



Photo Jan 21, 1974
Retention of Riparian Vegetation
Sacramento River Tisdale Weir to Hamilton City
February 27, 1978

 **MURRAY, BURNS AND KIENLEN**
A CORPORATION
CONSULTING CIVIL ENGINEERS
600 FORUM BUILDING — 1107 NINTH STREET — SACRAMENTO, CALIFORNIA

STATE OF CALIFORNIA—RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
THE RECLAMATION BOARD

THE RECLAMATION BOARD
RESOLUTION NO. 78-4

RETENTION OF RIPARIAN VEGETATION
SACRAMENTO RIVER, TISDALE WEIR
TO HAMILTON CITY

WHEREAS, The Reclamation Board has adopted general policies to preserve and encourage riparian vegetation; and

WHEREAS, inactive riparian vegetation along the Sacramento River is being removed at an alarming rate; and

WHEREAS, The Reclamation Board has caused a study to be made which concludes that certain key stands of riparian vegetation along the Sacramento River not only do not interfere with the successful operation of the flood control project but are beneficial in that they stabilize the river channel, protect levees from wind driven wave wash, reduce bank erosion, assist in maintaining hydraulic control for the proper operation of the Sacramento River Flood Control Project and in some instances protect flood control project features from potentially damaging high velocity flows;

NOW, THEREFORE, BE IT RESOLVED, that:

1. The Reclamation Board hereby accepts the Murray, Burns and Kienlen letter report entitled, "Retention of Riparian Vegetation Sacramento River Tisdale Weir to Hamilton City"; and

2. The Board directs and encourages that all activities carried out along the Sacramento River Flood Control Project from Tisdale Weir to Hamilton City be consistent with the recommendations of the Murray, Burns and Kienlen letter report; and

3. The Board hereby solicits public comment to enable the cooperative program to move forward.

Dated: March 21, 1978



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February 27, 1978

Mr. Paul Clifton, General Manager
The Reclamation Board
Resources Building
1416 Ninth Street, Room 335
Sacramento, California 95814

Dear Mr. Clifton:

In conformance with Contract B 52393 between the State Reclamation Board and Murray, Burns and Kienlen, there is submitted herewith twenty-eight 1976 photo atlas sheets on which have been delineated 38 sites which, in our opinion, contain riparian vegetation which is significant to the overall stability of the Sacramento River and its overflow areas between Tisdale Weir (River Mile 118.8) and Hamilton City (River Mile 199.4). The 38 riparian vegetation sites recommended for retention are identified on the Index Map (Sheet 1) at a scale of 1:62,500. In addition, a map (Plate I) at a scale of 1:62,500 compares the channel alignment from the 1949-1954 editions 15 minute U. S. Geological Survey quadrangles with the 1976 approximate channel alignment. A short statement for each identified riparian vegetation site is included. Table A, preceding the individual site descriptions, summarizes the locations, acreages and site priority. Acreages were determined by planimetry of the site areas delineated on Sheets 2 through 29. Priorities are assigned on a scale of 1 to 3 with 1 representing the most significant sites.

The selection of the riparian vegetation sites was based on a review of available historic topographic maps; study of

current and historic aerial photography; review of publications and analysis by others relative to Sacramento River riparian vegetation and river and bank stability; collection, review and analysis of current hydrologic and hydraulic data; experience of MBK personnel in monitoring in detail the Sacramento River and Sacramento River Flood Control Project for over 25 years; and detailed aerial inspection of the study area in January and February 1978.

The retention of vegetation at the selected sites will not stop Sacramento River bank erosion but it can have a beneficial effect in many instances by reducing the rate of erosion. Retention of vegetation also prevents detrimental effects resulting from clearing and levelling the land up to the river bank, including the natural levee, which generally accelerates surface erosion and often greatly accelerates bank erosion. In addition, vegetation at certain of the sites assists in maintaining the necessary hydraulic control for the proper operation of the Sacramento River Flood Control Project. Retention of vegetation in fringe areas adjacent to levees can assist in limiting wave wash and high velocity flows impinging on the levee section. Obviously there are other environmental considerations involved with retaining or clearing riparian vegetation; however, the vegetative sites identified herein were selected on hydraulic and flood control considerations only.

It is emphasized that the hydraulic characteristics of the Sacramento River from Hamilton City to Tisdale Weir must be monitored on a continuing basis to ensure that the overall system is properly managed from all aspects -- flood control, land preservation, recreation, riparian habitat, etc. Management decisions

including retention of vegetation, and conversely, clearing of vegetation when necessary, must be based on accurate and realistic hydraulic data to ensure that the Sacramento River Flood Control objectives as well as other resource objectives are met as efficiently and as safely as possible.

The selected vegetation sites consist mainly of substantial areas of native vegetation dominated by large oak, cottonwood and willow trees interspersed, in many areas, with vines and low-growing bushes. These sites, totaling approximately 4,104 acres, are generally along reaches of the river which have been observed to be actively meandering during the past 10 to 15 years and have been particularly evident following the December 1964 flood. A comparison of the river channel on the 1949-1954 edition of the 15 min. U. S. G. S. quadrangles with the 1976 photography (see Plate I) indicates that changes in channel alignment have been quite dramatic in some reaches in that approximate 25-year period. Some changes have been quite abrupt and others have been barely noticeable to the casual observer until several years have passed. The long-term result, however, is the same: land is lost or redistributed and in many cases expensive works have to be constructed to protect the banks and Project levees.

The river channel will continue to erode its banks and meander over its flood plain as it always has regardless of our efforts and our wishes otherwise. It has been demonstrated, however, at many locations along the Sacramento River, as on other rivers in the Sacramento Valley, that often even small-scale clearing usually followed by land levelling, may result in dramatic and costly channel realignments. It is believed

that the retention of these 38 sites will at the very least delay the inevitable meanders in these reaches and provide a natural measure of relative stability to the river channel. In addition to the recommended sites, native fringe vegetation on narrow berms should be retained consistent with Project maintenance requirements.

Hydraulic analysis at some future time may indicate the need for clearing in some or all of the selected sites to maintain flood flows at or below the Project Design Flood Plane. In that case we recommend consideration be given to selective clearing to accomplish this important purpose as well as to retain, if possible, sufficient native cover to inhibit channel meandering.

In addition to the 38 selected sites, there are numerous other areas of native vegetation which no doubt contribute to the relative stability of the channel but are situated such that a direct or "primary" stabilizing influence can not now be attributed to them. It is difficult, if not impossible, to predict the change, if any, a river may make if some of the less obvious natural constraints are removed. The rather rapid agricultural development of riparian flood plain lands will probably continue in the future as it has in the recent past to the point where natural terrain and vegetation in these areas will cease to exist. Although we believe these areas to be of less immediate concern than the selected sites, they may also contribute to the present relative stability of the channel. In addition, our review of the literature indicates that these areas are ecologically significant from the standpoint of riparian wildlife habitat maintenance. These sites consist, for the most part, of oxbows, some of which are a considerable

distance from the present channel. They are located as follows:

Table B

<u>Sheet No.</u>	<u>River Mile</u>	<u>Bank</u>
15 & 16	161.5	Left
18	168	Right
18	169	Right
19	170.5	Right
22	176.5	Left
23 & 24	182.5	Left

Below Colusa the levees essentially border the main channel except along three reaches between River Mile 119.2 near Tisdale Weir and River Mile 131. In these three reaches there are relatively wide overbank areas where the river is tending to meander. The rest of the river banks below Colusa for the most part, which have not already been revetted with stone or in some cases planted to orchard, consist of narrow berms with native vegetation. This strip growth, even if sparse, should be retained in its natural state for as long as possible to assist in limiting wave wash and higher velocity flows from impinging on the levee section. These areas must be managed to ensure that the vegetation does not detrimentally affect the river bank, berm or levees or other flood control facilities. For example, it may be necessary to top trees to ensure they will not be blown down during storms resulting in serious damage to the river bank or flood control facility. It may also be necessary to selectively remove some trees and vegetation in the fringe areas to prevent or minimize damage to the banks or levees.

Recommendations

It is recommended that the Reclamation Board initiate action to ensure retention of vegetation at the 38 identified sites. Continuing evaluation of operation of the Sacramento River system from Tisdale Weir to Hamilton City is required to ensure that the retained vegetation areas do not, at some future time, adversely affect the functioning of the flood control system. Future hydraulic conditions may require management of the vegetation, such as selective thinning or clearing.

It is also recommended that the oxbow sites listed in Table B be reviewed with the landowners involved to determine the possibility of retaining the vegetation at these sites.

We will be pleased to meet with you and the Reclamation Board at your convenience to discuss the information contained herein.

Sincerely,

MURRAY, BURNS and KIENLEN

By:

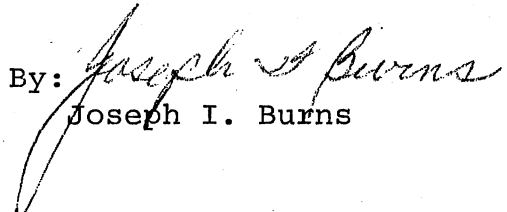

Joseph I. Burns

Table A
Riparian Vegetation Retention Sites

Site No.	Sheet No.	River Mile	Bank	Area -- Acres		
				Priority 1	Priority 2	Priority 3
1	2	118.8-120.0	R	--	--	39
2	2	119.2-119.9	L	--	--	27
3	4	125.6-126.6	L	--	49	--
4	4	127.4-127.9	R	--	--	36
5	5	128.1-131.1	R	--	--	193
6	10	144.4-145.9	R	--	103	--
7	10	145.0-145.4	L	--	50	--
8	10	145.6-145.8	L	--	5	--
9	10	145.8-145.9	L	--	4	--
10	10,11	146.2-147.3	R	71	--	--
11	11,12	148.1-148.9	R	--	--	77
12	11,12	148.8-149.0	L	--	10	--
13	12	149.4-149.7	L	--	15	--
14	13	154.3-154.9	R	21	--	--
15	13,14	156.0-157.1	L	--	83	--
16	14	156.9-159.0	R	103	--	--
17	14	157.2-157.3	L	--	--	11
18	14	158.8-159.6	L	19	--	--
19	16	161.7-162.7	R	--	42	--
20	16,17	162.6-163.4	L	--	49	--
21	17,18	165.5-167.0	R	--	--	106
22	18	168.9-169.6	R	--	105	--
23	18,19,20	168.8-172.1	L	417	--	--
24	19	169.9-171.3	R	--	86	--
25	20	172.0-173.0	R	--	--	67
26	20	173.2-173.4	R	--	--	15
27	20,21	173.4-173.7	R	--	--	11
28	21	174.7-176.2	L	--	264	--
29	22	178.0-178.6	R	90	--	--
30	23	179.8-181.6	R	--	--	195
31	23,24	182.3-184.0	R	--	--	140
32	24	182.8-183.3	L	66	--	--
33	24	184.3-185.0	R	--	30	--
34	25	187.3-188.1	R	--	53	--
35	25,26	187.3-190.2	L	366	--	--
36	26,27	190.2-192.5	L	742	--	--
37	28	193.0-193.7	L	74	--	--
38	28,29	194.2-196.2	L	--	270	--
Total				1,969	1,218	917
Grand Total -				4,104 acres		

Site Locations and Descriptions

Site No. 1, right bank, River Mile 118.8 to 120.0, 39 acres (Priority 3). This site is immediately upstream of Tisdale Weir. The vegetation provides berm and levee protection at a sharp bend.

Site No. 2, left bank, River Mile 119.2 to 119.9, 27 acres (Priority 3). This site is on the inside of a bend just upstream of Tisdale Weir. A marina has recently been developed at this site and presumably the native vegetation will be retained.

Site No. 3, left bank, River Mile 125.6 to 126.6, 49 acres (Priority 2). This site is at an extremely sharp bend of the river immediately upstream from Grimes. The vegetation in this site should be retained for berm and levee protection.

Site No. 4, right bank, River Mile 127.4 to 127.9, 36 acres (Priority 3). This site is on the outside of two adjacent meander loops. Upstream of this site the river is immediately adjacent to the Project levee and protected by rock revetment.

Site No. 5, right bank, River Mile 128.1 to 131.1, 193 acres (Priority 3). This is a reach of three meander loops within a relatively narrow flood plain between the Project levees. The most upstream loop is partially developed to orchard with strip vegetation remaining around the lower perimeter. With respect to the center meander loop, a portion of the interior has been cleared along the inside upstream portion along which erosion is active at the present time. The third and most downstream loop appears to have had minor clearing, the upstream portion of which is also actively eroding at this time. The two narrow strips connecting these three loops provide protection for the narrow berms and the adjacent Project levee.

Site No. 6, right bank, River Mile 144.4 to 145.9, 103 acres (Priority 2). The upstream portion of this site is a relatively narrow strip of vegetation along the outside of a bend which has been translating downstream over the past several years. Retention of this site will tend to reduce the rate of further downstream translation. The most downstream portion of this site is on the inside of a meander. In addition, this site, together with Sites 7, 8 and 9, can assist in maintaining hydraulic control to assure adequate head on the Colusa Weir. We are advised by Reclamation Board staff that 42.2 acres of this site are within the Colusa State Park.

Site No. 7, left bank, River Mile 145.0 to 145.4, 50 acres (Priority 2).

Site No. 8, left bank, River Mile 145.6 to 145.8, 5 acres (Priority 2).

Site No. 9, left bank, River Mile 145.8 to 145.9, 4 acres (Priority 2).

The above sites, together with Site 6, collectively can help in providing stability to the channel as well as providing hydraulic control to assure adequate head on Colusa Weir.

Site No. 10, right bank, River Mile 146.2 to 147.3, 71 acres (Priority 1). This site is along the reach of recent active meandering and should be retained to prevent the river channel from moving westerly and further away from Colusa Weir. This site also provides protection to the downstream overbank area.

Site No. 11, right bank, River Mile 148.1 to 148.9, 77 acres (Priority 3). Retention of this site will serve to buffer the right bank Project levee.

Site No. 12, left bank, River Mile 148.8 to 149.0, 10 acres (Priority 2). This is at the upstream end of a relatively recent diagonal cut-off. The site provides berm protection to the

adjacent Project levee and also may provide some stability to the upstream portion of this reach of the river which has been quite active in recent years.

Site No. 13, left bank, River Mile 149.4 to 149.7, 15 acres (Priority 2). This small site serves to buffer the left bank Project levee between reaches where the river is immediately adjacent to the Project levee.

Site No. 14, right bank, River Mile 154.3 to 154.9, 21 acres (Priority 1). This is a relatively narrow strip site on the outside of a bend. Retention of the vegetation on this site will provide some protection to the immediately downstream stone protection and also provide protection to the relatively narrow berm adjacent to the Project levee.

