placement of buckeye seed



Cover seed with 1-2 inches of soil

Project Maintenance

Maintenance of native plant revegetation projects is critical to project success, and often requires an equal or greater expenditure of labor and resources than the installation phase. Maintenance usually includes weeding, watering and general monitoring.

Important maintenance tasks include:

- Regular hand weeding around individual plants during the height of growing season in spring and early summer, as well as one final weeding in the fall. In some cases, where tall weedy species like mustard, hemlock or fennel are present, the whole site may require mowing or mechanical weeding in order to ensure site access and reduce excess shading.
- Soil moisture should be checked on a regular basis during the first two to three growing seasons and plants evaluated for drought stress. The watering regime (whether hand irrigation or a drip system) should be scheduled according to plant needs, rather than an arbitrary schedule. Irrigation should include the minimum amount necessary to keep the plants healthy so they do not become dependent upon additional water. If the plants are appropriate to the location, and installed correctly at the right time of year, they should not require irrigation past year three. Watering should taper off as the plants mature.
- General monitoring should take place at each maintenance visit. Each plant should be checked for signs of disease, rodent or insect browse, and drought stress. Damaged plants should be replaced when possible. Encroachment by invasive species should also be monitored, and these species controlled before they take over the revegetation site.



Mechanical weeding of project site



Hand watering of individual plant

REGULATORY AGENCIES AND REQUIREMENTS

(excerpted from The Pierce's Disease/Riparian Habitat Workgroup, 2000 Riparian Vegetation Management for Pierce's Disease in North Coast California Vineyards)

Several federal, state, and local agencies have regulatory authority over work done in the riparian corridor and may need to be contacted for a revegetation project. It is the landowner's responsibility to be familiar with these agencies and notify them when a project is planned.

Different agencies may have jurisdiction over a project, depending on the character or extent of the project. Most revegetation projects will involve only the removal of specific non-native plants, and replanting of native plants. Such simple revegetation projects will require the least regulatory agency input. The one agency that will certainly require notification, even for a simple revegetation project, is the California Department of Fish and Game. In addition, the Regional Water Quality Control Board may need notification if the project would result in soil erosion, and/or runoff of pesticides into the stream (due to removal of a vegetative buffer).

Some revegetation projects may have a streambank stabilization component. If the stabilization involves re-contouring of the streambed and banks, the United States Army Corps of Engineers and NOAA Fisheries may need notification, in addition to the two agencies mentioned above. Streambank stabilization projects that use bio-technical approaches, such as live vegetation baffles and revetments, will have fewer negative impacts to natural resources and may need less regulatory agency involvement than projects with standard engineering and riprap. The use of standard engineering and riprap is generally discouraged in areas that contain threatened and endangered species, such as salmon and steelhead, because of the negative effects on habitat.

Formal agency notification typically involves completing a form that describes the project, often with a project design map and written description, and paying a fee. Talking to agency representatives about the project before this formal notification can save a significant amount of



Riparian revegetation project, Russian River watershed

time. Most agencies encourage informal consultation in the early stages of project planning. The concerns of each party can be addressed, and potential roadblocks eliminated or reduced. In some cases, one agency may pass your project on for review by other agencies, but do not assume this will happen. The landowner and project manager is always responsible for informing all agencies. Many of these agencies charge fees to process the applications and permits. Call each agency for information and a current fee schedule.

Become familiar with the regulatory agencies described below. Even better, get to know the agency staff that work in your area and find out what their interests are, before designing your project (refer to Part VI, Project Planning and Organization).

<u>Activity</u>	Agency to Contact
Native plant revegetation	California Department of Fish and Game
Native plant bio-engineering	California Department of Fish and Game
Streambank stabilization	United States Army Corps of Engineers
(riprap, other structures)	California Department of Fish and Game
Earth moving &	United State Army Corps of Engineers
placement of fill	California Department of Fish and Game
-	Regional Water Quality Control Board
	County Permit and Resource Management Dept.
	County Planning Department
	Natural Resources Conservation Service
Herbicide application	Agricultural Commissioners Office
	Regional Water Quality Control Board
Vegetation removal (native or non-native)	California Department of Fish and Game



Riparian corridor expansion project



Herbicide application

Table XI-1. Native Plants for Revegetation: Planting Location, Container Type and Spacing

The following plants are common in central and north coast watersheds and are recommended for use in riparian revegetation projects. Before choosing plants for a revegetation project, survey your area to determine the appropriate species, or consult with a native plant specialist. This table provides information about the typical location of riparian species, the revegetation approach (e.g., container, direct seed, dormant sprig or transplant) and general spacing suggestions.

COMMON NAME	LATIN NAME	PLANTING LOCATION	REVEGETATION APPROACH	SPACING feet-on-center	PAGE	
BROADLEAF TREES	BROADLEAF TREES					
Big Leaf Maple	Acer macrophyllum	floodplain	container	8 – 10'	A-1	
Black Cottonwood	Populus balsamifera ssp. trichocarpa	channel	container, sprig	8 - 10' 2 - 6'	A-2	
Box Elder	Acer negundo var. californicum	floodplain	container	8 – 10'	A-3	
California Bay Laurel	Umbellularia californica	floodplain	container	8 – 10'	A-4	
California Buckeye	Aesculus californica	floodplain	container, direct seed	8 – 10'	A-5	
Coast Live Oak	Quercus agrifolia	floodplain	container, direct seed	8 – 10'	A-6	
Fremont Cottonwood	Populus fremontii ssp. fremontii	floodplain, channel	container, sprig	8 - 10' 2 - 6'	A-7	
Mountain Dogwood	Cornus nuttallii	channel	container	8 – 10'	A-8	
No. CA Black Walnut	Juglans californica var. hindsii	floodplain	container	8 - 10'	A-9	
Oregon Ash	Fraxinus latifolia	floodplain, channel	container	8 - 10'	A-10	
Oregon Oak	Quercus garryana var. garryana	floodplain	container, direct seed	8 – 10'	A-11	
Red Alder	Alnus rubra	floodplain, channel	container	8 - 10'	A-12	
Sycamore	Platanus racemosa	floodplain	container	8 – 10'	A-13	
Valley Oak	Quercus lobata	floodplain	container, direct seed	8 – 10'	A-14	
Water Birch	Betula occidentalis	channel	container	8 – 10'	A-15	
White Alder	Alnus rhombifolia	channel	container	8 – 10'	A-16	
Willow	Salix spp.	channel, floodplain	container, sprig	8 – 10' 2 – 6'	A-17	
CONIFEROUS TREES						
California Nutmeg	Torreya californica	floodplain	container	8 – 10'	A-18	
Coast Redwood	Sequoia sempervirens	floodplain	container	8 – 10'	A-19	
Douglas Fir	Pseudotsuga menzieii	floodplain	container	8 – 10'	A-20	
Pacific Yew	Taxus brevifolia	floodplain	container	8 – 10'	A-21	
Western Hemlock	Tsuga heterophylla	floodplain	container	8 – 10'	A-22	
SHRUBS AND SMALL TREES						
Blue Elderberry	Sambucus mexicana	floodplain	container	8 – 10'	A-23	
California Blackberry	Rubus ursinus	floodplain	container	4 - 6'	A-24	
California Hazelnut	Corylus cornuta var. californica	floodplain	container	4 - 6'	A-25	
California Wild Rose	Rosa californica	floodplain	container	4 - 6'	A-26	
Cascara	Rhamnus purshiana	floodplain	container	4 - 6'	A-27	
Coffeeberry	Rhamnus californica	floodplain	container	4 – 6'	A-28	

COMMON NAME	ΙΔΤΙΝΝΔΜΕ	PLANTING LOCATION	REVEGETATION	SPACING foot on conter	PACE
		Localion	minkohen	Teet-on-center	TAGE
SHRUBS AND SMAL	L TREES				
Coltsfoot	Petasites frigidus	floodplain	container	4 - 6'	A-29
Creambush	Holodiscus discolor	floodplain	container	4 - 6'	A-30
Elk Clover	Aralia californica	floodplain	container	4 – 6'	A-31
Hawthorn	Crataegus douglasii	floodplain	container	4 – 6'	A-32
Mulefat	Baccharis salicifolia	floodplain	container	4 - 6'	A-33
Ninebark	Physocarpus capitatus	floodplain	container	4 - 6'	A-34
Osoberry	Oemleria cerasiformis	channel	container	4 – 6'	A-35
Pacific Wax Myrtle	Myrica californica	floodplain	container	4 - 6'	A-36
Red Elderberry	Sambucus racemosa	floodplain	container	8 – 10'	A-37
Red Flowering Currant	Ribes sanguineum	floodplain	container	4 – 6'	A-38
Red Twig Dogwood	Cornus glabrata	floodplain	container	4 - 6'	A-39
Salmonberry	Rubus spectabilis	floodplain	container	4 - 6'	A-40
Snowberry	Symphoricarpos albus	floodplain	container	4 - 6'	A-41
Spiraea	Spiraea douglasii	floodplain	container	4 - 6'	A-42
Stink Currant	Ribes bracteosum	floodplain	container	4 - 6'	A-43
Stream Dogwood	Cornus sericea	channel	container	4 - 6'	A-44
Thimbleberry	Rubus parviflorus	channel	container	4 - 6'	A-45
Toyon	Heteromeles arbutifolia	floodplain	container	4 - 6'	A-46
Twinberry	Lonicera involucrata	floodplain	container	4 - 6'	A-47
Vine Maple	Acer circinatum	floodplain	container	4 - 6'	A-48
Western Azalea	Rhododendron occidentale	floodplain	container	4 - 6'	A-49
Western Spicebush	Calycanthus occidentalis	floodplain	container	4 - 6'	A-50
Wild Mock Orange	Philadelphus lewisii	floodplain	container	4 - 6'	A-51
	·	· · · · ·			
VINES	1	I	Γ		
California Wild Grape	Vitis californica	floodplain	container	4 – 6'	A-52
Dutchman's Pipevine	Aristolochia californica	floodplain	container	4 – 6'	A-53
Honeysuckle	Lonicera hispidula var. vacillans	floodplain	container	4 – 6'	A-54
Manroot	Marah fabaceus	floodplain	container	4 – 6'	A-55
Poison Oak	Toxicodendron diversilobum	floodplain	container	4 – 6'	A-56
Virgin's Bower	Clematis lasiantha	floodplain	container	4-6'	A-57
EMERGENT AND HE	ERBACEOUS PLANTS				
Bulrush	Scirpus acutus var occidentalis	channel	container transplant	1 - 2'	A-58
Cattail	Typha latifolia	channel	container transplant	$1 - 2^{2}$	A-59
Creeping Wild Rye	Levmus triticoides	floodplain	container, transplant	1 - 2'	A-60
Horsetail	Equisetum spp	floodplain channel	container transplant	1 - 2'	A-61
Indian Rhubarb	Darmera peltata	channel	container, transplant	1 - 2'	A-62
Mugwort	Artemesia douglasii	floodplain channel	container, transplant	1 - 2'	A-63
Rush	Juneus spp	floodplain channel	container, transplant	$1 - 2^{2}$	A-64
Sedge	Carer spp.	floodplain channel	container, transplant	1_2,	A-65
Spike rush	Fleocharis spp.	channel	container, transplant	1_2,	Δ_66
Stinging Nettle	Urtica dioica	floodplain channel	container, transplant	$1 - 2^{\prime}$	A-67

GLOSSARY

Achene: Dry, one-seeded fruit that often looks like a seed. Produced in a one-chambered ovary. Does not open to release the seed.

Allelopathic: Plant produces and releases a toxic substance that results in suppressed growth in other plant species.

Alternate: Describes growth pattern in which new structures develop singularly along axis. For leaves, only one leaf is produced per node so leaves appear to have "alternated" the side of the stem from which they grew (see opposite).

Annual: Plant completes entire life cycle, from germination to seed production and death, in one year or growing cycle (see biannual, perennial).

Asexual: Reproduction by a single individual using a process that is not sexual and does not involve the union of individual cells and the reassortment of genetic characteristics.

Biennial: Plant completes entire life cycle, from germination to seed production and death, in two years or growing cycles. Usually flowers are produced only during the second cycle (see annual, perennial).

Bisexual: Flowers have both female and male fertile reproductive structures (see unisexual, dioecious, monoecious).

Bract: A leaf-like or scale-like structure associated with and usually directly under a flower or cone.

