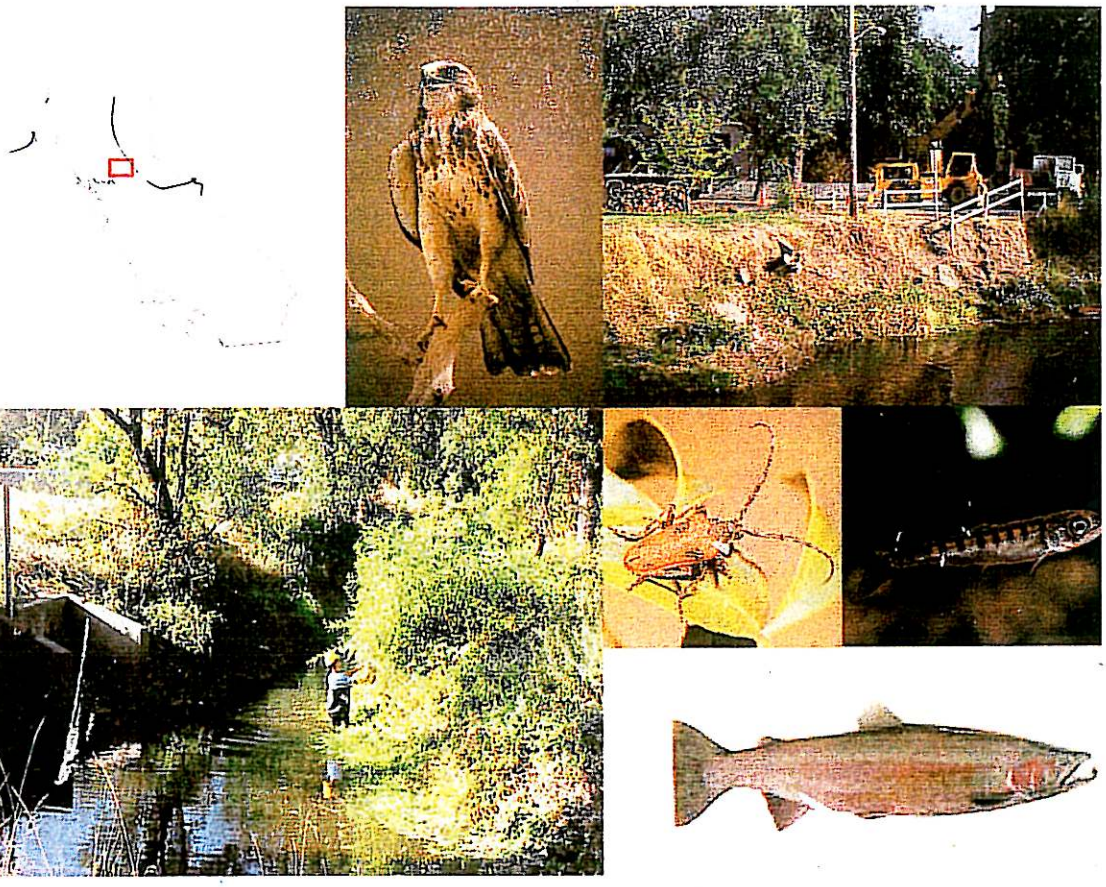
GANDA

City of Roseville

CREEK MAINTENANCE GUIDELINES



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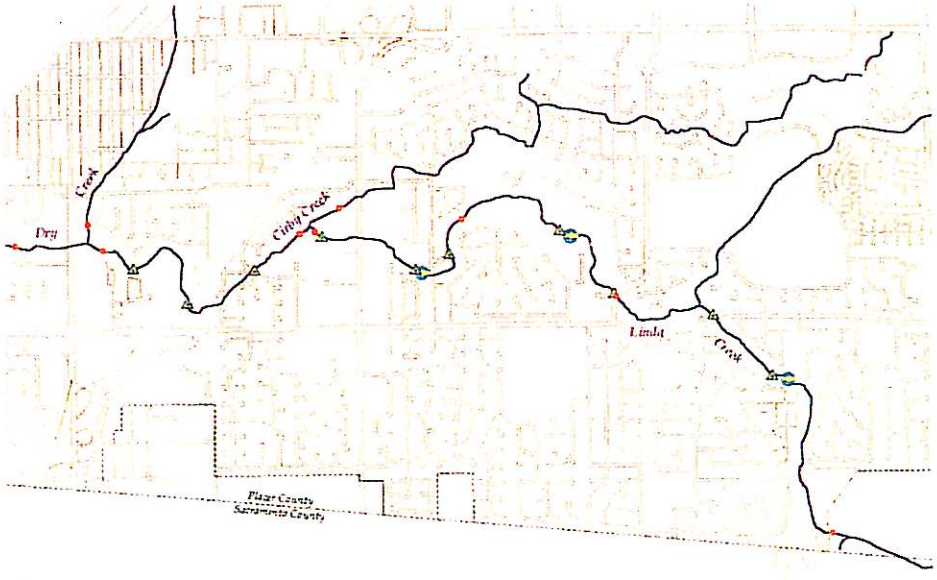

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316 Vernon Street #102
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February 2001

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A. Introduction

This document entitled, "Creek Maintenance Guidelines," defines routine maintenance activities and establishes procedures to minimize impacts to natural resources within or adjacent to the various creeks within the city limits of Roseville. Creek maintenance activities are carried out by the City's Park Maintenance and Street Maintenance divisions and are conducted, as needed, each summer at various locations throughout the City.

Creek maintenance activities are necessary to maximize flow conveyance and ensure adequate storm drainage and public safety. These activities must, however, be conducted according to the Memorandum of Understanding (MOU) between the City and the California Department of Fish and Game (CDFG) regarding Routine Maintenance Activities in Unimproved and Improved Channels (See Appendix A).

This guidelines document is designed to assist field crews with details on ways to minimize adverse effects of creek maintenance activities to satisfy the City's obligation to protect special-status species. For the purpose of this guidelines document, special-status species include those species that are federally or state listed as threatened or endangered, federal candidates for listing as threatened or endangered, or State of California species of special concern. In order to help field crews in identifying special-status species, descriptions are provided herein prior to presenting the maintenance activities. A glossary of commonly-used terms can be found in Section H.

As a supplement to this guidelines document, a creek maintenance field booklet is included in the inside pocket of this document. The field booklet is a condensed version of the information provided in this document and should be referred to only after creek maintenance staff have reviewed this comprehensive guidelines document.

The development of these guidelines are based on Garcia and Associates' (GANDA) on-going work with the City of Roseville regarding the status and health of Roseville's creeks and associated special-status species.

B. Special-Status Species

The Federal Endangered Species Act (FESA) of 1973 and the California Endangered Species Act (CESA) of 1984 provide legal protection for plant and animal species in danger of becoming extinct. There are several listing categories defined under these laws. In addition, some species listed by the Federal Government as endangered or threatened may not necessarily be afforded the same status by the State of California and vice-versa. In addition to federal and state endangered and threatened listings, species may also be listed as a ***species of special concern*** due to their limited distribution, declining populations, diminishing habitat, or unusual scientific, recreational, or educational value. These species are not afforded the same legal protection as listed species, but may be added to official lists in the future.

In general, a species is considered ***endangered*** when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors. A species is considered ***threatened*** when the species is existing in such small numbers throughout all, or a significant portion, of its range that it may become endangered if its environment worsens. For ease in discussion, endangered or threatened species covered by any or all of the above list categories are referred to as ***special-status species***.

Within the geographic boundaries of the City's creek system, seven special-status species may occur, including two fish species, two raptors, one insect, one plant and one reptile. Figure 1 identifies the various management zones within the City's limits that are referred to in the document. Table 1 documents the presence of, or use of the creeks by, the special-status species. Following are species accounts for the seven species.

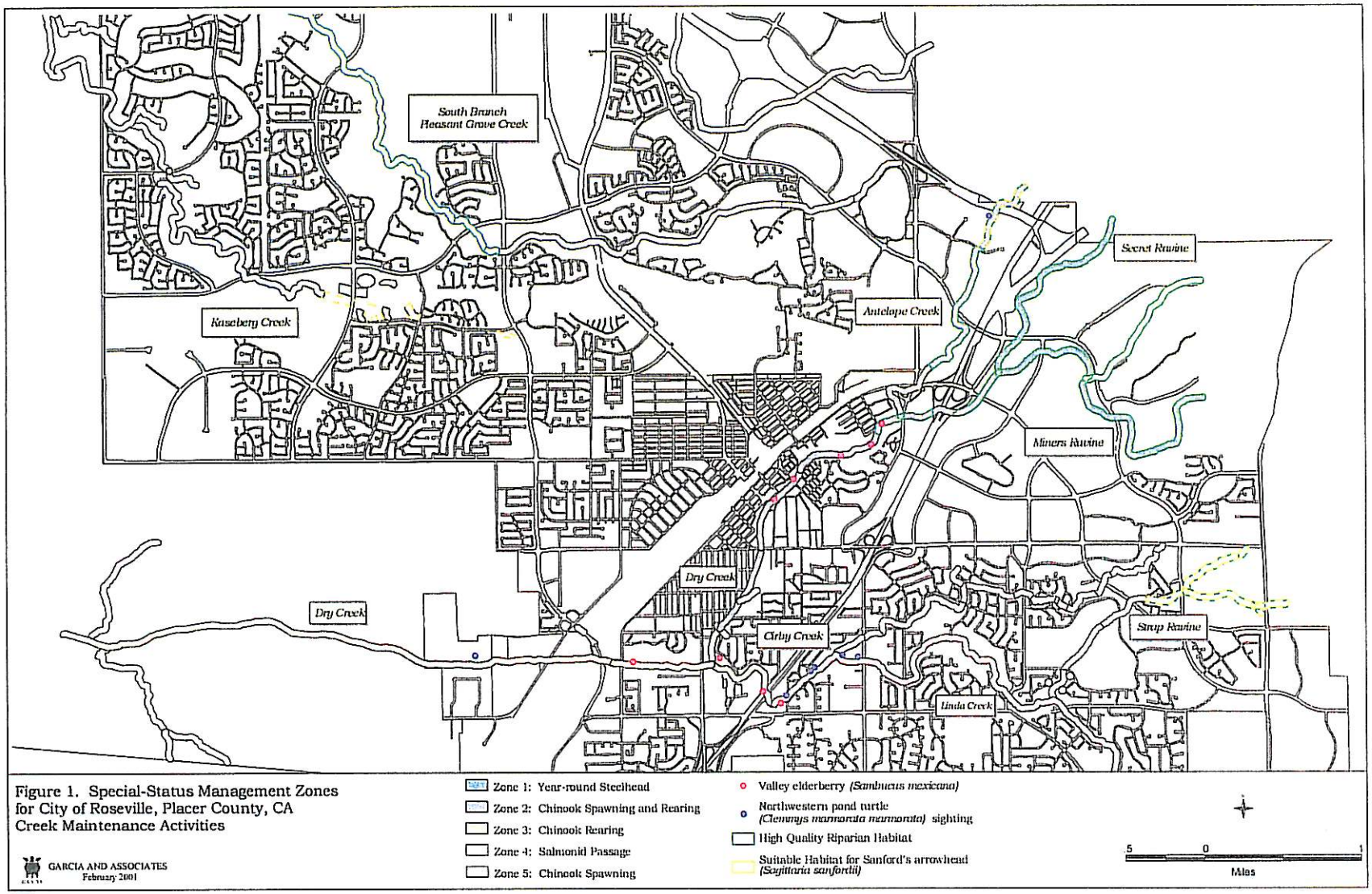
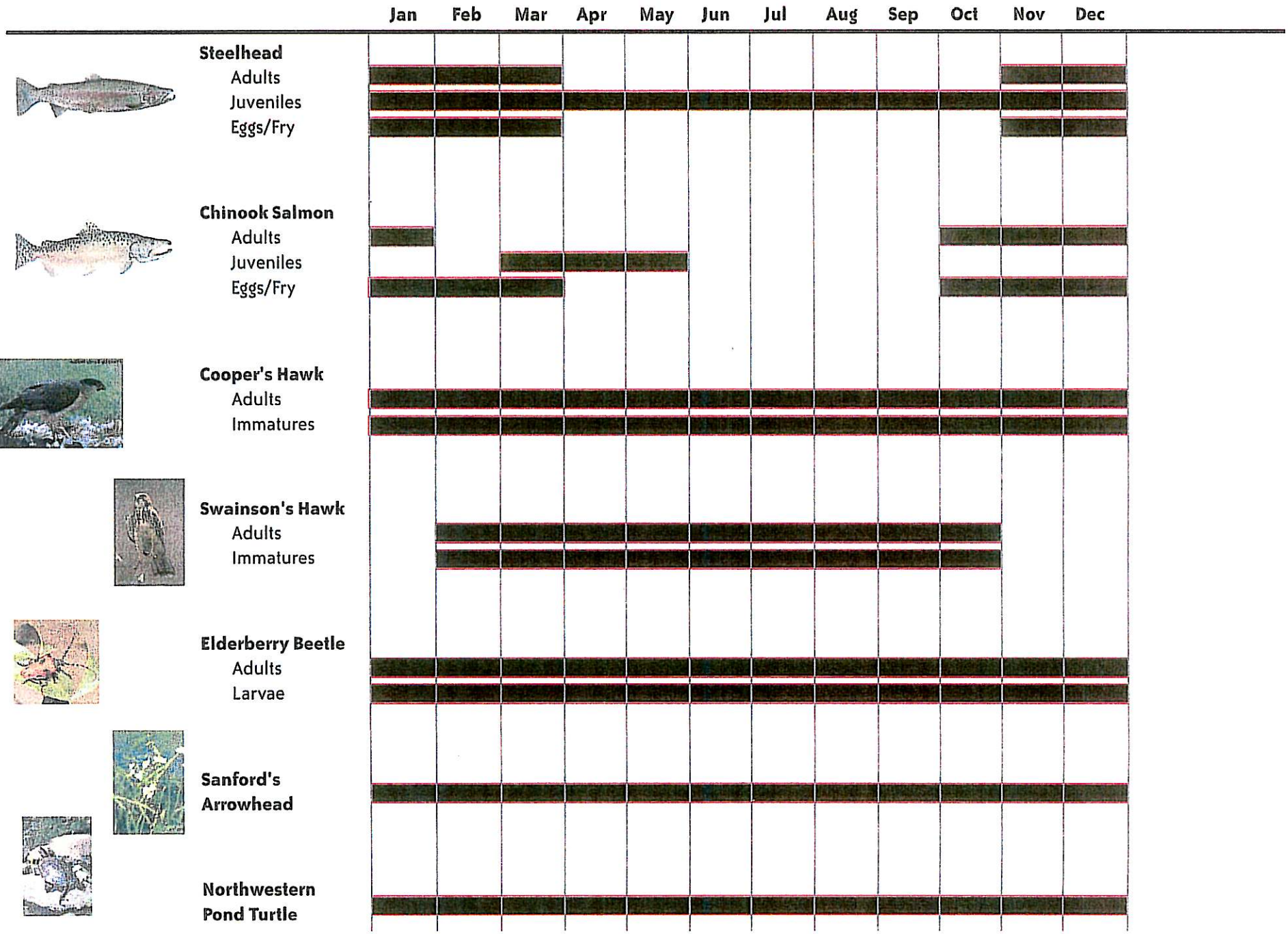
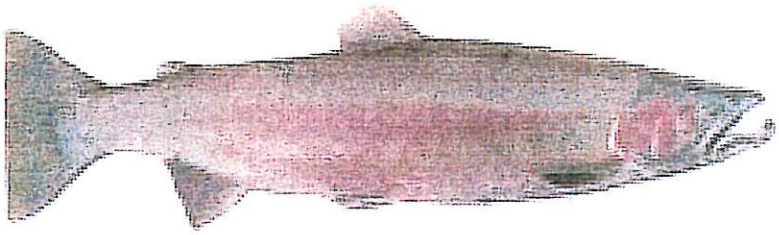


Figure 1. Special-Status Management Zones for City of Roseville, Placer County, CA Creek Maintenance Activities

Table 1. Potential presence / use of creeks within the City limits by various life stages of Special-Status Species.