Site No. 15, left bank, River Mile 156.0 to 157.1, 83 acres (Priority 2). This site, together with the lower one-third of Site 16, should be retained to assist in maintaining hydraulic control in the river reach fronting Moulton Weir. Vegetation at these two sites can be managed, if necessary, to assist in maintaining adequate head at the weir. In addition, the upstream end of Site 15 may assist in slowing the on-going channel loop rotation, and the downstream portion of the site can help buffer the berm in front of the left bank Project levee.

Site No. 16, right bank, River Mile 156.9 to 159.0, 103 acres (Priority 1). This site will help maintain channel stability through the reach past Moulton Weir and also provide protection to the narrow berm along the Project levee. The lower one-third of the site may assist, together with Site 15, in maintaining hydraulic control in this reach.

Site No. 17, left bank, River Mile 157.2 to 157.3, 11 acres (Priority 3). This small site is on the outside of a meander loop. Recent clearing has occurred in the area immediately upstream from this site. While this site is probably not large enough to have a material effect on the tendency for this meander loop to extend eastward, the vegetation will minimize the possibility of the river developing a major or secondary channel through the left overbank.

Site No. 18, left bank, River Mile 158.8 to 159.6, 19 acres (Priority 1). This area is in the downstream portion of a loop which is in rotation. At the most upstream point of this site the river channel is adjacent to the left bank Project levee. Retention of this site may assist in slowing the channel loop rotation.

Site No. 19, right bank, River Mile 161.7 to 162.7, 42 acres (Priority 2). The upstream portion of this site is on the outside of a small meander loop which is tending to extend to the west and translate. The downstream two-thirds of the site is adjacent to the right bank Project levee.

Site No. 20, left bank, River Mile 162.6 to 163.4, 49 acres (Priority 2). This site is on the outside of a shallow bend which is tending to extend easterly. The upstream portion of this site is quite narrow and is adjacent to the Project levee.

Site No. 21, right bank, River Mile 165.5 to 167.0, 106 acres (Priority 3). This site is on the inside of a meander loop which is in the process of translation. Some clearing in the upstream portion of this site has already occurred. Immediately below this loop, the river on the right bank impinges on a very narrow berm. It is understood approximately 50 acres of this site is owned by the Wildlife Conservation Board.

Site No. 22, right bank, River Mile 168.9 to 169.6, 105 acres (Priority 2). This is a site of relatively recent regrowth and is the area of a meander loop which was cut off by artificial means to reestablish a relatively straight approach to the Butte City Bridge and to prevent additional erosion loss of land on the right overbank.

Site No. 23, left bank, River Mile 168.8 to 172.1, 417 acres (Priority 1). This site is along what is presently a relatively straight stretch of river approaching the Butte City Bridge. However, in the recent past the river has meandered in this reach, most recently near the lower end of the site. The site is dominated primarily by larger mature trees which is an indication that a major portion of this site has been relatively stable for the past several years.

Site No. 24, right bank, River Mile 169.9 to 171.3, 86 acres (Priority 2). This site is across the neck of an old oxbow or meander loop and begins just below an area of recent loop extension to the west causing considerable loss of levelled ground and walnut orchards. This site is on the opposite side of the river from Site 23.

Site No. 25, right bank, River Mile 172.0 to 173.0, 67 acres (Priority 3). This site is on the inside of a meander loop which is presently extending easterly. Retention of this vegetation site will retard a tendency for a cut-off to develop.

Site No. 26, right bank, River Mile 173.2 to 173.4, 15 acres (Priority 3). This site and Site 27 are the only remaining native vegetation sites along this reach and are on the outside of a slight bend approaching a meander loop just downstream. In addition to the contribution of general stability of the river channel, the two sites also afford some protection to the adjacent overbank area.

Site No. 27, right bank, River Mile 173.4 to 173.7, 11 acres (Priority 3). See comments regarding Site 26.

Site No. 28, left bank, River Mile 174.7 to 176.2, 264 acres (Priority 2). This area is located at the latitude of the upstream end of the left bank levee of the Sacramento River Flood Control Project. From a flood control standpoint it is essential to retain the ability to pass excess flood waters into Butte Basin upstream of the left bank Project levee. By retaining vegetation on this site, some hydraulic control can be provided to assist in maintaining the necessary upstream water level to ensure movement of excess Sacramento River flows into Butte Basin. The importance of maintenance of hydraulic control at this location is increased by the recent extensive clearing on the upstream left bank flood plain.

Site No. 29, right bank, River Mile 178.0 to 178.6, 90 acres (Priority 1). This meander loop is in the process of downstream rotation. The adjacent land on the outside of the loop is presently cleared. Retention of the vegetation may tend to protect some of the berm land waterward of the levee that will remain when the downstream rotation of the channel is completed.

Site No. 30, right bank, River Mile 179.8 to 181.6, 195 acres (Priority 3). This site is in a reach which over the years has been quite active as indicated by the numerous oxbows adjacent and downstream on the left bank. Recent clearing on the left bank flood plain leaves this site as the only significant area of natural vegetation in a reach over five miles long.

Site No. 31, right bank, River Mile 182.3 to 184, 140 acres (Priority 3). This site is the inside of a loop just downstream of Ord Ferry Bridge. This loop has not translated downstream significantly but has been cutting the outside banks (both right and left) during the past several years. Some clearing of small areas has taken place in the upper end of this area.

Site No. 32, left bank, River Mile 182.8 to 183.3, 66 acres (Priority 1). This site is at the midway point and on the outside of the meander loop described in Site 31. As indicated previously, the river has been cutting the bank along this area, and immediately upstream and downstream of this site the adjacent land has been cleared and farmed. The bank immediately upstream has been revetted to protect the Ord Ferry Road.

Site No. 33, right bank, River Mile 184.3 to 185.0, 30 acres (Priority 2). Although the channel has been quite stable in this reach, this area of native vegetation provides protection to the bank in the vicinity of the right abutment of Ord Ferry Bridge.

Site No. 34, right bank, River Mile 187.3 to 188.1, 53 acres (Priority 2). This site, at least a portion of which is a Glenn County park, fronts a private levee (Reclamation Board Application No. 4993) which extends easterly from the end of County Road No. 29. This is on the outside of a meander loop which during several of the recent past high water periods has moved downstream undermining the bank and requiring the relocation of the adjacent County road.

Site No. 35, left bank, River Mile 187.3 to 190.2, 366 acres (Priority 1). This is a reach of very active recent bank erosion at both ends of a meander loop. Recent Corps of Engineers bank protection has prevented an almost certain cut-off. Retention of native vegetation on this narrow peninsula will assist in uniform distribution of the flows, thereby minimizing the tendency for surface erosion.

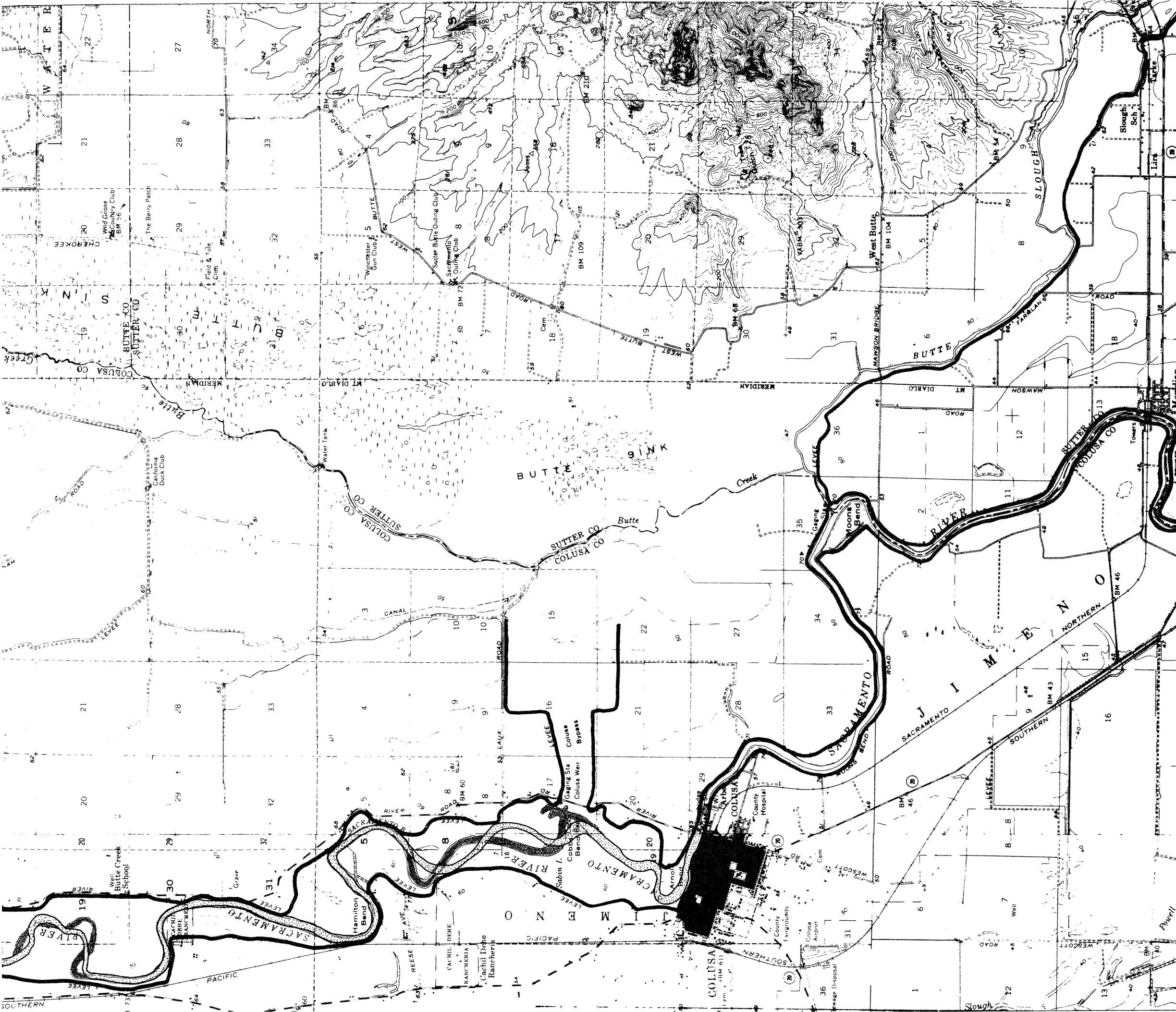
Site No. 36, left bank, River Mile 190.2 to 192.5, 742 acres (Priority 1). This site begins just below the mouth of Big Chico Creek and extends downstream to opposite the mouth of Stony Creek. This large area fronts the Chico Landing Weir site, a point of

significant overflow into Butte Basin during large floods. The area is also in the reach of recent significant meanders and threatened cut-offs which must be prevented to maintain the integrity of the downstream Sacramento River Flood Control Project. Site 35, as well as this site, is important in this regard.

Murphy Slough borders the downstream end of this site. The Murphy Slough Plug has been constructed by the Corps of Engineers to prevent the persistent efforts of the river in the past 15 years to cut off about 3 miles of the main channel immediately downstream of this site. Except for two open but unlevelled areas in the southerly portion, this site, with large native vegetal cover, also provides a half mile or more wide buffer zone.

Site No. 37, left bank, River Mile 193.0 to 193.7, 74 acres (Priority 1). This area is at the mouth of Big Chico Creek and just upstream of an active erosion site adjacent to the Phelan levee. Retention of vegetation at this site could help negate the necessity of extending the upstream bank protection into this area.

Site No. 38, left bank, River Mile 194.2 to 196.2, 270 acres (Priority 2). This site is at and downstream of a significant river cut-off that is presently occurring on the right bank of the Sacramento River between River Miles 195.7 and 197. When the cut-off is completed, the full force of the Sacramento River will be directed at the upper end of this site. Downstream of this site considerable effort by the County and U. S. Corps of Engineers has been expended to stabilize the left bank of the river. Less than one-quarter of the site is presently planted to orchard, but about 50 percent has been cleared or is sparsely vegetated. The native vegetation remaining, however, is situated so as to have some hydraulic retardant capabilities. The width of up to about 1/2 mile is probably one of the more important features of the site.