Capsule: Dry, pod-like fruit with fused or partially fused chambers. When ripe, the fruit splits to release multiple seeds.

Catkin: An unbranched inflorescence of closely attached flowers. Flower petals and sepals are inconspicuous or absent but bracts can be showy. Flowers are all the same sex on each catkin.

Compound: Composed of two or more parts or repeating a structural pattern.

Deciduous: Leaves fall off naturally at the end of each growing season and re-grow after a period of leaf-less dormancy (see evergreen).

Dioecious: Male and female flowers produced on separate plants. Each plant produces either male or female unisexual flowers (see monoecious and bisexual).

Elliptic (al): Shaped like a flattened circle, widest at center and tapering almost equally at both ends.

Evergreen: Leaves remain green and on the plant throughout the year, and do not shed en-mass at the end of the growing season (see deciduous).

Gall: An abnormal outgrowth in plant tissue caused by certain parasitic insects, fungi, bacteria, or mechanical injury.

Inflorescence: A cluster of flowers and associated structures such as bracts, petioles and stems (does not include full sized foliage leaves).

Lanceolate: Lance shaped, width widest along lower half and tapers to a point at the tip.

Monoecious: Plant produces both male and female unisexual flowers (see dioecious and bisexual).

Oblong: Longer than wide, with almost parallel sides and rounded corners at each end.

Opposite: Describes a growth pattern in which new structures develop directly across from one another. In leaves, two leaves will grow per node on opposite sides of the stem (see alternate).

Ovate: Egg shaped, widest below middle, tip round or pointed.

Palmate: Radiating from a common point, similar to fingers from the palm of a hand.

Perennial: Plants live more than two years or growing cycles. For this text, description applies to plants that are non-woody above ground and also describes species that lose all above ground structures during dormancy and re-grow from roots (see annual, biannual).

Petiole: Slender stem that supports the leaf, i.e. the leaf stalk.

Pistil: Female reproductive structure of the flower. At the base is the ovary with one or more ascending stalk-like structures (styles) supporting the pollen receiving structure, the stigma (see stamen).

Sepal: Outer most structure of the flower. Similar to petals but usually green.

Stamen: Male reproductive structure of the flower. A stalk like structure (filament) with a pollenproducing anther at the tip (see pistil).

Stigma: Pollen receiving structure of the pistil. Usually located near the flower center, elevated above the ovary. The stigma is often sticky or hairy and sometimes lobed.

Terminal: At the end or tip of a structure.

Unisexual: Flowers that have either male or female fertile reproductive structures but not both (see bisexual, dioecious, monoecious).

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APPENDIX XI-A

CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS



BIG LEAF MAPLE

Species Name:Acer macrophyllumFamily:Aceraceae (maple family)Plant Type:Broad-leaf tree

Description: Tree, height to 90 feet, with a broad, rounded shape, deciduous with leaves turning yellow in the autumn.

Leaf: Palmate, opposite, width to 10 inches, with 3-5 deeply cut, irregularly toothed lobes, surface shiny green but paler underneath.

Flower: April-May, bisexual, also separate sexes: develop in long, drooping clusters of petaled, fragrant, greenish-yellow small flowers. Flowers appear after leaves.

Fruit/Seed: Distinctive paired achenes with wings, wings spreading <90°.

Typical Location: Floodplain, streamside, moist shady areas, riparian zone as well as hillsides outside the riparian zone, common; elevations below 5,000 feet.

Revegetation Approach: Container

Key Notes: Related to the box elder (*A. negundo*) and vine maple (*A. circinatum*). Easily distinguished by leaf shape.

Notes: Trees provide shade, shelter and roosting areas. Seedlings, leaves, buds, flowers and seeds provide forage for a range of mammals and birds.





whole plant





Location: floodplain

BLACK COTTONWOOD

Species Name:Populus balsamifera ssp. trichocarpaFamily:Salicaceae (willow family)Plant Type:Broad-leaf tree

Description: Tree, height to 120 feet, branches wide spreading, forming massive crowns, deciduous.

Leaf: Ovate, base round and tip tapered to point, length to 4 inches, dark green above, silvery or rust colored below, margin finely scalloped.

Flower: February-April, dioecious (separate sex trees): male catkin length 1-5 inches; female catkin length 3 inches in flower, 10 inches at fruit.

Fruit/Seed: Capsule containing many tiny seeds with conspicuous white cottony tufts.

Typical Location: Alluvial bottomlands, floodplains, streamside; elevations below 9,000 feet.

Revegetation Approach: Container or cuttings. Care in correctly identifying species, see Key Notes.

Key Notes: Related to the native Fremont cottonwood, *P. fremontii*. Leaf shape differentiates between species. Also related to the non-native, cultivated Lombardy poplar, *P. nigra* (not shown). Care must be taken to correctly identify.

Notes: Important feature of mature riparian forest, provides habitat for osprey, herons and egrets, stream shading and leaf litter valuable for aquatic insects. Heavy limbed, brittle species. Tallest of the *Populus* species. Susceptible to galls.



iei



whole plant





flower seed Location: channel

BOX ELDER

Species Name: Acer negundo **F**amily: Aceraceae (maple family) **Plant Type:** Broad-leaf tree

Description: Tree, height to 65 feet, deciduous with bright autumn color.

Leaf: Compound leaf composed of 3-5 leaflets. Leaflet coarsely toothed, 3-5 lobed, length to 5 inches with the terminal leaflet longest.

Flower: March-April, dioecious (separate sex trees): female develops small, non-petaled greenish flowers on drooping stalks; male has clusters of small non-petaled flowers.

Fruit/Seed: Distinctive paired achenes with wings, achene initially reddish but ripens to a straw color in the autumn. Produces a substantial quantity of seed, which germinate in great numbers in open areas.

Typical Location: Common canopy species, streamsides, established floodplains, bottomlands; elevations below 6,000 feet.

Revegetation Approach: Container

Key Notes: Related to the vine maple (A. circinatum) and the big leaf maple (A. macrophyllum). Easily distinguished by leaf shape. A. negundo is the only compound leaf maple in North America.

Notes: Provides excellent shelter for wildlife. Seeds provide good forage for birds and small mammals.







leaf



whole plant



seed



CALIFORNIA BAY LAUREL

Species Name: Family: Plant Type:

Umbellularia californica Lauraceae (laurel family) Broad-leaf tree

Description: Tree, broad, round topped with height over 90 feet; also a shrub, especially on coastal bluffs, or in dry or poorly drained soils, evergreen.

Leaf: Oblong, length to 4 inches, alternate, highly aromatic when crushed.

Flower: December-May, bisexual, clusters of 6-10 small, greenish-yellow flowers, flowers petal-less, with 6 petal-like sepals, sepal length 1/8 inch.

Fruit/Seed: Round-oval stone fruit, greenish but ripening to dark purple, olive-like appearance, length to 1 inch, ripens in late autumn or winter.

Typical Location: Floodplains, mixed evergreen forests and upland habitat; elevations below 5,200 feet.

Revegetation Approach: Container, direct seed. Gather seed in October-December, remove thin fleshy coat and plant immediately.

Key Notes: Fragrance from crushed leaves is a notable characteristic.

Notes: Provides shade, shelter, roosting and nesting sites. Seeds provide forage for small mammals and birds. Source of large woody debris.





whole plant







CALIFORNIA BUCKEYE

Species Name:Aesculus californicaFamily:Hippocastanaceae (buckeye family)Plant Type:Broad-leaf tree

Description: Tree, height 15-40 feet, deciduous with leaves falling by late summer as a strategy against drought, new leaf growth begins in February.

Leaf: Compound, palmate leaf, generally with 5 leaflets, leaflet finely toothed, length 2-7 inches.

Flower: May-June: Spike-like cluster, length 6-8 inches, with small white to pinkish, sweet smelling flowers (length ¹/₂ inch). Pollen and nectar are toxic to honeybees.

Fruit/Seed: Large, pear shaped, grayish-brown, and leathery. Usually a single fruit is born at tip of flower spike and remains on tree after leaf fall. Fruit splits to reveal a large brown seed (said to look like a buck's eye). Seed round, large, diameter 1-2 inches, glossy brown, ripens in September.

Typical Location: Established floodplain forests, borders of streams, canyons, dry slopes; elevations below 5,600 feet.

Revegetation Approach: Container and direct seeding. Seeds easy to grow but toxic. Tolerant of urban pollution and salt spray.

Notes: All plant parts toxic, but seeds provide wildlife with some forage. Roots are good for binding soil. Native Americans used ground seeds to stun fish.





whole plant





flower



COAST LIVE OAK

Species Name:Quercus agrifoliaFamily:Fagaceae (oak family)Plant Type:Broad-leaf tree

Description: Tree, wide top, height 35-80 feet, large branches that often touch the ground, evergreen with leaves falling year round.

Leaf: Ovate, leathery, waxy, strongly convex, with small brownish hairs at the intersections of the primary leaf veins on the leaf underside, length to 3 inches, margin wavy, irregular, often spined.

Flower: Female flower tiny, singular or small clusters on new growth; male flower catkin, long, threadlike strand containing 25 - 100 male flowers, located on older growth.

Fruit/Seed: Acorn: slender, pointy tip, length to $1\frac{1}{2}$ inches, wooly interior, ripens in autumn after 6-8 months growth. Cap large with thin, flat scales.

Typical Location: Established floodplain, valleys, mixedevergreen forest, woodland; elevations below 5,000 feet.

Revegetation Approach: Container, direct seed. Hybridizes with *Q. kelloggii*, *Q. parvula*, *Q. wislizenii*.

Key Notes: Leaf and acorn morphology help distinguish from valley oak (*Q. lobata*) and Oregon oak (*Q. garryana*).

Notes: Trees provide shade as well as roosts and nesting sites for cavity nesting birds and bats. Acorns are an important food source for many wildlife species, especially woodpeckers and squirrels. Native Americans utilized acorns as a staple food crop. Wood made excellent charcoal and was massively harvested by European pioneers. Long-lived, commonly exceeding 250 years.





leaj



whole plant



seed



FREMONT COTTONWOOD

Species Name:Populus fremontii ssp. fremontiiFamily:Salicaceae (willow family)Plant Type:Broad-leaf tree

Description: Tree, height to 90 feet, branches wide spreading, forming massive crowns, deciduous with leaves turning yellow in autumn but remaining on tree into late winter.

Leaf: Triangular, wider than long (length to 4 inches), abruptly narrowing to a point at apex, same color top and bottom, margin coarsely scalloped.

Flower: March-April, dioecious (separate sex trees), male and female: catkin, 1½-3 inches long, containing small greenish-yellow flowers that appear before leaves.

Fruit/Seed: Capsule containing many tiny seeds with conspicuous white cottony tufts. Seed ripen in early summer.

Typical Location: Alluvial bottomlands, stream channels, floodplains, wet areas; elevations below 6,500 feet.

Revegetation Approach: Container or cuttings. Care in correctly identifying species, see Key Notes.

Key Notes: Related to the native black cottonwood, *P. balsamifera*. Leaf shape differentiates between species. Also related to the non-native, cultivated Lombardy poplar, *P. nigra* (not shown). Care must be taken to correctly identify.

Notes: Important feature of mature riparian forests and provides habitat for osprey, herons and egrets. When young, found in large numbers on open gravel bars. Susceptible to mistletoe. Source of large woody debris.









whole plant

CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS BROAD-LEAF TREES XI-A-7 Location: floodplain, channel

MOUNTAIN DOGWOOD PACIFIC DOGWOOD WESTERN DOGWOOD

Species Name:Cornus nuttalliiFamily:Cornaceae (dogwood family)Plant Type:Broad-leaf tree

Description: Tree, one or more trunks, height to 80 feet, deciduous with yellow, pink and red autumn color.

Leaf: Elliptical, tapered at both ends, opposite, length $2\frac{1}{2}-5\frac{1}{2}$ inches, leaf veins follow smooth leaf edges towards apex in curved pattern.

Flower: April-July, appearing before leaves, with second flowering in September, bisexual, petal-like bracts large (length 2 inches), showy, white to pinkish, surround cluster of small greenish flowers.

Fruit/Seed: April-July, autumn, clusters of crowded berries, berries elliptical in outline, ¹/₂ inch long, shiny bright red to orange-red, seed smooth.

Typical Location: Forests; elevations below 6,600 feet.

Revegetation Approach: Container.