Central Valley Steelhead

Oncorhynchus mykiss

Description and Natural History

Adult Central Valley steelhead may range from very silver, with only faint dark spotting, to darker dorsal coloration with a faint lateral red band and heavier spotting. Adult steelheads aged usually between 2-4 years return from the ocean and can potentially enter the creeks within the City to spawn from November through March. Female steelhead deposit their eggs in a depression dug in the gravel called a "redd." Gravel size preferred by steelhead is generally two to three inches in diameter. Egg incubation extends from November through March. Egg development rate is temperature-dependent and usually requires 31 days at 50°F. The eggs develop into "sac fry" which are small fish that still possess a yolk sac. As the yolk sac is absorbed and the sac fry emerge from the gravel, they become "fry." The small, active fry develop a series of distinctive marks on their sides referred to as "parr marks." Juvenile steelhead parr marks are nearly round in contrast to the vertical parr marks of juvenile chinook salmon. Young steelhead typically spend one to two years in the creeks before migrating to the ocean; although, some individuals may become permanent creek residents and never leave fresh water. Preferred habitats of steelhead in freshwater include heads of pools, runs, and riffles. While in freshwater, young steelhead are typically opportunistic feeders with a diet comprised of aquatic insects and smaller fish. While in the ocean, adults primarily feed on fish. Steelheads are adapted to cool water temperatures and can become stressed at temperatures above 65°F, and die if water temperatures exceed 75°F.

Distribution

All of the creeks within the City's jurisdiction are considered critical habitat for this species. GANDA biologists have not observed steelhead in Linda or Cirby creeks; although, they are established in Dry Creek, particularly the headwater tributaries of Secret Ravine and Miners Ravine, and in Antelope Creek (Figure 1). Table 1 depicts the timing of various life stages of steelhead in the City's creeks.

Current Status

This population of steelhead is a Federally listed threatened species and a California Species of Special Concern.

Chinook fry can be found in quiet water areas, along the creek banks, and close to cover such as tree roots or logs. Juvenile chinook have been observed in areas of higher velocity in mid-stream away from the shore. Their diet is similar to that of steelhead in which they feed primarily on aquatic insects as juveniles and switch to fish as adults in the ocean.

Distribution

As depicted in Figure 1, suitable habitat for different life history stages of chinook salmon occurs throughout the majority of creeks within the City's jurisdiction. GANDA biologists have observed chinook salmon in Cirby, Linda and Dry creeks. Other observations have been made in Secret Ravine, Miners Ravine, and Antelope Creek. Table 1 depicts the timing of various life stages of chinook salmon in the City's creeks. Viable populations are thought to occur in Miners Ravine and possibly Antelope Creek.

Current Status

This population of late fall Chinook salmon is a Federal Candidate Species and California Species of Special Concern.

Cooper's Hawk
Accipiter cooperii

Description and Natural History

Cooper's hawk is approximately 14-21 inches long, with a 27-36 inch wingspan. Adults are blue-gray in the upperparts, with a breast and belly cross-barred with reddish plumage. The top of the head is blackish and contrasts with the gray back. The gray tail is usually rounded and crossed by four or more blackish bars. The eyes are yellow to deep red. Immature birds are similar in appearance to adults but have brown upperparts and a whiter breast and belly streaked with brown. This species can be difficult to see as it perches quietly in the dense leafy crown of trees. Its noisy alarm call is a *cac, cac, cac*.

Adult Cooper's hawks begin nesting in March or early April and may extend to early August before the young leave the nest site. Nests are usually located in relatively dense patches of woodland and are almost always located in live oaks. During the nesting season, especially prior to and during nest construction, Cooper's hawks may be sensitive to human disturbance and may abandon a nest site. Cooper's hawks feed on a wide variety of vertebrates, especially small birds and mammals.

Distribution

The potential for Cooper's hawk exists along the City's creek system. The riparian woodland and oaks near Antelope Creek, Secret Ravine, and Miners Ravine all provide suitable nesting habitat for this species. In addition to nesting birds which may be resident, there is an influx of wintering birds that can be found from September though April. Table 1 indicates that Cooper's hawk can be found within the City throughout the year.

Current Status

Cooper's hawk is a California Species of Special Concern.

Swainson's Hawk
Buteo swainsoni

Description and Natural History

Swainson's hawk is a large raptor exceeding 15 inches in length with a 40-inch wing spread. Plumage color is variable, but adults often have a brown head and upperparts, with a wide chesnut-brown band across the chest that contrasts with a white throat and pale belly. The tail is gray or brown with a wide dark band near the tip. The long wings extend past the tail on perched birds and, in flight, the trailing edge of the wing (flight feathers) are always dark and usually contrast with the lighter leading edge of the wing. Its call sounds like a whistle *kr-e-e-e.*

Swainson's hawks nest between March-July (very late nests may extend into August) and nests are usually located in trees situated within riparian corridors or along other watercourses. This species is subject to nest abandonment from excessive disturbance. Their diets consist of small rodents found in open grasslands or croplands. Grasshoppers and other large insects also comprise a large part of the diet.

Distribution

Potential nesting sites occur along riparian corridors at the western edge of the City limits along Dry Creek or Pleasant Grove Creek where there are large areas of nearby grassland and agricultural land in which to forage. Table 1 indicates that both adult and immature birds can be found within the City from February through October.

Current Status

Swainson's hawk is a California Species of Special Concern.

Valley Elderberry Longhorn Beetle

Desmocerus californicus

Description and Natural History

The valley elderberry longhorn beetle is a small beetle about the size of a large earwig. It is scarlet in color with black spots, and has a pair of curved antennae as long as its body. Endemic to California's Central Valley, the beetle has highly specific life history requirements and only inhabits living elderberry shrubs throughout its life cycle.

The valley elderberry longhorn beetle relies on the valley elderberry shrub (*Sambucus mexicana*) to procreate. Females lay eggs in the cracks of an elderberry stem in spring and summer. When the larvae hatch they feed on plant tissues inside the stout stems and bore into the pithy core of the stems for as long as two years during which time they are invisible to humans. After pupating, they emerge as adults in spring by boring their way out through the woody stem. They live as adults just long enough to feed on elderberry flowers and breed. For males, this period is limited to a few days and for females, a few weeks.

Distribution

Known locations of valley elderberry shrubs within the City limits include nine sites located on lower Cirby Creek and Dry Creek (Figure 1). Valley elderberry longhorn beetle may inhabit these elderberry shrubs. Table 1 indicates that valley elderberry longhorn beetle can potentially be found year-round at specific locations within the City.

Current Status

Valley elderberry longhorn beetle is a Federally listed threatened species.

Sanford's Arrowhead
Sagittaria sanfordii

Description and Natural History

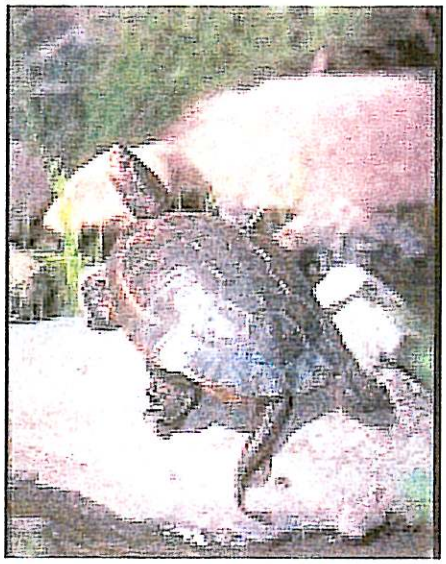
Sanford's arrowhead is a freshwater marsh species that is found in sluggish backwaters of creeks, freshwater marshes, and ditches. It blooms generally from May to September. Emergent leaf blades are between 5.5 to 10 inches, linear and 3-angled to narrowly ovate. Flowers appear in several whorls, located well below leaf ends, with white petals. The lowest whorl has three flowers. Within the Central Valley, it generally grows in somewhat silty soils, and often in thick cattail marshes in slow-moving sloughs or marshes.

Distribution

As depicted in Figure 1, suitable habitat within the City for Sanford's arrowhead is found along Antelope Creek, Strap Ravine and Kaseberg Creek. Table 1 indicates that Sanford's arrowhead is a year-round resident at suitable locations within the City.

Current Status

Sanford's arrowhead is a Federal Species of Concern and California Native Plant Society List 1B species.



Northwestern Pond Turtle

Clemmys marmorata marmorata

Description and Natural History

Northwestern pond turtles are medium-sized turtles with a dorsal shell length between 6-8 inches. The dorsal shell is referred to as a "carapace" and is generally dark brown to deep olive green in color. Small individuals and females have specks on their necks while adult males typically have a light colored yellow neck.

Northwestern pond turtles reach sexual maturity at approximately 6-8 years of age. Courtship and mating occurs between March and May. Adults lay eggs in nests dug in creek banks or nearby uplands. Nest cavities are typically oval-shaped. Measurements of known nests in California have ranged from 2.5-3.5 inches deep, with a 2.6-2.8 inch wide egg chamber and a 1.4-1.6 inch mouth.

Average clutch size varies from 2 to 12 eggs, with eggs measuring approximately 1.5 inch in length by 1 inch wide. After a two and a half to three month incubation period, depending on ambient temperature, the eggs hatch. Studies have shown that eggs incubated at 77-91°F hatch after 73-81 days. Hatchlings measure 1 - 1.25 inches in carapace length and normally over-winter in the nests their first winter.

Northwestern pond turtles feed on a variety of prey items, including dragonfly larvae, water beetles, small fish, crustaceans, worms, and snails. Adults may also ingest plants which provide nutrients when live prey are unobtainable.

Northwestern pond turtles often bask at the edge of water, or on fallen tree limbs and stones above water. Pond turtles are secretive and will seek refuge at the bottom of the creeks at the slightest disturbance. There are several predators of northwestern pond

Northwestern pond turtles often bask at the edge of water, or on fallen tree limbs and stones above water. Pond turtles are secretive and will seek refuge at the bottom of the creeks at the slightest disturbance. There are several predators of northwestern pond turtles within the City, including raccoons, bullfrogs, red-shouldered hawks, catfish and bass.

Distribution

Northwestern pond turtles can potentially inhabit creeks throughout the City. GANDA biologists have observed Northwestern pond turtles basking on overhanging trees or exposed boulders primarily in pool habitats associated with Linda, Cirby, Dry, and Antelope creeks. Table 1 indicates that northwestern pond turtles are year-round residents within, and adjacent to, the City's creeks.

Current Status

The Northwestern pond turtle is a Federal Candidate Species and California Species of Special Concern.

C. Other Important Animal and Plant Species Associated with the Creek Ecosystem

- The Dry/Linda/Cirby Creek watersheds support year-round warm water fisheries, including Sacramento pike minnow, hitch, Sacramento sucker, black bullhead, largemouth and spotted bass, bluegill, and mosquito fish.

- Numerous species of birds use the riparian habitat and open water associated with Roseville's many creeks. Red-shouldered hawks are a commonly observed raptor within the City and nest at several sites. White tailed kites have been observed nesting along Linda and Cirby creeks where there are significant patches of grassland such as near Maidu Park. All raptors or birds of prey are protected by California Game Code Section 3503.5. Various native ducks, including mallards and wood ducks. also utilize the City's creek system.

- Several other forms of wildlife inhabit the creek margins and riparian corridors including amphibians, reptiles and mammals. Beavers are particularly noteworthy as they can affect creek hydrology and maintenance through the construction of dams. Beaver dams can have both beneficial and detrimental impacts to the creek habitats.

- Plant species found along the creeks include white alder, sandbar willow, buttonbush, Oregon ash, soft rush, western ragweed, and umbrella sedge. These plant species can be associated with marsh, aquatic, riparian scrub, or herbaceous habitats along the creeks and provide valuable habitat for numerous species of fish and wildlife. The City considers oak trees an important resource and their removal is regulated under the City's Tree Preservation Ordinance 2294.

D. Creek Maintenance Activities

Creek maintenance activities are designed to:

1) allow routine flood control and related creek maintenance activities within improved channels and unimproved natural channels to maintain the designed capacity of the channels(s);
2) protect the City's investment, to prevent loss of life and property, and to promote efficient storm water discharge; and
3) comply with the policies of the California Fish and Game Code Section 1600 et seq., for the protection and conservation of fish and wildlife resources.

Figure 2 depicts the City Divisions involved with Creek Maintenance and their respective duties. The Park Maintenance Division's activities are primarily limited to downed tree and debris removal with some minor vegetation trimming/removal; the division does not become involved in excavation or earth moving activities. The Street Maintenance Division's activities center on culvert maintenance and may utilize heavy equipment.

The following channel types and location examples apply to the categories of "improved" and "unimproved" channels as given in the MOU between the City and the CDFG (See Appendix A).

- An ***improved channel*** is defined as the channel of a stream in which significant man-made alterations have occurred to improve the passage of flood flows. Within this category, there are sub-categories, including an **improved channel, without significant riparian habitat** which occurs at various locations throughout the City, particularly in the Cirby, Linda, and Pleasant Grove creek systems. An **improved channel with significant riparian habitat** would be typical of Dry Creek through Saugstad Park. An **improved mitigated channel** would be Dry Creek at Royer Park and Linda Creek through the Flood Control Project Work Package #7.

- An ***unimproved channel*** is defined as a channel of a stream in which significant man-made alterations and/or improvements have not occurred. Within this category there are sub-categories including an **unimproved channel, without significant riparian habitat** which can be found at various locations throughout the City, particularly in lower Dry Creek. An **unimproved channel, with significant riparian habitat** is typical of upper Dry Creek, Secret Ravine and Miners Ravine.

