RIPARIAN HABITAT ALONG THE SACRAMENTO RIVER

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Abstract. There has been a significant reduction in the amount of riparian vegetation[1] along the Sacramento River since settlement began in the 1840's. Unless large scale protective measures are implemented to protect the remaining vegetation, the banks of the Sacramento River will be converted into a barren environment with very little wildlife or aesthetic values remaining.

INTRODUCTION

The Sacramento River is the primary stream of the largest river system in the State of California, with a drainage area of approximately 26,000 square miles (Figure 1). On the valley floor, it is an alluvial stream with meandering characteristics. One of the most significant environmental resources of the river is the riparian vegetation associated with it (Figure 2). This vegetation consists of valley oaks (*Quercus lobata*) cottonwoods (*Populus spemontii*), willows (*Salix* sp.), sycamores (*Plantanus racemosa*), and a lesser number of other tree species in conjunction with numerous species of shrubs, forbs, and grasses. These plants frequently grow in dense stands and provide habitat for a wide variety of wildlife species. Because most of the land adjacent to the river is intensively farmed, this habitat is one of the few remaining places where wildlife can exist. The purpose of this paper is to describe the past and present conditions of riparian vegetation along the Sacramento River from Kewsick Dam, north of Redding, to Collinsville, near the river's mouth, a total of about 302 river miles.

[1]For the purpose of this paper, riparian vegetation is defined as all naturally occurring vegetation associated with a watercourse.

