

Appendix H

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Consultants Report

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**DRAFT BOTANICAL RESOURCES STUDY
FOR PROGRAM EIR
MAD RIVER, MAD RIVER GRAVEL EXTRACTION**

MARCH 8, 1993

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I INTRODUCTION

The following report has been prepared for use in the Program EIR for instream gravel extraction on the lower Mad River in Humboldt County, California. The study area extends along an approximate 17-mile stretch of Mad River, from the historic location of Swasey Dam downstream to the Hammond Bridge. The geographic scope, as defined by the Humboldt County Planning Department, is bank to bank where instream gravel mining presently occurs, plus adjacent processing sites. The report includes existing facilities, extraction areas, and roads only, and does not address the impacts of future facilities expansion, increased extraction volumes, or new operations.

II STUDY GOALS

The goals of this study are to evaluate the potential impacts of instream gravel mining on riparian vegetation and associated habitat values, and to present mitigation strategies which can minimize and/or eliminate potential impacts. It is proposed to meet these goals by attaining the following objectives:

- description of the existing botanical habitats, including a discussion as to their development and brief comment as to their potential wildlife habitat value;
- discussion of the potential impacts of instream gravel mining operations, both direct and indirect, on existing habitats;
- discussion of possible mitigation measures to be employed to reduce or avoid potential impacts; and
- a discussion of the characteristics of each gravel bar under examination in the Program EIR.

III METHODOLOGY

The following tasks were undertaken and completed for the study:

- review of pertinent literature and aerial photography with regard to the vegetative characteristics of the study area;

- review of pertinent literature and aerial photography with regard to the evolution of the riparian vegetation;
- review of methodologies employed for in-stream mining operations;
- literature and agency review with regard for the potential for sensitive plant species;
- field reconnaissance to delineate existing botanical habitats within the study area;
- field survey to document presence or absence of sensitive botanical species in the survey area.

IV BOTANICAL HABITATS

A. Overview

Field investigation was undertaken during February 1993 to determine the nature and extent of botanical habitat types within the survey area. Results of the field survey along with information gathered from aerial photography from the 1992 season indicate the presence of four distinct habitat types. Arbitrary cover class designations are used within the report as follow:

- sparse <10% cover,
- low 10%-30% cover,
- moderate 30%-70% cover,
- dense 70%-90% cover,
- very dense >90% cover.

Starting from the summertime low-water wetted channel and moving upland, these include gravel bar, riparian scrub, and mature riparian forest. Ponds and backwaters, the fourth type, are found infrequently within both the scrub and forest vegetation types.

A "typical" cross section of riparian vegetation shows a progression, starting at the gravels alongside the channel, of sparse herbaceous vegetation to low density woody vegetation (early successional scrub) to dense woody vegetation (late successional scrub) to riparian forest. The progression of vegetation is correlated to terrace elevation and depth of sediment deposits, with the sparse herbaceous vegetation at the lowest elevations, the early successional scrub on the lower (most recently formed) terraces, the late successional scrub on the moderate-elevation terraces, and the riparian forest on the higher terraces. Of importance to the development of vegetation in terrace evolution is the deposition of silt and fines, which provide a medium for vegetation development. As early vegetation establishes, additional sediment is trapped and nutrients are added to the

developing soil. This process continues as the terrace evolves, allowing for the establishment of woody scrub species and, eventually, tree species.

Remnant channels and backwaters occur throughout the study area, and interrupt the "typical" vegetative progression. This creates linear stands of differing ages of scrub vegetation and, occasionally, young forest vegetation. Some backwaters and ponds persist long enough to allow for the growth of emergent wetland vegetation, which provides a small but notable component of the riparian vegetation complex.

Riparian vegetation provides a high degree of potential wildlife habitat value, in term of species diversity, species density, and Species of Special Concern as listed by the California Department of Fish and Game. Wildlife habitat value is afforded by a variety in food sources, cover, vertical structural, and proximity to water. The dynamic nature of natural riverine systems results in the establishment of different zones of vegetation, each with its own special characteristics. Even within a single habitat type, early successional stages offer different habitat values than do the later, more mature stages.