Notes: Streambank stabilizer. Berries provide forage for small mammals and birds, especially band-tail pigeons. Native Americans used long slender branches to make baby baskets.





whole plant





flower seed Location: channel

Northern California Black Walnut

Species Name:Juglans californica var. hindsiiFamily:Juglandaceae (walnut family)Plant Type:Broad-leaf tree

Description: Tree, height 50 to 80 feet, single trunk with broad crown, deciduous.

Leaf: Compound, alternate, with 11-19 leaflets. Leaflet lanceolate to ovate, pointed at tip, length 2-4 inches, margin toothed.

Flower: April-May, monoecious (separate sexes on same tree), female flowers small, petal-less, erect, born in clusters at tip of new growth; male catkin droops, length to 4 inches, grows on old growth.

Fruit/Seed: Round, smooth-shelled nut covered in a fibrous, fleshy black husk, ripens in autumn.

Typical Location: Floodplain, woodlands, valleys; elevations 160-2,000 feet.

Revegetation Approach: Container, direct seed. Hybridizes with the non-native English walnut making precise identification difficult. Care should be taken in collecting from a genetically pure source.

Key Notes: Young plants sometimes confused with the invasive non-native, tree of heaven (*Ailanthus altissima*). Seeds, flowers or careful inspection of leaf characteristics distinguish between species.

Notes: Provides forage, roosting and nesting sites (cavities) for wildlife. Nuts are forage for squirrels and rodents, as well as birds. Used as a rootstock for cultivated English walnut. Drought tolerant and oak-root fungus resistant.



leaf



whole plant







CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS BROAD-LEAF TREES XI-A-9

OREGON ASH

Species Name:Fraxinus latifoliaFamily:Oleaceae (olive family)Plant Type:Broad-leaf tree

Description: Tree, height to 80 feet, deep-rooted, deciduous.

Leaf: Compound, opposite, length to 12 inches, with 5-7 leaflets. Leaflet oblong to oval, broadest toward tip, tip abruptly pointed, length to 4 inches.

Flower: March-May, dioecious (separate sex trees): female and male flowers tiny, inconspicuous, petal-less, appearing in clusters with or before leaves.

Fruit/Seed: Winged achene, length to 1³/₄ inches, grows in clusters on female trees, matures in summer.

Typical Location: Floodplain, streambanks, woodlands; elevations below 5,600 feet.

Revegetation Approach: Container.

Notes: Functions as overstory or understory species in late successional areas. Tolerates standing water during winter.







flower (male)





seed



OREGON OAK

Species Name: Quercus garryana **Family: Plant Type:**

Fagaceae (oak family) Broad-leaf tree

Description: Tree, wide top, height to 65 feet, deciduous with reddish-brown autumn color.

Leaf: Length 2-6 inches, surface dark green, leathery, shiny, underside pale green to rusty with downy hair, margin with 5-7 deep, rounded lobes.

Flower: Female flower tiny, singular or small clusters on new growth; male flower catkin, long, threadlike strand containing 25-100 male flowers, located on older growth.

Fruit/Seed: Acorn: oval to spherical, rounded tip, length to 1 inch, smooth interior, ripens in autumn after 1-year growth (but abundant crop irregular, every 2-5 years). Cap small, shallow, cup-like with smooth to slightly bumpy scales.

Typical Location: Established floodplain, valleys; elevations 1,000 to 5,900 feet.

Revegetation Approach: Container, direct seed. May hybridize with other oak species.

Key Notes: Leaf and acorn morphology helps distinguish from valley oak (Q. lobata) and live oak (Q. agrifolia).

Notes: Trees provide roosts and nesting sites for cavity nesting birds and bats. Acorns are an important food source for many wildlife species, especially woodpeckers and squirrels. Native Americans utilized acorns as a food crop, but less favored than live oak. Trees harvested for lumber.





whole plant



Red Alder

Species Name:Alnus rubraFamily:Betulaceae (birch family)Plant Type:Broad-leaf tree

Description: Tree, single whitish trunk, height to 80 feet, branches slim and drooping forming a narrow crown, deciduous.

Leaf: Elliptical to oval, length 2-6 inches, leaf midrib and major veins indented, surface gray-green, underside rust colored. Margins coarsely toothed and rolled under (look carefully).

Flower: March-April, monoecious (separate sexes on same tree), female catkin erect, length to ³/₄ inch, develops before leaves; male catkin long (3-7 inches), yellowish-green, develops before leaves, produces large quantities of pollen in February.

Fruit/Seed: Woody, cone-like catkin. Sheds seeds in autumn but cone can remain throughout winter.

Typical Location: Active channel, floodplain, wet areas; elevations sea level to 3,300 feet.

Revegetation Approach: Container.

Key Notes: Distinguish from white alder, *A. rhombifolia*, by carefully looking at leaf margins and vein structure. Only found near the coast and at lower elevations.

Notes: Important habitat for fish and aquatic insects by shading streams, providing shelter beneath undercut roots and providing a source of large woody debris. Seeds provide excellent forage for birds. Root nodules contain atmospheric nitrogen-fixing bacteria, actinomycetes. Leaf fall enriches the surrounding soils with nitrogen. Stabilizes soil. Tolerant of saline water.



leaj







SYCAMORE

Species Name:Platanus racemosaFamily:Platanaceae (sycamore family)Plant Type:Broad-leaf tree

Description: Tree, height 115 feet, single base trunk, may form secondary trunk that leans and twists, bark peals in reddish-brown plates exposing whitish areas. Branches widely spreading with lower branches twisting.

Leaf: Palmate with 3-5 deep lobes, length to 10 inches, margins smooth edged. Leaves turn brown in early autumn but may remain on tree until new leaf growth.

Flower: February-April, monoecious (separate sexes on same tree), female and male flowers in unisex spherical clusters, 3-7 clusters per stalk, individual flowers tiny.

Fruit/Seed: Spherical cluster (diameter 1 inch) of spiny achenes, ripen in winter.

Typical Location: Floodplain, streamsides, canyons; elevations below 6,600 feet.

Revegetation Approach: Container.









flower

whole plant





VALLEY OAK

Species Name: *Ouercus lobata* Family: **Plant Type:**

Fagaceae (oak family) Broad-leaf tree

Description: Tree, wide top, height 50-115 feet (often as wide), may have massive branches sometimes extending to the ground, largest North American oak, deciduous.

Leaf: Length 2-4 inches, surface dark green, underside pale green with felt-like hairs, margin with 6-10 deep, rounded lobes.

Flower: March-April, female flower tiny, singular or small clusters on new growth; male flower catkin, long, threadlike strand containing 25 - 100 male flowers, located on older growth.

Fruit/Seed: Acorn: long, conical, length to 2 inches (largest of California oaks), smooth interior, ripens in autumn after 1-year growth, germinates immediately. Cap with wart-like bumps on scales.

Typical Location: Established floodplain, valleys; elevations below 5,600 feet.

Revegetation Approach: Container, direct seed. Hybridizes with Q. berberidifolia, Q. corneliusmulleri, Q. douglasii, Q. engelmannii, Q. garryana, Q. john-tuckeri.

Key Notes: Leaf and acorn morphology help distinguish from live oak (Q. agrifolia) and Oregon oak (Q. garryana).

Notes: Trees provide roosts and nesting sites for cavity nesting birds and bats. Source of large woody debris. Acorns are an important food source for many wildlife species, especially woodpeckers and squirrels. Young branches may have dense clusters of spherical insect galls harboring small, native wasp larvae. Native Americans utilized acorns as a food crop. May live for 400- 600 years.





whole plant





CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS BROAD-LEAF TREES XI-A-14

WATER BIRCH

Species Name:Betula occidentalisFamily:Betulaceae (birch family)Plant Type:Broad-leaf tree

Description: Tree or large shrub, usually with multiple trunks, height to 30 feet, bark smooth and dark brown/red, deciduous.

Leaf: Widely ovate, tip pointed, margins doubly toothed, length to 2 inches.

Flower: April-June, monoecious (separate sexes on same tree), female catkin erect, length $\frac{3}{4}$ to $\frac{21}{2}$ inches; male catkin elongate, length 1 to 2 inches.

Fruit/Seed: Many tiny, winged seeds inside catkin.

Typical Location: Streams, springs, moist areas; elevations 2,000 to 9,500 feet.

Revegetation Approach: Container.

Notes: Important wildlife forage and bank stabilizer.



leaf



whole plant







seed

WHITE ALDER

Species Name:Alnus rhombifoliaFamily:Betulaceae (birch family)Plant Type:Broad-leaf tree

Description: Tree, single whitish trunk, height to 115 feet, branches slim and drooping forming a narrow crown, deciduous.

Leaf: Elliptical to oval, length 2-6 inches, leaf midrib and major veins not indented, surface gray-green, underside yellowish. Margins coarsely toothed and not rolled under (look carefully).

Flower: March-April, monoecious (separate sexes on same tree), female catkin erect, length to ³/₄ inch, develops before leaves; male catkin long (3-7 inches), yellow-greenish, develops before leaves, produces large quantities of pollen in February.

Fruit/Seed: Woody, cone-like catkin. Sheds seeds in autumn but cone remains throughout winter.

Typical Location: Active channel, floodplain, wet areas; elevations 300 to 8,000 feet.

Revegetation Approach: Container.

Key Notes: Distinguish from red alder, *A. rubra*, by carefully looking at leaf margins and vein structure.

Notes: Important habitat for fish and aquatic insects by shading streams, providing shelter beneath undercut roots and providing a source of large woody debris. Seed provide excellent forage for birds. Root nodules contain atmospheric nitrogen-fixing bacteria, actinomycetes. Leaf fall enriches the surrounding soils with nitrogen. Stabilizes soils.





leaf

catkins (male and female)



whole plant



whole plant

CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS BROAD-LEAF TREES XI-A-16

OCTOBER, 2003

Location: channel

WILLOW

Species Name: Salix spp. Salicaceae (willow family) **Family: Plant Type:** Broad-leaf tree

Description: Tree or shrub, stems slender, flexible, most hairy, bark reddish or yellowish brown, height to 50 feet, some species spread by roots (developing clonal thickets), deciduous.

Leaf: Elliptical, slender or wide (almost ovate), length variable (2-6 inches), hairy, one central vein, margins smooth or toothed, tip pointed or rounded.

Flower: February-May, dioecious (separate sex trees), female and male catkins on leafy shoot, length 1-4 inches, appear just before or with leaves.

Fruit/Seed: Dry, 2 part fruit, length 1/4-1/3 inch, contains many tiny seeds. Seeds disperse by wind and water.

Typical Location: Active channel, streamsides, marshes, wet ditches, springs; elevations below 9,000 feet.

Revegetation Approach: Container or cutting.

Key Notes: Accurate identification requires an understanding of flower characteristics. Distinguish from mulefat (Baccharis salicifolia) by leaf vein pattern.

Notes: Excellent for streambank stabilization and habitat restoration. Dense growth provides excellent cover for aquatic organisms, terrestrial wildlife and birds. Native Americans used stems in basketry and bow making. Willows produce salicin, a chemical similar to acetylsalicylic acid (aspirin).









whole plant - floodplain



whole plant - channel



CALIFORNIA NUTMEG

Species Name:Torreya californicaFamily:Taxaceae (yew family)Plant Type:Coniferous tree

Description: Conifer, pointed crown, rounding as it matures, widely spaced horizontal branches, height to 140 feet, aromatic leaves and fruit, evergreen.

Leaf: Needle, dark green, 2 white bands on underside, length 1-2³/₄ inches, rigid with slightly upturned tip, tip sharp, needles arranged in 2 almost parallel rows, aromatic.

Flower: Monoecious, female cone develops into olive shaped fruit, male cone a stalked cluster with 6-8 whirls.

Fruit/Seed: Olive-like fruit, oblong, pale green with purplish markings, longitudinally grooved, length to 2 inches, seed completely contained within fruit.

Typical Location: Shady canyons in forest, woodland and chaparral; elevations 100 to 6,900 feet.

Revegetation Approach: Container.

Notes: Trees provide shelter and habitat diversity in watersheds. Seeds are an important forage.





whole plant



COAST REDWOOD

Species Name:Sequoia sempervirensFamily:Taxodiaceae (bald cypress family)Plant Type:coniferous tree

Description: Tree, height to 350 feet, narrow crown, horizontal branches grow straight out from trunk and slightly upward at ends, mature trees generally free of branches in the lower half, red bark thick and fibrous, evergreen.