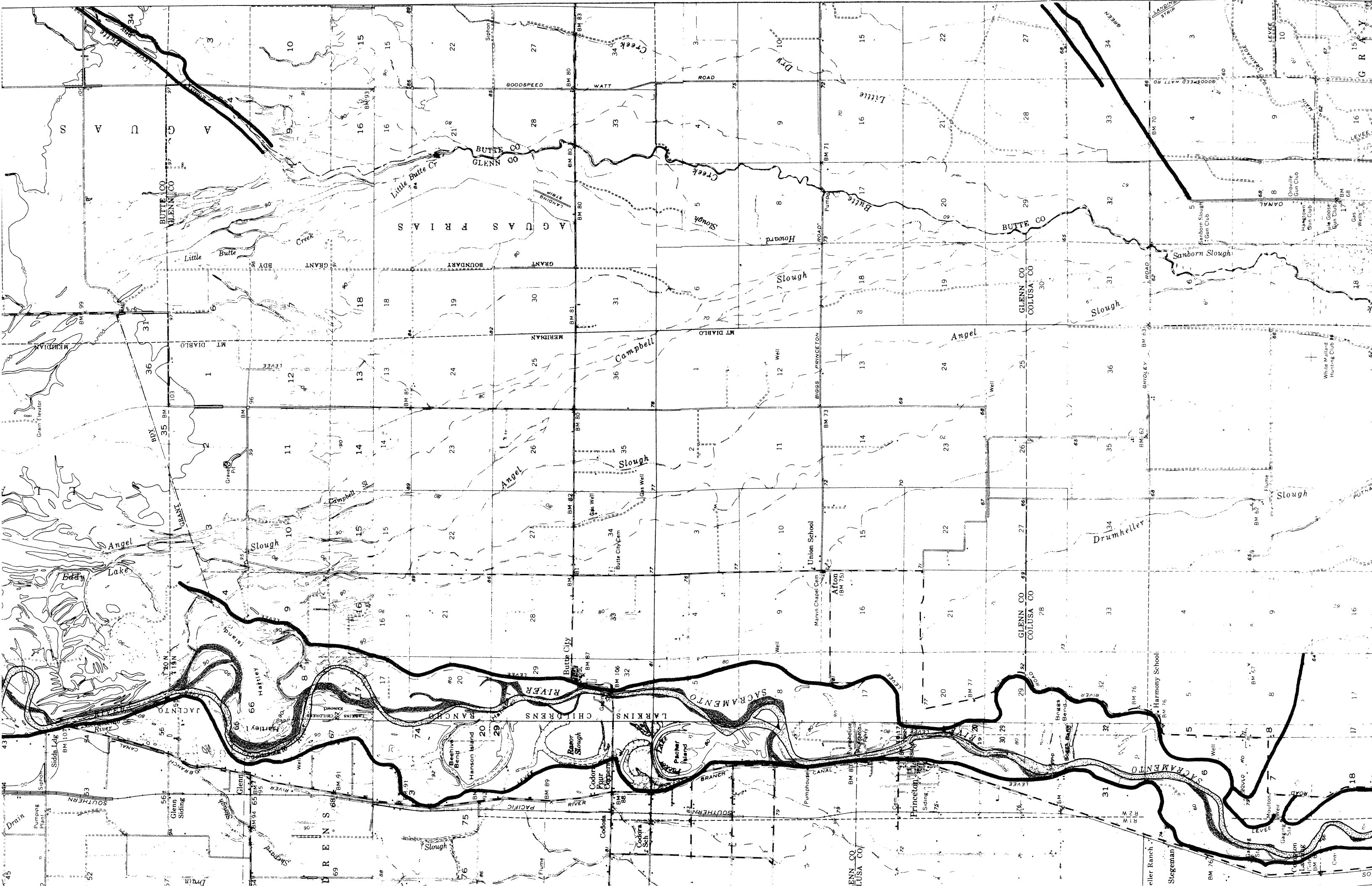
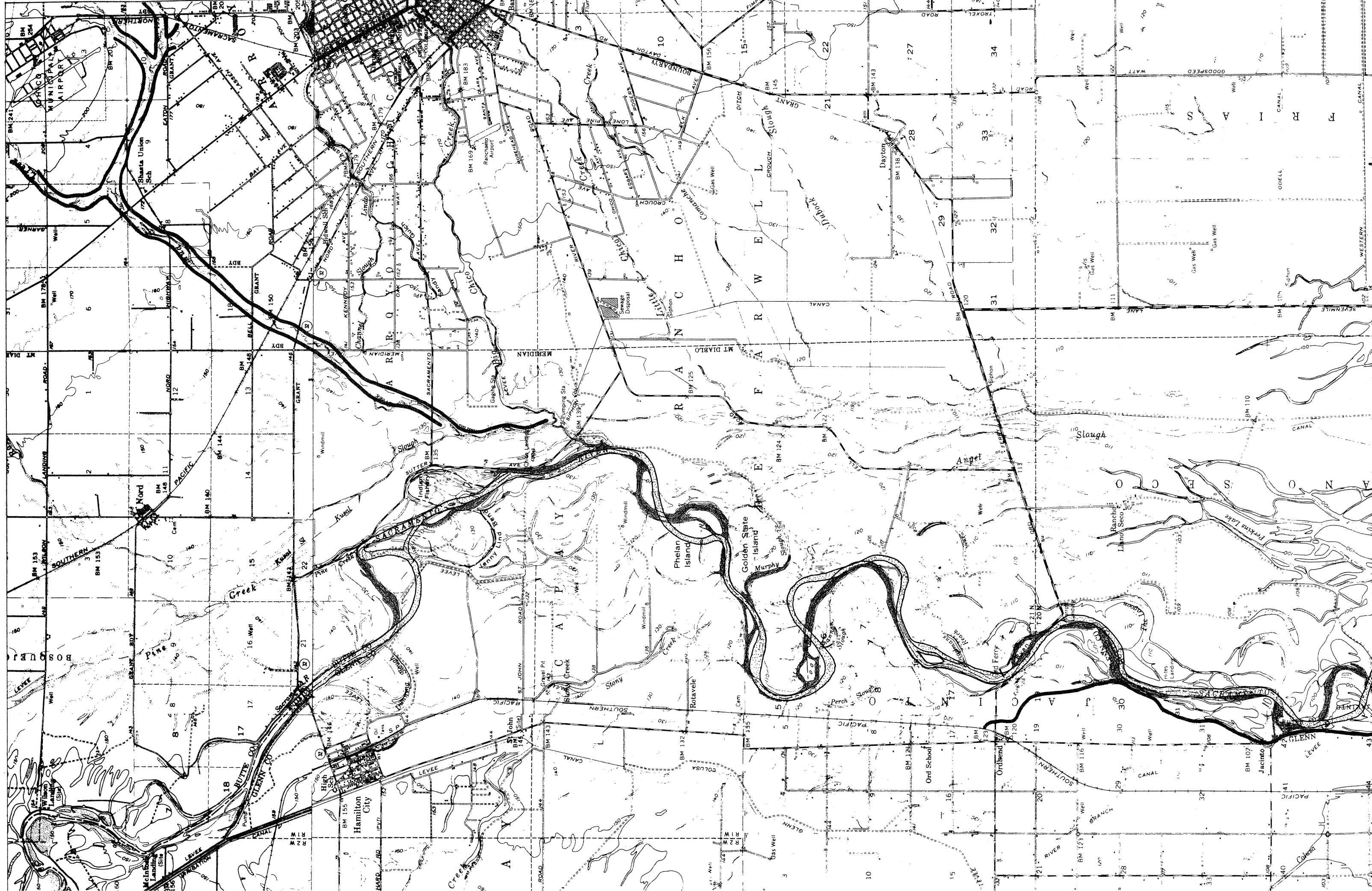
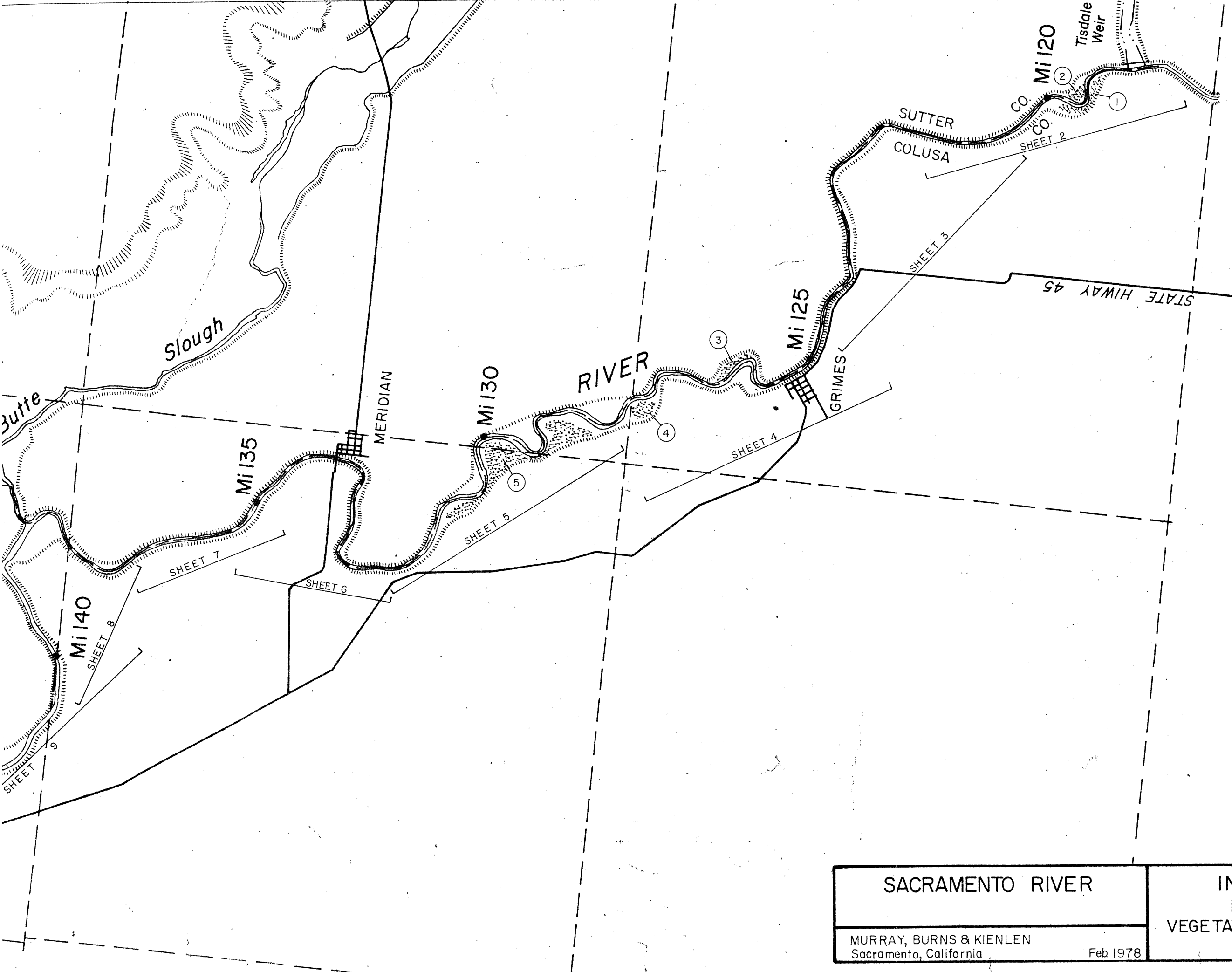
-  1976 CHANNEL
-  1949-54 CHANNEL, WHERE DIFFERENT FROM 1976
-  PROJECT LEVEE