Portions of the study area appear to meet the wetlands criteria for the California Department of Fish and Game and/or the US Army Corps of Engineers. The wetlands characteristics of the study area are not addressed as a separate issue within this report, but will need to be addressed on an individual permit basis in the future.

B. Gravel Bar

The gravel bar habitat encompasses that area which is seasonally inundated and scoured by normal winter flows. The substrate is comprised of varying amounts of cobbles, pebbles, and gravel with minor amounts of silt and sand. Large woody debris (tree trunks and root wads) has accumulated at a number of spots within this habitat type.

Gravel bars are generally devoid of perennial woody vegetation, and support annual forbs and grasses during spring and summer months. In some areas, large woody debris provides localized protection for vegetative growth. The diversity and density of this vegetation is quite variable and depends on site-specific characteristics, including period of inundation, availability of moisture during summer months, insolation, substrate qualities (e.g., amount of accumulated fines), and mechanical disturbance. Most of this area was either under water or had been recently inundated during field investigation in February 1993. A few seedlings were noted during field review; identification was not attempted this early in the season.

A period of prolonged drought, such as that which has occurred over recent years, not only results in less frequent inundation during winter months, but may also result in lower summertime flows. Lowering of the channel bed (degradation) has also occurred within the study area during recent years (Jager, et. al, 1992). A combination of these two factors has apparently led to a lowering of the water table and allowed sparse woody vegetation, primarily arroyo willow (*Salix lasiolepis*) or coyote brush (*Baccharis pilularis* var. *consanguinea*), to establish in some areas which might not otherwise support these species. These areas of young woody vegetation are often linear patches running parallel to the direction of high winter flow. As these patches mature, they trap sediment and debris, resulting in the formation of hummocks of differing vegetation within the gravel bar habitat.

C. Riparian Scrub

Riparian scrub extends transversely from the lowest terraces bordering the gravel bar to the uppermost terraces supporting riparian forest. The substrate is comprised of coarse fragments (cobbles, pebbles, and gravel) overlain with fine deposits (sand and silt) which increase in depth from the lower to upper terraces. Woody debris has accumulated in some of the lower areas, and appears to be generally smaller than that found on the gravel bars. This debris is often trapped against existing vegetative stands.

The vegetation is quite variable within the habitat, in terms of diversity, density, and spatial distribution. The greatest vegetative diversity is generally located within the early successional stages on the lower terraces, which are characterized by extensive herbaceous cover and sparse young woody vegetation (coyote brush and/or arroyo willow). Late successional vegetation is located at slightly higher elevations and is generally underlain with a deeper layer of fine deposits. The later stages are characterized by a decrease in herbaceous cover, an increase in shrub density and cover, a deepening of fine deposits, and an increase in elevation. Young red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) may be found sparingly at the upper edges of mature scrub vegetation.

It appears that the combined influences of the recent drought period along with channel degradation may have allowed the early stages of the riparian scrub to encroach further onto the gravel bar than would occur during "normal" hydrologic years. Low winter flows have deposited fine sediments at lower elevations in areas which are usually subject to annual scouring. The accumulation of these sediments has, in turn, allowed for encroachment of herbaceous and woody species, and expanded the spatial extent of the scrub habitat and associated potential wildlife value.

D. Riparian Forest

This habitat is located on higher terraces than the others and is usually spatially the farthest away from the river channel. On alluvial terraces, the substrate is characterized by deep silt and sand deposits overlying coarse material. On native slopes (e.g., between Glendale and Essex, and upriver of the fish hatchery), the substrate is comprised of native material, with occasional rocky outcrops. River-borne woody debris is sparse to absent within this habitat.

Within the riparian forest may be single-aged or mixed-aged stands of vegetation, depending on historic river channel locations, flood activity, and land use practices. Within the study area, the riparian forest is typified by moderately dense to dense canopy cover with black cottonwood, red alder, and yellow willow (*Salix lasiandra*) being dominant. In more mesic areas associated canopy species include California bay (*Umbellularia californica*) and cascara sagrada (*Rhamnus purshiana*) with occasional Sitka spruce (*Picea sitchensis*) and coast redwood (*Sequoia sempervirens*). By virtue of its spatial location, the riparian forest is protected from frequent periodic inundation, which, in turn, has allowed the canopy species to develop and mature.