Leaf: Needle, length ¹/₂-³/₄ inch, branchlets with needles in 2 rows, arranged in one plane (feather-like).

Fruit/Seed: Spherical, reddish cone, length 1¹/₄ inch, found mostly near the top of the tree, clustered at the end of branchlets, ripens in autumn.

Typical Location: Northern California coastal drainages south to Monterey; elevations sea level to 3,600 feet.

Revegetation Approach: Container.

Notes: Long-term source of woody debris in streams, cools streams by providing dense shade, undercut roots provide vital aquatic shelter. Tallest trees in North America. Generally re-sprouts from cut stems or trunk, and after fire. Mainstay of the California lumber industry from 19th century to the early 20th century.







leaf



whole plant



DOUGLAS FIR

Species Name: Pseudotsuga menziesii Pinaceae (pine family) Family: **Plant Type:** coniferous tree

Description: Conifer, height to 220 feet, rounded crown, large upper branches, branches typically curl upward, evergreen.

Leaf: Soft needles, flat, rounded tips, length ³/₄-1¹/₂ inch, blue-green to dark green, radiate in all directions from stem, persistent to eight years, fragrant.

Flower: Monoecious (separate sexes on same tree), female cone woody, reddish, near branch tip; male cone (bud like) small, oblong, reddish, not woody, near branch tip.

Fruit/Seed: Cone, reddish brown, length 2-3¹/₂ inches, scales rounded with distinctive 3-pronged bracts, hangs down, matures in August.

Typical Location: Mixed-evergreen, mixed-conifer forests; elevations below 7,200 feet.

Revegetation Approach: Container.

Notes: Trees provide shelter for wildlife, shading for streams and a source of large woody debris. Seeds are an important forage for small mammals and birds.









whole plant



PACIFIC YEW

Species Name:Taxus brevifoliaFamily:Taxaceae (yew family)Plant Type:coniferous tree

Description: Conifer, tree or large shrub, branches may droop slightly, height to 60 feet, trunk width often irregular, bark reddish-brown and often peels, leaves and fruit non-aromatic, evergreen.

Leaf: Needle, yellowish-green on top but lighter underneath, length up to 1 inch, tip pointed, needles arranged in 2 almost parallel rows that may spiral along stems, non-aromatic.

Flower: Dioecious, female cone small, singular, greenish, develops on branch underside; male cone a stalked cluster with 4-8 whirls, roundish, yellow, diameter 1/6 inch, develops on branch underside, numerous cones produced.

Fruit/Seed: Cup-like, fleshy, reddish, diameter up to 1/2 inch, contains one seed that is visible at the end. Fleshy coat is edible (sweet) but seed is poisonous to humans.

Typical Location: Understory of shady mixed-evergreen forests, slopes and canyon bottoms, tolerates shade; elevations 30-5,000 feet.

Revegetation Approach: Container.

Notes: Trees provide large woody debris, shelter, habitat diversity, and nesting sites, as well as shade that maintains cool water temperatures. Fibrous roots bind and stabilize soil. Seeds are an important forage for birds and small mammals. Leaves and bark provide forage for grazers. The cancerfighting drug Taxol is produced in the bark and, to a lesser extent, in the leaves.



leaf







WESTERN HEMLOCK

Species Name:Tsuga heterophyllaFamily:Pinaceae (pine family)Plant Type:coniferous tree

Description: Conifer, crown conical and narrow, height to 160 feet, drooping branches, thin reddish-brown bark, stem hairy, evergreen.

Leaf: Needle, white bands on underside, tip rounded, 2 rows of short needles (length $\frac{1}{4}-\frac{3}{4}$ inch), persistent for 4-7 years.

Flower: Monoecious (separate sexes on same tree), female cone oval, length ¹/₂-3 inches, hangs down from branch tip, immature greenish, ripens to brown and woody; male cone small, yellowish, not woody, occurs on previous year's growth.

Fruit/Seed: Woody oval cone, length ½-3 inches, hangs down from branch tip, scales open first season releasing seeds, seed length to ¾ inch.

Typical Location: Coastal conifer and mixed evergreen forests, especially in flat or low slope areas; elevations below 2,300 feet.

Revegetation Approach: Container.

Notes: Trees contribute large woody debris to stream and provide shelter, habitat and nesting sites (cavities) for wildlife. Foliage and seeds provide forage, especially for small mammals and birds. Harvested for paper pulp.





ieuj



whole plant



BLUE ELDERBERRY

Species Name:Sambucus mexicanaFamily:Caprifoliaceae (honeysuckle family)Plant Type:Shrub / small tree

Description: Shrub, lacking main trunk, height to 25 feet, often as wide as tall, deciduous.

Leaf: Compound, opposite with 3-9 elliptic to ovate, sharply toothed leaflets (length to 7 inches). Leaflet base often asymmetrical, terminal leaflet much longer than paired leaflets.

Flower: March-September, large (12 inches wide), showy, flat topped clusters of small white flowers.

Fruit/Seed: Clusters of round berries, berry diameter 1/3 inch, almost black with whitish bloom thus appearing bluish, contains 3-5 small seeds.

Typical Location: Streambanks, open areas in forest, established floodplains; elevations below 9,800 feet.

Revegetation Approach: Container.

Key Notes: Related to the red elderberry (*S. racemosa*). Distinguished by flower, fruit shape and fruit color.

Notes: Important source of forage for wildlife, especially for some species of migratory birds. Berries edible to human and used for jellies, pies and wine. Pierce's Disease host plant (see page XI-7 for more information).



leaf



flower



seed





CALIFORNIA BLACKBERRY

Species Name:Rubus ursinusFamily:Rosaceae (rose family)Plant Type:Shrub

Description: Mound building, vine-like shrub with tip rooting, running stems. Stems grayish with slender, delicate, straight thorns.

Leaf: Compound with 3 leaflets, leaflets irregularly toothed, length 1-4 inches.

Flower: March-June, generally dioecious (separate sex shrubs): Singular or clusters of white flowers, petal length to 1 inch.

Fruit/Seed: Blackberry (aggregate of black stone fruits), round to oblong, red ripening to black, highly edible, ripens in summer. Multiple small seeds inside a single blackberry.

Typical Location: Moist areas, shade, floodplain stream banks; elevations below 5,000 feet.

Revegetation Approach: Container, plants grow rapidly.

Key Notes: Often confused with the non-native Himalayan blackberry (*R. discolor*). Distinguished by leaf and thorn shape.

Notes: Dense growth provides excellent foraging, nesting and hiding habitat for wildlife. Edible berries are an important food source for many species of mammals and birds. Spreading growth binds soil for erosion control. Pierce's Disease host plant (see page XI-7 for more information on Pierce's Disease).





leaf and fruit



flower



stem



CALIFORNIA HAZELNUT

Species Name:Corylus cornuta var. californicaFamily:Betulaceae (birch family)Plant Type:Shrub / small tree

Description: Shrub or small tree, spreading with multiple stems, open shape, height 5-13 feet, deciduous with bright yellow autumn color.

Leaf: Round to ovate, velvety hairy on both sides, length to 4 inches, coarsely toothed.

Flower: January-April, monoecious (separate sex on same plant): Female flower, tiny cluster ($\frac{1}{2}$ inch) containing 2 flowers with bright red stigma, grow as terminal buds, appear before leaves; male flower catkin, length to $2\frac{1}{2}$ inches, remain after leaf fall.

Fruit/Seed: Smooth nut (1-inch-diameter) enclosed in 2 fused, papery, leaf-like bracts, ripen in early autumn.

Typical Location: Streamsides, moist, shady floodplain forests, often found in the understory of redwood and Douglas fir forests; elevations below 7,000 feet.

Revegetation Approach: Container.

Notes: Edible nut is an important food source for many species. It is related to the European hazelnut (filbert). Native Americans used the flexible stems in basket making.



leaf



male flower/catkin





seed



CALIFORNIA WILD ROSE

Species Name:Rosa californicaFamily:Rosaceae (rose family)Plant Type:Shrub

Description: Thicket building shrub, height 3-8 feet, stems with compressed, curved thorns.

Leaf: Compound with 5-7 leaflets. Leaflets ovate to oblong, toothed, length to $1\frac{1}{2}$ inch.

Flower: May-August, singular or in clusters, pinkish, ³/₄ inch petals.

Fruit/Seed: Round, reddish, fleshy rose hip, ³/₄ inch diameter.

Typical Location: Moist areas, streamsides; elevations below 5,300 feet.

Revegetation Approach: Container. Hybridizes with nonnative cultivated roses, care must be taken in collection.

Notes: Important understory species, and good soil stabilizer. Species extremely variable. Rose hip high in vitamin C and important forage for wildlife.



leaf



flower





seed



CASCARA

Species Name:Rhamnus purshianaFamily:Rhamnaceae (buckthorn family)Plant Type:Shrub / small tree

Description: Erect shrub or small tree, height to 30 feet, branch ends often tufted with leaves, deciduous showing yellow autumn color.

Leaf: Elliptic, alternate, prominent veins, length 2-6 inches, margin smooth.

Flower: May-June, bisexual, small cluster of greenish flowers develop at leaf axis.

Fruit/Seed: Round berry, black when ripe, diameter to 1/2 inch, contains 3 seeds.

Typical Location: Floodplains, coniferous forests, coastal scrub; elevations below 6,500 feet.

Revegetation Approach: Container.

Key Notes: Related to coffeeberry (R. californica).

Notes: Berries are attractive forage for birds and mammals, including ringtail and raccoon. Can be toxic to small children.



leaf



flower





seed



Coffeeberry

Species Name:Rhamnus californicaFamily:Rhamnaceae (buckthorn family)Plant Type:Shrub / small tree

Description: Shrub, erect or low and spreading, height to 16 feet, evergreen.

Leaf: Variable, elliptic, alternate, variable in thickness, length 1-3 inches, edges smooth or toothed.

Flower: April-June, bisexual, clusters of 5-60 inconspicuous flowers produced on new growth.

Fruit/Seed: Round berry, ripening from green to red then black when ripe, diameter to ¹/₂ inch.

Typical Location: All soil types, woodlands, forests, coastal scrub, chaparral; elevations below 7,500 feet.

Revegetation Approach: Container.

Key Notes: Related to cascara (R. purshiana).

Notes: Leaves and berries provide forage for deer, birds feed on berries as well.



leaf







flower



Coltsfoot

Species Name:Petasites frigidusFamily:Asteraceae (sunflower family)Plant Type:Shrub

Description: Perennial herb with creeping rhizomes, dormant in winter with erect stems appearing before leaves in spring, no branches, height 6-24 inches.

Leaf: Grow from stem base, palmate, roundish, multi-lobed, width 2-10 inches, edges coarsely toothed, underside densely hairy.

Flower: March-April, produced at top of a long stalk (length to 24 inches) before leaf-out. Clusters of small, disk-like, white-orange flowers, male and female usually not produced on same disk, sometimes dioecious (separate sex plants).

Fruit/Seed: Achene with thread-like bristles, length <1/4 inch.

Typical Location: Streamside, wet soils, deep shade in wood areas; elevations below 1,300 feet.

Revegetation Approach: Container.

Notes: Rhizomatous growth helps stabilize soil.



leaf









whole plant

seed



CREAMBUSH/OCEANSPRAY

Species Name:Holodiscus discolorFamily:Rosaceae (rose family)Plant Type:Shrub / small tree

Description: Shrub, densely branched, stems hairy, bark light brown to gray and shredding with age, height 4-18 feet, deciduous. Has both long stems and short, each with different leaf size.

Leaf: Ovate, alternate, edges coarsely toothed or scalloped. Long stem leaf length 2-5 inches; leaf length $\frac{3}{4}$ to $\frac{1}{2}$ inch.

Flower: May-July, showy, large (length 4-10 inches) branched clusters of small, white flowers produced at the ends of mature branches.

Fruit/Seed: Achene, tiny.

Typical Location: Floodplains, moist woodlands, rocky slopes, variety of plant communities below 6,000 feet.

Revegetation Approach: Container.

Notes: Showy flowers attract birds.



leaf



flower





seed



ELK CLOVER

Species Name: Aralia californica **Family:** Araliaceae (ginseng family) **Plant Type:** Shrub

Description: Erect shrub, height 3-9 feet, deciduous. Roots large, contain milky juice.

Leaf: Compound, large with 3-5 leaflets. Leaflet ovate, tip pointed, margins small-toothed, length 6-12 inches.