PLATE I
COMPARISON OF
SACRAMENTO RIVER
CHANNEL LOCATIONS
COLUSA TO HAMILTON CITY

MURRAY, BURNS & KIENLEN FEB 1978

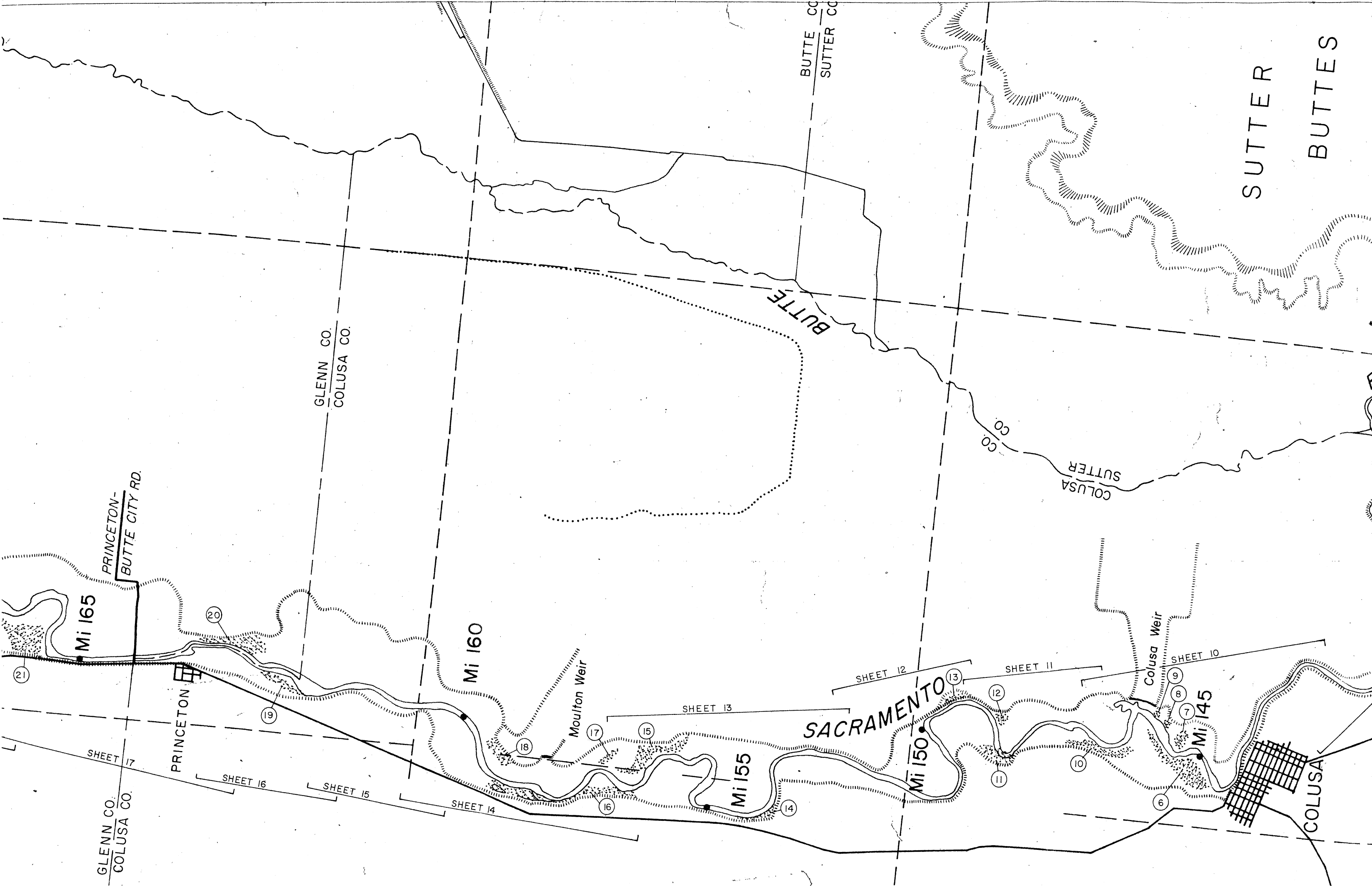






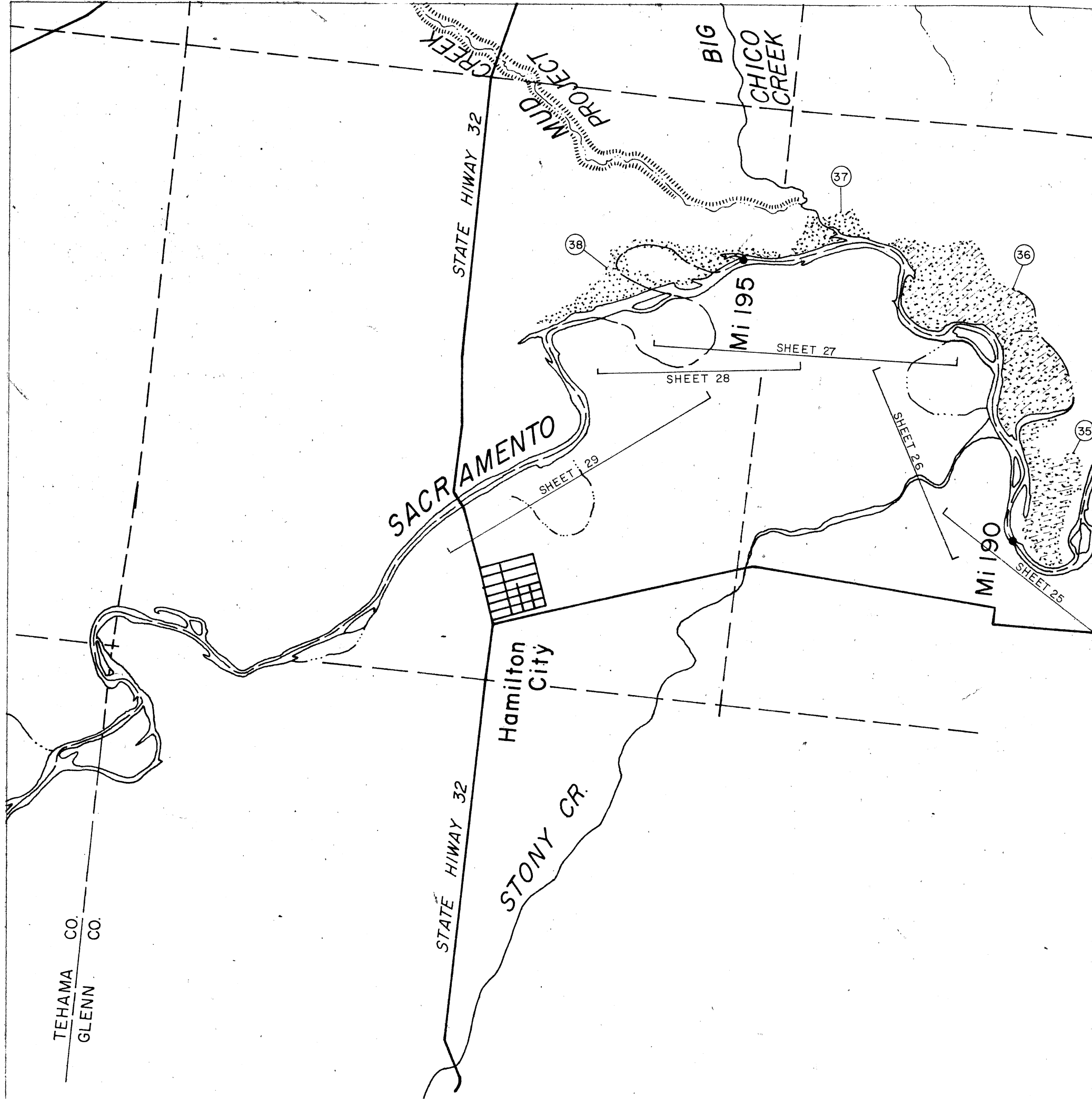
SACRAMENTO RIVER		INDEX MAP PROPOSED VEGETATION RETENTION SITES	SHEET 1
MURRAY, BURNS & KIENLEN Sacramento, California			

Feb 1978





TEHAMA CO.
GLENN CO.



SACRAMENTO

STATE HIWAY 32

Hamilton
City

STONY CR.

MUD
CREEK
PROJECT

BIG
CHICO
CREEK

Mi 195

Mi 190

SHEET 27

SHEET 28

SHEET 29

SHEET 26

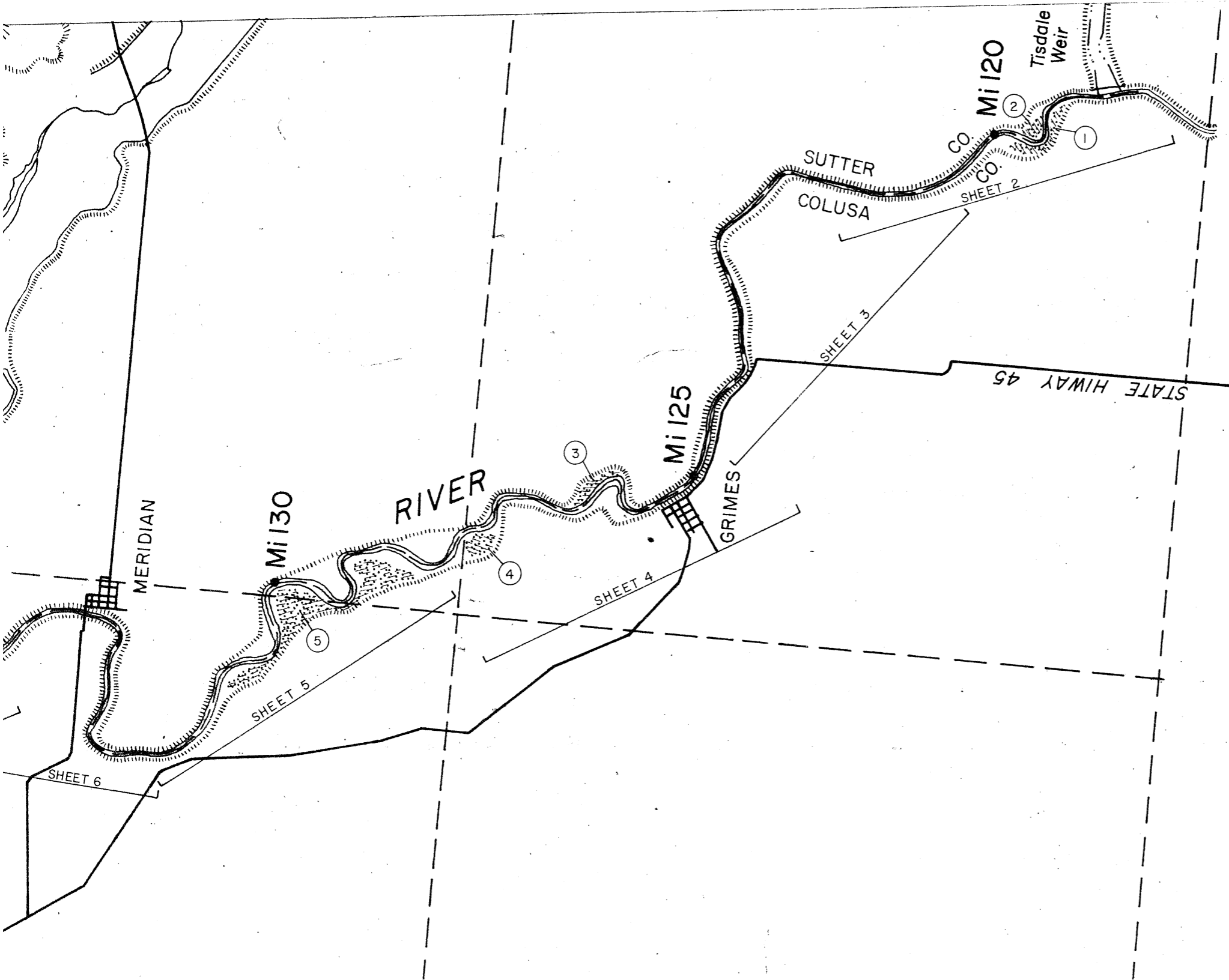
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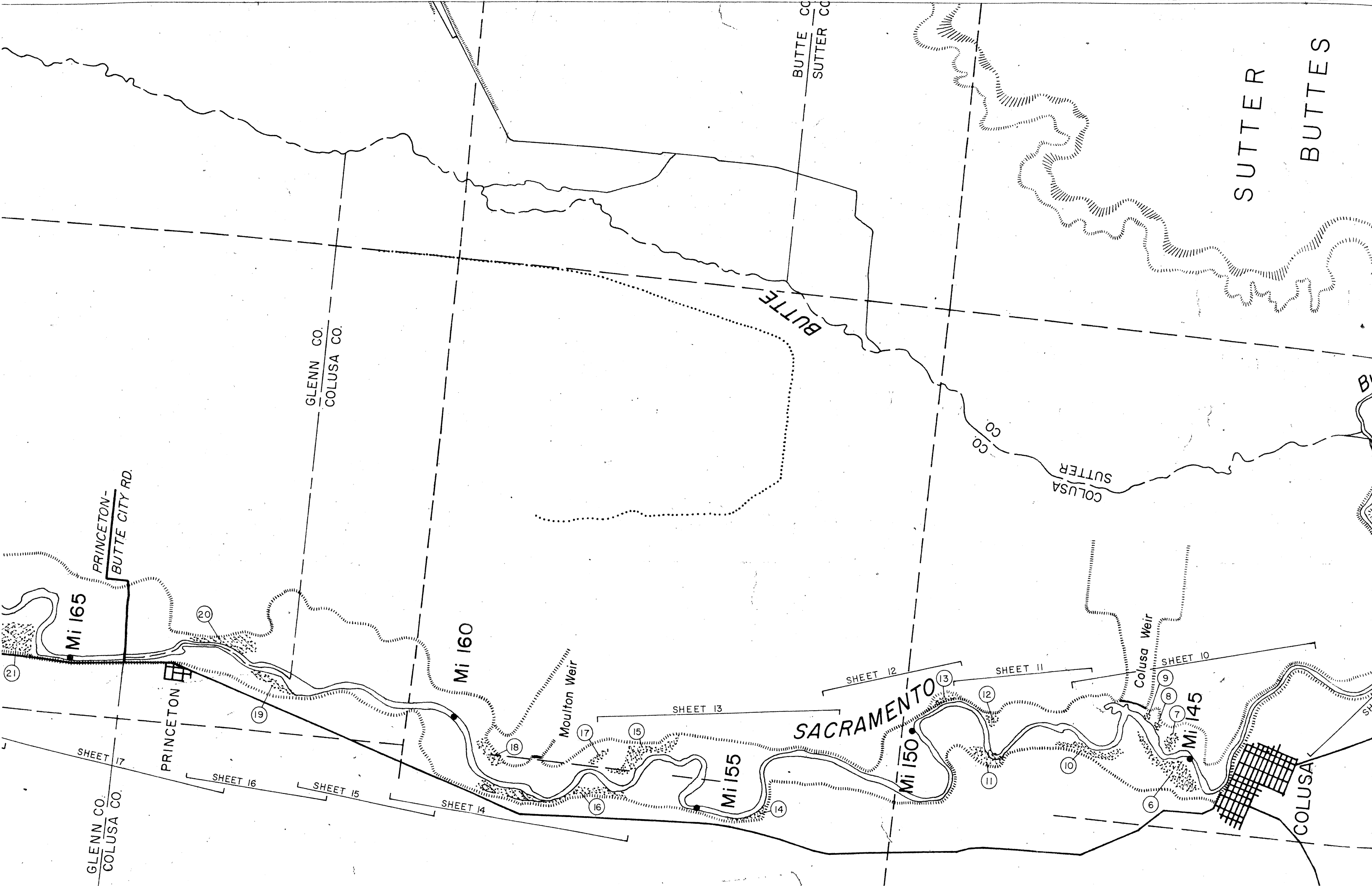
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BUTTE CO
SUTTER CO

SUTTER
BUTTES

GLENN CO.
COLUSA CO.

COLUSA
SUTTER
CO

PRINCETON-
BUTTE CITY RD.

Mi 165

Mi 160

Moulton Weir

Colusa Weir

SACRAMENTO

Mi 150

Mi 155

Mi 145

COLUSA

PRINCETON

SHEET 17

SHEET 16

SHEET 15

SHEET 14

SHEET 13

SHEET 12

SHEET 11

SHEET 10

GLENN CO.
COLUSA CO.



CREEK

MT. DIABLO

BUTTE CO.
GLENN CO.

PARROTT

GRANT

LINE

MERIDIAN

BUTTE CITY

RIVER

Ord Ferry

Mi 185

Mi 180

Mi 175

Mi 170

STATE HWAY 45

SHEET 24

SHEET 23

SHEET 22

SHEET 21

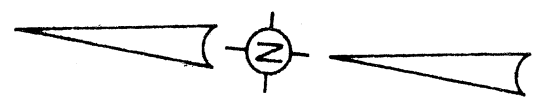
GLENN

SHEET 20

SHEET 19

SHEET 18

3
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MILES



36

35

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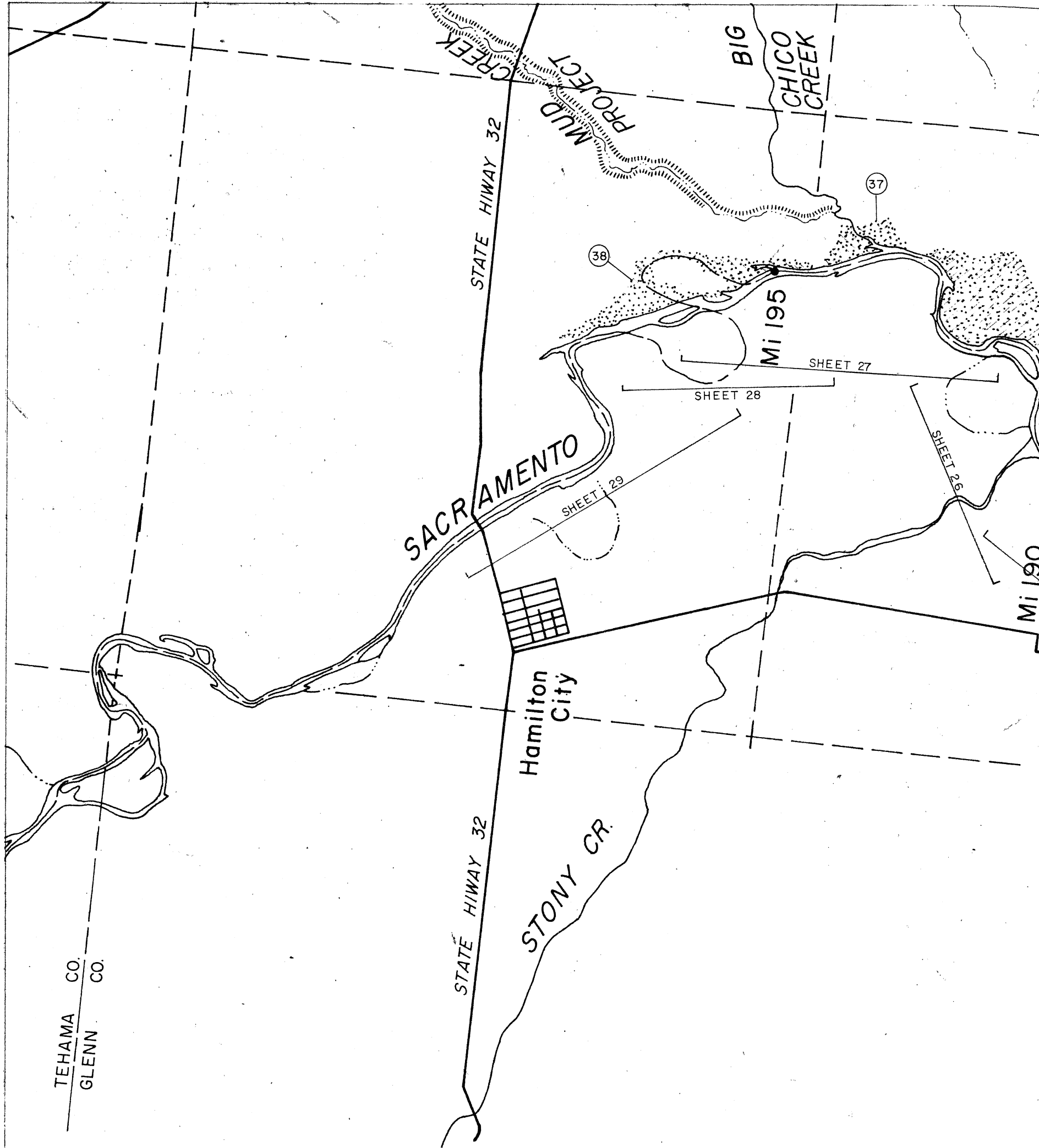
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TEHAMA CO.
GLENN CO.