The shrub layer is present in low to moderate cover classes. Characteristic species include coyote brush, salmonberry (*Rubus spectabilis*), and red elderberry (*Sambucus racemosa* ssp. *pubens* var. *arborescens*), with California blackberry (*Rubus vitifolius*) and Himalaya berry (*Rubus discolor*) being more evident along the edges and in disturbed areas. The herb layer generally exhibits low cover values, with sword fern (*Polystichum munitum*) and bracken fern (*Pteridium aquilinum* var. *pubescens*) being typical.

The relative species composition of the riparian forest is variable within the study area. In some stands cottonwood is the dominant species, with red alder being a moderate to very minor component. Other stands are dominated by red alder with cottonwood being a minor to absent component. Yellow willow was noted primarily in the vicinity of Graham Bar, associated with both cottonwood and red alder.

The age class of forest vegetation is also variable within the study area. Review of historic aerial photography and conversations with the property owner indicate that the young forest complex adjacent to Graham Bar has developed within the last 25 years. Examples of older stands include those just downstream of Hatchery Bridge as well as those adjacent to agricultural fields in the Blue Lake area. Isolated mature cottonwood on agricultural fields are most likely remnants from a more extensive forest which existed prior to clearing for agriculture.

E. Ponds and Backwaters

There are isolated backwaters and ponds, generally within the scrub habitat, which are subject to inundation more frequently than the rest of the habitat and which accumulate silt deposits. A number of these persist for a period sufficient to support a different flora than the remainder of the scrub with the vegetation being characterized by hydrophytic species. Slough sedge (*Carex obnupta*), broadleaf cattail (*Typha latifolia*), and horsetail (*Equisetum laevigatum*) are the most common. Adjacent vegetation is variable, from sparse to very dense shrubs and young trees. The location of these backwaters and ponds change periodically, depending on the annual flow characteristics of the river. Their present locations will be addressed later in this report in the section dealing with site-specific characteristics.

F. Sensitive Plant Species

An inquiry was made to the Natural Diversity Data Base with regard to presence of rare, threatened and/or endangered plant species within the project area. There are no records of any species within the study area. Additionally, review of the Inventory of Rare and Endangered Vascular Plant Species (CNPS, 1988) and the California Department of Fish and Game's Special Plant List (CDF, 1991) does not reveal any species which would be expected within the habitats found in the study area.

G. Wildlife Habitat Value

This discussion is intended only as a brief overview of the potential wildlife values of each vegetation habitat for terrestrial species. Species-specific values of each vegetation habitat will be discussed separately in the wildlife report to be prepared by Ron LeValley.

The wildlife habitat value of the gravel bar habitat is low in comparison with the remaining riparian habitats due to the relative absence of cover and scarcity of food. Scattered patches of woody vegetation which have developed within the gravel bar habitat act to locally enhance wildlife values by providing cover and a food source for species which may not usually be found here.

The riparian scrub provides habitat for a wide variety of small and moderate-size mammals and birds. In general, the potential wildlife habitat value increases with an increase in the vegetative density, with the denser stands supporting a greater diversity of species and number of individuals.

The riparian forest provides a high degree of wildlife habitat value, due to well-developed vertical structure, extent of cover, and food availability. This habitat is utilized by a wide variety and large numbers of insects, birds, and mammals.

Persistent ponds and backwaters with emergent vegetation provide habitat for several wildlife species of concern, including the California red-legged frog, the northern yellow-legged frog, and the western pond turtle. The potential value of this habitat lies not so much in the diversity of species but in the particular special species which it supports. These areas most likely meet the wetlands criteria of both the California Department of Fish and Game and the US Army Corps of Engineers.