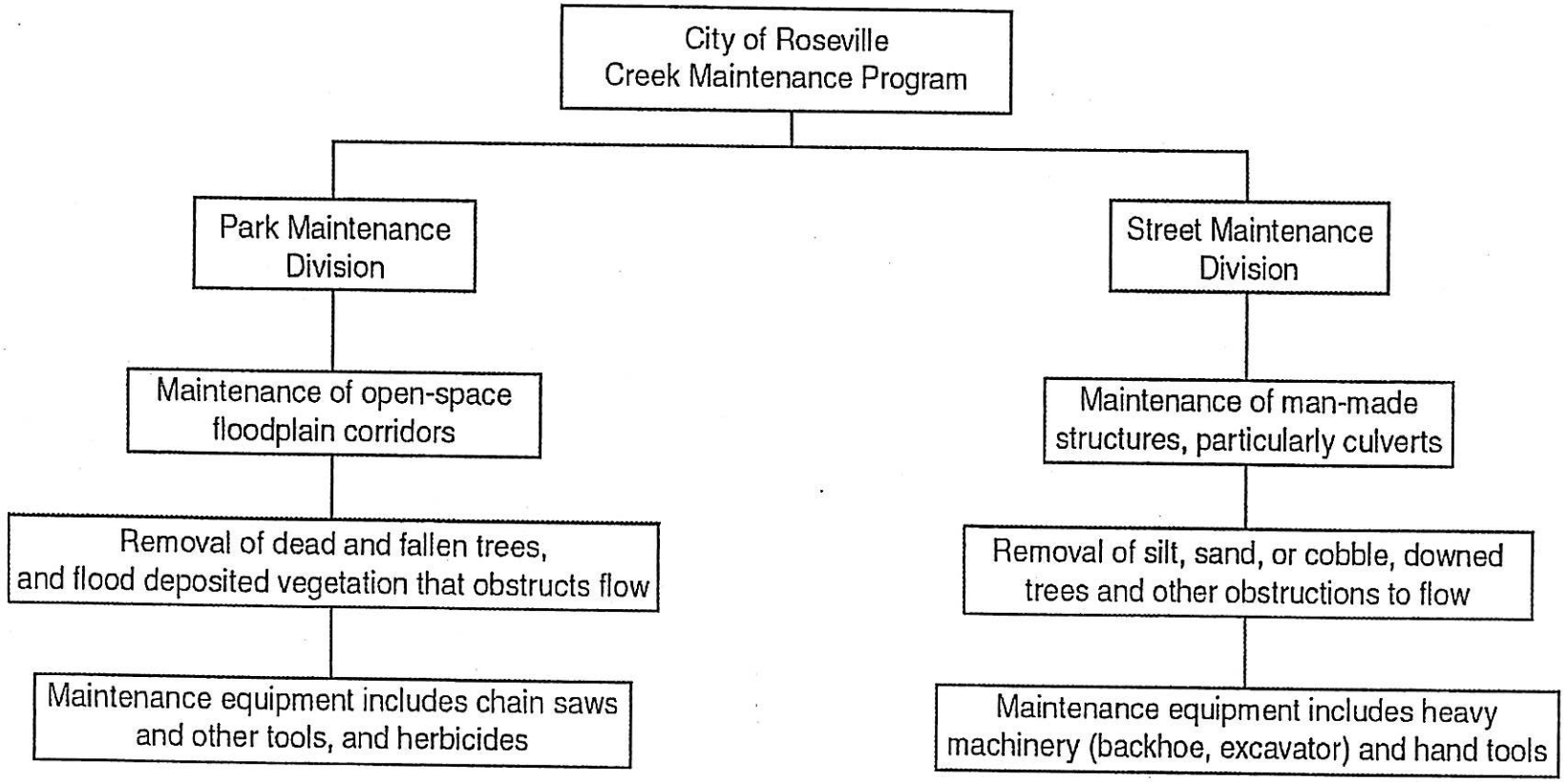


Figure 2. Organizational chart for the City of Roseville Divisions involved with creek maintenance activities.

The following summaries broadly outline creek maintenance activities performed by the City.

1) Debris or Obstruction Removal

This maintenance activity is primarily carried out by Park Maintenance staff, as needed, throughout the open space floodplain corridors along Antelope, Cirby, Dry, Linda, and Pleasant Grove creeks. Routine maintenance includes the removal of debris, trash, rubbish, flood-deposited woody and herbaceous vegetation, fallen trees, dead trees which are in clear danger of falling in or across the channel, and weeds, grasses and emergent vegetation that obstruct flow. Park maintenance crews should use only hand equipment (*e.g.*, chain saws, pruning tools). No heavy equipment is permitted in the creeks.

2) Silt, Sand, or Cobble Removal

This activity is conducted primarily by the Street Maintenance staff and entails the mechanical removal of silt, sand, or cobble in the immediate vicinity of man-made structures (*i.e.*, culverts) which can cause an obstruction to flow.

Maintenance activities consist of mechanical removal of debris, flood-deposited cobble and accumulated sediments, downed trees, and other obstructions to flow; and control of emergent vegetation that obstructs flow. Removal methods could include the use of a bobcat, backhoe, and/or excavator.

In ***improved*** channels, maintenance is permitted to the extent necessary to restore proper operation of the channel. In ***unimproved*** channels, excavation of silt, sand, or cobble must not exceed 100-linear feet upstream or downstream from the structure. No heavy equipment is permitted in the creeks without prior approval of a supervisor. Channels must be cleared in such a manner that trees greater than four inches in diameter will be avoided, or trimmed only as necessary to gain access. In channels where small trees line both sides of the watercourse, authorization by CDFG must be obtained prior to thinning of trees to permit access. In this instance, the City's Environmental Coordinator (EC) should be contacted prior to this activity. Vegetation removal along extended reaches of the bank must be avoided.

3) Vegetation Control

Both the Park and Street Maintenance staffs conduct this activity. Control of aquatic vegetation, grasses, shrubs, and woody growth is necessary to remove obstructions to flow in ***improved*** channels and is permitted in the channel bottom from toe of slope to top of bank of ***unimproved*** channels. Control of the low hanging branches of trees growing on the lower creek banks from ground level is allowable to a distance of six (6) feet above ground level. Where appropriate, removal of non-native vegetation (bamboo, tree tobacco, castor bean, pampas grass, eucalyptus, acacia, etc.) from toe of bank to top of bank is permitted. Control of aquatic and terrestrial vegetation may be performed with the use of mechanical devices, chemicals, or hand labor. When possible, the use of herbicides

should be minimized in Dry Creek or in Secret Ravine and Miners Ravine as juvenile steelhead may be present. Only herbicides registered with the California Department of Pesticide Regulation (copy available from EC) can be used for vegetation control. Labeled instructions for the herbicide must be on hand during the application process.

Vegetation removal should be conducted only to the extent necessary to maintain the design capacity and structural integrity of the channels. Trees greater than four (4) inches diameter breast height (DBH) must not be removed without prior authorization. Clear-cutting banks should be avoided as this activity accelerates erosion and potential landslides.

4) Repair of Previous Erosion Control Work

This activity includes the repair of failed rock, sacked concrete, or gabion section. Maintenance activities must be confined to the failed section and immediate adjacent areas (adjacent area not to exceed twenty feet) affected by the failure.

5) Minor Erosion Control Work

This activity includes sloping, installation of rock, gabions, or other erosion control measures from the toe of the slope in the channel to a maximum of 30 feet, measured vertically, above the channel invert to stabilize the eroded area. The length of the project must be less than 50 feet, unless prior authorization is granted.

Project work should be limited to periods when there is low stream flow. The EC should be contacted well in advance of any activities resulting in diversion of stream flow. Creek flow diversion must be conducted within the least amount of time using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses. The EC should also be contacted if creek maintenance activities involve the construction of a dam or other artificial obstruction, or require de-watering of a site. Anytime these activities are necessary, sufficient water must be allowed to pass downstream to maintain aquatic life below the dam.

Upon project completion the creek channel must be scarified from the work site to the equipment entrance where activities have caused compaction of the streambed soil material. To the extent possible, the creek channel shall be returned to its natural state without creating a future bank erosion problem.

E. Potential Impacts to Flora and Fauna from Creek Maintenance Activities

Creek maintenance activities could potentially impact different life history stages of a variety of special-status species and/or other natural resources, including amphibians, birds, fish, mammals, plants and reptiles within City creeks. Below is a summary of potential impacts.

- Creek maintenance activities which result in excessive removal of streamside vegetation is detrimental to special-status aquatic resources, including steelhead, chinook salmon, and northwestern pond turtles. The vegetation along the City's creek system is essential for shading and maintaining cooler water temperature regimes particularly suitable for the salmonids. When the vegetation is removed, water temperatures during the summer can exceed 75°F. This is intolerable to steelhead which spend 1-2 years in freshwater before migrating to the ocean. Elevated temperatures also reduce the amount of time chinook salmon can rear in the creeks because they cannot survive for prolonged periods of elevated temperatures. As previously mentioned, juvenile chinook migrate out of the creeks due to increasing water temperatures by late May. High water temperatures can also promote disease because of induced stress, and impede growth. Removal of streamside vegetation affects all the special-status aquatic species by reducing the amount of cover available to allow escape from predators.

- Creek maintenance activities which result in streamside vegetation being cropped too severely results in reduced creek bank stability and erosion, and increases the amount of sediment entering the creeks. Fine particle sediments settle into spaces between gravels in which salmonid eggs are incubated potentially smothering the redds. In addition to hindering emergence of hatched fish, water flow in gravel is impaired and developing embryos do not receive sufficient dissolved oxygen. Also, metabolic waste of the embryos is not flushed, which contributes to higher mortality rates. Research has demonstrated that for steelhead trout, when sediment approximates 30% of the substrate, less than 25% of the eggs develop to the emergent fry stage compared to an excess of 75% emergence when sediments are less than 20%. During rearing, excessive suspended and deposited fine sediments can directly affect salmonids by clogging gills of juvenile fish.

- Excessive streamside vegetation removal also reduces, both directly and indirectly, the amount of fish food organisms important for salmonids. Lush streamside vegetation provides habitat for many terrestrial insects and their larvae which provide a direct source of food for salmonids. Streamside vegetation that is normally washed into the creeks during high flows or when dead provides a food base for aquatic invertebrates that are also a predominant food source for salmonids. When increased sedimentation occurs through vegetation removal, the material can also cause abrasion and interfere with functions of respiratory systems of invertebrates. In

addition, when sediment settles over the most productive invertebrate substrate such as gravel and cobble, the result is diminished food for salmonids.

- Creek maintenance activities which remove well stabilized root balls is detrimental to bank stability, and leads to decreased stream shading, fish cover and increased sediment loading.

- Creek maintenance activities could inhibit the in-migration and/or spawning of adult chinook salmon if maintenance activities extend into the month of October or disturb juvenile chinook salmon inhabiting the creeks prior to their out-migration during the month of May.

- Creek maintenance activities could disturb juvenile steelhead trout, particularly in upper tributaries leading into and including Dry Creek, as juveniles typically remain in fresh water for one to two years before out-migrating to the ocean.

- Creek maintenance activities could increase turbidity levels during in-stream maintenance activities, or through direct mortality should juvenile salmonids be present during instream work such as excavation of sand or silt around culverts.

- Creek maintenance activities could affect special-status birds, and other raptors and wildlife by noise pollution from heavy equipment and chain saws during working hours.

- Creek maintenance activities could cause a temporary disturbance within the riparian zone which functions as a wildlife corridor and/or nursery area for other wildlife including amphibians, reptiles, and mammals.

- Creek maintenance activities could impact special-status and/or other indigenous plants through inadvertent or unnecessary removal.

F. Guidelines to Minimize Adverse Effects of Creek Maintenance Activities

Creek maintenance activities are an essential part of the City's flood control program but these activities need to be done in a way which minimizes impacts to the rich variety of natural resources inhabiting the creek ecosystem. By following these recommended guidelines and implementing the mitigation measures as outlined in Appendix B, creek maintenance activities will have minimal impact on special-status species and other natural resources. Failure to comply with these guidelines may result in the City incurring substantial penalties for any violation.

- All supervisors must be familiar with the contents of the MOU (See Appendix A), and crews must have a copy available when conducting creek maintenance activities.

- All supervisors must ensure that the mitigation monitoring program provided in Appendix B is completed, as needed, prior to any maintenance activities. For example, raptor nest surveys must be conducted prior to maintenance activities during the breeding season. If an active nest is located, maintenance activities shall be limited in the vicinity of the nest based on recommendations by the surveying biologist.

- Surveys for special-status species must be conducted prior to creek maintenance at all prospective sites. If special-status species are found in the potential area of impact, jurisdictional agencies must be consulted by the EC regarding the appropriate procedure for protecting the species.

- Any wildlife encountered during the course of routine maintenance must be allowed to leave the area unharmed or herded a safe direction away from the project site.

- Periods of implementation of maintenance activities within ***unimproved*** channels are June 1st to October 30th. Implementation of maintenance activities within ***improved*** channels without significant riparian vegetation is not restricted to a specific time period, but should be conducted during low stream flow. Ideally, all maintenance activities should be conducted after the juvenile chinook salmonid out-migration (preferably after mid-June) and prior to the adult migration (preferably before October 15). Maintenance activities conducted in upper Dry Creek (particularly Secret Ravine and Miners Ravine) should be carried out with the utmost caution to avoid impacts to young steelhead residing in these areas during the summer months.

- Vegetation removal must be limited to flow-restricting obstacles within and up to one hundred feet up and downstream of man-made structures (*e.g.*, culverts).

- Mechanical removal of accumulated debris, sediments, and cobble from culverts must be contained within a precise area immediately above or below obstructed culverts.

- Tules should not be removed unless they are affecting the structural integrity of a culvert or bridge crossing.

- Precautions to minimize turbidity/siltation should be taken into account during silt, sand, and cobble removal activities, including placement of hay bales and/or silt fences.

- Placement of erosion control measures must comply with accepted engineering practices and city development standards. These activities should be limited to periods when there is low or no streamflow.

- Any stream flow diversion must be conducted using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses.

- Any temporary dam or other artificial obstruction constructed shall only be built from materials such as sandbags or clean gravel. When any dam or other artificial obstruction to stream flow is necessary for maintenance, sufficient water shall at all times be allowed to pass downstream to maintain aquatic life.

- All cleared vegetation, sediment, cobble, and other flood debris must be hauled away from each site by dump trucks, and deposited outside the 100-year floodplain.

- Impacts to riparian habitat must be minimized to the extent possible to avoid existing high-quality riparian habitat and large trees.

- In cases where woody riparian vegetation must be cleared, the vegetation will be trimmed rather than uprooted, where possible, to allow re-sprouting. Where public safety is not at risk, woody vegetation will be cut no more than one foot above ground level to encourage re-sprouting.

- Chain saws will be used to trim downed trees and all root balls must be kept in place to provide bank stability. Root-wads do not create a major impediment to stream flow. The physical root support is lost after root balls are removed which accelerates the rate of erosion leading to increased sedimentation.