SACRAMENTO

STATE HIWAY 32

STATE HIWAY 32

Hamilton
City

STONY CR.

Mi 195

Mi 190

SHEET 28

SHEET 27

SHEET 29

SHEET 26

MUD PROJECT

BIG
CHICO
CREEK

37

38



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-2-26

PHOTOGRAPHED OCTOBER 1976
SYMBOL WR-AFV-2
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

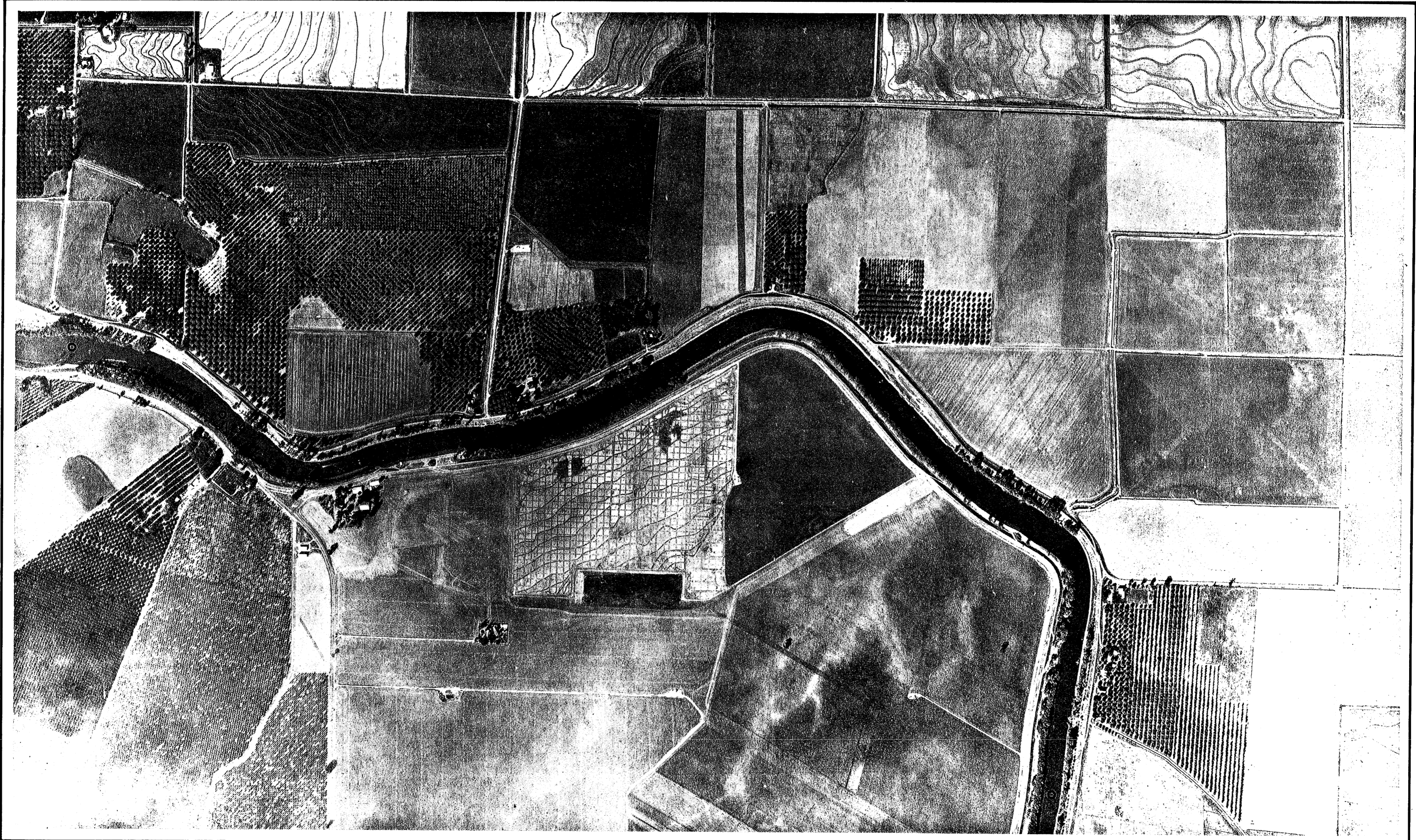
SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

FEB 78

MBK

SHEET
2



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-2-29

PHOTOGRAPHED OCTOBER 1976
SYMBOL WR-AFV-2
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
3

FEB 75

VEP



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-3

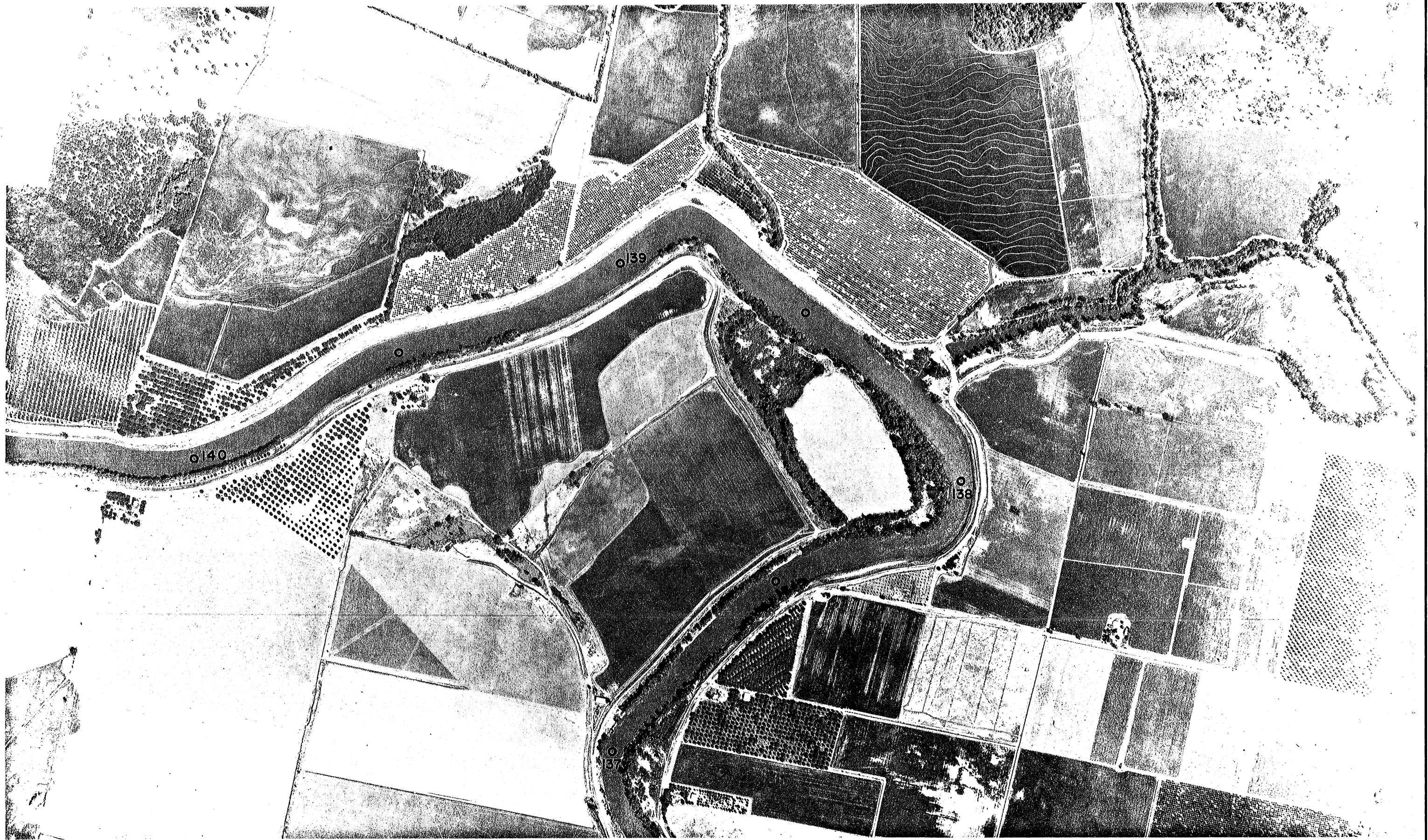
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
7



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-4

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

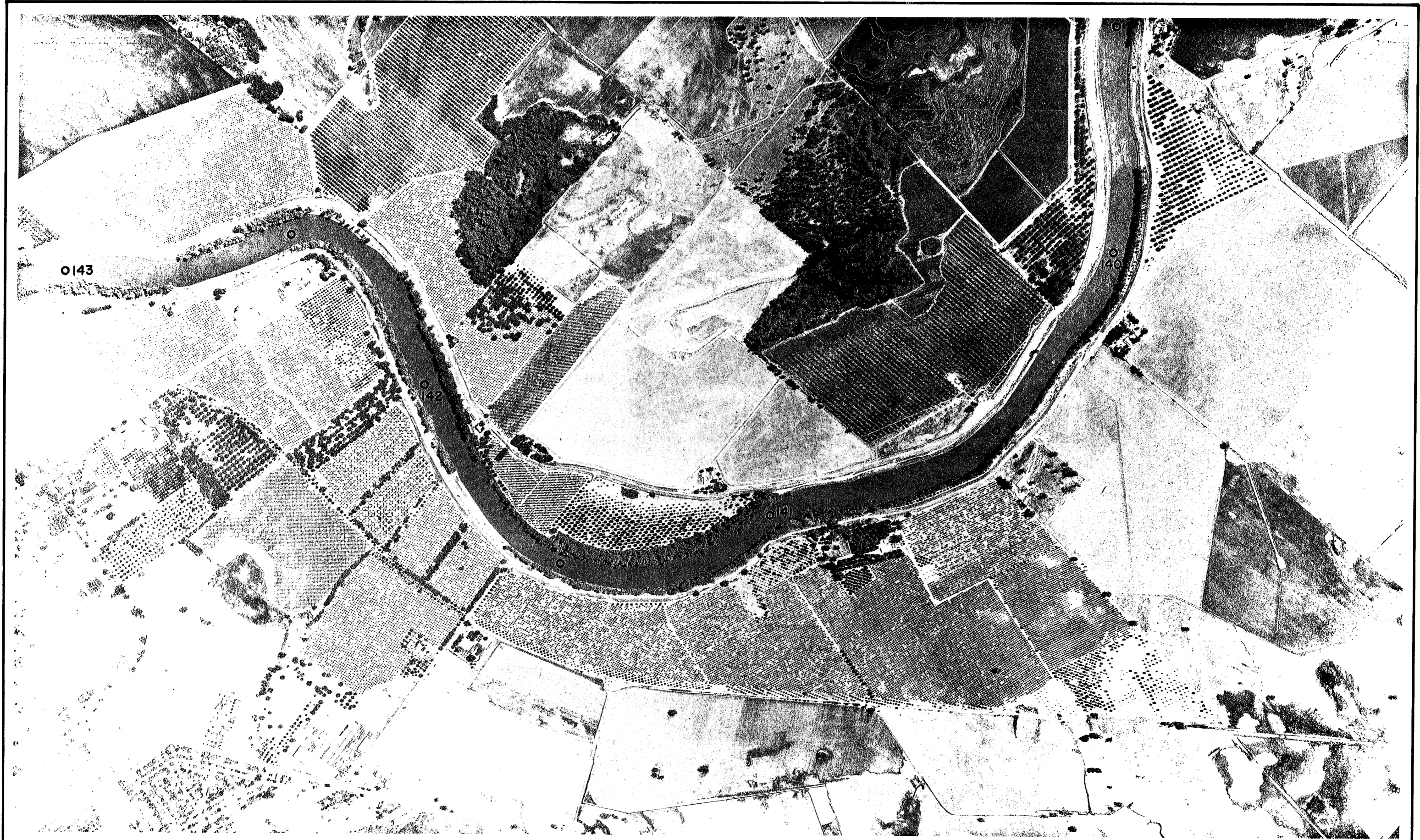
SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
8

FEB 76

154



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-7

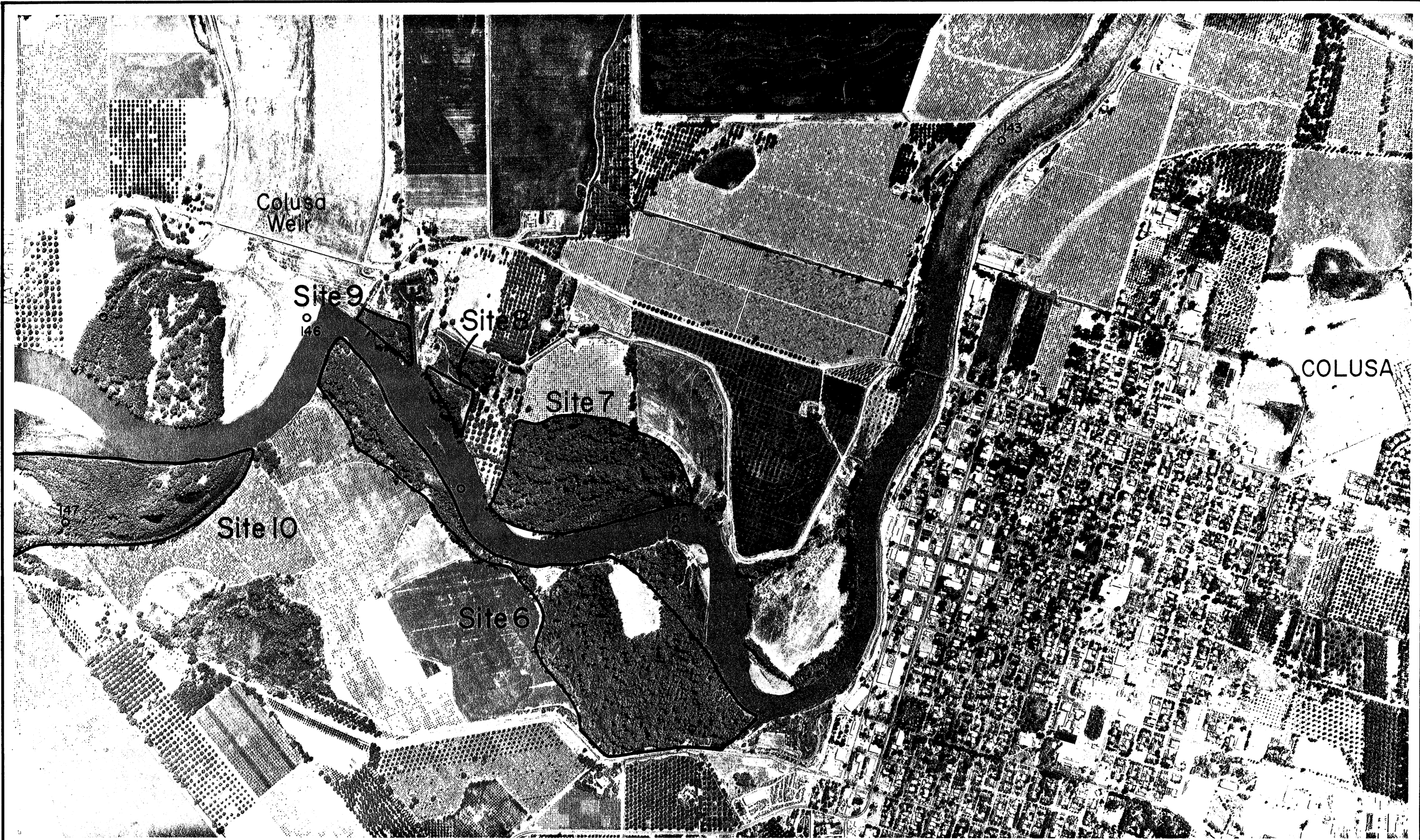
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
9