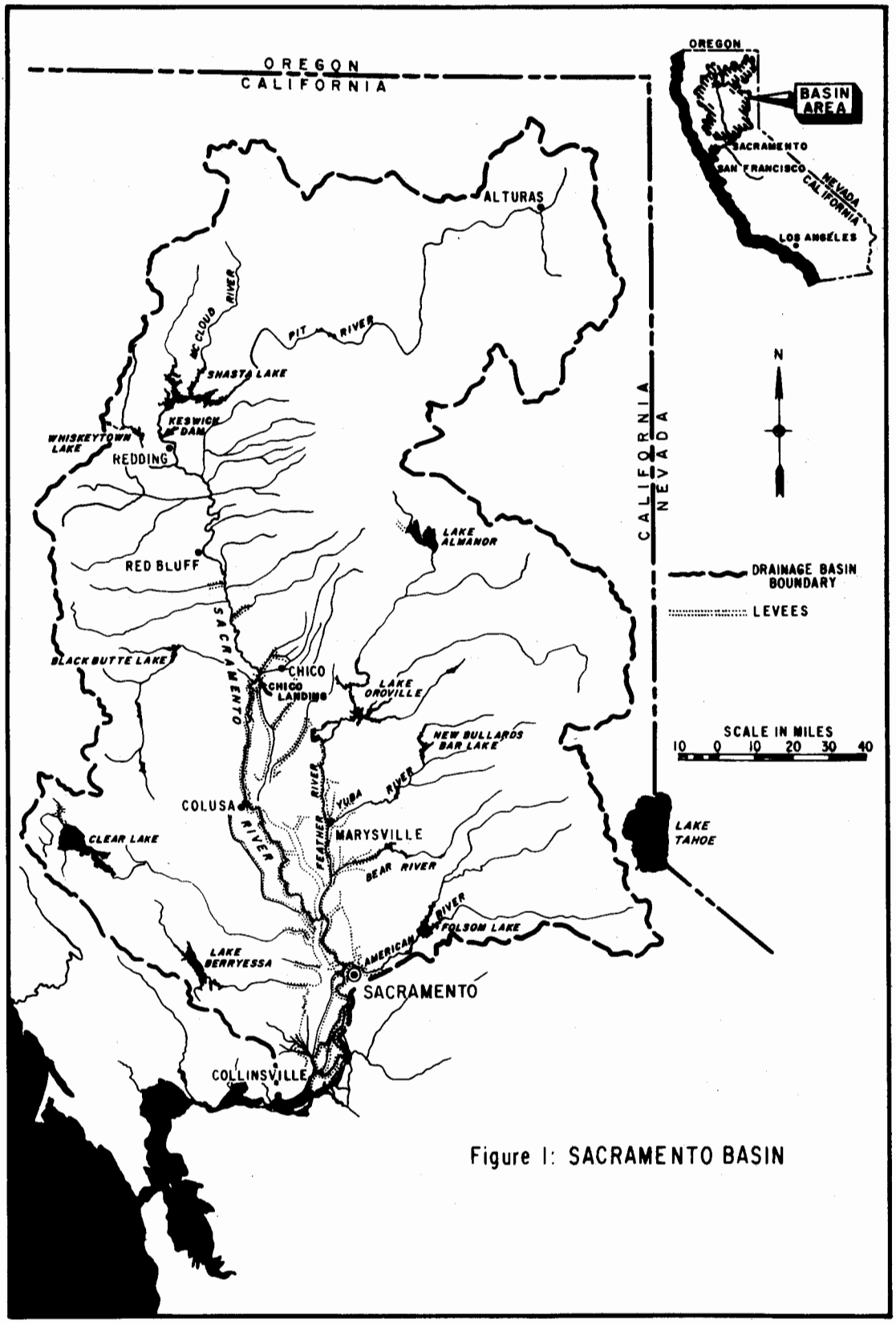


Figure I: SACRAMENTO BASIN

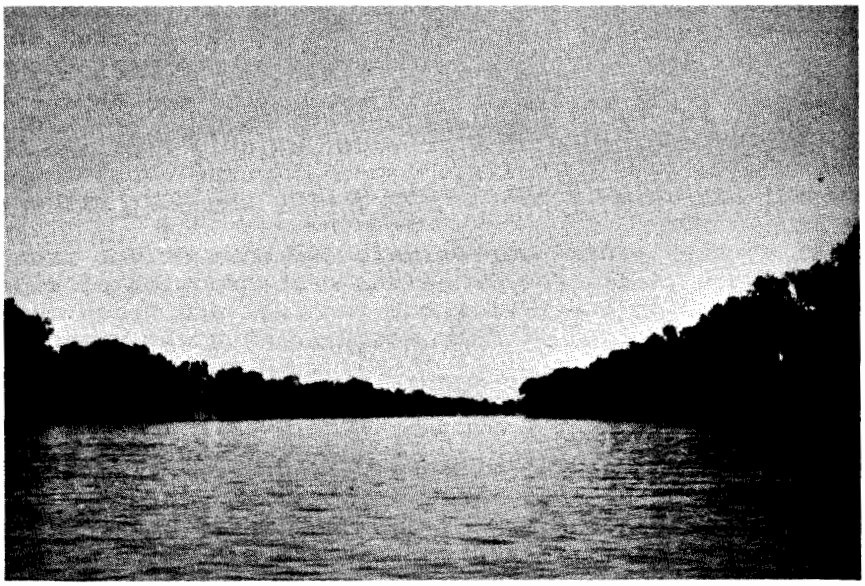


Figure 2. Typical riparian vegetation along Sacramento River.

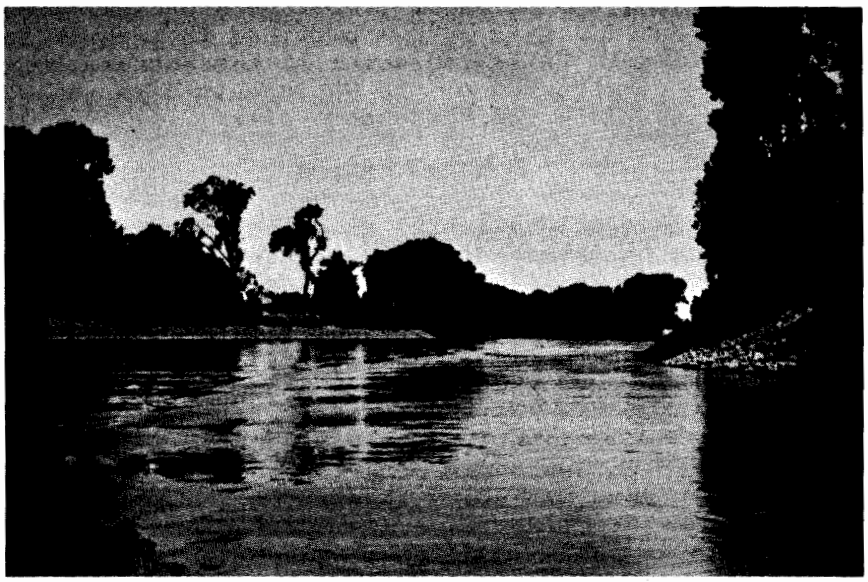


Figure 3. Riparian vegetation protected from future erosion by bank protection placed by waterborne equipment.