- At no time should native oaks be removed without supervisory approval and appropriate City permits.

- Any work area left barren of vegetation as a result of the maintenance activities must be restored to its natural state by seeding, or other agreed-upon means with native species of trees, shrubs, and grasses, within 30 days, or by October 30th of the year the activity occurred.

- Noise pollution from heavy equipment and chain saws that disrupt wildlife should be kept to a minimum.

- Emissions from heavy machinery should be kept to a minimum.

- All creek maintenance activities should be limited by the City's Municipal Code to daytime hours (7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 8:00 p.m., Saturday, Sunday and Holidays).

- Only herbicides registered with the California Department of Pesticide Regulation (copy available from EC) can be used for vegetation control. All herbicides will be used according to labeled instructions. Labeled instructions for the herbicide must be on hand during the application process and made available at the request of CDFG.

- Any hazardous material discovered during the course of the maintenance activities must be reported immediately to the supervisor. At no time should maintenance activities involve the transport, use, or disposal of hazardous materials.

- If unidentified cultural resources or fossils are discovered during creek maintenance activities, all work must cease and the EC notified.

G. Pro-Active Creek Maintenance Activities

Reduced streamside vegetation, and sediment and pollutant runoff from the urbanized watershed and bank erosion from flood flows are common problems throughout much of the City's creek system. These point and non-point sources can introduce large amounts of fine sediment into the creeks and can negatively affect both special-status species and other natural resources by reducing habitat diversity, increasing water temperatures, creating high turbidity levels, covering spawning gravel, filling in pools, and smothering the benthic macroinvertebrate (aquatic insect) community.

Although stream bank erosion is a natural process, it is greatly accelerated under an urbanized land use setting where creek channels are confined and floodplains and wetlands (which dissipate the force of water and where sediments are deposited) are greatly reduced. Streambank restoration practices provide both short- and long-term stability by anchoring the soil, reducing the velocity of surface runoff, protecting the soil from wind and water erosion, and enhancing natural beauty. Development of a mature and healthy riparian corridor prevents erosion and reduces the loss of creek banks.

Creek maintenance activities can be carried out consistent with the goal of achieving maximum flow conveyance while restoring creek habitat and enhancing the biodiversity of the creek ecosystem. A pro-active approach to creek maintenance can benefit the rich variety of aquatic and terrestrial species associated with the creek and can provide a cost savings to the City by reducing maintenance activities that are hydrologically unnecessary for flood control. For example, the streamside vegetation being removed from lower Dry Creek as depicted in Appendix C, Plates 1 and 2 needs to be carefully evaluated as this practice reduces canopy cover and may not be necessary for proper flow conveyance.

Pro-active creek maintenance steps to help restore aquatic and terrestrial habitats can include both instream and riparian improvements to reduce sediment loading into the creeks and increase streamside vegetation and canopy cover. These practices would also help maintain cooler water temperatures and reduce the deleterious effects of continued erosion.

Reversing the process of severely eroding creek banks will, obviously, necessitate a phased approach to restoration activities. The seriously eroded high sandy bank on Dry Creek (Appendix C, Plates 3 and 4) is an example of an area that may require both structural and goetechnical remedies to reduce high creek flows from carrying away soil from the bank and protect bank stability.

The following are brief descriptions of pro-active creek maintenance activities that could enhance both the riparian and aquatic habitat for both special-status species and other natural resources and could be considered as part of a larger restoration program.

1) Vegetative Soil Stabilization Practices

Stabilization of creek banks is fundamental to successful erosion control. Once the foot of the bank is stabilized, soil erosion and undercutting would be reduced; eventually, the bank will reach a state of equilibrium where slumps and slides are minimized. Restoring streamside vegetation at exposed banks is probably the most cost-effective and aesthetically acceptable method for minimizing erosion and bank failure and for long-term restoration of the City's creeks. Native grasses and sedges are rapidly growing types of vegetation that could produce an adequate ground cover in a short period of time and begin the process of soil stabilization. As soils become stabilized, other vegetation can become established which adds to the strength of the soil. Geotechnical erosion control methods could also be used prior to establishing grasses or sedges. Providing cover to exposed banks, such as shown in Appendix C, Plate 5 would reduce the amount of sediment entering the creek.

Planting cuttings, such as willows, and/or other riparian vegetation and shrubs in exposed areas can be an effective and inexpensive way to stabilize creek banks and contribute to a long-term bank stabilization program. As part of the mitigation program for the Harding Bridge Extension Project, several riparian shrubs and trees were planted along Antelope Creek that now provide valuable cover for many aquatic organisms and shade for reducing the creek temperature (Appendix C, Plate 6).

Cuttings could be obtained from areas of dense vegetation pockets found within the City's creek system. Willows respond well to pruning, so they can be thinned liberally from a grove. Willow cuttings need to be planted in sunny areas where the soil stays moist throughout the dry season. Cuttings 2 to 3 inches in diameter and 3 to 4 feet long are reported to work best, and should be used in the most actively eroding places. Cuttings should be planted the same day they are cut and should be driven into the soil 75 to 80 percent of their total length. On large, rapidly eroding creek banks, appropriate spacing may be as close as one foot. In more stable creek banks, the cuttings can be placed two feet apart. Pro-active planting of willows could, in time, shade out tules and thereby decrease the amount of creek maintenance labor and effort necessary for tule removal processes, especially near culverts. An example of an area where pro-active planting of willows to reduce tule growth could be pursued is Linda Creek below Champions Oak Drive (Appendix C, Plate 7).

Shrub planting in isolated small areas is a useful method to protect exposed banks once these areas are stabilized with grasses. Shrubs are deep-rooting and, over time, help to stabilize soils. The success of planting shrubs will not be as great for initial erosion control because not enough of the eroded bank is protected and the newly planted shrubs and seedlings may be washed out by a major storm.

The establishment of trees is a very effective practice to stabilize slopes and to prevent erosion because the well-developed root system stabilizes soil while the canopy absorbs the raindrop impact and the tree litter and fallen leaves protect the soil surface. In addition, mature trees serve as valuable wildlife habitat, particularly for raptors.

However, trees are slow growing and require time to grow to a sufficient size to control erosion adequately. After stabilizing slopes with grass, willows and/or shrubs, trees can be interplanted at a desired spacing. Mulches are a cost-effective way to help establish trees as they stabilize the soil and increase the moisture available to the roots.

As the vegetative cover along the banks of the creeks continues to grow and provide shade, temperatures during the summer will remain cooler, which is beneficial for chinook salmon, steelhead and other aquatic species. An example of an area where a lush growth of seasonal streamside vegetation exists, which could be left intact, is Linda Creek above the Flood Control project as shown in Appendix C, Plate 8.

Vegetation will, however, only keep soil in place on slopes that are physically stable. Vegetation by itself will not stabilize oversteepened slopes or long slopes with long uninterrupted faces. In severely eroded areas, such as the north bank of Cirby Creek downstream of Interstate 80 as shown in Appendix C, Plate 9, the best solution to this degree of slope instability is a combination of structural and vegetative practices to reduce further bank erosion.

2) Tree Removal and Root Ball Stabilization

It is necessary to remove fallen trees or dead trees, which are in clear danger of falling in or across the channel, to maximize flow conveyance and public safety. There are, however, pro-active steps that should be taken when removing trees, which would contribute to a long-term bank stabilization program.

Specific trees that need to be removed should only be cut to the minimum amount necessary to ensure adequate flow conveyance and safety. In the short term, saplings should be planted adjacent to the removed trees to assist with soil stabilization of the banks. Planting saplings and/or other riparian vegetation should also be conducted in vulnerable areas were trees are likely to be removed in the future to maximize flood conveyance and minimize sloughing of banks. This process would benefit from a creek maintenance reconnaissance survey that could identify extremely vulnerable riparian areas and trees likely to be downed during severe storm events. Replacement trees should then be planted ahead of time so that the area remains relatively intact. A creek reconnaissance program utilizing a GIS would be an important first step to identify sensitive and vulnerable areas for pro-active restoration efforts.

Removing fallen trees should be done without removing the root ball. Root balls are valuable for maintaining soil structure and integrity. Their removal accelerates erosion and sediment input into the creeks by destabilizing the banks. Where root balls are vulnerable to high intensity flood flows and erosion, they should be anchored and secured.

A cable technique is a cost-effective method of securing root balls that may become dislodged from the bank during storm events. A cable could be attached to adjacent stable trees, where present. Other engineering methods for anchoring root balls could be

discussed with the City's Engineering Department. The most appropriate method for root ball stabilization should be determined on a site-by-site basis.

3) Boulder Placement

Preventing bank erosion and improving creek habitat should also include the placement of large boulders or groups of boulders along exposed creek margins. Boulder structures have been used in a variety of situations and configurations to stabilize steeply eroded banks and prevent soil erosion from oversteepened slopes. Large boulder structures provide longevity and resistance to movement by high flows and can provide habitat for a variety of organisms.

Boulder clusters have also been used to provide habitat for juvenile salmonids and to build quiet water resting areas for upstream migrating spawners. Appendix C, Plate 10 shows boulders placed in Antelope Creek as part of the mitigation for the Harding Boulevard Extension Project. These boulders have not been moved by flood flows and GANDA biologists have also observed northwestern pond turtles on these particular boulders. Boulder clusters are also effective in maintaining and stabilizing salmonid spawning gravel.

4) Placement of Gravel

The placement of additional gravel at suitable sites could provide enhanced habitat for increasing salmonid spawning success and benefit other aquatic organisms, particularly benthic macroinvertebrates. For example, Linda Creek presently has minimal spawning gravel for salmonids and the lack of suitable gravel often results in a minimum amount of gravel placed over chinook salmon redds. The paucity of gravel, combined with sedimentation, contributes to the low success of fry emergence from the redds. Direct placement of gravel at suitable sites would improve spawning success and could potentially be accomplished with outside funding sources. Gravel placed in Antelope Creek downstream of Harding Bridge has remained in place for several years and may provide valuable spawning habitat for salmonids during late fall/early winter high water levels (Appendix C, Plate 11).

5) Retaining Structures

Retaining structures refer to a wall or other structure placed at the toe of an oversteepened slope. Retaining structures are often used as a last resort in stabilizing severely degraded banks with oversteepened slopes. Retaining structures are effective in stabilizing a slope against mass sediment movement; to protect the toe or face of a slope against scour or erosion by storm runoff; and to allow flattening of the slope above for re-vegetation purposes.

6) Culvert Flow Deflectors and Vegetation Removal

High intensity flow discharge from culverts, particularly during severe storm events, can create erosion problems immediately below the culvert. Steps could be taken to provide flow deflectors where the discharge impacts the creek banks, as depicted in Appendix C, Plate 12. In addition, much of the aquatic vegetation below culverts lies down during flooding and may not need to be removed unless the structural integrity of the culvert or concrete abutments are in jeopardy of failing (See Appendix C, Plate 13).

7) Street Cleaning Practices

Street sweeping is effective in removing accumulated sediments and other contaminants on streets, including pollutants resulting from vehicle operation which can impact the creek ecosystem.

Street cleaning practices should be integrated with the creek maintenance program. The timing and frequency of street sweeping should include a comprehensive sweeping conducted prior to annual fall-winter rain events. This is a time when considerable sediment and toxic pollutants from motor vehicles has accumulated.

Vacuum street sweeping is much more effective in removing fine particulate matter than brush sweeping. Research has shown that the major portions of polluting substances reaching the creek attach themselves to very fine particles. Street cleaning using vacuum-type sweepers is more effective in removing fine particulate sediment and other contaminants, thus preventing degraded runoff from paved areas entering the creeks.

8) Beaver Dams

The North American beaver is an American wildlife icon. Beavers have an uncanny ability of altering their habitat to better suit their needs. Beavers are found within the City's creeks and can create both benefits and problems for special-status species. By backing up the water and creating deeper pools, temperature stratification is created in beaver ponds. This stratification could be of importance to steelhead during the summer since the cool lower layer could be used as a retreat during hot days. While it is conceivable that beaver dams can be an obstacle to fish migration, there are studies which have shown that the barrier influence of beaver dams is not a major impediment to salmon movement.

However, beavers can also have an adverse effect on the aquatic ecosystem by cutting down shade trees and exposing larger areas of the creeks to sunlight, thereby increasing water temperatures. Tree removal eliminates valuable habitat for many terrestrial species, including birds and mammals.

Beaver populations require balanced management to ensure continued aquatic and terrestrial habitat for the creeks' abundant natural resources. The decision to remove or keep in place beaver dams needs to be carefully reviewed on a case-by-case basis.

Beavers are hard working and persistent animals. When either a portion or all of a beaver dam is removed, the beaver family will normally restore the damaged structure. Only when determined to be detrimental, after consultation with CDFG, should beaver dams be modified.

9) Community Outreach

As part of a comprehensive creek maintenance program, the City should consider expanding its public awareness programs to stimulate added interest and support for management of the creek system. For example, a creek ecosystem brochure could be sent to all residents encouraging citizen groups to volunteer labor and/or provide other support to creek restoration efforts. This scenario is similar to the efforts being carried out on roadways with the "Adopt a Highway" program. Development of an "Adopt a Creek" program, where specific sections of the City's creeks are maintained by different community and/or interest groups, could provide additional restoration and educational opportunities.

H. Relevant Creek Maintenance and Ecological Terminology

Aquatic: Growing or living in or frequenting water; taking place in or on water.

Armoring: The application of various materials to protect stream banks from erosion.

Bed Load: Sediment moving on or in the creek bed and frequently in contact with it.

Benthos: Organisms living on or within the creek's substrate, as in benthic macroinvertegrates (aquatic insects).

Canopy: The overhanging branches and leaves of streamside vegetation.

Caudal: The tail fin.

Channel Stability: A measure of the resistance of a stream to erosion that determines how well a stream will adjust to, and recover from, changes in flow or sediment transport.

Community: An association of living organisms having mutual relationships among themselves and to their environment and thus functioning, at least to some degree, as an ecological unit.

Cover: Anything that provides protection from predators or ameliorates adverse conditions of streamflow and/or seasonal changes in metabolic costs. May be instream cover, turbulence, and/or overhead cover, and may be for the purpose of escape, feeding, hiding, or resting.

Critical Habitat: The specific areas within or outside the geographical areas occupied by a species, at the time it is listed, on which are found the physical or biological features essential to the conservation of the species, and which may require special management considerations or protection.

Degradation: The geologic process by which stream beds are lowered in elevation by the removal of material.

Deposition: The settlement or accumulation of material out of the water column and onto the stream bed. Occurs when the energy of flowing water is unable to support the load of suspended sediment.

Discharge: Volume of water flowing in a given creek at a given place and within a given period of time. The City gauges express discharge as cubic feet per second (CFS).

Dissolved oxygen: The concentration of oxygen dissolved in water often expressed as milligrams per liter (mg/l).

Ecosystem: The interacting complex of a community and its environment functioning as an ecological unit in nature.