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-10

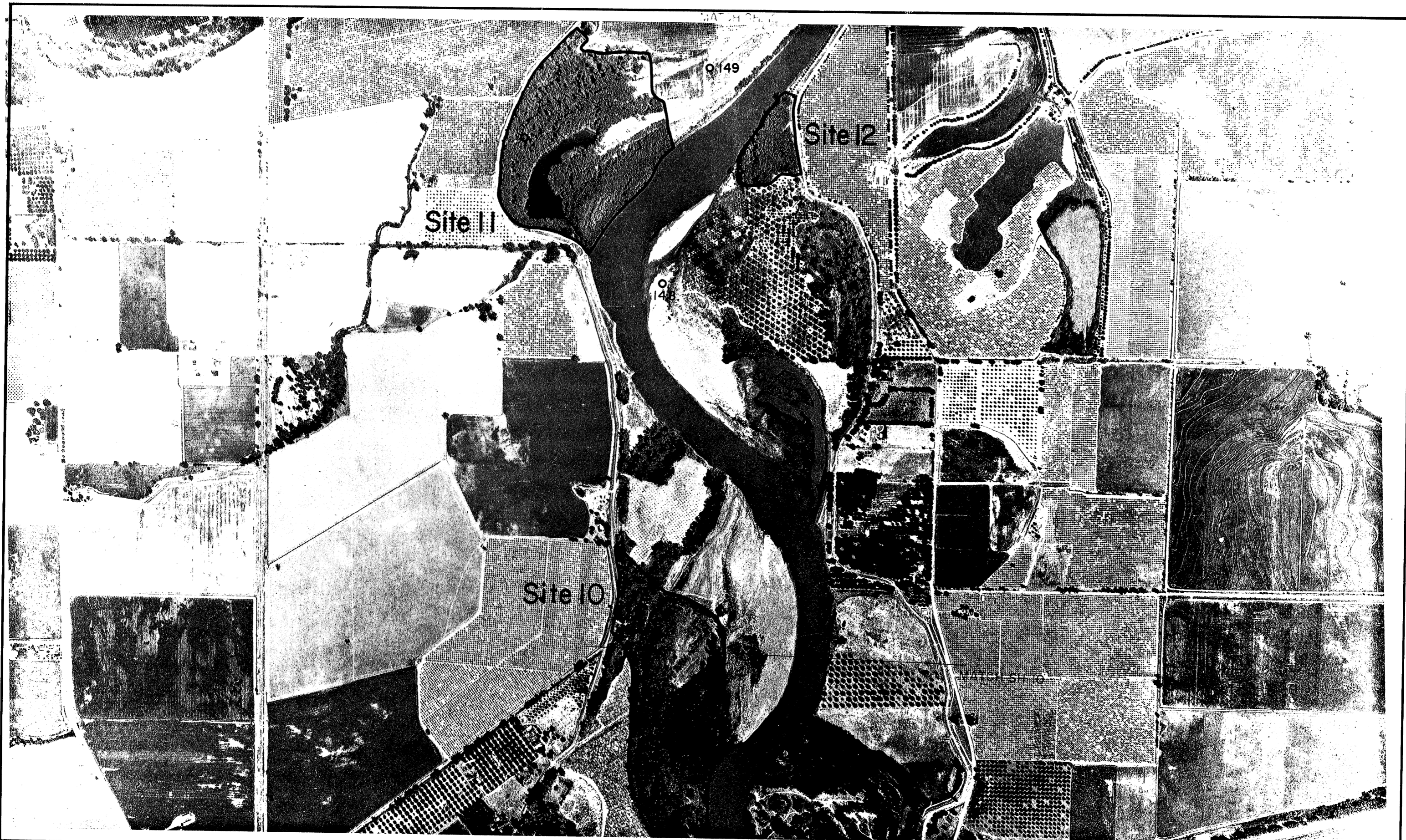
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
10



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-11

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
11



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-12

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

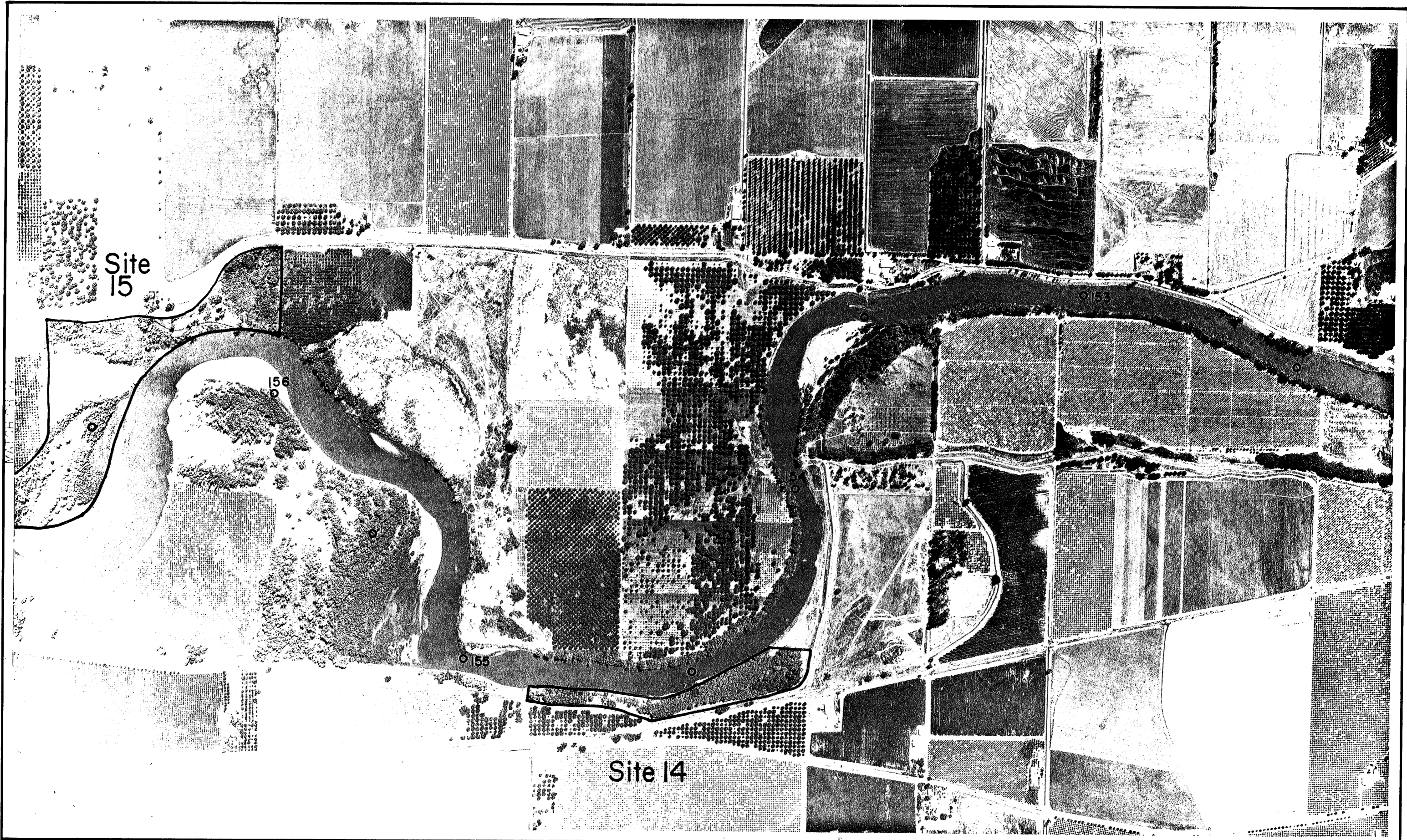
STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
12

FEB 78



Site 15

Site 14

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-14

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
13



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-16

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

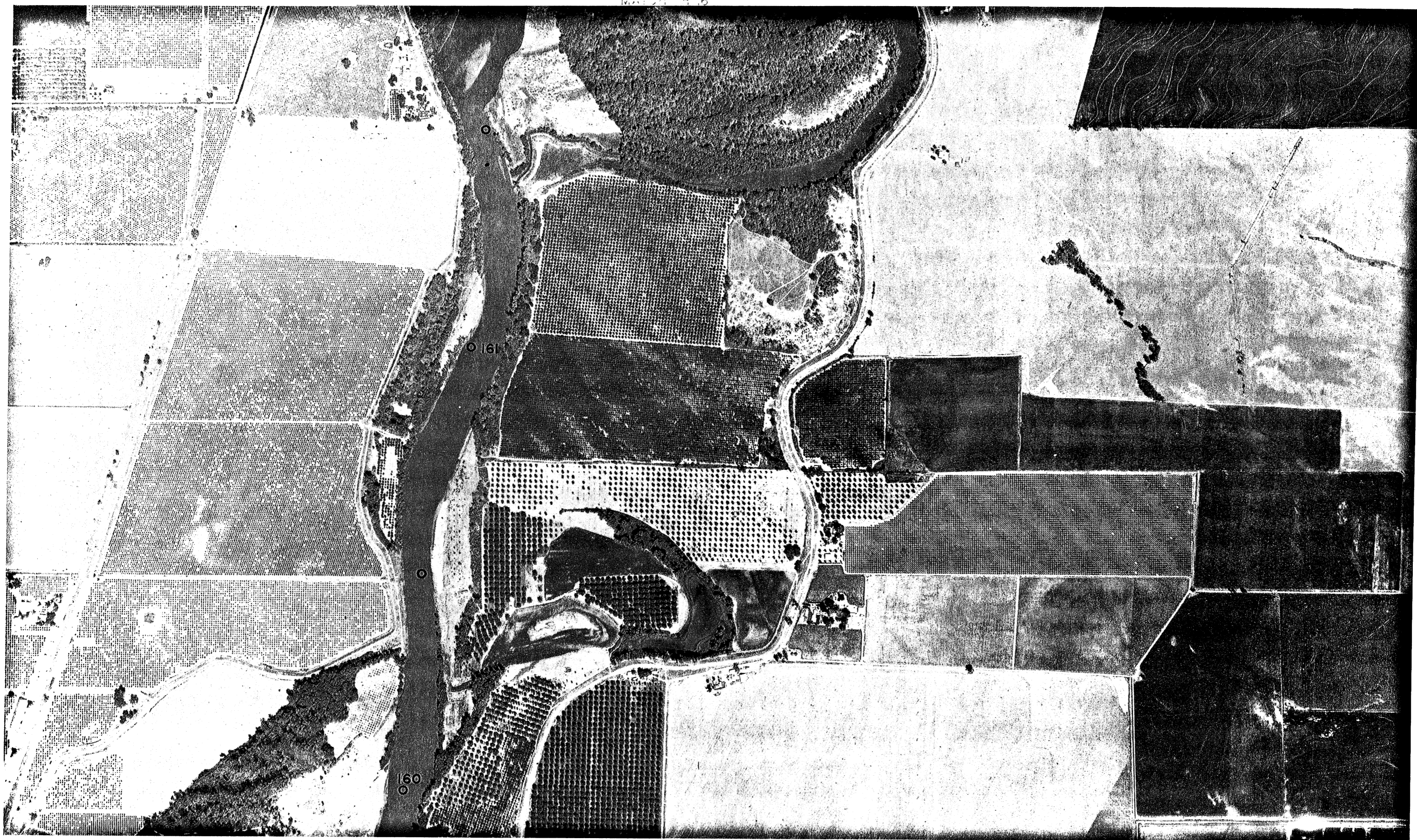
STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
14

MAX 04 16



APPROXIMATE SCALE 1 INCH = 1000 FEET
 ENLARGED FROM EXPOSURE NO. WR-AFV-I-19

PHOTOGRAPHED AUGUST 1976
 SYMBOL WR-AFV
 FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
 VEGETATION RETENTION
 SITES