Flower: June-August, long stalk (length 14-18 inches), multiple branches of small, ball-like clusters of white, sticky flowers.

Fruit/Seed: Berry, round, black, <1/4 inch diameter.

Typical Location: Moist shady areas, streamsides, canyons; elevations below 6,500 feet.

Revegetation Approach: Container.

Notes: In same family as non-native English ivy, Hedera helix.



leaf









whole plant

seed



HAWTHORNE WESTERN BLACKHAW

Family: **Plant Type:**

Species Name: Crataegus douglasii Rosaceae (rose family) Shrub / small tree

Description: Erect shrub or small tree, height to 30 feet, densely branched, armored with strong thorns (length over $\frac{1}{2}$ inch), deciduous.

Leaf: Base wedge shaped, top lobed with double-toothed margin, length 1-3 inches, dark green, shiny.

Flower: May-July, clusters at branch tips, flowers cupshaped, white, 5-petaled, width 1/2 inch, fragrant.

Fruit/Seed: Berry-like, black, fleshy, sweet, diameter to $\frac{1}{2}$ inch, contains tiny nutlet.

Typical Location: Floodplains, meadow edges, forest, grassland, sagebrush scrub; elevations 2,300 to 5,500 feet.

Revegetation Approach: Container.

Notes: Fruit provides excellent forage for birds and flowers attract bees.



leaf and flower



flower





seed


MULEFAT

Species Name:Baccharis salicifoliaFamily:Asteraceae (sunflower family)Plant Type:Shrub

Description: Erect shrub, spreads to form thickets, height 6-12 feet, evergreen.

Leaf: Lanceolate, length to 6 inches, margins smooth to slightly toothed, underside with 3 large veins.

Flower: March-July, dioecious (separate sex shrubs), clusters of small white disk flowers (width <¼ inch) form at the tips of lateral branches.

Fruit/Seed: Tiny, finely bristled achene.

Typical Location: Dry streambeds, active channel, gravel bars across California at elevations below 4,000 feet.

Revegetation Approach: Container.

Key Notes: Sometimes confused with young willow growth: mulefat has three large veins on the leaf, the willow only has one.

Notes: Important gravel bar colonizer and stabilizer. Native Americans used the straight-growing, woody stems for arrows.



leaf



flower





seed



NINEBARK

Species Name:	Physocarpus capitatus
Family:	Rosaceae (rose family)
Plant Type:	Shrub / small tree

Description: Erect, spreading shrub, height 3-8 feet, peeling bark distinctive, deciduous.

Leaf: Rounded palmate with 3-5 lobes, length to 5¹/₂ inches, margin toothed.

Flower: April-July, dense, round clusters of small, white flowers (petal length $< \frac{1}{4}$ inch).

Fruit/Seed: Round clusters of dry, inflated fruit, fruit contain 2-4 seeds.

Typical Location: Moist banks, floodplains, coniferous forests; elevations below 4,600 feet.

Revegetation Approach: Container.



leaf



flower



whole plant in flower







OSOBERRY

Species Name:Oemleria cerasiformisFamily:Rosaceae (rose family)PlantType:Shrub / small tree

Description: Shrub or small tree, height to 15 feet, stems mostly straight and slender, bark gray to reddish, deciduous.

Leaf: Elliptical, alternate, length 2-5 inches, margin smooth, smells like cucumber when crushed.

Flower: January-April, dioecious (separate sex shrubs) with some bisexual flowers, hanging clusters (length 1-4 inches) of 5-10 flowers produced at branch ends, female and male flowers small, fragrant, petals white, clawed, blooms before leafing.

Fruit/Seed: Berry, bean-shaped, waxy, peach colored turning bluish when ripe, diameter ¹/₂ inch.

Typical Location: Floodplains, chaparral, shaded coniferous forest, streamsides; elevations below 5,600 feet.

Revegetation Approach: Container.

Key Notes: Name changed to *Oemleria* from *Osmaronia*.

Notes: Berries provide forage for birds.



leaf







seed



PACIFIC WAX MYRTLE

Species Name:Myrica californicaFamily:Myricaceae (wax myrtle family)Plant Type:Shrub / small tree

Description: Erect shrub or small tree, densely branched, height 6-30 feet, bark smooth and gray to light-brown, evergreen.

Leaf: Lanceolate to oblong, dark green, glossy, length to 5 inches, spicy scent.

Flower: March-April, monoecious (separate sexes on same shrub), female and male catkin scaly, length to 1 inch.

Fruit/Seed: Round, dark purple nut with pale waxy coating, diameter ¹/₄ inch.

Typical Location: Coastal areas (including sand dunes) north of Santa Monica county into Washington, canyon walls and moist slopes below 500 feet.

Revegetation Approach: Container.

Notes: Wax myrtle berries are important forage for many bird species. The name comes from the waxy coating on the berries, which were historically used in the making of soaps and candles.



leaf and flower

seed





CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS SHRUBS AND SMALL TREES XI-A-36 OCTOBER, 2003

Location: floodplain

Red Elderberry

Species Name:Sambucus racemosaFamily:Caprifoliaceae (honeysuckle family)Plant Type:Shrub / small tree

Description: Shrub, lacking main trunk, height to 20 feet, deciduous.

Leaf: Compound, opposite with 5-7 leaflets, leaflets ovate to lanceolate, base often asymmetrical, length to 6 inches, margin sharply toothed.

Flower: March-July, domed shaped clusters (width to 4 inches) of small whitish flowers.

Fruit/Seed: Clusters of berries, berry bright red, round, diameter ¹/₄ inch, contains 3-5 small seeds.

Typical Location: Moist areas, coastal.

Revegetation Approach: Container.

Key Notes: Related to the blue elderberry (*S. mexicana*). Distinguished by flower and fruit shape.

Notes: Important forage for birds. Berries bitter tasting to humans and sometimes toxic.



leaf



flower





seed



Red Flowering Currant Pink Winter Currant

Species Name:Ribes sanguineumFamily:Grossulariaceae (gooseberry family)Plant Type:Shrub / small tree

Description: Erect shrub, height to 12 feet, stems thin, spreading, deciduous.

Leaf: Palmate, dark green, finely haired, lobes rounded, margin irregularly toothed, length 2-4 inches.

Flower: January-June, bisexual, drooping clusters (length 2-4 inches) of 1-20 flowers, flowers small, red to pink.

Fruit/Seed: Berry, blue-black with whitish bloom, diameter to $\frac{1}{2}$ inch.

Typical Location: Floodplains, open spaces, chaparral, woodland, mixed evergreen and closed pine forests; elevations to 6,000 feet.

Revegetation Approach: Container.

Notes: Flowers and fruit attract birds.



leaf











Red Twig Dogwood Brown Dogwood

Species Name:Cornus glabrataFamily:Cornaceae (dogwood family)Plant Type:Shrub / small tree

Description: Shrub or small tree, generally forms dense thickets, height to 20 feet, stems slender, brown to red, deciduous.

Leaf: Lanceolate to elliptical, tapered at both ends, length to 2 inches, leaf veins in 3-4 pairs.

Flower: May-July, bisexual, flat topped clusters (2 inch width) of small, white flowers.

Fruit/Seed: Berry, white to bluish, length ¹/₄ inch, seed with almost smooth sides, ripens in late summer.

Typical Location: Floodplains, moist areas; elevations below 5,000 feet.

Revegetation Approach: Container.

Key Notes: Leaf and seed morphology distinguish from stream dogwood (*C. sericea*).



leaf



flower





seed



SALMONBERRY

Species Name:Rubus spectabilisFamily:Rosaceae (rose family)Plant Type:Shrub / small tree

Description: Erect shrub, height 6-12 feet, branches with few short, straight thorns, mature branches woody, bark shredding, forms dense thickets, deciduous.

Leaf: Compound with 3 leaflets. Leaflets palmate with 3 shallow lobes, length 2-4 inches, edges irregularly toothed.

Flower: March-June, singular and clusters, petal length to $\frac{1}{2}$ inch, red-purple, papery.

Fruit/Seed: Raspberry-like (aggregate of stone fruits), yellow to red, edible, ripen in summer.

Typical Location: Moist shady areas, streamsides; elevations below 5,000 feet.

Revegetation Approach: Container.

Key Notes: Related to the blackberry, raspberry and thimbleberry.

Notes: Edible berries provide forage for wildlife.



leaf



flower

seed



CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS SHRUBS AND SMALL TREES XI-A-40

SNOWBERRY

Species Name:Symphoricarpos albus var. laevigatusFamily:Caprifoliaceae (honeysuckle family)Plant Type:Shrub / small tree

Description: Erect shrub, branching stems, height to 6 feet, spreads rhizomatously, deciduous.

Leaf: Oval to almost round, opposite, length ¹/₂ to 2¹/₂ inches.

Flower: May-June, cluster of 8-16 pinkish, bell shaped flowers, flowers hairy inside.

Fruit/Seed: Distinctive snow-white berry (½ inch diameter), ripens in autumn and persists on bare branches throughout winter. Two tiny seeds per berry.

Typical Location: Mature riparian forest, shady woods, streambanks, north facing slopes, well-drained soils; elevations below 4,000 feet.

Revegetation Approach: Container.

Notes: Provides erosion control. Important understory species in riparian floodplains. Berries are an important food source for wildlife but may be toxic to humans. Foliage and twigs browsed by deer. Native Americans used the wood for construction of ceremonial tobacco pipes.



leaf



flower





seed



SPIRAEA

Species Name: Spiraea douglasii **Family:** Rosaceae (rose family) Plant Type: Shrub

Description: Erect shrub, height 3-6 feet, spreads rhizomatously forming large clumps, deciduous.

Leaf: Elliptic, alternate, rounded tip, length 1-5 inches, margin toothed.

Flower: June-September, inflorescence long (2-5 inch length), thin with clusters of small, rose pink flowers, develop at branch ends.

Fruit/Seed: Fruit pod-like, dry, small.

Typical Location: Moist areas, coniferous forests, valley flats, streamside, seeps; elevations below 6,500 feet.

Revegetation Approach: Container.

Key Notes: Spiraea douglasii is replaced by Spiraea denisflora at higher elevations.

Notes: Good ground stabilizer on moist banks. Rose color of flowers is unique to this shrub.



lea









STINK CURRANT

Species Name:Ribes bracteosumFamily:Grossulariaceae (gooseberry family)Plant Type:Shrub / small tree

Description: Erect shrub, height to 13 feet, stems sparsely hairy, aromatic with an unpleasant odor.

Leaf: Deeply 5-7 lobed, length 1½-8 inches, upper surface shiny, dull below, margins toothed.

Flower: February to June, erect clusters of 20-50 flowers, flowers small, base saucer-like, petals small, white.

Fruit/Seed: Round berry, black with a whitish bloom, diameter to ½ inch.

Typical Location: Moist forests; elevations below 4,600 feet.

Revegetation Approach: Container.

Notes: Berries provide forage for wildlife.



leaf











seed



STREAM DOGWOOD

Species Name:Cornus sericeaFamily:Cornaceae (dogwood family)Plant Type:Shrub / small tree

Description: Shrub, spreads by branch tip rooting and underground stems, height to 15 feet, branches reddish to purple, deciduous with bright red autumn color.

Leaf: Lanceolate to elliptical, tapered at both ends, length to 4 inches, leaf veins in 4-7 pairs.

Flower: May-July, bisexual, flat topped clusters (2 inches wide) of small, white flowers appearing with and after leaves.

Fruit/Seed: Berry, white to cream colored, length to 1/4 inch, seed with grooved sides, ripens in late summer.

Typical Location: Active channel, streamsides, floodplains, moist areas; elevations below 9,000 feet.

Revegetation Approach: Container.

Key Notes: A good identifying characteristic is to look for thin latex threads when leaf is pulled apart. Leaf and seed morphology distinguish from red-twig dogwood (*C. glabrata*).

Notes: Seeds ripen in summer and persist into winter, making excellent wildlife forage. Native Americans used plant in basket weaving.



leaf



flower



THIMBLEBERRY

Species Name:Rubus parviflorusFamily:Rosaceae (rose family)Plant Type:Shrub / small tree

Description: Erect shrub, height 3-6 feet, branches with soft hairs rather than thorns, mature branches woody, bark shredding, forms thickets, deciduous.

Leaf: Palmate with 5 unequal lobes, length 2-6 inches, surface soft, margin toothed.