HISTORY OF DECLINE

Historical accounts indicate that wildlife flourished in the Sacramento Valley prior to settlement in the late 1840's, with large numbers of elk (Cervus canadensis nannodes), Grizzly bear (Ursus chelan), antelope (Antilocapra americana), and deer (Odocoileus hemionus) inhabiting the native grasslands and riparian forests. Along the Sacramento River, riparian forests were generally four to five miles wide located on natural levees, or terrace lands (Figure 4), created by sediment deposited along the banks when the river overflowed the channel (Thompson 1961). After 1849 there was an influx of population lured by gold discovery. These immigrants, mostly with rural backgrounds, quickly realized the agricultural potential of the Sacramento Valley, especially the exceptionally fertile natural levee lands which flooded only during the most extreme high flows.

By 1870, most of the larger game animals had been driven from the valley by settlement (McGowan 1961), and large-scale destruction of riparian forests had occurred. Riparian trees were cut for fuel and fence material, and, it is assumed, for the fueling of many woodburning steam vessels on the Sacramento River system (McGowan 1961). Lands cleared of riparian forests were ideal for agricultural uses because they were elevated, and thus inundated infrequently, and composed of coarser textured soils tending to be well drained. In general, these riparian soils were the most fertile and easily managed in the valley. As agricultural development increased, flooding became a more frequent problem because hydraulic mining in the upstream mountainous areas raised the bed of the Sacramento River as much as 10 feet in some reaches. By the mid-1870's, adjacent agricultural lands were being flooded and covered with hydraulic mining debris to such an extent that agricultural interests filed suit against the mining companies and, in 1884, a court decree stopped virtually all hydraulic mining operated without a means of restraining the debris (U.S. Army Corps of Engineers).

By 1894, there were many miles of private levees along the Sacramento River to protect the agricultural lands. These levees were usually poorly constructed and frequently failed causing damages to agricultural lands. As a result, in 1917, Congress authorized the Sacramento River Flood Control Project which comprised a comprehensive system of approximately 980 miles of levees, overflow weirs, drainage pumping plants, and flood bypass channels extending from Collinsville near the mouth of the Sacramento River upstream to Chico Landing, and on major tributaries and distributaries of the Sacramento River (Figure 1). This system provided increased flood protection to areas in the Sacramento Valley adjacent to the Sacramento River. In 1944, Shasta Dam was constructed on the Sacramento River near Redding, further reducing flooding along the Sacramento River.

CURRENT STATUS

Riparian vegetation presently existing along the Sacramento River is a remnant of what was once an extensive forest extending more than one-half mile in width in some areas and being completely absent in other areas. In general, the Sacramento River can be divided into the following five reaches, based on the width and density of riparian vegetation:

(1) Keswick Dam to Red Bluff - The river flows through the foothills in this 59-mile reach. Because the banks are steep in most locations, riparian vegetation rarely extends more than 100 feet from the river.

(2) Red Bluff to Chico Landing - At Red Bluff, the river begins to flow through the Sacramento Valley. The riparian vegetation along this 59-mile reach is considerably more extensive than above Red Bluff. In areas of agricultural development, thin strips of riparian vegetation line much of the river bank while in other locations, agricultural development extends to the river bank. Numerous oxbow lakes on both sides of the main channel frequently support dense stands of riparian vegetation over one-half mile wide.