SHEET
 15

FEB 78

VIA 2-11-71 17



163

Site 20

Site 19

163

MATCH SH 15

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-20

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

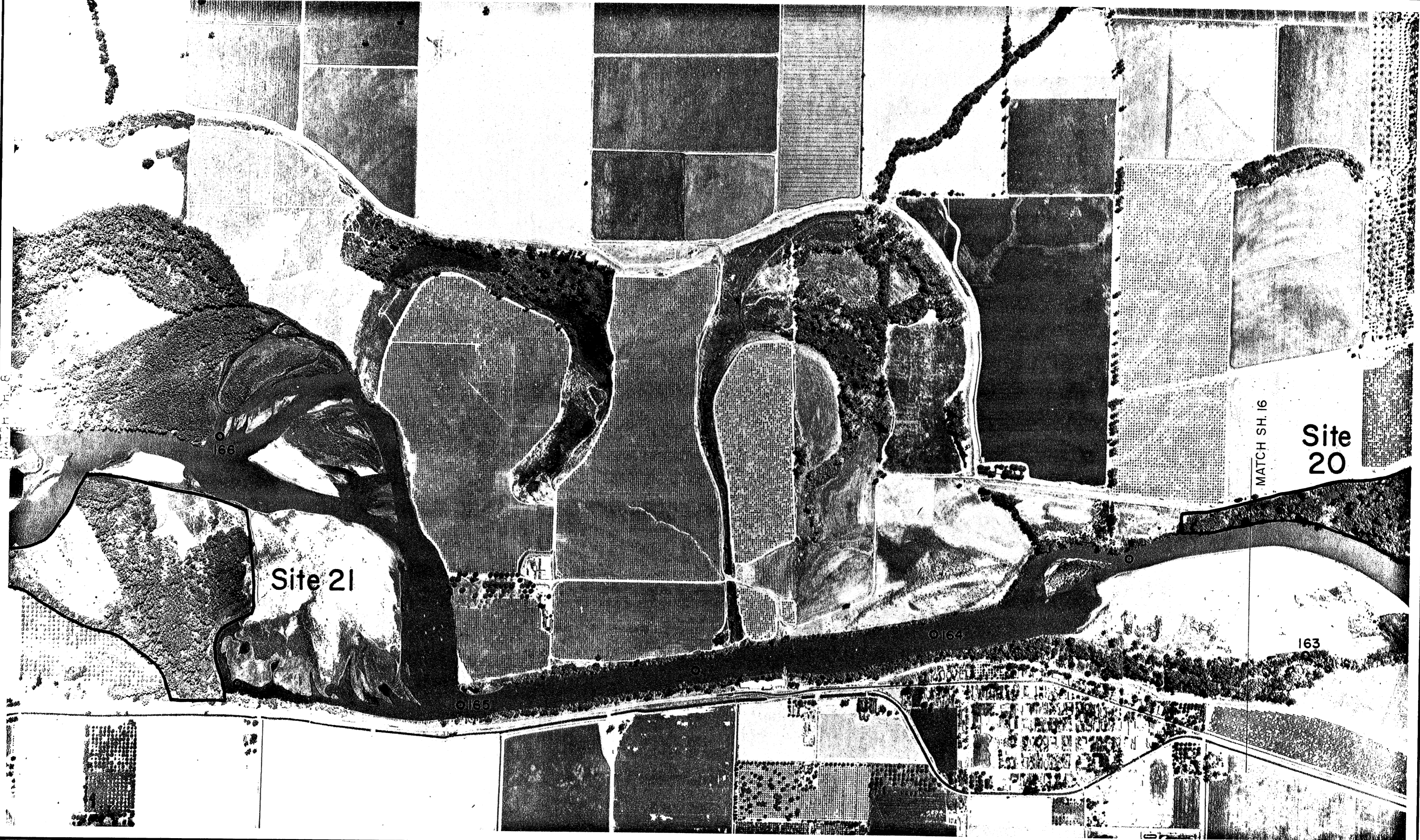
SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
16

FEB 73

163



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-21

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
17

FEB 75

VEP



Site 23

BUTTE CITY

MATCH SH. 17

Site 24

Site 22

Site 21

MATCH S

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-23

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

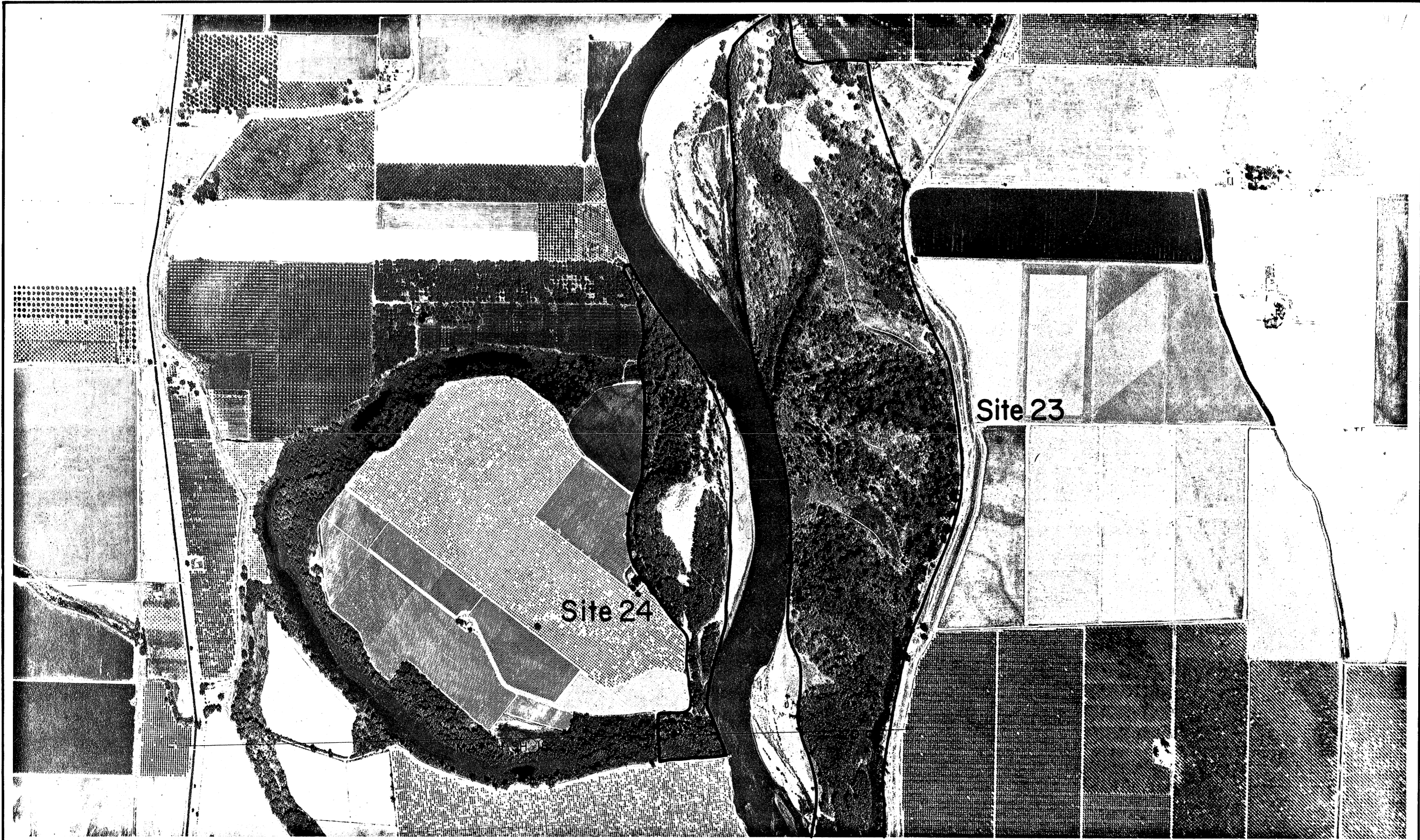
STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
18

FEB 78



Site 23

Site 24

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-24

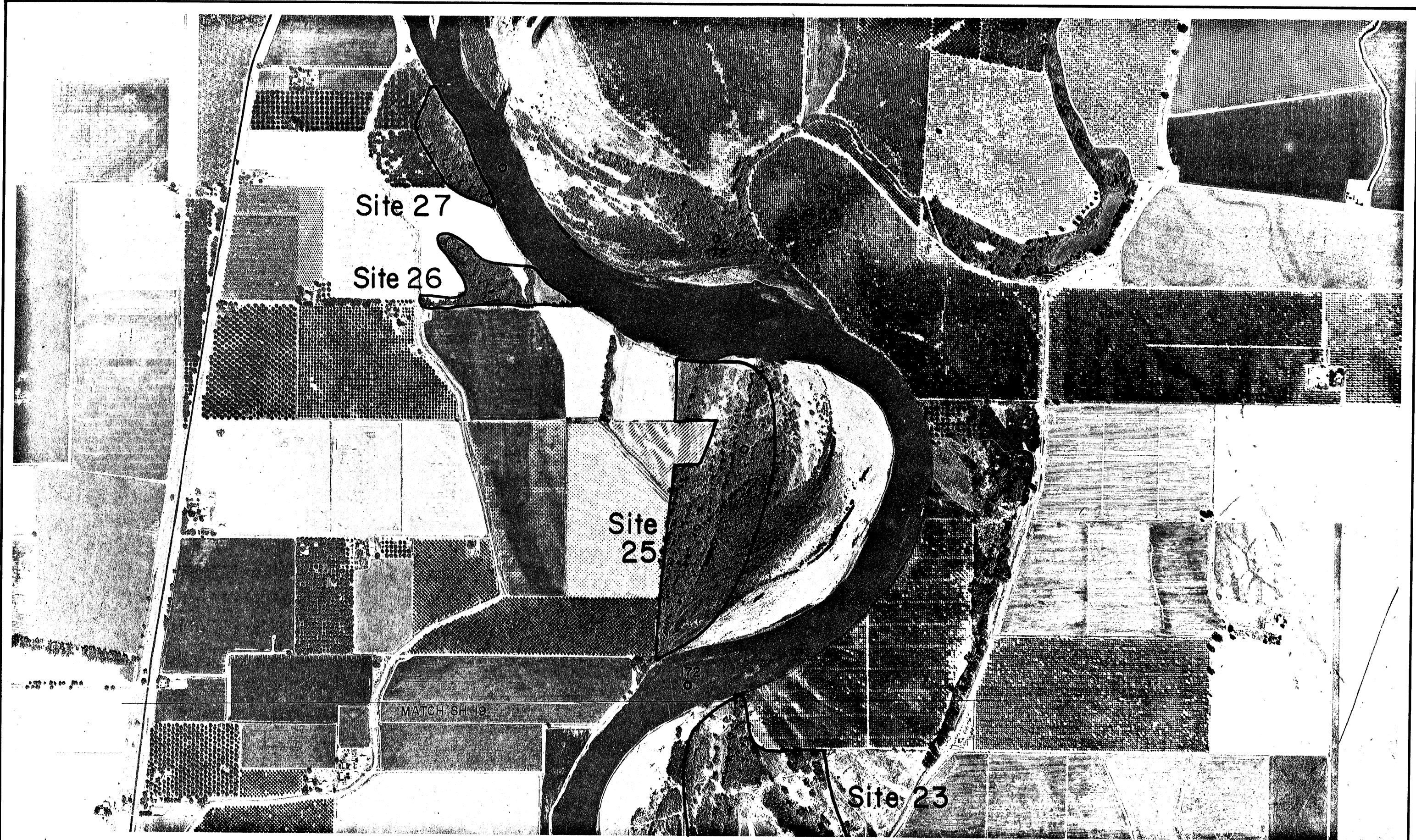
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
19



Site 27

Site 26

Site 25

Site 23

MATCH SH-19

172

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-I-25

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
20

FEB 76

734



Site 27

Site 28

174

175

176

177

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-26

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

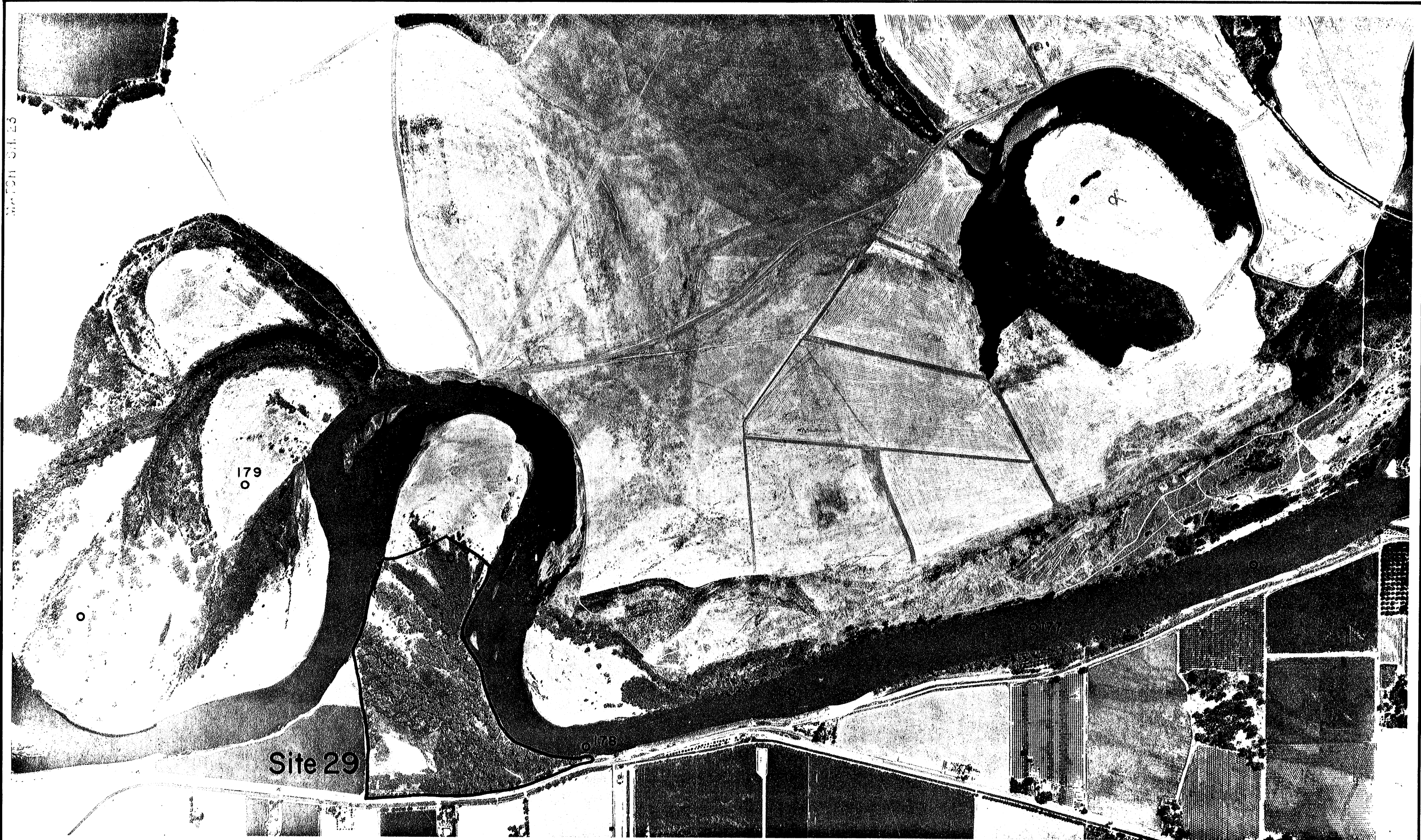
SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
21