IV POTENTIAL IMPACTS RESULTING FROM GRAVEL EXTRACTION

A. Direct Impacts

The immediate impact of gravel extraction on botanical habitats is the removal of vegetation and an overall decline in the botanical diversity. A reduction in vegetative cover will result in a decrease in wildlife habitat value with an expected decline in the numbers of individuals and species present. With respect to current conditions and values, the removal of gravel bar habitat would result in the least overall degree of direct impact while the removal of riparian forest would result in the greatest overall degree of impact on both botanical and wildlife values. There has been no attempt to quantify vegetation removal and/or disruption, as the results of concurrent studies (e.g., wildlife, fisheries, fluvial processes) and operational details of individual permit applications are not known at this time.

Removal of isolated patches of moderate to late stage scrub vegetation and young forest stands from the gravel bar and early scrub habitats would preclude the development and expansion of these vegetation types over time. These "islands" of more developed vegetation serve to enhance habitat values for wildlife; their removal would result in an overall decline in habitat value.

Continued excavation in any one area precludes the natural evolution of terraces and subsequent development of riparian vegetation. The low-lying herbaceous and early scrub habitats would be the most affected. The localized long-term effects would include the loss of early stage scrub, the maturation of the later stage scrub and forest, a decline in vegetative diversity, a decline in wildlife habitat values, and a likely decline in wildlife diversity.

B. Indirect Impacts

A natural riverine system is highly dynamic and routinely experiences changes in the location of the channel and the area of wetted surface over time. Depending on the nature and extent of relocation, bank erosion may occur on either side of the stream bed. Bank erosion, whether on low terraces vegetated with riparian scrub or on high terraces with mature riparian forest, results in

loss of vegetation, habitat diversity, and a decline in overall habitat value. In a natural system, erosion on one side of the channel is generally accompanied by deposition on the opposite side, with development of vegetation over time. The natural replenishment of the riparian vegetation is thus closely correlated with the hydrologic processes. The alteration of natural hydrologic processes by instream gravel extraction can affect riparian vegetation by accelerating the rate of erosion and/or precluding the deposition of materials (and subsequent establishment of vegetation) over time. These changes can occur both upstream and downstream of active mining areas as well as directly at the extraction sites.

Instream gravel extraction in excess of recruitment may lead to stream bed degradation which, in turn, results in a lowering of the water table. Many riparian species thrive where they do because of their specific water requirements. A significant lowering of the water table will alter the density and diversity of plant species growing in any specific location. Young shoots of arroyo willow, for instance, tend to colonize close to the water's edge in order to take advantage of the proximity of the water table. A lowering of the water table due to degradation of the low-water wetted channel is expected to preclude new colonization of these areas and to stress existing young stands.

V POTENTIAL IMPACTS RESULTING FROM GRAVEL PROCESSING

The areas currently used for gravel processing have been in operation for a number of years and are highly disturbed. Many of them, however, have remnant stands of mature forest and scrub vegetation at their outer edges. A substantial increase in the volume of material processed and stored at any one site might require additional space, which could result in the removal of these remnant stands.

VI MITIGATION MEASURES

It is recommended that a gravel management plan be prepared by the County in order to provide scenarios which allow for continuing gravel extraction with a minimal impact to other resources of the riverine system. A comprehensive management plan should include a monitoring program which documents the changes over time to the various components of the study area. The use of aerial photography with ground-truthing is an effective means of tracking changes over time. The acreages of each existing vegetation type should be calculated from the 1992 aerial photographs to serve as baseline data. There is also aerial photography available from several earlier dates which could be utilized for an historical perspective. If, for instance, one of the goals of the management plan is to maintain a certain percentage cover by riparian forest

within the study area, then routine calculation of the riparian forest coverage can be made from aerial photography to determine if this goal is being met.

Specific mitigation plans and monitoring programs should be developed for each individual permit. Monitoring programs should include measurable success standards and include a time frame in which the standards are to be met. Remedial action should be proposed should the standards not be met within the specified time frame. It is recommended that all mitigation occur as close to the area of impact as possible so as to minimize overall loss of habitat value. Mitigation plans need to be prepared to meet site-specific goals as well as comprehensive goals presented in the study area management plan.