Flower: March-August, clusters at branch ends, only a few per plant, petals length to 1 inch, white, floppy looking.

Fruit/Seed: Raspberry-like (aggregate of red stone fruits), dull red ripening to deep red, edible, ripens in summer.

Typical Location: Moist shady areas, streamsides, floodplains; elevations below 8,200 feet.

Revegetation Approach: Container.

Key Notes: Related to the blackberry, raspberry and salmonberry.

Notes: Edible berries provide forage for wildlife. Name derived from its distinctive berry, which looks like a thimble when removed from the plant.



leaf



flower

seed



TOYON CALIFORNIA HOLLY CHRISTMAS BERRY

Species Name:Heteromeles arbutifoliaFamily:Rosaceae (rose family)Plant Type:Shrub / small tree

Description: Shrub or small tree, multi-trunked, height to 30 feet, bark gray, evergreen.

Leaf: Oblong, leathery, glossy, dark green, length to 4 inches, margin sharply toothed.

Flower: June-July, flat toped clusters, flowers white, small (petal length to $< \frac{1}{4}$ inch), produced at ends of older branches.

Fruit/Seed: November-January, bright-red berry, fleshy, diameter ¹/₄ inch, persistent, contains 3-6 brown seeds.

Typical Location: Chaparral, oak woodland, floodplains, mixed-evergreen forest, dry to semi-dry slopes and canyons; elevations below 4,200 feet.

Revegetation Approach: Container.

Notes: Vital forage for California birds, especially during late winter.



leaf









seed



TWINBERRY

Species Name:Lonicera involucrataFamily:Caprifoliaceae (honeysuckle family)Plant Type:Shrub / small tree

Description: Erect densely foliaged shrub, branches slender, height to 10 feet, deciduous.

Leaf: Elliptical to ovate, length 2-4 inches.

Flower: March-July, paired tubular flowers (½ inch long), yellow with reddish tinge. "Leaf-like" bracts fuse to form cup underneath flower pair. Bracts darken to red or purple as flower matures.

Fruit: Distinctive paired round berries (1/3 inch diameter) containing tiny seeds, surrounded by colorful cup-like bracts.

Typical Location: Floodplains, moist, shady areas, streamsides; elevations below 9,500 feet.

Revegetation Approach: Container.

Notes: Close relative to the native honeysuckle, *L. hispidula* var. *vacillans*.



leaf



flower





seed



VINE MAPLE

Species Name: Acer circinatum Family: Aceraceae (maple family) Plant Type: Shrub / small tree

Description: Small tree or shrub, often reclining, rooting and vine-like (especially in shaded areas), height to 20 feet in full sun, deciduous with bright autumn color.

Leaf: Palmate, 5-7 lobes, width 2-5 inches.

Flower: April-May, clusters of 4-10 small, inconspicuous flowers, sepals deep red, petals pale green.

Fruit/Seed: Distinctive paired achenes with wings, achene round, reddish, wings spreading almost 180°.

Typical Location: Shaded stream banks, floodplains; elevations below 5,000 feet.

Revegetation Approach: Container.

Key Notes: Related to the big leaf maple (*A. macrophyllum*) and box elder (A. negundo). Easily distinguished by leaf shape.

Notes: Foliage provides forage for deer. Flowers, buds and seeds provide forage for birds and small mammals. Squirrels will cache seeds.



leaf



flower



WESTERN AZALEA

Species Name:Rhododendron occidentaleFamily:Ericaceae (heath family)Plant Type:Shrub / small tree

Description: Erect shrub, densely branched with slender twigs, height 5-16 feet, deciduous.

Leaf: Elliptic, thin, mid-vein not sunken, length 1-3¹/₂ inches, edges smooth.

Flower: April-August, clusters of large, showy, white or pinkish flowers, length to 2 inches, 3-4 petals fused, strong fragrance.

Fruit/Seed: Dry capsule with many scale-like seeds.

Typical Location: Streambanks, seeps, floodplains, coniferous forests; elevations below 7,200 feet.

Revegetation Approach: Container.

Notes: *Rhododendron* is a Greek word meaning "rose tree", as signified by the showy, fragrant flowers.



leaf



flower





seed



WESTERN SPICEBUSH

Family: Plant Type:

Species Name: Calycanthus occidentalis Calycanthaceae (sweet-shrub or calycanthus family) Shrub / small tree

Description: Erect shrub, bushy round shaped, aromatic (described as old wine barrel smell), height to 9 feet, deciduous with yellow autumn color.

Leaf: Oval to oblong, opposite, length 2-6 inches, slightly hairy underneath, aromatic when crushed.

Flower: April-August, bisexual, terminal single flower, deep reddish-brown, diameter 2 inches, looks like a tiny water lily, smells "spicy".

Fruit/Seed: Oval, leathery, cuplike receptacle containing velvety, whitish-brown seeds that ripen in the autumn.

Typical Location: Moist, shady areas, floodplains, canyons, streamsides, seeps; elevations below 5,000 feet.

Revegetation Approach: Container.





flower





fruit with seed inside



WILD MOCK ORANGE

Species Name:Philadelphus lewisiiFamily:Philadelphaceae (mock orange family)Plant Type:Shrub / small tree

Description: Erect shrub, loosely branched, many trunks, young bark reddish, older bark gray and peeling, height to 10 feet, deciduous.

Leaf: Ovate, opposite, margin partially toothed, length 1-3 inches.

Flower: May-July, terminal clusters of 6 or more flowers, white, width ³/₄-1 inch, numerous stamens, fragrant.

Fruit/Seed: Dry, multi-seeded capsule.

Typical Location: Slopes, canyons, forest openings, rocky slopes, canyons; elevations below 5,000 feet.

Revegetation Approach: Container.

Notes: Dense growth provides good cover. Seeds eaten by quail and squirrels.



leaf



flower





seed



CALIFORNIA WILD GRAPE

Species Name:Vitis californicaFamily:Vitaceae (grape family)Plant Type:Vine

Description: Sprawling woody vine, climbs surrounding vegetation, bush-like without support, tendrils produce opposite leaves, bark peeling, deciduous.

Leaf: Rounded with 0-3 shallow, palmate lobes, alternate, hairy especially on the underside, margins finely toothed.

Flower: May-July, numerous clusters of unisexual, greenish-yellow, small, fragrant flowers.

Fruit/Seed: Clusters of spherical berries, purple with whitish bloom, diameter $\frac{1}{2}$ inch.

Typical Location: Streamsides, floodplains, springs, and canyons; elevations below 3,200 feet.

Revegetation Approach: Container, care in collection should be taken as the wild grape readily hybridizes with European imports.

Notes: Berries are an important forage for wildlife.



leaf



flower



CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS VINES XI-A-52

DUTCHMAN'S PIPEVINE

Species Name:Aristolochia californicaFamily:Aristolochiaceae (pipevine family)Plant Type:Vine

Description: Semi-woody vine, slender stems with fine short hairs, twining stems, length to 16 feet, deciduous.

Leaf: Heart shaped, bright green, soft-hairy, alternate, length 1-6 inches, margins smooth.

Flower: January-April, U-shaped (pipe-like), hanging, green to brown, veins purple, interior lined with pink-red, length $1-1\frac{1}{2}$ inches, appear before leaves, metallic fragrance.

Fruit/Seed: Capsule, angular, light green, length to 2 inch.

Typical Location: Streamsides, floodplains, forest, chaparral; elevations below 2,300 feet.

Revegetation Approach: Container.

Notes: Provides food for the pipevine swallowtail larvae and is, in turn, pollinated by the pipevine swallowtail butterfly. Produces a specialized glycoside, known to cause heart attacks in vertebrates, which provides swallowtail larvae with a defense against predators. Other butterflies mimic pipevine swallowtail coloration as a predator defense strategy.



leaf and seed



flower



CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS VINES XI-A-53

HONEYSUCKLE

Species Name:Lonicera hispidulaFamily:Caprifoliaceae (honeysuckle family)Plant Type:Vine

Description: Climbing vine, slender stems, length to 20 feet.

Leaf: Oblong, opposite, length to 3 inches, upper pairs connected around stem.

Flower: April-July, clusters of paired flowers, flowers funneled, double-lipped blooms, upper lip four-lobed, very fragrant, purple to pink, length to ½ inch.

Fruit/Seed: Round, red berry, diameter ¹/₄ inch.

Typical Location: Streamsides, floodplain, wooded slopes, canyons; elevations below 3,600 feet.

Revegetation Approach: Container.

Notes: Related to the native twinberry, *Lonicera involucrata*.



leaf







whole plant





MANROOT Wild Cucumber

Species Name:Marah fabaceusFamily:Cucurbitaceae (gourd family)Plant Type:Vine

Description: Perennial vine, climbs, builds mounds and sprawls, stems soft/not-woody, sometimes with prickles, climbs using lateral tendrils, length to 21 feet, large root or tuber.

Leaf: Palmate, 5-7 lobes, large.

Flower: February-April, monoecious (separate sexes on same vine), female and male similar, white to yellowish-green, cup shaped, width to $\frac{1}{2}$ inch, female flowers solitary, male flowers in clusters.

Fruit/Seed: Spiny gourd, rounded with pointed tip, diameter 1¹/₂-2 inches, contains 4 large, often flat, brown seeds.

Typical Location: Streamsides, floodplains, washes, shrubby areas, open areas, and slopes; elevations below 5,200 feet.

Revegetation Approach: Container.

Notes: The common name "manroot" relates to the very large tuber root that can grow 4-8 feet long. Native Americans traditionally used pounded root in tidepools and stream pools to stun fish.



leaf



flower



POISON OAK

Species Name:Toxicodendron diversilobumFamily:Anacardiaceae (sumac or cashew family)Plant Type:Vine

Description: Shrub, occasionally tree-like (height 1½-14 feet) or vining (length to 85 feet) into tree canopies, gray to redbrown twigs, deciduous.

Leaf: Compound with 3 (occasionally 5) leaflets, leaflets resinous, smooth, shiny, red in autumn, lobed, terminal leaflet length to 3 inches, lateral leaflet length to $2\frac{3}{4}$ inches.

Flower: April-May, clusters of small, cream-colored flowers, petals ovate.

Fruit/Seed: Round berry, white, leathery, diameter <¹/₄ inch.

Typical Location: Floodplains, canyons, slopes, chaparral, oak woodlands; elevations below 5,400 feet.

Revegetation Approach: Not recommend for cultivation.

Notes: Resin on leaves, stems and flowers causes painful dermatitis to humans. Latin name means "poisonous tree". Fruit is an important winter forage for wildlife.



leaf



flower





seed



VIRGIN'S BOWER PIPESTEM

Species Name:Clematis lasianthaFamily:Ranunculaceae (buttercup family)Plant Type:Vine

Description: Semi-woody vine, stems slender, climbs surrounding vegetation with tendril-like leaf petiole, deciduous.

Leaf: Compound with 3-5 leaflets, leaflets elliptic/ovate, coarsely toothed or 3-lobed, length 1-2 inches.

Flower: January-June, single flower, showy, diameter 1¹/₄ inch, no petals but 4 cream-colored sepals showy and petal-like.

Fruit/Seed: Head-like clusters of small achenes with distinctive long feathery tails.

Typical Location: Floodplains, hillsides, chaparral, open woodlands; elevations below 6,600 feet.

Revegetation Approach: Container.



leaf











seed



BULRUSH TULE

Species Name:Scirpus acutus var. occidentalisFamily:Cyperaceae (sedge family)Plant Type:Emergent

Description: Erect perennial, spreads by rhizomes forming dense clusters, stems round, width to ½ inch, height 5-13 feet.

Leaf: Reduced to a membranous flat blade along stem base, length to 3 inches.

Flower: May-August, bisexual, erect, 1-7 branched clusters, straw colored or orange to dark reddish brown, produced at stem tip, flowers spiny.

Fruit/Seed: Achene, slightly angled sides, beaked, gray-brown, wind and water dispersed.

Typical Location: Active channel, streamsides, marshes, lakes; elevations below 8,200 feet.

Revegetation Approach: Container or transplant.

Notes: May provide critical juvenile fish habitat. Important nesting and escape cover for small mammals, waterfowl and other birds. Seeds provide forage for waterfowl. Thick rhizome root system provides some river and lake bank stabilization. Native Americans used *Scirpus* roots for basketry.



flower



whole plant



CATTAIL

Species Name:	Typha latifolia
Family:	Typhaceae (cattail family)
Plant Type:	Emergent

Description: Erect perennial, dense clumps of tall blades (height 5-10 feet), creeping rootstock.