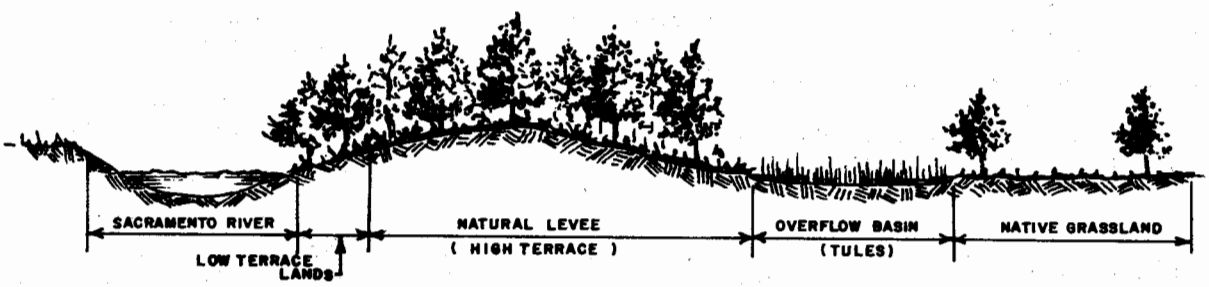
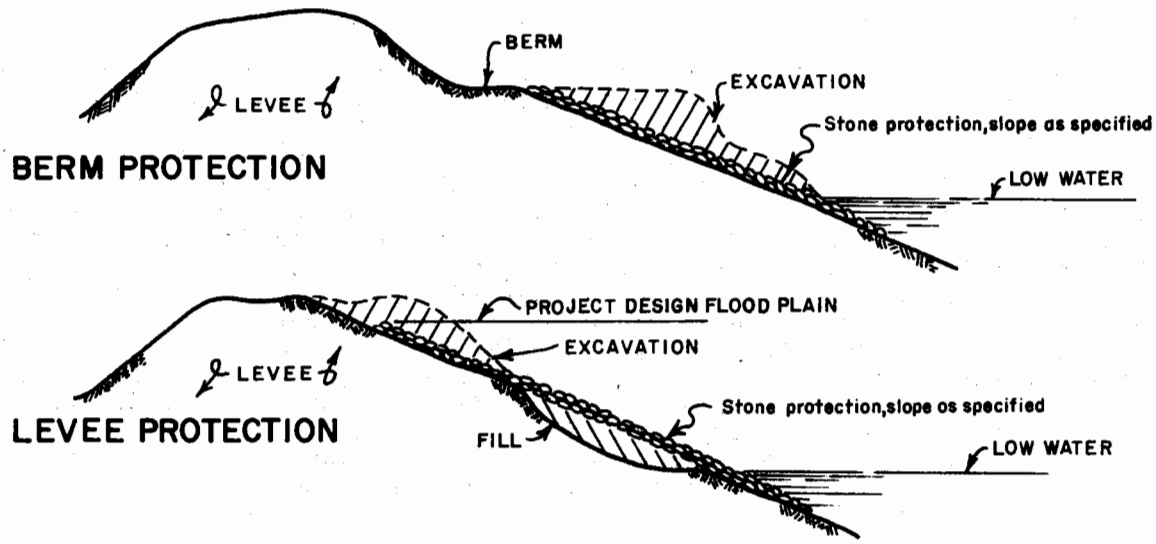


FIGURE 4
HISTORICAL CROSSECTION OF LANDS ADJACENT TO THE RIVER
Prior To Development
(NOT TO SCALE)



STANDARD BANK PROTECTION DESIGNS
FIGURE 5

(3) Chico Landing to Colusa - Levees of the Sacramento River Flood Control Project extend south from Chico Landing on both sides of the river to the mouth. Although this 40-mile reach is leveed, much of the levee system is more than a half mile from the river. Where riparian lands are not used for agriculture, vegetation extends from the river banks to the levees.

(4) Colusa to Sacramento - The levee system is adjacent to much of the river bank along this 85-mile reach and limits riparian vegetation to thin bands along the banks at some locations. At other locations there is a total absence of riparian vegetation.

(5) Sacramento to Collinsville - The levee system is adjacent to the river in the entire 60-mile reach, and riparian vegetation is generally absent except in isolated locations.

Although elk, grizzly bear, and antelope no longer inhabit the riparian vegetation along the river, this vegetation provides essential habitat for a wide variety of wildlife species. Of particular importance to wildlife is the successional stages of riparian vegetation which provide a variety of habitats. This primarily occurs between Red Bluff and Colusa where gravel bars are created as the river meanders. Initially the bars are of low elevation and subject to frequent inundation, but over the years, the lands are built up and a succession of vegetative communities develops, going from low-growing willows, forbs, and grasses, to a climax community consisting mainly of cottonwoods, sycamores, oaks, walnuts (Juglans hindsii), and alders (Alnus rhombifolia) with a dense understory of shrubs, vines, and grasses. More than 140 species of birds and 20 species of mammals use the natural vegetation along the river. Two Federally-listed endangered species are known to occur in the vicinity of the river: the southern bald eagle (Haliaetus leucocephalus leucocephalus) and the American peregrine falcon (Falco peregrinus anatum). The California yellow-billed cuckoo (Coccyzus americanus occidentalis), listed as a rare species by the California Department of Fish and Game, is found along the Sacramento River from Red Bluff to Colusa and is dependent on dense willow and cottonwood thickets bordering the river.