Two specific mitigation measures are offered to reduce the impacts of gravel extraction on riparian vegetation - avoidance and revegetation. Avoidance should be employed in those areas of continuous, well established vegetation, from moderate scrub to mature forest. At any one particular site, at least some of the early successional scrub should be avoided in order to allow for diversity of age class and attendant habitat value. Isolated stands of moderate age scrub and young forest within the gravel bar habitat should be considered on a case by case basis to evaluate their contribution to the overall habitat value. It is recommended that those patches with a high probability for surviving the forces of high water flows be avoided.

Revegetation allows for continued gravel extraction followed by habitat creation and enhancement. Salvage of existing plant material, particularly woody species, is recommended wherever possible. Salvaged material needs to be properly stored and maintained (e.g., adequate water supply, protection from desiccation). Reclamation also offers an opportunity for habitat diversification if desired. An example would be the creation of small ponds which allow for the establishment and support of particular species such as the California red-legged frog and the northern yellow-legged frog.

VII SITE-SPECIFIC CONSIDERATIONS

A. Site No. 1, Guynup Bar, Mad River Sand and Gravel

This includes a processing yard located on the uppermost terrace, as well as the bar itself. There is a remnant stand of riparian forest on the southeasterly side of the processing yard which extends down slope to meet with a mature scrub stand at the bottom. The forest supports a mix of cottonwood and red alder, with some mature arroyo willow. There was standing water several feet deep along the base of this slope at the time of field review, with vegetation on both sides. This is either a remnant channel or

a backwater area with potential habitat value for amphibians. A mix of forest and mature scrub continues northerly along the bank. The remainder of the area is comprised of gravel bar habitat and early to mid-successional scrub habitat. It is recommended that the mature scrub/forest complex on the slope and the associated low-lying backwater be avoided.

B. Site No. 2, Emmerson Bar, Redwood Empire Aggregates

This site is characterized primarily by gravel bar and early successional riparian scrub. There are a few isolated patches of woody vegetation, including several stands of 20-foot arroyo willow in the gravel bar and a patch of young cottonwood (to 25-30 feet), arroyo willow, and coyote brush in the lower reach of the riparian scrub. These patches have apparently been able to mature sufficiently in recent years to attain some height and begin accumulating silt and other debris at the base. They likely enhance the habitat value of the bar and lower terrace in providing cover and some food for wildlife. It is recommended that these patches be avoided during extraction, and that extraction be accomplished so as to minimize erosion around these areas during winter months.

A pond with emergent vegetation (primarily cattail) is located at the northerly end of the bar, at the base of the slope. It is surrounded by a moderately dense stand of arroyo willow and red alder. This pond potentially has high habitat value for amphibians due to its persistence and the presence of good vegetative cover, and should be avoided in order to protect its comparatively unique habitat value. This area would likely meet the wetland criteria of both the California Department of Fish and Game and the US Army Corps of Engineers.

A small bar is located just downstream of hatchery bridge, on the south side of the channel. At the time of field investigation, the lower part was under water and the remainder had been covered with up to a foot of sediment. Access to this site is via a road through a mature cottonwood forest. Portions of the access road are also used for storage of materials.

C. Site No. 3, Blue Lake Bar, Redwood Empire Aggregates,

Much of this bar is typified by gravel bar bordered by early successional riparian scrub, with patches of later successional scrub (dense arroyo willow thickets) concentrated in the northerly portion. There is a small stand of cottonwood (riparian forest) on the slope from the processing/storage yard down to the duck pond installed at the end of 1992. In addition, there is a large patch of transitional scrub/forest to the south of the duck pond; this area has an approximate 20% cover by coyote brush and clumps of arroyo willow and small diameter cottonwood to 15 and 25 feet in height respectively.

Due to the lack of riparian forest on this site, it is recommended that this latter area, particularly the woody clumps, be avoided during extraction so as to allow for the maturation of the cottonwood and development of riparian forest. Development of riparian forest at this site would not only diversify the on-site habitat and increase the value to wildlife, but would assist in providing a corridor for wildlife migration between forest patches upstream and downstream of this bar. Revegetation in and around the duck pond could be incorporated for mitigation should this area not revegetate naturally, as had been expected.