Leaf: Blade, alternate, flat on the inside, rounded on the outside, interior spongy, tip pointed, height to over 6 feet.

Flower: June-July, cattail, terminal flowers on a round stalk, male flowers above female flowers, no separation between male and female clusters, female flowers green in flower, turn brown as seeds ripen.

Fruit/Seed: Tiny, brown nutlets, length 1/25 inch, released with white mass of wooly hairs, seeds disperse by floating on wind or water.

Typical Location: Lakes, marshes, any slow moving or stagnant water; elevations below 6,600 feet.

Revegetation Approach: Seed, transplant.

Notes: Nest building habitat and shelter for birds and waterfowl. Tolerates saline conditions.



leaf and flower







CENTRAL AND NORTH COAST NATIVE RIPARIAN PLANTS EMERGENT AND HERBACEOUS XI-A-59

CREEPING WILD RYE

Species Name: Leymus triticoides **Family: Plant Type:**

Poaceae (grass family) Herbaceous

Description: Mat forming grass, height 1¹/₂-4 feet, perennial, stems smooth to slightly hairy, spreads by rhizomes, may remain green even in dry season, leaf blades lean away from stem.

Leaf: Blade, flat, surface slightly rough.

Flower: Cluster of grass spikelets at end of tall stem (height 2-8 inches), spikelets 1-3 per node.

Fruit/Seed: Achene-like grain.

Typical Location: Streamsides, floodplains, moist meadows and areas subject to flooding; elevations below 7,500 feet.

Revegetation Approach: Container, transplant.

Notes: Useful in binding soil for erosion control, lies flat when flooded and recovers quickly. Tolerates saline conditions.



whole plant



whole plant



HORSETAIL **SCOURING RUSH**

Species Name:	Equis
Family:	Equis
	(horse
Plant Type:	Emer

etum spp. etaceae etail family) Emergent

Description: Perennial from spreading rhizomes, erect annual (some perennial) stems, stem is segmented with distinct rings, ring may have whirl of wiry leaf-like branches, spore producing non-woody cone forms at stem tips, may have separate sterile and fertile stems, height 4 inches to 6 feet.

Leaf: None or scale-like, close growing, brown (wiry branches are leaf-like, but not leaves).

Flower: None, sexual reproduction by a spore producing non-woody cone (not a flowering plant).

Fruit/Seed: Spore, spherical, green.

Typical Location: Streamsides, moist areas, roadside ditches, seeps, disturbed areas; elevations below 9,800 feet.

Revegetation Approach: Container or transplant.

Notes: Provides soil stabilization. Native Americans made tea for medicinal uses and used the fertile stems of E. telmateia as sandpaper. Outer surface has high silica content.



whole plant with branches



whole plant with fertile stems



INDIAN RHUBARB UMBRELLA PLANT

Species Name:Darmera peltataFamily:Saxifragaceae (saxifrage family)Plant Type:Herbaceous

Description: Perennial herb, stemless, flowers and leaves from ground, flowers before leaves appear, spreads by rhizomes, height to 5 feet, leaves turn bright red in autumn.

Leaf: Palmate, multi-lobed, height to 5 feet, broad (width to 3 feet), stem attached towards center of leaf, margins with irregular teeth.

Flower: April-July, umbrella shaped cluster of small, white to pale pink flowers, grows on long stalk (length 1 to 5 feet) before leaves.

Fruit/Seed: 2 dry red follicles, length to 1/2 inch.

Typical Location: Rocky streambanks; elevations below 6,000 feet.

Revegetation Approach: Container, transplant.

Notes: The common name "umbrella plant" describes the leaves, which look like umbrellas blown inside out.



leaf



flower



MUGWORT

Species Name:Artemisia douglasianaFamily:Asteraceae (sunflower family)Plant Type:Herbaceous

Description: Perennial erect herb, stems in dense clump, height to 8 feet, spreads by rhizomes.

Leaf: Coarsely 3-5 lobed, evenly-spaced, alternate, underside hairy and grayish, aromatic (sage-like), length to 6 inches.

Flower: June to October, dense clusters on elongated leafy stems, length 4-12 inches, disk flowers small (diameter <¼ inch), bell shaped, greenish.

Fruit/Seed: Tiny dry achene.

Typical Location: Moist low places, open and shady places, drainages; elevations below 7,200 feet.

Revegetation Approach: Container.

Notes: Common, stabilizes soil. Pierce's Disease host plant (see page XI-7 for more information).





leaf



flower



RUSH

Species Name: Juncus spp. Family: Juncaceae (rush family) Plant Type: Emergent

Description: Erect grasslike annual or perennial, usually spread by rhizomes forming dense clumps, stems wiry, round or flat, height to 4 feet.

Leaf: Wiry, round or flat, sometimes greatly reduced to just tip of stem.

Flower: May-August, bisexual, lateral clusters near stem tip, 1-50 flowers, flower green or purplish-brown, inconspicuous.

Fruit/Seed: Many, tiny beaked seeds.

Typical Location: Active channel, streamsides, marshes, seeps, springs; elevations below 12,000 feet.

Revegetation Approach: Container or transplant.

Key Notes: Accurate identification requires an understanding of flower characteristics.

Notes: Thick rhizome root system provides streambank stabilization. Native Americans used rushes for basketry and fish trap construction.



whole plant and flower







SEDGE

Species Name:Carex spp.Family:Cyperaceae (sedge family)Plant Type:Emergent

Description: Perennial, bladed (grass-like) with 3-sided stems and flat blades, forms clumps or tufts, height to 4 feet, often evergreen, some species spread by rhizomes.

Leaf: Blade, usually flat, can be rolled, thick (width ¹/₄-¹/₂ inch).

Flower: Unisexual, male spikelets sit above the female spikelets near the blade tip, flower stalk solid and without nodes.

Fruit/Seed: Tiny, 2-4 sided achene.

Typical Location: Depends on species: active channel, floodplain, wet areas, valley slopes, seasonally wet areas; elevations below 13,000 feet.

Revegetation Approach: Container, transplant.

Key Notes: Identification to species usually requires microscopic evaluation of flowering parts.

Notes: With over 1,000 species, sedges comprise one of the largest genera of plants in the world. Native Americans traditionally used certain species of *Carex* in basket weaving.



Carex nudata



SPIKE RUSH

Species Name:Eleocharis spp.Family:Cyperaceae (sedge family)Plant Type:Emergent

Description: Erect annual or perennial, spreads by rhizomes, stems round, wiry, generally grooved, height to 3 feet.

Leaf: Generally without or reduced to sheath around stem, sometimes leaves from base.

Flower: Bisexual, erect, single cluster at stem tip, flowers few to many.

Fruit/Seed: Achene, 2-3 sided or round.

Typical Location: Streamsides, marshes, meadows; elevations below 8,500 feet.

Revegetation Approach: Container or transplant.

Notes: Stems, roots and seeds are all forage for waterfowl.



whole plant and flower



flower



STINGING NETTLE

Species Name:	Urtica dioica
Family:	Urticaceae (nettle family)
Plant Type:	Herbaceous

Description: Perennial erect herb, stems with fine hairs, spreads by rhizomes, height to 10 feet.

Leaf: Lanceolate to widely ovate, margin toothed, veins 3-5 originating at base, length to 1½ inches.

Flower: April, mostly dioecious flower clusters (length to 3 inches) in leaf axis, male and female flowers small, sepals greenish, without petals.

Fruit/Seed: Ovate achene.

Typical Location: Streambanks, woodland marshes, moist waste areas; elevations below 10,000 feet.

Revegetation Approach: Container.

Key Notes: A subspecies is native to Eurasia and naturalized in North America, care must be taken in identification.

Notes: This plant contains tiny hollow hairs, which, upon contact with human skin, releases an irritating, stinging acid (formic acid), hence the name. Pierce's Disease host plant (see page XI-7 for more information).





flower





flower whole plant Location: channel, floodplain
APPENDIX XI-B

CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS



ACACIA

Species Name:Acacia spp.Family:Fabaceae (legume family)Plant Type:Exotic invasive tree

Description: Tree, height to 40 feet, evergreen.

Leaf: Distinctive primary and secondary leaflets, silver-gray, hairy. Primary leaflet: 10-25 pairs of secondary leaflets; secondary leaflet: 20-50 pairs of tiny, thin, overlapping leaflets (length to $<^{1}/_{4}$ inch).

Flower: Bisexual, spherical clusters of 25-30 tiny, bright yellow flowers.

Fruit/Seed: Pod, straight or slightly curved, slightly indented between seeds, length 2-3 inches.

Typical Location: Disturbed areas, roadsides, elevations below 1,600 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Members of the family Fabaceae have root nodules that contain atmospheric nitrogen-fixing bacteria.

Notes: Ornamental species brought from Australia. Highly invasive and has little wildlife value. Chemicals leaching from trees may cause allelopathic effects resulting in reduced or inhibited germination and growth in native plants.



leaf



flower





seed



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-1

CAPE IVY

Species Name:Delairea odorataFamily:Asteraceae (sunflower family)Plant Type:Exotic invasive vine

Description: Perennial vine, stems green or purple, older stems woody, ground cover develops to 30 inches high, climbs to considerable heights, spreads by runners that root at nodes.

Leaf: Palmate with 5-9 pointed lobes, shiny, greenish-yellow, length 1-3 inches.

Flower: Spring blooming, disk-like flowers, bright yellow, numerous.

Fruit/Seed: Achenes, tiny, wind dispersed, mostly sterile in California.

Typical Location: Moist forest, riparian areas, seasonal wetlands, coastal areas; elevations below 650 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Name changed to *Delairea odorata* from *Senecio mikanioides*.

Notes: Native to South Africa. Highly invasive and grows rapidly. Extreme pest with climbing behavior resulting in smothering and exclusion of native vegetation.



flower



leaf







ENGLISH IVY

Species Name:Hedera helixFamily:Araliaceae (ginseng family)Plant Type:Exotic invasive vine

Description: Woody vine, ground cover or climber with aerial rootlets, spreads by runners, evergreen.

Leaf: Variable shape, palmate with 3-5 lobes to ovate or diamond shaped, length to 4 inches, base width to 4 inches, edges smooth.

Flower: Branches with small, ball-like clusters of greenish flowers.

Fruit/Seed: Round berry, black, diameter <1/4 inch.

Typical Location: Moist shady areas, elevations between sea level to 3,300 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Very similar to non-native Algerian ivy (not pictured), *H. canariensis*, although Algerian ivy has larger leaves (width 5-8 inches) that are more widely spaced.

Notes: Non-native, planted as soil stabilizing ground cover, introduced from Europe, highly invasive. Prevents native plant germination. Ground cover and vining behavior kill both understory and overstory native plants by shading. Harbors slugs, snail and rodents.



leaf



flower



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-3

EUCALYPTUS GUM TREE

Species Name:Eucalyptus spp.Family:Myrtaceae (myrtle family)Plant Type:Exotic invasive tree

Description: Tree, tall and slender, height 30-150 feet, peeling bark, evergreen.

Leaf: Variable among species, always longer than wide (length 2-8 inches), leathery, usually lanceolate, edges smooth, pointed at tip, highly aromatic containing volatile oil.

Flower: Mostly spring/summer, sometimes through autumn, bisexual, cup-like receptacle contains flower, petals inconspicuous but stamen showy white, yellow, pink or red.

Fruit/Seed: Woody capsule, angular sides, flat top, contains many tiny seeds.

Typical Location: Disturbed areas; elevations below 1,000 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Native to Australia and imported as a wood source. Removal sometimes controversial because native wildlife, especially birds and Monarch butterfly, use tree for roosting or nesting. Allelopathic and shading effects result in reduced and inhibited native plant germination and growth. Thick leaf, bark and limb litter create fire hazard.







leaj



whole plant



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-4

FENNEL

Species Name:Foeniculum vulgareFamily:Apiaceae (carrot family)Plant Type:Exotic invasive herb

Description: Perennial herb with large taproot, erect, solid stems, height 3-10 feet, woody dry stems with seed heads remain visible after winter die back, new leaves form from base in late winter. Entire plant has strong licorice or anise-like aroma.

Leaf: Large triangle leaf, finely divided into thread like sections.