Several agencies have conducted studies to identify land use trends along the Sacramento River. The studies, which are described in the following paragraphs, indicate that riparian vegetation adjacent to the river has declined at an alarming rate in recent years.

As part of the Northern California Investigation, the California Department of Water Resources is investigating the Sacramento River and possible water developments related to it. One current investigation is land-use change study along the river from Kewsick Dam, near Redding, to the confluence of Butte Slough and the Sacramento River, a few miles south of Colusa. The study covers 164 miles of river and involves land-use changes over the 20-year period from 1952 to 1972. Preliminary data obtained from the Department of Water Resources (Table 1) indicate the following:

(1) Over half of the high terrace lands (Figure 4) supporting riparian vegetation (lands susceptible to flooding only during periods of very high flow) has been converted to other uses, primarily orchards.

(2) Riparian vegetation on low terrace lands (Figure 4) decreased only by about 4 percent (430 acres). Since low terrace lands are flooded nearly every year, development is very limited.

(3) Annual crop acreage consisting of grain, forage, and annual row crops was reduced by about 22 percent (5,370 acres) with the land going mainly into orchards.

These data indicate that orchard development in this reach is the most significant factor causing losses in riparian vegetation/wildlife habitat. Cropland, which provides an important food source to wildlife is also being converted to orchards. Orchard lands are usually clean tilled and sprayed frequently, and as a consequence, little wildlife values exist on these

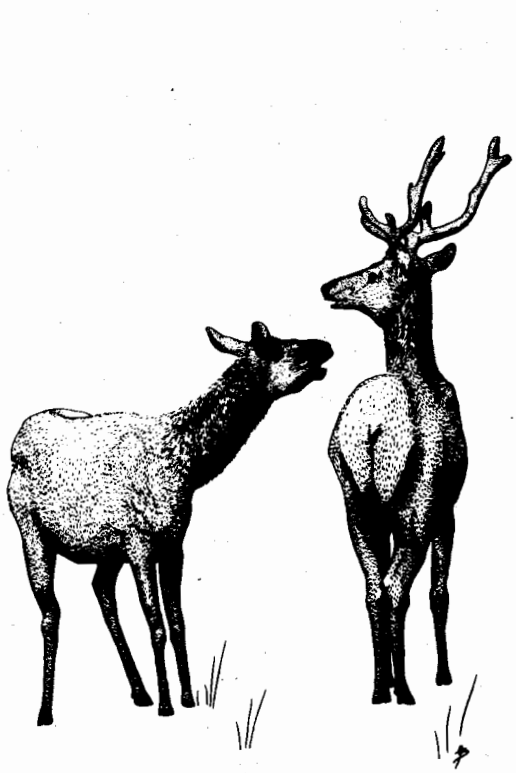
TABLE I

RIPARIAN ZONE STUDY*
SACRAMENTO RIVER
KEWSICK DAM TO CONFLUENCE OF BUTTE SLOUGH
(Land Use in Acres)

Land Use Category	1952	1972	Net Change
Orchard/High Terrace	3,020	13,910	10,890
Annual Cropland/High Terrace	21,560	16,630	-4,930
TOTAL	(24,580)	(30,540)	(5,960)
Orchard/ Low Terrace	140	2,380	2,240
Annual Cropland/Low Terrace	2,940	2,500	-440
TOTAL	(3,080)	(4,880)	(1,800)
Riparian Vegetation/High Terrace	16,470	7,810	-8,660
Riparian Vegetation/Low Terrace	11,250	10,820	-430
TOTAL	(27,720)	(18,630)	(-9,090)

*Preliminary information obtained from California Department of Water Resources, Northern District.

NOTE - These figures do not identify all land uses surveyed by the California Department of Water Resources, but only those that have a significant direct bearing on riparian vegetation.



lands. Since numbers and variety of wildlife along the river are dependent on the amount of food and cover available, wildlife has been reduced notably in the past 20 years. Soil and rugged terrain above Red Bluff restrict orchard development in that area, so most orchard development has occurred below Red Bluff.