D. Site No. 4, Christie Bar, Eureka Sand and Gravel

Nearly all of this site supports the gravel bar and very early successional riparian scrub habitat types. A few patches of arroyo willow are present toward the established scrub habitat. In addition there is a small population of mixed riparian forest and scrub on a terrace remnant toward the easterly (upstream) end of the bar. This terrace remnant appears to be rapidly eroding. Two ponds have been excavated on the bar, one toward the upstream side (1989) and one toward the downstream side (1992). There is a broad stand of mature scrub and patches of forest vegetation between the processing yard and the gravel bar, much of which has evolved over the last few decades. It is recommended to continue using the existing roads between the processing and extraction areas in order to preclude disruption of this stand. Revegetation in and around the ponds could be incorporated for mitigation should these areas not revegetate naturally, as had been expected.

E. Site No. 5, Johnson Bar, Redwood Empire Aggregates

Most of the Johnson Bar, as delineated by the County, is comprised of gravel bar habitat. There was a small linear stand of scrub willow (to 10 feet in height) noted as well as patches of early successional scrub. There is a broad terrace above this bar to the south which is dominated by early and mid successional scrub vegetation with strips of mature scrub. There were a few older backwater channels which may persist long enough for amphibian breeding. If this is, in fact, the case, then these areas should be avoided during excavation. Planting around these backwater channels for mitigation of impacts on other areas of the bar would enhance the potential wildlife value. No other recommendations are offered for this site.

F. Site No. 6, Essex Bar, Mercer Fraser

The upper terrace of this site is utilized for storage of materials from on and off site. Vegetation in this area is quite sparse, with ruderal (weedy) herbaceous species and a few coyote brush being noted in areas not recently disturbed. There is a narrow band of mixed scrub and forest vegetation between the storage terrace and the riverside gravel bar, characterized by

arroyo willow and red alder with sparse cottonwood. The gravel bar exhibited virtually no vegetation at the time of field review. The bar itself was partially covered with several inches of sediment, apparently from this year's high flows. It was noted during field review that a number of alder had been cut very recently on the adjacent upstream parcel. It is recommended that the existing roads between the storage and extraction areas be utilized, and that the narrow band of scrub/forest be left undisturbed.

G. Site No. 7A, Johnson-Spini Bar, Arcata Ready Mix

This site is characterized by two large gravel bars just downstream of the US 299 bridge, and a very small strip of gravel bar along the southerly bank. Moderate amounts of sediment have been deposited unevenly on the bars during the past winter. There was no vegetation noted on either bar during field review; the northerly bank of the this stretch of river has been lined with rip rap, and supports a moderately dense cover of arroyo willow (scrub). The southerly edge of the study area is lined with a mature forest supporting a mix of cottonwood and red alder. Access is via a road on the south side of the river, through the cottonwood/alder stand. It is recommended that this road continue to be utilized, and that no new roads be cut through the forest.

H. Site No. 7B, Arcata Ready Mix Bar

This site is comprised primarily of the processing plant and storage yard. There is a mature stand of mixed scrub-forest vegetation along the easterly half of the slope descending from the upper terrace to the river. At the time of field investigation, the entire area below this band of vegetation had been covered with up to several feet of sediment; no exposed gravels were noted. It is recommended that the band of scrub-forest between the processing and extraction areas not be disturbed.

I. Site No. 8, Graham Bar, Redwood Empire Aggregates

This site includes the Redwood Empire Aggregates processing yard and narrow bar on the south side of the river, a long narrow bar on the northerly bend on the river, and another bar on the westerly side of the downstream bend. The southerly side of the river supports a band of fairly mature forest, dominated by red alder with yellow willow and cottonwood present in lesser amounts. The southerly bar was covered with several feet of sediment at the time of field investigation. There is a pocket of mature scrub vegetation on the downstream bend, and sparse early scrub vegetation on the bar itself.