Embeddedness: The degree that larger particles (boulders, rubble, or gravel) are surrounded or covered by fine sediment. Usually measured in classes according to percentage of coverage of larger particles by fine sediments.

Endangered Species: Federal (FE): A federal government designation for any species that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species: State (CE): A California state designation for any species that is in danger of extinction throughout all or a significant portion of its range.

Environment: The complex of climatic, edaphic, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival.

Fine sediment: The fine-grained particles in stream banks and substrate. These are defined by diameter, varying downward from 6mm.

Fish habitat: The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary biological and physical support systems required by fish species during various life history stages.

Flood: Any flow that exceeds the bankfull capacity of a stream or channel and flows out of the floodplain; greater than bankfull discharge.

Habitat: The ecological and/or physical place determined and bounded by the needs and presence of a specific animal or plant population, which contains a particular combination of environmental conditions sufficient for that populations' survival.

Intergravel flow: That portion of the surface water that infiltrates the stream bed and moves through the substrate pores.

Jams: Large accumulations of debris partially or completely blocking the stream channel, creating major obstructions to flow.

List IB Species: California Native Plant Society (CNPS) rare, threatened, or endangered listing.

Low flow: The lowest discharge recorded over a specific period of time.

Moveable bed: A creek bed made up of materials readily transportable by the streamflow.

Overhead cover: Material (organic or inorganic) that provides protection to fish or other aquatic animals from above; generally includes material overhanging the stream less than

a particular distance above the water surface. Values less than 1.5 feet and less than 3 feet have been used.

Peak flow: The highest discharge recorded over a period of time. Within the City of Roseville, this occurs normally during the late fall or winter rainy season.

Percentage fines: Percentage of fine sediments in substrate samples, expressed as a percentage by weight or volume less than some specified diameter.

Population: a group of individuals of the same species inhabiting a specific zone or system.

Redd: A depression dug in the gravel in which female steelhead deposit their eggs.

Riffle: The topographic high points on a streambed profile composed of the coarsest material being transported by a stream.

Riparian: Pertaining to the banks and other immediate terrestrial environments adjacent to the banks of the creeks.

Riparian vegetation: Vegetation growing on or near the banks of a stream or other body of water on soils that exhibit some wetness characteristics during some portion of the growing season.

Riprap: A layer of large, durable materials (usually rock) used to protect a stream bank from erosion.

Root ball: The root mass of the tree.

Scarified: To break up and loosen the streambed channel.

Species of Concern - State (SC): A California Department of Fish and Game administrative designation given to vertebrate species that appear to be vulnerable to extinction because of declining populations, limited ranges and/or continuing threats.

Threatened Species - Federal (FT): A federal government designation for any species likely to become endangered within the foreseeable future.

Threatened Species - State (CT): A California state designation for any species likely to become endangered within the foreseeable future.

Zone: An area surrounded by boundary lines; a region or area set off as distinct from surrounding or adjoining parts.

APPENDIX A

Memorandum of Understanding (MOU) between the City and the California Department of Fish and Game (CDFG)

MEMORANDUM OF UNDERSTANDING

between

THE CITY OF ROSEVILLE

and

CALIFORNIA DEPARTMENT OF FISH AND GAME

regarding

ROUTINE MAINTENANCE ACTIVITIES
IN UNIMPROVED and IMPROVED CHANNELS

(1999 - 2003)

This Memorandum of Understanding (MOU) by and between the California Department of Fish and Game, hereinafter called the "Department", and the City of Roseville, hereinafter called the "City", is for the purpose of delineating and defining routine maintenance activities in improved channels and unimproved natural channels and shall not require further notice and agreement in compliance with Section 1601 of the Fish and Game Code.

WHEREAS, Section 1601 of the Fish and Game Code allows the Department to propose reasonable modifications to certain maintenance and construction projects as would allow for the protection and continuance of existing fish and wildlife resources that may be substantially adversely affected by that construction project; and

WHEREAS, with regard to any project that involves routine maintenance and operation of water supply, drainage, flood control, or waste treatment and disposal facilities, notice to, and agreement with, the Department is not required subsequent to the initial notification and agreement, unless the work as described in the agreement is substantially changed or conditions affecting fish and wildlife resources change, and the resources are adversely affected by the activity conducted under the agreement; and

WHEREAS, it is essential that the City perform routine maintenance activities within improved channels and unimproved natural channels to maintain the designed capacity of the channel(s), to protect the City's investment, to prevent loss of life and property, and to promote efficient and wise use or disposal of water; and

WHEREAS, consistent with the policies of California Fish and Game Code Section 1600 et seq., the protection and conservation of the fish and wildlife resources of California are of utmost public interest, and fish and wildlife conservation is a proper responsibility of the State; and

WHEREAS, in order to avoid future conflicts, it is mutually beneficial to delineate and define routine maintenance, to establish procedures to expedite maintenance activities, and to provide for the protection and continuance of the existing fish or wildlife resources during such maintenance activities; and

WHEREAS, nothing in this agreement shall constitute a waiver of any future or current Department claims to the use and maintenance of natural conditions under the public trust doctrine; and

WHEREAS, nothing in this agreement shall constitute a waiver of the City's claimed rights to maintain and operate the channel(s) solely from the flood control standpoint without a 1601 agreement; and

WHEREAS, this MOU is not intended to affect the City's rights under Fish and Game Section 1601 (f) to undertake emergency work necessary to protect life or property.

NOW THEREFORE, the Department and the City agree as follows:

I. DEFINITIONS

The following definitions shall govern this MOU:

(Type 1) Improved Channel without significant riparian habitat- An improved channel without significant riparian habitat is defined as a channel of a stream or river in which significant man-made alterations have occurred to improve the passage of irrigation and/or flood flows, including straightening the channel or containing the flows within constructed banks and concrete-lined, rip rapped, or vegetation barren earth channels with modified banks (including leveed systems). This type of channel lacks any significant riparian habitat. The waterway reaches listed in Exhibit 1 attached hereto include the exclusive list of improved channels as defined in the MOU.

(Type 2) Improved channel with significant riparian habitat- An improved channel with significant riparian habitat is defined as a channel of a stream or river in which significant man-made alterations have occurred to improve the passage of irrigation and/or flood flows, including straightening the channel or containing the flows within earth lined, constructed banks (including leveed systems). The riparian habitat consists of volunteer vegetative growth and does not contain mitigated riparian habitat.

(Type 3) Improved Mitigated Channel- An improved mitigated channel is defined as the channel of a stream or river in which significant man-made alterations have occurred to improve the passage of irrigation and/or flood flows, including straightening the channel or containing the flows within constructed banks and rip rapped, or earth channels with modified banks (including leveed systems) and where significant efforts to mitigate the previous loss of riparian habitat are incorporated into the channel. The waterway reaches listed in Exhibit 1 attached hereto includes the exclusive list of improved mitigated channels as defined in the MOU.

(Type 4) **Unimproved channel without significant riparian habitat-** An unimproved channel without significant riparian habitat is defined as a channel of a stream or river in which significant man-made alterations and/or improvements have not occurred and where significant riparian habitat does not exist. Channels not listed in Exhibit 1 attached hereto are considered to be unimproved channels without significant riparian habitat.

(Type 5) **Unimproved channel with significant riparian habitat-** An unimproved channel with significant riparian habitat is defined as a channel of a stream or river in which significant man-made alterations and/or improvements have not occurred. This type of channel contains significant riparian habitat. The waterway reaches listed in Exhibit 1 attached hereto includes the exclusive list of unimproved channels as defined in the MOU.

Channel banks, channel bottoms, low flow channels and other appurtenant features of channel types 1 through 5 are defined by the illustrations shown on Exhibits 2 through 6.

Maintenance activities - Maintenance activities in channels are defined as the removal/displacement of sand, silt, sediment, debris, rubbish, woody or aquatic vegetation and other obstructions to flow; the control of weeds, grasses, and emergent vegetation; and the cleaning, clearing, repair, and replacement of in-kind or similar erosion control facilities and constructed channel improvements; all as authorized to maintain the structural integrity and designed capacity of the channels.

Diameter Breast Height (DBH) - Diameter of a tree trunk at a point measured 4 1/2 feet above grade.

II. AUTHORIZED ACTIVITIES

The routine maintenance activities identified below, when performed on the channel(s) and work area(s) specifically specified in Exhibit 1 and in accordance with the procedures described below, shall not require further notice to, or agreement with, the Department.

A. Debris or Obstruction Removal

Removal of debris, trash, rubbish, flood-deposited woody and herbaceous vegetation, fallen trees, dead trees which are in clear danger of falling in or across the channel, branches, and associated debris which noticeably reduces channel capacity, would result in accelerated erosion and/or cause pump damage.

Mitigation Measure: All cleared debris shall be removed from the normal high water areas of the stream corridor and shall not be redeposited within the 100-year floodplain. Cleared or trimmed vegetation and woody debris may "chipped" and scattered as "mulch" at the project sites or removed from the normal high water areas of the stream corridor. Fallen trees, tree limbs and other woody debris may be used as part of a biotechnical bank stabilization technique.

B. Silt, Sand, or Sediment Removal

Removal/displacement of silt, sand, or sediment in the immediate vicinity of man-made facilities or structures which cause obstruction to flow.

Mitigation Measure: In unimproved channels, excavation of silt, sand or sediment shall not exceed 100 - feet linear from the structure without specific notice to the Department. Removal of silt, sand, sediment from improved channels and the forebay of sump pumping plants shall be performed to the extent necessary to ensure proper operation of the improved channels and sump pumping plant.

Mitigation Measure: Precautions to minimize turbidity/siltation shall be taken into account during silt, sand, and sediment removal activities. Silt, sand, and sediment removal operations shall be limited to periods when there is low or no stream flow.

Mitigation Measure: In unimproved channels and in improved mitigated channels, unless otherwise agreed, should stream flow exist, the stream flow should be diverted using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses. Where appropriate, silt fences, screening, or other measures should be placed in the channels to reduce turbidity caused by the maintenance activity. Any temporary dam or other artificial obstruction constructed shall only be built from materials such as sandbags or clean gravel which will cause little or no siltation. When any dam or other artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall at all times be allowed to pass downstream to maintain aquatic life below the dam or other artificial obstruction.

Mitigation Measure: Where removal of accumulated sand, silt, sediment, and other obstructions to maintain channel capacity in an unimproved channel or improved mitigated channel exceed 100 feet, the City shall submit separate plans detailing the project. Channels should be cleared in such a manner that trees greater than four (4) inches in diameter are avoided or are trimmed as is necessary to gain access. In channels where small trees are contiguous on both sides of the watercourse, thinning of trees may be authorized to permit access. Removal of all vegetation along long reaches of the stream bank shall be avoided. Unless agreed otherwise, any work area left barren of vegetation as a result of the maintenance activities shall be restored to its natural state by seeding, or other agreed upon means with native species of trees, shrubs, and grasses, within thirty (30) days or by October 30th of the year the activity occurred.

C. Vegetation Control

Control of aquatic and terrestrial vegetation may be performed with the use of mechanical devices, chemicals, or hand labor. Control of aquatic vegetation, weeds, grasses, shrubs and woody growth to remove obstructions to flow in improved channels and in the channel bottom from toe of slope to toe of slope of unimproved channels, as shown on Exhibit 7. Control of weeds and grasses on maintenance roads within the banks, to conduct facility inspection, by mechanical means, hand labor, or chemical application. Control of the lower branches of woody growth, less than four (4) inches in diameter, growing on the lower stream banks from ground level to a distance of 6 feet above the ground level. Where appropriate, removal of non-native vegetation (bamboo, tree tobacco, castor bean, pampas grass, eucalyptus, acacia, etc.), including stump and root removal from top of bank to top of bank, as shown on Exhibit 8.

Mitigation Measure: Trees greater than four (4) inches DBH shall not be removed without consultation with the Department.

Mitigation Measure: Cleared or trimmed vegetation may "chipped" and scattered as "mulch" at the project sites or removed from the normal high water areas of the stream corridor.

Mitigation Measure: Only herbicides registered with the California Department of Pesticide Regulation shall be used. All herbicides shall be applied in accordance with regulations set by the California Department of Pesticide Regulation. All herbicides shall be used according to labeled instructions, (specifically the use of chemicals in the vicinity of State Waters).. Labeled instructions for the herbicide used shall be made available to the Department upon request.

Mitigation Measure: If any wildlife is encountered during the course of routine maintenance, said wildlife shall be allowed to leave the maintenance area unharmed, and shall be flushed, hazed, or herded in a safe direction away from the project site. No trees shall be disturbed that contain active bird nests until all eggs have hatched and young birds have fledged without prior consultation and approval of a Department representative.

D. Repair of Previous Erosion Control Work

Repair of failed rock, sacked concrete, or gabion section. Maintenance activities shall be confined to the failed section and immediately adjacent areas (adjacent areas not to exceed twenty (20) feet) affected by the failure.

E. Minor Erosion Control Work

Sloping, installation of rock, gabions, or other erosion control measures as shown in Exhibits 6 and 7, from the toe of slope in the channel to a maximum of thirty (30) feet, measured vertically, above the channel invert to stabilize the eroded area. The length of the project work shall be less than fifty (50) feet.

Mitigation Measure: Project work shall be limited to periods when there is low or no stream flow. Unless otherwise agreed, should stream flow exist, the stream flow shall be diverted using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses. Any temporary dam or other artificial obstruction constructed shall only be built from materials such as sandbags or clean gravel which will cause little or no siltation. When any dam or other artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall at all times be allowed to pass downstream to maintain aquatic life below the dam. Project work shall be performed in a manner that minimizes stream turbidity.

Mitigation Measure: Removal of vegetation shall be minimized. Trees greater than four (4) inches DBH shall not be removed without consultation with the Department. To the extent possible, the stream channel shall be returned to its natural state and without creating a possible future bank erosion problem. Erosion control shall be confined to specific locations listed in Exhibit 9 and 10.

Mitigation Measure: Upon project completion, the stream channel bottom shall be scarified from the work site to the equipment entrance, where activities have caused compaction of the stream bed soil material. Unless agreed otherwise, any work area left barren of vegetation as a result of the maintenance activities shall be restored to its natural state by seeding, or other agreed upon means with native species of trees, shrubs, and grasses, within thirty (30) days or by October 30th of the year the activity occurred.

III. TIME AND MANNER OF MAINTENANCE ACTIVITIES

Maintenance activities shall be performed at a time and in a manner so that the proposed maintenance activities minimize adverse impacts and provide for the protection and continuance of the fish and wildlife. Periods of implementation of maintenance activities within **unimproved channels with significant riparian habitat (Type 5), improved channels with significant riparian habitat (Type 2), improved mitigated channels (Type 3) and the flowing portion of unimproved channels without significant riparian habitat (Type 4) listed in Exhibit 1, and improved channels without significant riparian vegetation (Type 1) not listed in Exhibit 1** are as follows:

Mechanical crews - June 1 to October 30

Hand crews - June 1 to March 1 (regular cleaning)
Critical Locations Anytime debris build-up at bridges or culverts threatens to flood existing structures or facilities.