Over 85 percent of the lands adjacent to the river between Red Bluff and Colusa are zoned for agriculture, and since landowners are taxed at agricultural land rates for riparian acreages, they are compelled to develop their lands to support the higher taxes. A possible solution to this problem is to reduce taxes on lands that are presently in native vegetation. Another solution is the large-scale purchase of riparian lands by some Governmental body to insure they would remain in their natural state. Several agencies and organizations are currently planning to purchase selected parcels of land on the river for public access and protection of wildlife habitat.

In 1973, the Corps of Engineers, Sacramento District, made estimates of land-use change on the waterside of the Sacramento River Flood Control Project levees. This study included the remaining 138 miles of river from Colusa to Collinsville. Estimates were made by comparing 1964 and 1972 aerial photographs. Since no field surveys were made, the information obtained provided only general trends. The most significant change in the eight year period was a 27 percent decrease in riparian trees (from 3,500 acres to 2,570 acres).

It is assumed that a major portion of this loss resulted from erosion of the natural banks and the Sacramento River Bank Protection Project. Concern over erosion problems has increased in the past 20 years because of the rapid development taking place along the river which was directly affected by erosion. Also, after Shasta Dam went into operation in 1944, recreational boating on the river increased because flows were sustained at a higher elevation, especially in the summer. This caused increased erosion of the banks due to boat wave wash. Erosion of the river banks is especially damaging to riparian vegetation below Colusa where levees are usually within 100 feet of the river. This narrow strip of land, usually referred to as a berm, contains the only remaining riparian vegetation left in this reach.

As erosion continues, riparian vegetation is lost, and the levee system is endangered. To combat against erosion and possible failure of the flood control levees, Congress authorized the Sacramento River Bank Protection Project in 1960 which consists of a long-range program of bank protection and levee setbacks. Such a failure would result in widespread damages and possible loss of life. The area protected by the levee system comprises over one million acres, in which 50 communities are located.

Until recently, bank protection construction consisted of clearing vegetation from the bank or levee slope, and then surfacing the slope with rock (Figure 5). Conservationists have been particularly critical of this type of construction because it has resulted in destruction of wildlife habitat. Also, maintenance of the completed work by local reclamation districts has not allowed vegetation to regrow.

Numerous modifications of bank protection have been tested and evaluated recently to find ways to provide bank protection and also preserve the riparian vegetation remaining along the banks. The method most promising which preserves vegetation as well as preventing further erosion is the placement of bank protection using waterborne equipment. Very little vegetation is disturbed using this method since land-based equipment is not used for construction (Figure 3).

A major factor limiting the amount of vegetation saved is cost. Currently, bank protection is constructed after most of the riparian vegetation has been eroded away. In the past, annual funding for the work has been

generally adequate only to protect critical erosion sites endangering the levee system.

Initial protection of riparian vegetation that this and other measures offer does not protect it from being developed for agriculture or other uses; however, the State of California has agreed to acquire environmental easements at future bank protection sites having significant riparian vegetation. These easements will prevent any type of development on the protected berm.

Although some riparian vegetation along the Sacramento River below Colusa is being protected by certain measures, losses will continue to occur. The U.S. Fish and Wildlife Service is presently preparing a wildlife mitigation study to determine the extent of wildlife habitat losses resulting from past bank protection construction. If the study determines that losses warrant Federal involvement in providing mitigation lands, it is expected that additional riparian vegetation may be protected through acquisition.

In 1970, the Secretaries of Interior and Agriculture identified the Sacramento River above Sacramento as a potential addition to the National Wild and Scenic Rivers System. Studies are currently being undertaken to assess the river's characteristics related to such potential designation. The study results will also be utilized to further improve the planning, design, and construction of the bank protection works. If all or parts of the river are eventually recommended for inclusion in the system, Federal funds could be appropriated for acquisition and management of lands bordering the river.

CONCLUSION

Significant reductions in riparian vegetation and associated wildlife habitat have occurred during the past century. Although this vegetation has been reduced in magnitude, it provides essential habitat for a wide variety of wildlife species. Riparian vegetation has disappeared from certain segments of the river and this trend will continue unless large-scale acquisition and protective programs are undertaken to protect this valuable resource.

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