The northerly bar, across from the processing plant, is at the edge of a moderately aged stand of mixed forest vegetation which has developed within the last twenty-five years. Several low-lying areas within the forest are wet enough to support

emergent vegetation. Thick sediment deposits with no exposed gravel were noted during field review on this bar. There are no stands of forest vegetation of equal or greater size downstream. It is recommended that extraction operations be conducted to minimize impacts on the forest stand so as to allow it to mature.

J. Site No. 9, Simpson Bar

The Simpson Bar is bounded by native slopes rather than alluvial terraces on both sides of the river. The current channel is on the northerly side of the canyon. This site supports an open gravel bar habitat with early scrub vegetation being extremely sparse to absent. The banks on both sides of the river support mature arroyo willow on the lower slope and a mature red alder forest on the upper slope. At the top of both banks, the deciduous riparian forest grades into a mixed forest with cottonwood, alder, and sparse California bay (*Umbellularia californica*) and Sitka spruce (*Picea sitchensis*).

Bank erosion in this area would result in the loss of mature riparian scrub and forest habitat, and could undermine the upland forest on top of the bank. It is recommended that gravel extraction in this area be undertaken in such a manner as to minimize bank erosion. Due to the current position of the low-water wetted channel, the northerly bank is probably more exposed to erosion than is the southerly bank.

K. Site No. 10, Simpson (across from hatchery)

This site is located at the upstream end of the Blue Lake Valley. It is characterized by a mid-stream gravel bar (with gravel bar habitat), gravel bar and early to mid-aged scrub on the easterly side, and mixed young and moderate age scrub on the westerly side. Portions of the westerly bank are being actively eroded. While mature scrub and riparian forest were not observed within the active area defined by the county, they are located adjacent to and westerly from the site. It is recommended that extraction activities be undertaken in such a manner as to not accelerate the erosional process (and loss of mature vegetation) on the westerly bank.

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APPENDIX
COMPILED SPECIES LIST

CANOPY SPECIES

<i>Alnus rubra</i>	red alder
<i>Ilex aquifolium</i>	English holly
<i>Picea sitchensis</i>	Sitka spruce
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood
<i>Rhamnus purshiana</i>	cascara sagrada
<i>Salix lasiolepis</i>	arroyo willow
<i>Salix lasiandra</i>	yellow willow
<i>Sequoia sempervirens</i>	coast redwood
<i>Umbellularia californica</i>	California laurel

SHRUB AND VINE SPECIES

<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush
<i>Rubus discolor</i>	Himalaya berry
<i>Rubus spectabilis</i> var. <i>spectabilis</i>	salmon berry
<i>Rubus vitifolius</i>	California blackberry
<i>Sambucus racemosa</i> ssp. <i>pubens</i> var. <i>arborescens</i>	red elderberry

HERB AND FERN SPECIES

<i>Anaphalis margaritacea</i>	pearly everlasting
<i>Bellis perenne</i>	English daisy
<i>Bromus</i> sp.	brome
<i>Carex obnupta</i>	slough sedge
<i>Cirsium vulgare</i>	bull thistle
<i>Cortaderia selloana</i>	pampas grass
<i>Daucus carota</i>	Queen Anne's lace
<i>Dipsacus fullonum</i>	teasle
<i>Equisetum laevigatum</i>	horsetail
<i>Festuca</i> sp.	fescue
<i>Foeniculum vulgare</i>	fennel
<i>Hedera helix</i>	English ivy
<i>Holcus lanatus</i>	velvet grass
<i>Hypochoeris radicata</i>	perennial cat's ear
<i>Melilotus alba</i>	sweet white clover
<i>Plantago lanceolata</i>	English plantain
<i>Poa</i> sp.	bluegrass
<i>Polystichum munitum</i>	sword fern

APPENDIX
COMPILED SPECIES LIST
(continued)

<i>Pteridium aquilinum</i>	bracken fern
var. <i>pubescens</i>	wild radish
<i>Raphanus sativa</i>	California beeplant
<i>Scrophularia californica</i>	hedge nettle
<i>Stachys</i> sp.	clover
<i>Trifolium</i> sp.	broadleaf cattail
<i>Typha latifolia</i>	wooly mullein
<i>Verbascum thapsus</i>	periwinkle
<i>Vinca major</i>	