Implementation of maintenance activities outside the wetted (flowing) portion of **unimproved channels without significant riparian habitat (Type 4) listed in Exhibit 1, and improved channels without significant riparian vegetation (Type 1) not listed in Exhibit 1** are not restricted to a specific time period, unless otherwise agreed to in writing.

IV. REPORTING REQUIREMENTS

The City shall provide to The Regional Manager, Region 2 of the Department, Exhibit 1 and a report describing the proposed maintenance activities and anticipated time schedule. Exhibit 1 and the report shall be submitted for review and approval prior to commencement of maintenance activities. The Department reserves the right to modify the stream definition types if maintenance activities at specific locations are viewed as adverse impacts to signification wildlife habitat. The written report shall include the following information: Typical problem descriptions, proposed solutions, equipment to be used, and the scheduled time periods of proposed activity. For unanticipated routine maintenance activities that are located outside the approved stream type location or outside the approved work period, the City, shall provide the Department written notice of such activities 14 days prior to commencement of the work. (See example provided.)

V. FEES

A fee of $2,220.00 for a five year period shall be paid to the Department prior to commencement of maintenance activities. This negotiated fee is based on the anticipated annual costs that will be reasonably incurred by the Department to administer and monitor the routine maintenance described in this MOU.

VI. AMENDMENT AND TERMINATION

This MOU cannot be amended or modified in any way except by a written agreement duly executed by the Department and the City. Any proposal for amendment or modifications must be delivered for review and approval by the Regional Manager or the official designated by the Regional Manager. If the City gives notice to and obtains the agreement of the Department to maintain additional specific facilities on improved or unimproved channels, any such additional facilities shall be added to Exhibit 1 by written amendment to this MOU, and all provisions of this Agreement shall apply.

This MOU becomes effective on receipt of signed MOU and the fee agreed to in section V. of this MOU. This MOU may be terminated by either party. Said termination shall become effective three (3) months after the party not initiating the termination has been duly notified in writing. This MOU expires on December 31, 2003. After the termination of this MOU the City may seek a new MOU. The City shall submit new exhibits when requesting a new MOU. The MOU processing fee are subject to change.

The Department reserves the right to suspend and/or revoke this MOU if the Department determines that the circumstances warrant. The circumstances that could require a reevaluation include, but are not limited to, the following: A) Failure to comply with the terms/conditions of this MOU. B) The information provided by the operator in support of the MOU is determined by the Department to be incomplete, or inaccurate. C) When new information becomes available to the Department representative(s) that was not known when preparing the original terms/conditions of this MOU. D) The project as described in the notification/agreement has changed, or conditions affecting fish and wildlife resources change.

VII. ENTIRE AGREEMENT

This MOU, along with the exhibits attached hereto, constitutes the entire Agreement and understanding between the Department and the City for routine maintenance activities. This Agreement supersedes all prior and contemporaneous routine activity agreements, representation, understanding, if any, whether oral or written.

A copy of this MOU must be provided to the Contractor/work crew and must be in their possession at the work site. The MOU shall be presented to any Department of Fish & Game employee inspecting the stream maintenance activity.

VIII. OTHER ENVIRONMENTAL LAWS, STATUTES, OR REGULATIONS

This MOU does not constitute any form of authorization, permit, biological opinion, or compliance with the requirements and provisions of any other statue, regulation, requirement, or ordinance respecting the protection or conservation of fish and wildlife resources. Those statutes include, but are not limited to, the California Environmental Quality Act, the California Endangered Species Act, or the Federal Endangered Species Act.

Various work and activities encompassed by this agreement may require prior approval by the Corps of Engineers and/or may be governed by special conditions of the Department of the Army permit issued for the project. Nothing in this agreement shall be construed to alleviating the need to comply with the terms and conditions of the Department of the Army permit or obtain the Corps of Engineers authorization, where applicable.

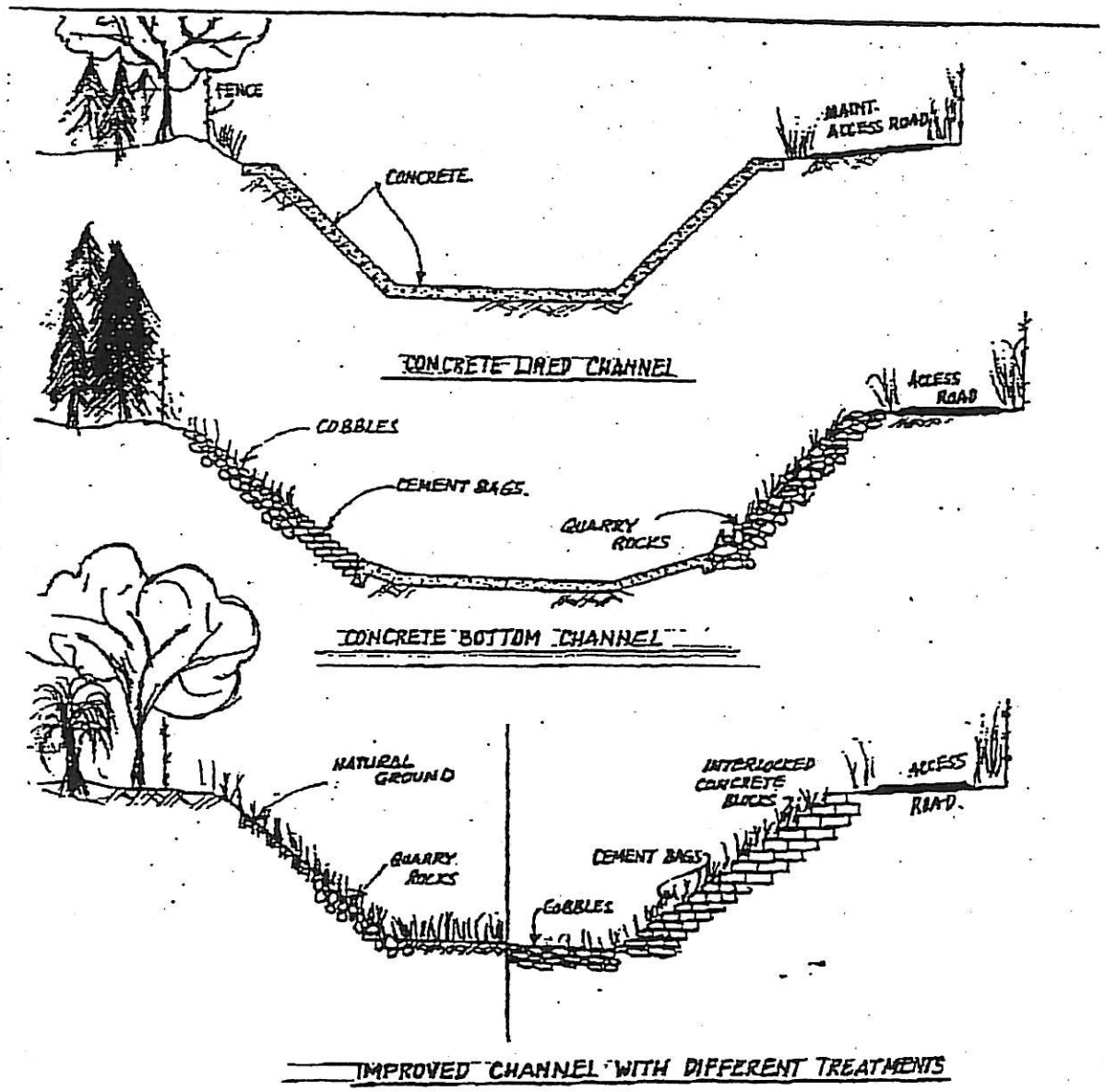
THE DEPARTMENT OF FISH AND GAME
The Resources Agency of California

By: Dale Watt for Gary L. Hobgood — 7/25/00
Fish & Game Warden — Date
Sacramento Valley Central Sierra Region