Flower: May-September, bisexual, umbrella like clusters (width to 4 inches) with 15-40 rays containing clusters of small, yellow flowers.

Fruit/Seed: Oblong, ribbed, length 1/8 inch, seed face flat.

Typical Location: Streamsides, roadsides, disturbed areas; elevations sea level to 1,200 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Native to Europe, escaped from cultivation. Spreads rapidly and excludes native vegetation. Disturbed, open soil encourages establishment. Dispersal of seeds by water result in downstream invasions.



whole plant



flower





seed



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-5

FLOATING PRIMROSE, WATER PRIMROSE

Species Name:Ludwigia peploides/Ludwigia hexa-petalaFamily:Onagraceae (evening primrose family)Plant Type:Exotic invasive emergent/aquatic

Description: Perennial herb, spreads by rooting nodes over stream edges and water forming floating mats (roots in water up to 18 inches deep, 10-15 feet from shore). Stems straight or branching, prostrate or erect, length 1-10 feet.

Leaf: Oblong to round, alternate, length to 2¹/₂ inches.

Flower: May-October, bisexual, showy, bright yellow, petal length to 1 inch. Flowers on stalks arising from leaf axis (point where leaf joins stem).

Fruit/Seed: Capsule, hard, long, cylindrical, 5-sided, with tiny seeds embedded in fruit walls.

Typical Location: Stream banks, ditches, ponds; elevations below 3,000 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Native to Southern U.S., cultivated as ornamental for landscaped ponds. Floating aquatic and emergent, depending on season and water level.



leaf and flower (erect fom)



flower





whole plant (floating form)



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-6

GIANT REED

Species Name:Arundo donaxFamily:Poaceae (grass family)Plant Type:Exotic invasive grass

Description: Many stemmed, dense clumps of cane or bamboo-like grass, stem hollow but divided by partitions at nodes (like bamboo), height 9-30 feet, spreads by rhizomes and rooting at nodes, semi-dormant in winter (turns brownish).

Leaf: Blade-like, flat, length to 3 feet, width to 2 inches at base, tapers to point at tip, alternate, arranged in a single plane (corn-like).

Flower: March-September, plumed terminal cluster, length 1-2 feet, brown or purple.

Fruit/Seed: No viable seed produced in North America.

Typical Location: Streamside, floodplains, drainages, ditches; elevations below 1,600 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Introduced from Asia and one of the greatest vegetative threats to the health of California's waterways. It is highly flammable, provides limited stream shading, and minimal habitat for native wildlife. Forms dense monocultures that may exclude native vegetation.



leaf





whole plant



whole plant Whole plant Location: floodplain, channel

CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-7

HIMALAYAN BLACKBERRY

Species Name:Rubus discolorFamily:Rosaceae (rose family)Plant Type:Exotic invasive vine

Description: Thicket forming, mound building (height to 10 feet or more), sprawling, vine-like, cane length to 20 feet, stems 5 angled, thorns large and curved, stem tips root.

Leaf: Compound with 5 leaflets, leaflet ovate, margins sharply toothed, length 2-4 inches.

Flower: April-June, clusters of white to pale pink flowers, petal length 1/2 inch.

Fruit/Seed: Blackberry (aggregate of black stone fruits), oblong, red ripening to black, highly edible, ripening in summer. Multiple small seeds inside single blackberry.

Typical Location: Common, disturbed moist areas, streamsides, roadsides, fencerows; elevations below 5,200 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Often confused with the native California blackberry (*R. ursinus*). Distinguished by leaf and thorn morphology.

Notes: The dense brambles choke out native vegetation and dominate the riparian forest floor. Thickets provide shelter and forage for wildlife, and erosion control. Removal requires revegetation with native vegetation. Pierce's Disease host plant (see page XI-7 for more information).







flower



seed



stem



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-8

PAMPAS GRASS

Species Name:Cortaderia selloanaFamily:Poaceae (grass family)Plant Type:Exotic invasive grass

Description: Perennial grass, dense clumps, height 6-14 feet, width 12 feet.

Leaf: Blades greenish-gray, width 1-3 inches, tapering at tip, sharp edges can cut.

Flower: Summer, dioecious (separate sex grasses) but can reproduce asexually, long stalks (length to 14 feet) with distinctive plum-like silvery flower head.

Fruit/Seed: Tiny seeds, wind dispersed, ripen in autumn.

Typical Location: Moist areas, disturbed sites, elevations below 1,000 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Ornamental brought from South America. Produces wind-born seeds asexually, results in rapid spread. Dominates landscape and excludes native vegetation.



Pampas grass



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-9

OCTOBER, 2003

seed

PEPPERWEED

Species Name:Lepidium latifoliumFamily:Brassicaceae (mustard family)Plant Type:Exotic invasive herb

Description: Perennial herb, erect, branching, height to 6 feet. Spreads by creeping roots (rhizomes) up to 10 feet from original plant. Dies back during winter months.

Leaf: Lanceolate, toothed or entire, waxy, distinctive white veins, lower leaves larger (length to 1 foot, width 2-3 inches) than upper leaves (width to 1 inch).

Flower: May-July, bisexual, dense clusters of tiny, white, 4 petaled flowers produced at stem tips.

Fruit/Seed: Round, pod-like, slightly hairy, diameter 1/12 inch, contains 2 tiny, reddish-brown seeds, spread by wind, water and possibly waterfowl.

Typical Location: Riparian areas/wetlands, roadsides, disturbed areas, saline soils; elevations below 6,200 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Flowers have 4 petals, a characteristic of the mustard family.

Notes: Native to Eurasia, accidentally brought to U.S. Successful competitor in riparian and wetland areas forming dense clusters that exclude native vegetation. Does not hold soil well resulting in streamside erosion. Reproduces and spreads by seeds and root fragments.





leaf



flower



whole plant



PERIWINKLE

Species Name:Vinca majorFamily:Apocynaceae (dogbane family)Plant Type:Exotic invasive vine

Description: Spreading, low growing, with erect flowering stems (height 9-20 inches) and trailing non-flowering stems (length to 6 feet), stems root at tips, deciduous. Stems produce milky latex if broken.

Leaf: Oval, tip pointed, opposite, length to 3 inches.

Flower: Spring-Summer, bisexual, single flowers, diameter 1-2 inches, light blue-purple, produced from leaf axis (point where leaf joins stem).

Fruit/Seed: Rarely produces viable seed in California.

Typical Location: Sheltered places, floodplains, streamsides usually escaped from cultivation; elevations below 650 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Native to Mediterranean region, commonly planted as ground cover. Low value to native wildlife and insects. The scientific name, Vinca, translates in Latin to "bind or conquer". Vinca lives up to its name with an aggressive, spreading growth that prevents native plants from becoming established. Pierce's Disease host plant (see page XI-7 for more information).



leaf and flower



flower





POISON HEMLOCK

Species Name:Conium maculatumFamily:Apiaceae (carrot family)Plant Type:Exotic invasive herb

Description: Perennial herb, erect, branched, stems hollow, generally purple spotted/striped, height 2-10 feet, taproot solid, whitish, parsnip like. Plant gives off unpleasant "mouse-like" odor when bruised.

Leaf: Compound, length 2-12 inches. Leaflets very small, finely divided, delicate.

Flower: May-September, bisexual, umbrella like clusters (width 1-2 inches) with 5-15 rays containing clusters of small, white flowers.

Fruit/Seed: Round to ovate, sides ribbed, diameter <1/4 inch.

Typical Location: Wet areas; elevations below 3,200 feet.

Revegetation Approach: Do not plant in riparian areas!

Notes: Native to Europe. Very toxic if eaten, all parts (leaves, seeds, roots) contain high levels of conine and related pyridine-type alkaloids. The Greek philosopher Socrates was executed by drinking prepared poison hemlock. May have allelopathic effects that suppress germination of native plants.



leaf



flower





seed



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-12

TAMARISK Salt Cedar

Species Name:Tamarix spp.Family:Tamaricaceae (tamarisk family)Plant Type:Exotic invasive shrub

Description: Shrub or small tree, thin, narrow crown, height to 26 feet, branches jointed and often drooping, deep taproot, spreads extensively by rhizomatous roots, deciduous.

Leaf: Scale-like, tiny (length to <¼ inch), overlap, can excrete salt.

Flower: March-September, small cluster (length to 2 inches) of small, pink, short- petaled (length to ¹/₄ inch) flowers, insect pollinated, highly fecund.

Fruit/Seed: Seeds tiny, tuft of hair at one end, spread by wind and water.

Typical Location: Floodplains, riverbanks, ditches, marshes; elevations below 2,600 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Native to Asia. Invades wet areas especially after human disturbance, requires great quantities of water, can lower water table. Spreads by seed, rhizomes and re-rooting of fractured root fragment. Accumulates salt in leaves, falling leaves may result in accumulation of salt in topsoil. May be long lived (50-100 years). Excludes native vegetation, provides little value to native wildlife and insects, and may change soil and water conditions.





leaf and seed



flower



seed



whole plant in flower



TEASEL

Species Name:Dipsacus fullonumFamily:Dipsacaceae (teasel family)Plant Type:Exotic invasive herb

Description: Biannual herb/small shrub, stems branched, armed with thorns, height to 6 feet.

Leaf: In pairs, partially fused around stem, toothed.

Flower: Early spring to late autumn, bisexual, flower head egg-shaped, spiny. Flowers small, lavender-white, appear in rows around head.

Fruit/Seed: Achene, hairy, box-like, length 1/4 inch.

Typical Location: Roadsides, pastures, moist sites; elevations below 5,600 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Distinctive bristly dried flower heads persist through winter.

Notes: Native to Europe. Imported in 19th century and grown for the bristly flower head. The dried flower head was used to brush woolen fabrics to bring up the nap.



whole plant



flower



Location: floodplain

CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-14

TREE OF HEAVEN

Species Name:	Ailanthus altissima
Family:	Simaroubaceae
Plant Type:	(quassia or simarouba family) Exotic invasive tree

Description: Tree, bark gray-brown and thin, height to 65 feet, fast growing, often grows in clumps, deciduous.

Leaf: Compound, length 1-3 feet, with 13-25 leaflets. Leaflets lanceolate, margins with few teeth, pointed at tip, length 3-5 inches, produce a bad smell when crushed.

Flower: April-July, dioecious (separate sex trees), occasionally bisexual, female and male flowers similar, non-descript, yellow-green. Flowers grow in 3-8 inch clusters. Male flowers have unpleasant odor.

Fruit/Seed: Winged achene, green-yellow or showy orangered, seed at center, length 2 inches, wind dispersed, female trees produce large quantities, ripen September-October.

Typical Location: Disturbed areas, roadsides, tolerant of pollution; elevations below 4,100 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Key Notes: Young plants sometimes confused with the native black walnut (*Juglans californica*). Seeds, flowers or careful inspection of leaf characteristics distinguish between species.

Notes: Brought to California from Asia during the gold rush era. Highly invasive, grows rapidly and spreads both vegetatively and by seed.







leaf



whole plant



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-15

YELLOW STAR THISTLE

Species Name: Family: Plant Type:

: *Centaurea solstitialis* Asteraceae (sunflower family) Exotic invasive herb

Description: Annual, early spring growth from taproot, green, low to ground; in late spring through autumn the plant bolts to become stiff branched, bluish-green, develops stem leaves and flowers, height to over 3 feet.

Leaf: Lower leaves lobed, length 2-6 inches, bristly, lost before flowering; upper leaves not lobed, narrow, leaf ridge extends down stem past point of attachment (winged appearance), bluish-green, length to over 1 inch.

Flower: May-December, numerous, solitary, ovoid flower head with long spines (length to 1 inch), bright yellow, can have 2 flowering seasons per year (spring then autumn).

Fruit/Seed: Achene, 2 types, outer seedhead achenes are dark brown, inner are light brown with tiny bristles.

Typical Location: Pastures, roadsides, grasslands, woodlands, disturbed areas; elevations below 4,200 feet.

Revegetation Approach: Do not plant in riparian areas! Remove where feasible.

Notes: Introduced from southern Europe, believed to be accidentally moved with livestock feed. Considered one of the western United States' most noxious weeds. Displaces native plants and animals, and reduces soil moisture reserves in grasslands. Long spines limit access to recreational areas. Reduces land value, poisonous to horses and poor forage for livestock.



flower



whole plant in flower



CENTRAL AND NORTH COAST INVASIVE NON-NATIVE PLANTS XI-B-16