CITY OF ROSEVILLE
A POLITICAL SUBDIVISION OF THE STATE OF CALIFORNIA

By: Fred Brummer — JUNE 2, 1999
Fred Brummer — Date

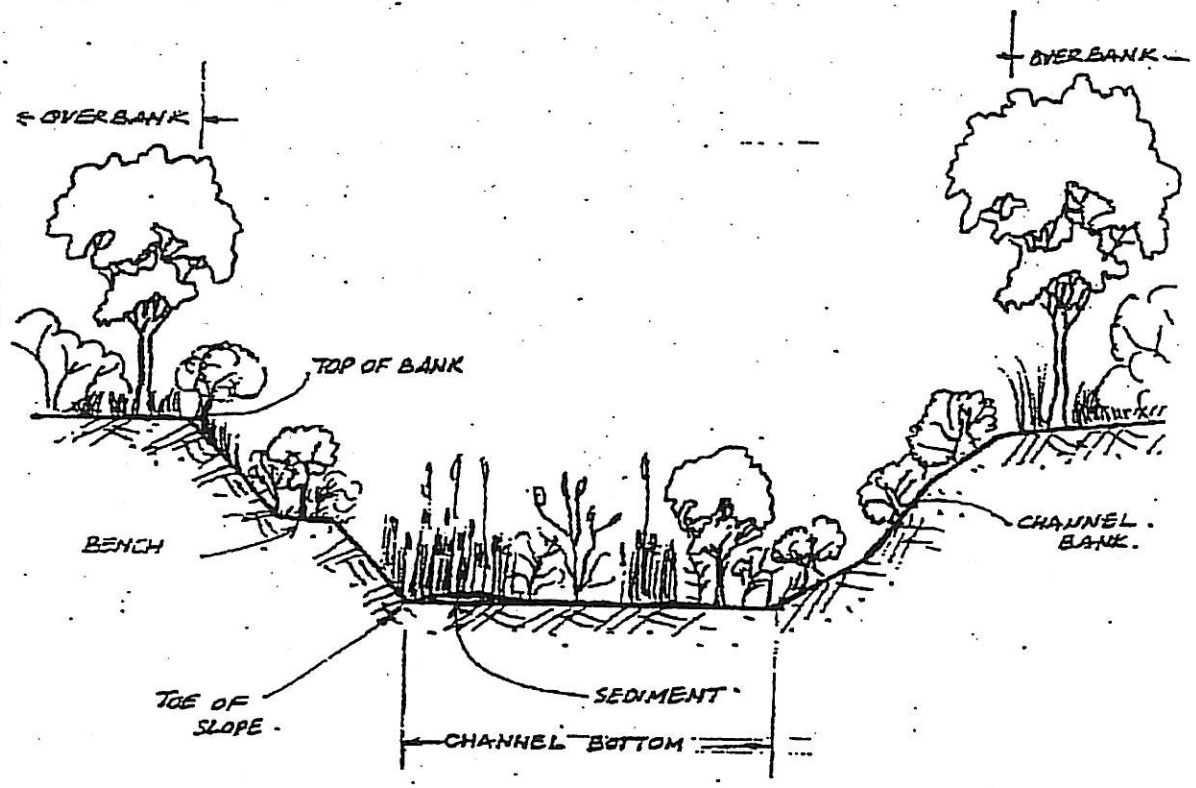
pgs 9-17



CHANNEL TYPE 1 - TYPICAL

IMPROVED CHANNEL WITHOUT SIGNIFICANT RIPARIAN HABITAT

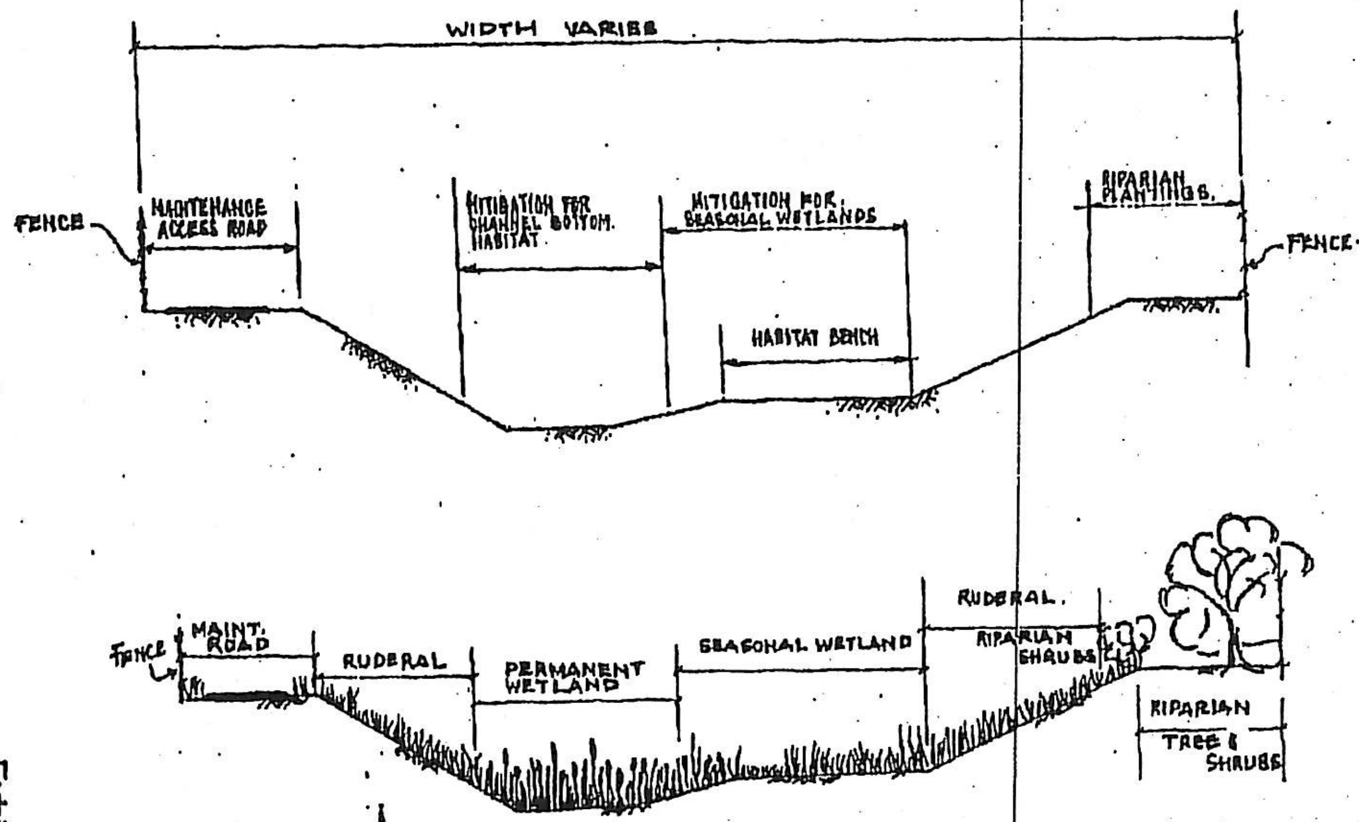
Exhibit 2



CHANNEL TYPE 2 ~ TYPICAL

IMPROVED CHANNEL WITH SIGNIFICAHT RIPARIAN HABITAT

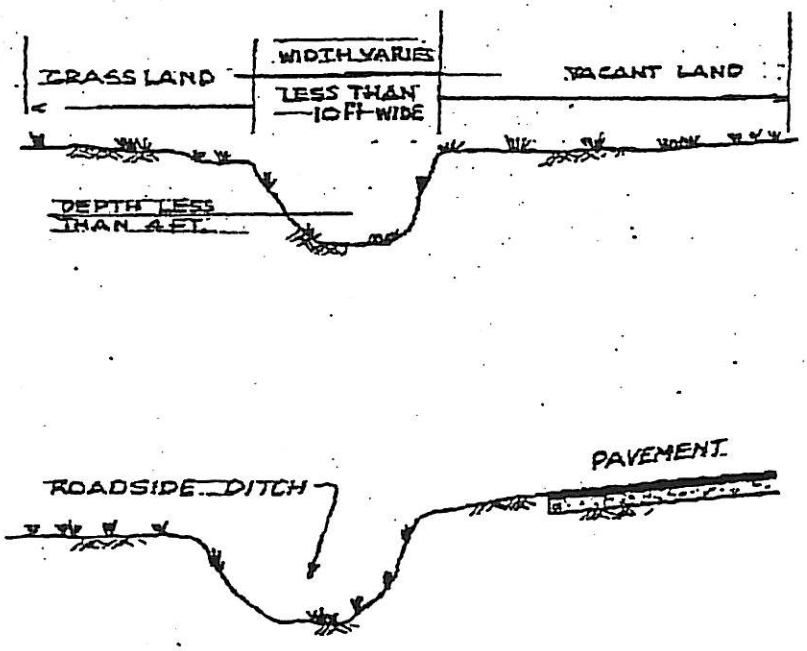
Exhibit 3



CHANNEL TYPE 5 – TYPICAL

IMPROVED CHANNEL WITH MITIGATING RIPARIAN HABITAT

Exhibit 4



CHANNEL TYPE 4 - TYPICAL

UNIMPROVED CHANNEL WITHOUT SIGNIFICANT RIPARIAN HABITAT

Exhibit 5

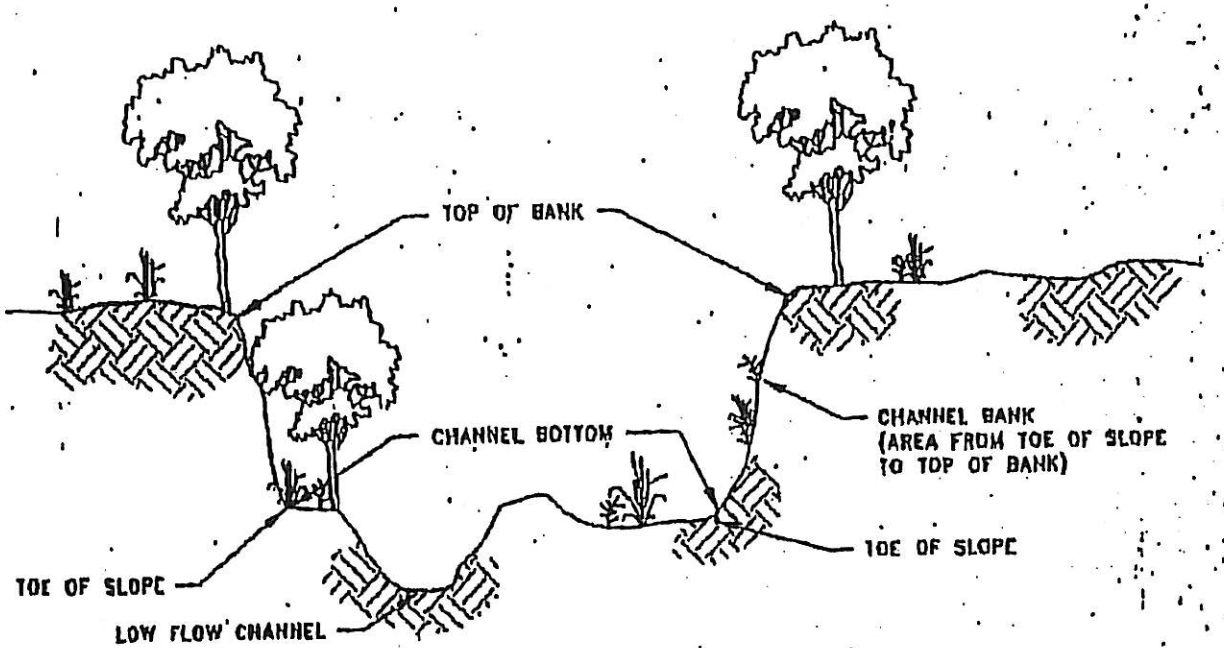


Exhibit 6

CHANNEL TYPE 5 - TYPICAL

UNIMPROVED CHANNEL WITH SIGNIFICANT RIPARIAN HABITAT

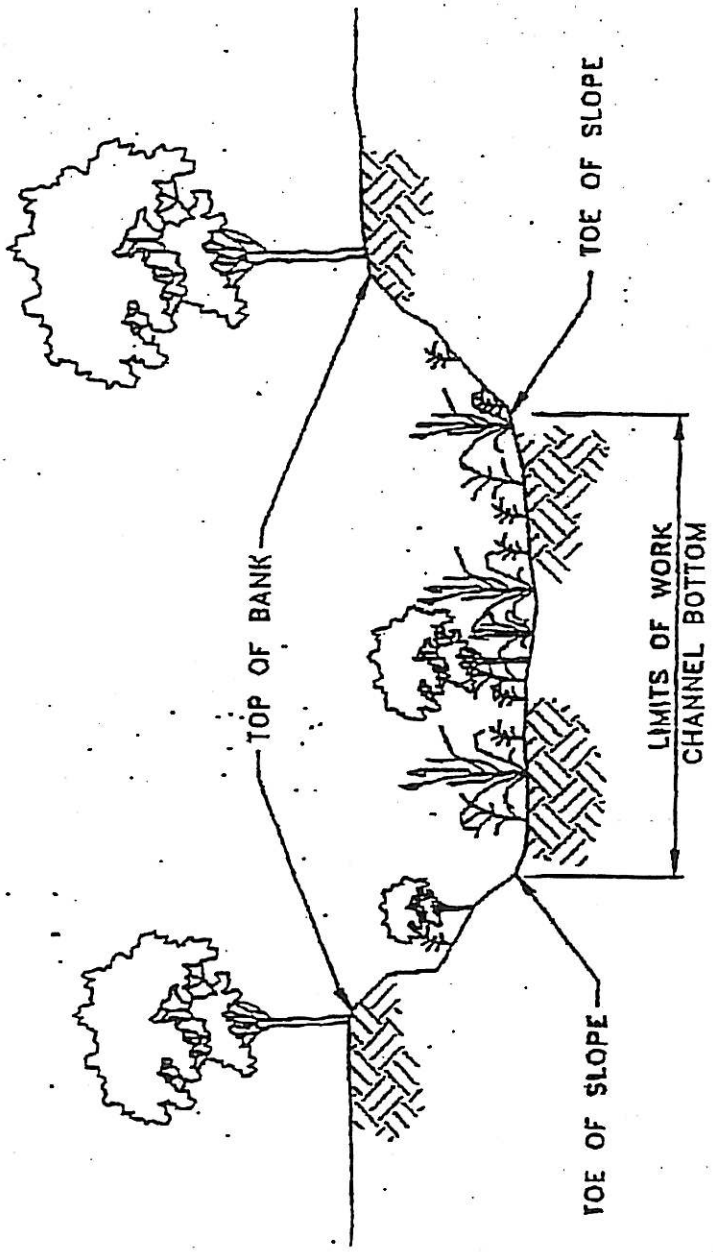


EXHIBIT 7
CONTROL OF AQUATIC
AND WOODY GROWTH

Exhibit 7

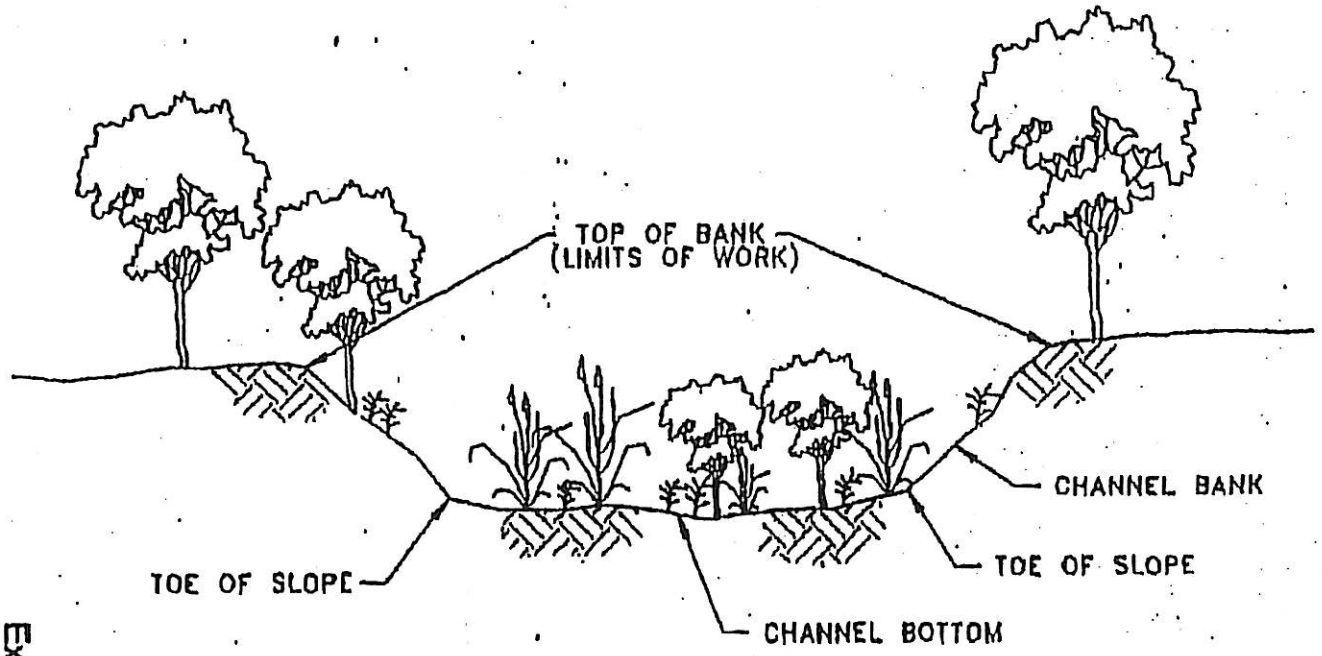


Exhibit 8

EXHIBIT 8
CONTROL OF NON-NATIVE VEGETATION

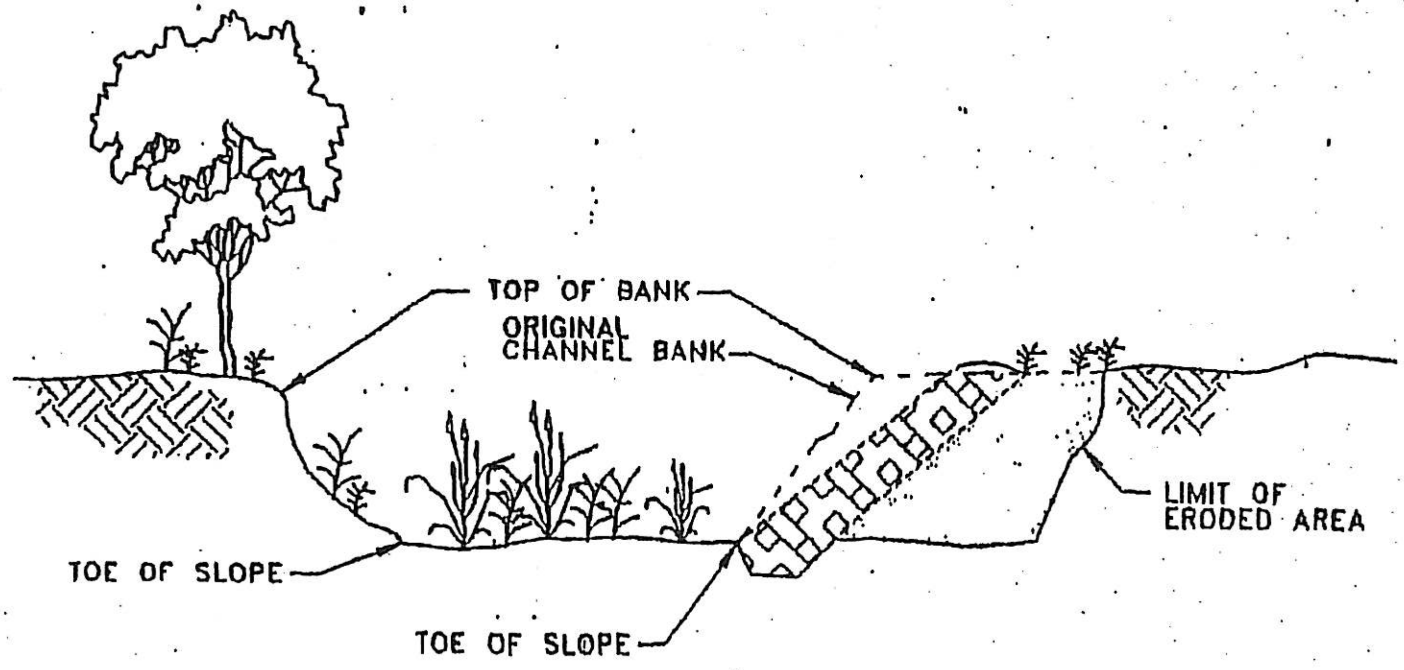


Exhibit 9

EXHIBIT 9
MINOR EROSION CONTROL WORK

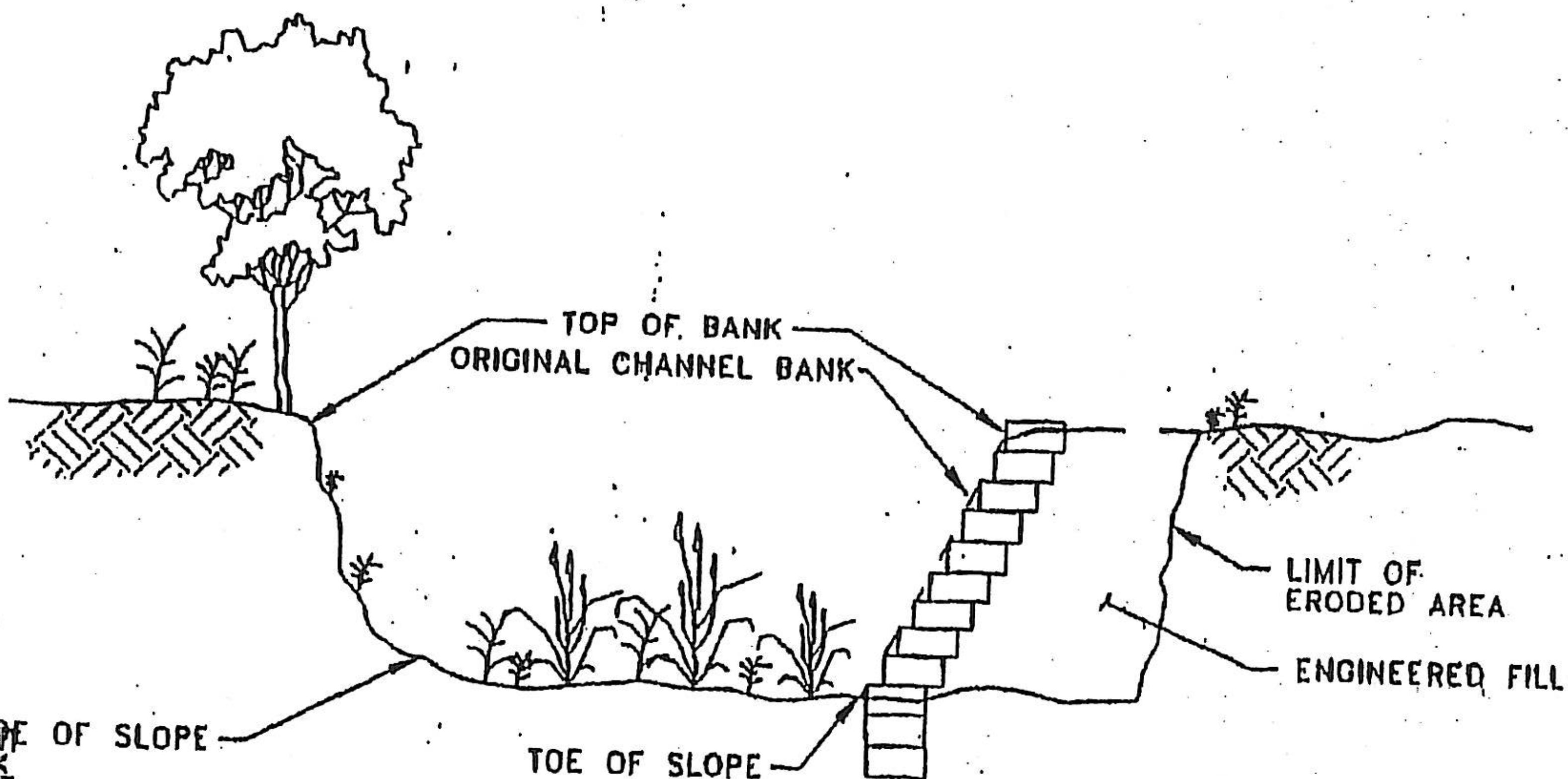


Exhibit 10

EXHIBIT 10
MINOR EROSION CONTROL WORK

APPENDIX B

Mitigation Monitoring and Reporting Program

Mitigation Monitoring and Reporting Program

The City of Roseville Creek Maintenance and Monitoring Program includes:

* a list of mitigation measures with a space for the completion date,

* the full text of the mitigation measures, and

* monitoring details, including:

    1) agency responsible for implementation,
    2) timing, and
    3) standards of success.

➢ List of Mitigation Measures and Date of Completion:

Completion Date

_____ BIO-1: Conduct raptor nest surveys prior to maintenance activity

_____ BIO-2: Conduct survey for special-status species

_____ BIO-3: Minimize impacts to riparian habitat

➢ Mitigation Monitoring Measures:

BIO-1: Conduct raptor nest surveys prior to maintenance activity.
Raptor nest surveys shall be conducted prior to maintenance activities at all sites during the nesting season. The nesting season in south Placer County extends from January (e.g. Great Horned Owls) through mid-August (e.g. White-tailed kite). Maintenance work outside of this period (mid-August-December) would not require any nesting raptor surveys. If an active nest is located, maintenance activities shall be limited in the vicinity of the nest based on recommendations by the surveying biologist and consultation with the CDFG.

Party Responsible for Mitigation: Parks and Recreation Department, Park Maintenance Division; and Department of Public Works, Street Maintenance Division

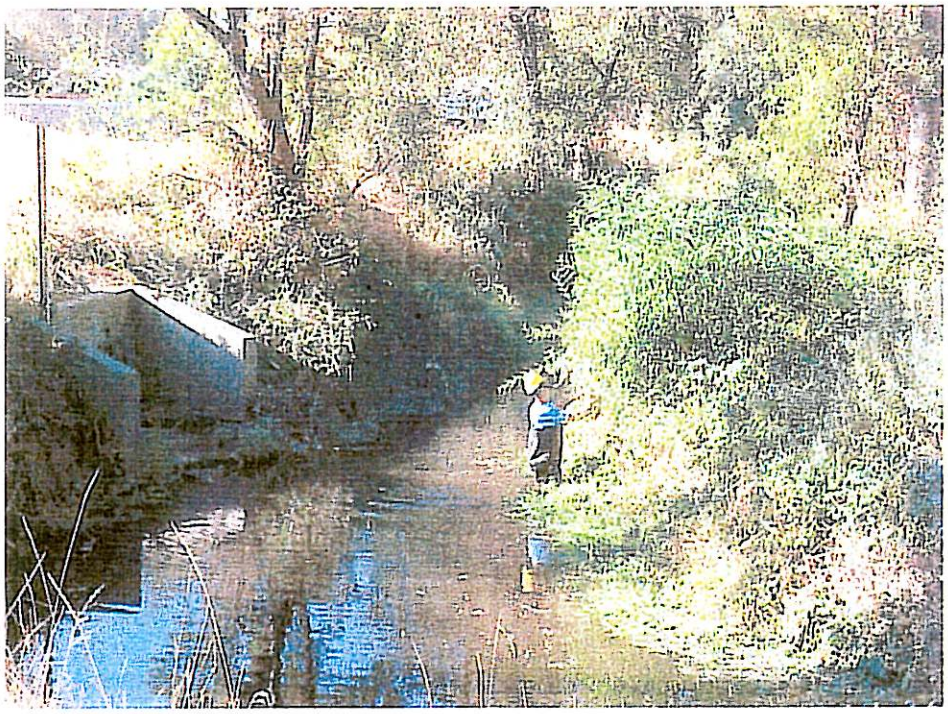
Monitoring Agency: Parks and Recreation Department, Park Maintenance Division; and Department of Public Works, Street Maintenance Division

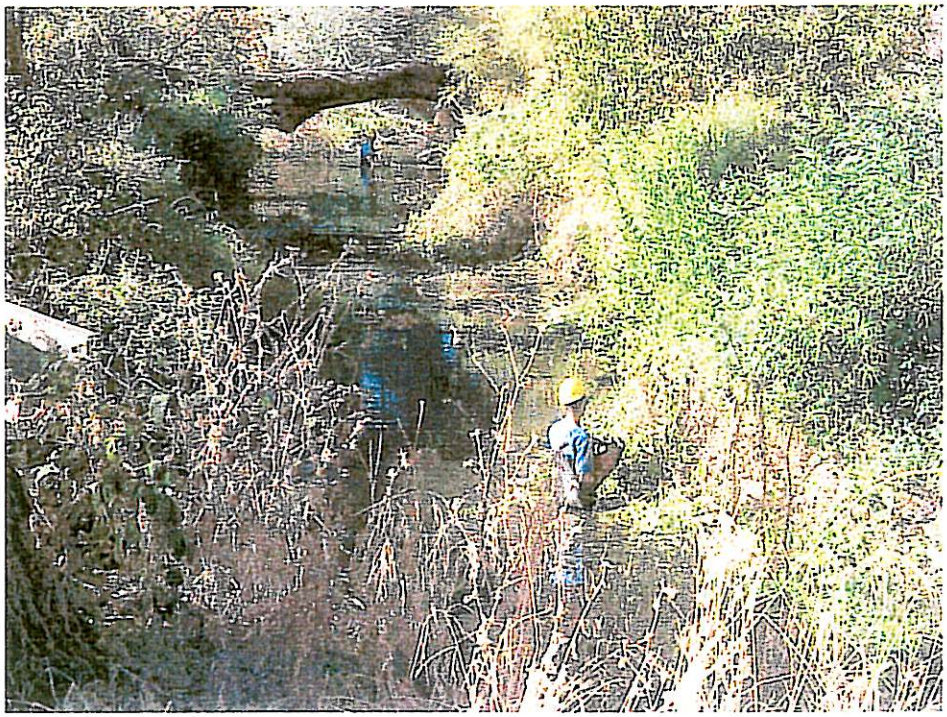
Timing Process: Prior to conducting maintenance activity

Standards of Success: The measure will be deemed successful if an opportunity is provided to determine the presence of raptor nests prior to the maintenance activity; and, if nests are found, appropriate action is taken to minimize impacts to the species.

APPENDIX C

Creek Maintenance and Restoration Photographs





Plates 1 and 2 – Cropping of riparian vegetation by creek maintenance staff in Dry Creek. Much of this cropping may not be necessary for adequate flood control.

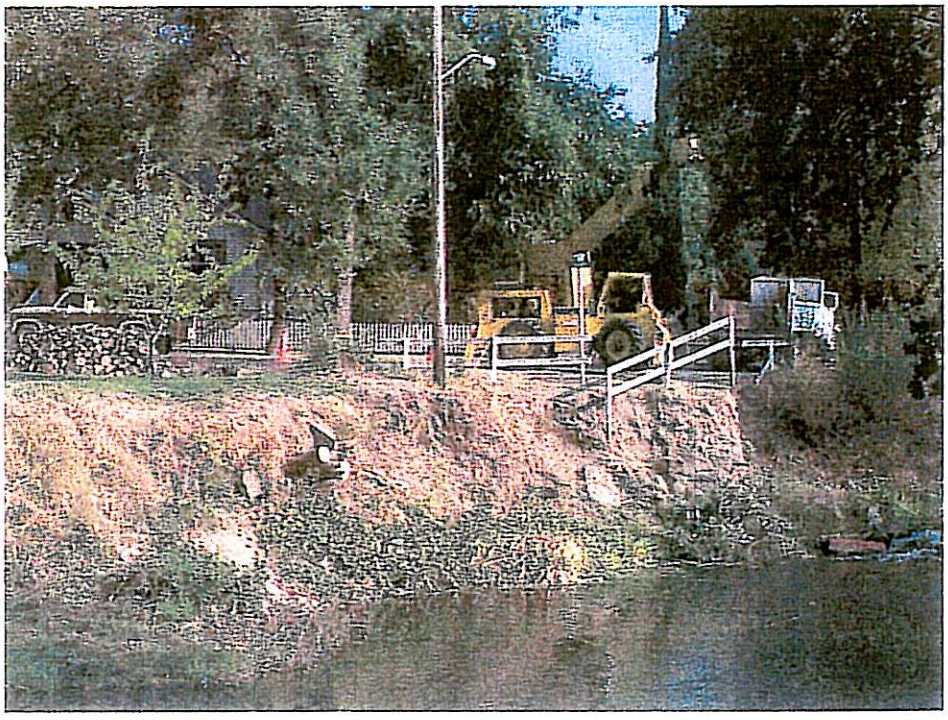


Plate 3 and 4 - A seriously eroded high sandy bank on Dry Creek. High creek flows carry away loose soil from the bank keeping it in a state of instability.

Plate 5 – Linda Creek above the Flood Control project site. Seeding with grasses on this exposed bank would reduce the amount of sediment entering the creek during storm events.

Plate 6 – This section of Antelope Creek downstream of Harding Bridge was revegetated as part of a mitigation program and now provides a variety of aquatic habitat types and riparian cover valuable for many special status species.

Plate 7 – Linda Creek below Champion Oaks Drive. Pro-active planting of willows to increase shading could minimize the tule growth below this culvert. On-going creek maintenance could then be reduced.

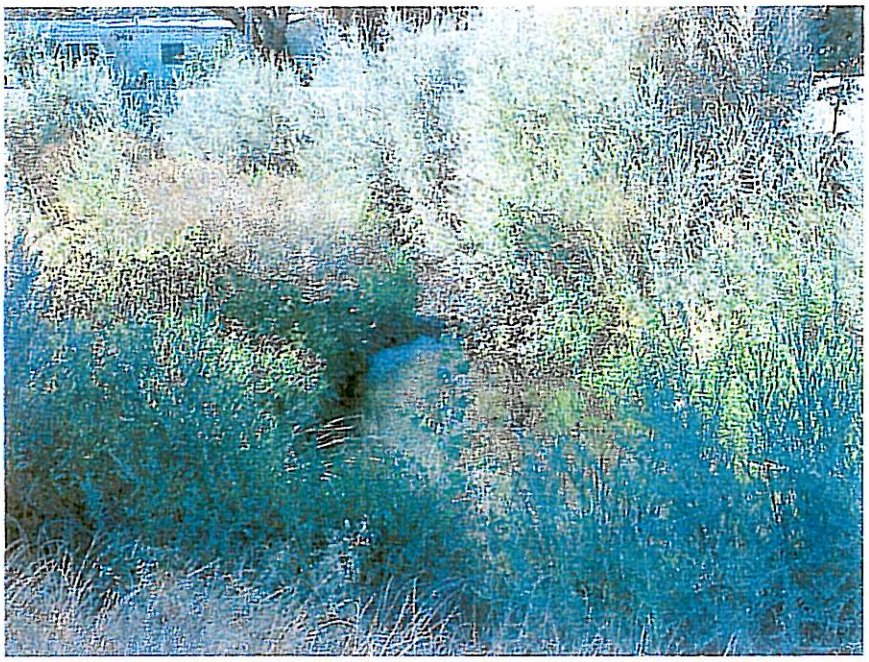


Plate 8 – Linda Creek above the Flood Control Project site showing a lush growth of streamside vegetation. This type of growth is seasonal and the vegetation dies off during the fall thereby minimizing its effect in reducing flood conveyance.

Plate 9 - This section of Cirby Creek, downstream of Interstate 80, could benefit from pro-active erosion control measures such as bank stabilization

Plate 10 - These boulders were placed in Antelope Creek as part of the Harding Bridge Extension Project and provides valuable in-stream cover and a degree of bank stabilization.

Plate 11 - This gravel was placed at Antelope Creek as part of the mitigation for the Harding Bridge Extension Project and provides valuable spawning habitat for salmonids during late fall/early winter high water levels.

Plate 12 - Flood flows exiting from culverts can cause bank erosion and sediment loading in the creek. Steps could be taken to stabilize creek banks below culverts to minimize erosion.

Plate 13 – Linda Creek below Rocky Ridge Drive. The aquatic vegetation below this box culvert should only be cleared when the integrity of the culvert and/or concrete embankments are in jeopardy. The remaining vegetation would typically lie down during flood events and would not inhibit flow movement.