FEB 78

18



March 23, 76

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-30

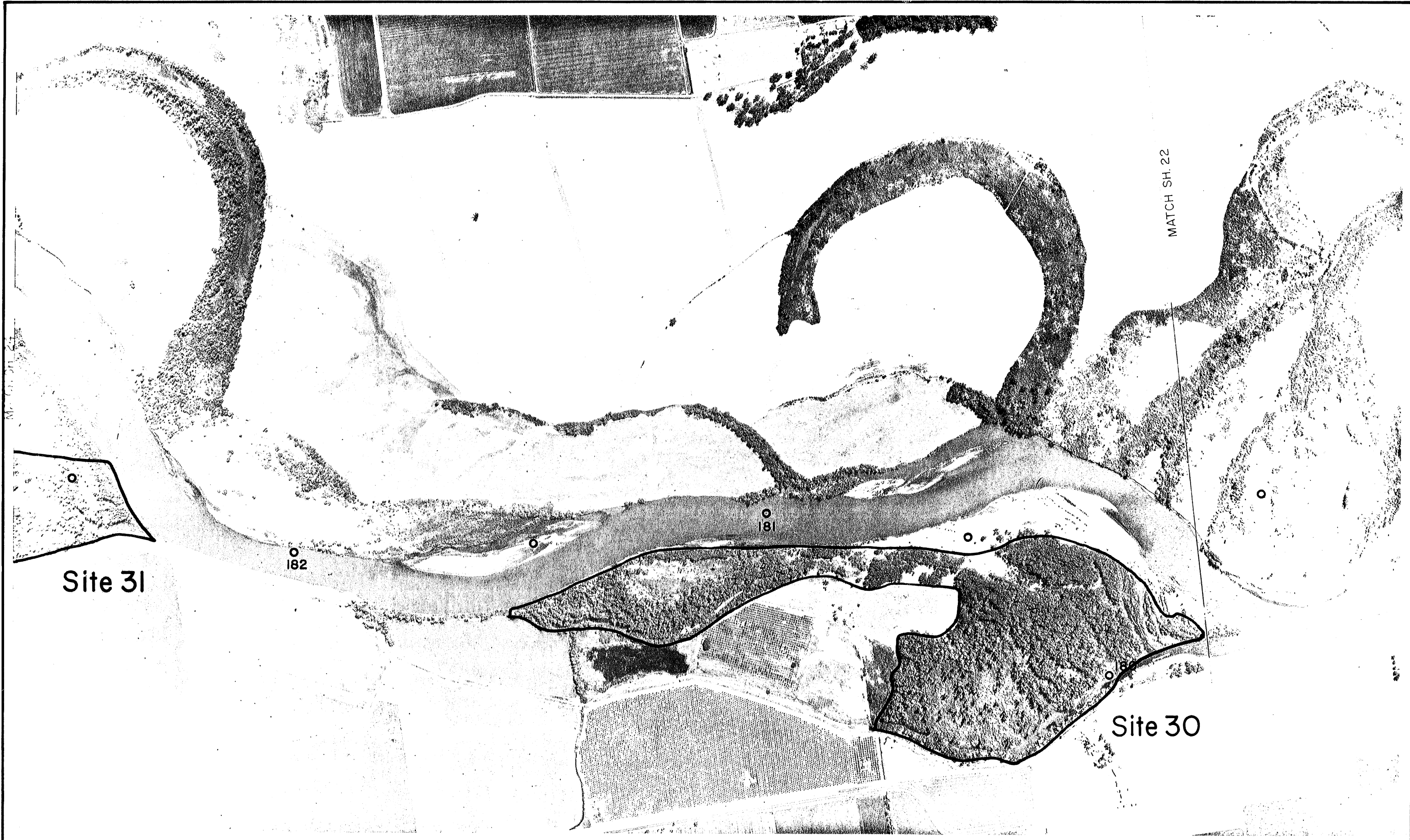
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
22



Site 31

Site 30

MATCH SH. 22

182

181

183

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-I-32

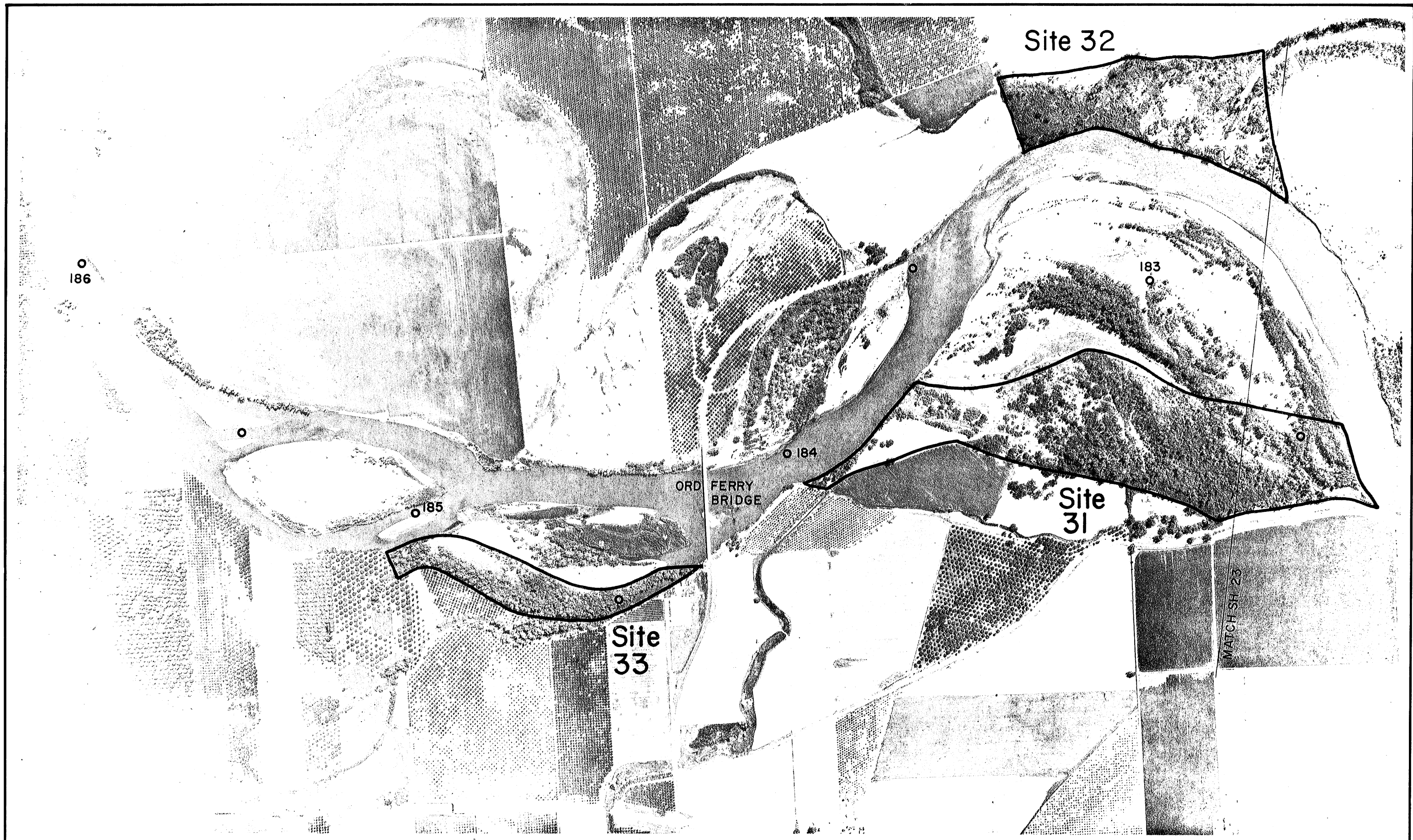
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
23



APPROXIMATE SCALE 1 INCH = 1000 FEET
 ENLARGED FROM EXPOSURE NO. WR-AFV-1-34

PHOTOGRAPHED AUGUST 1976
 SYMBOL WR-AFV
 FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
 THE RESOURCES AGENCY
 UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
 VEGETATION RETENTION
 SITES

SHEET
 24



Site 35

Site 34

189

188

187

186

APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-37

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
25



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-38

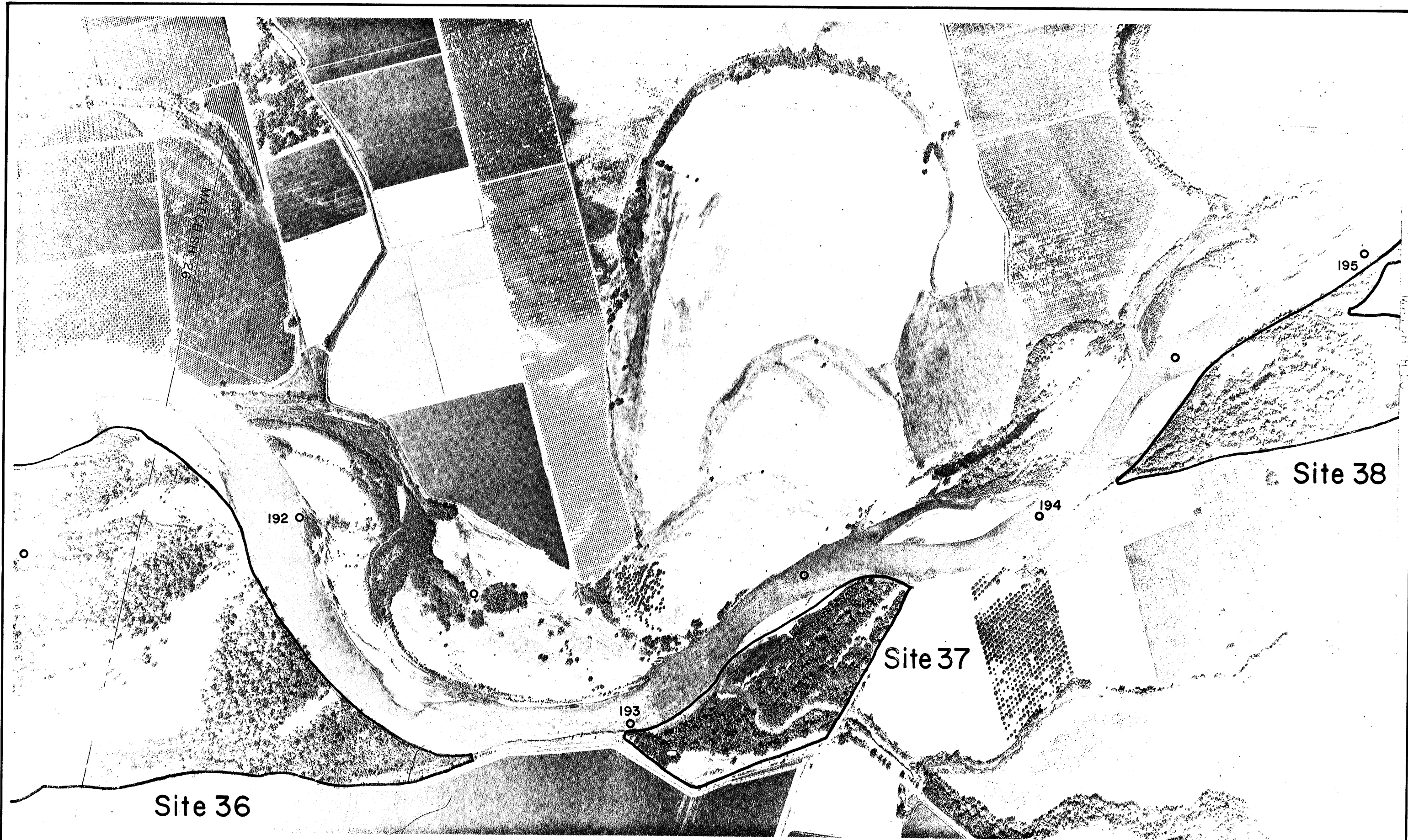
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
26



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-40

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
27



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-43

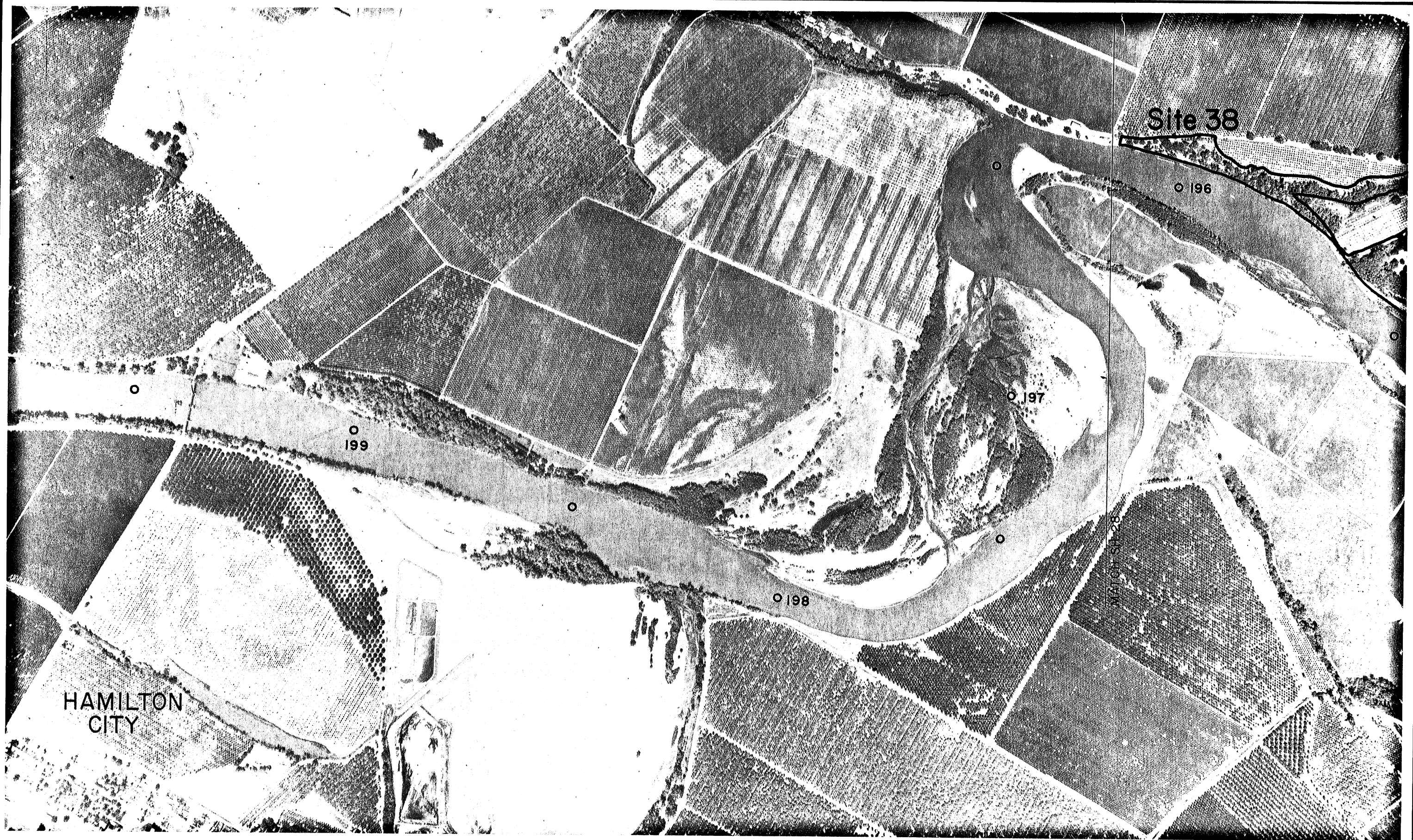
PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
28



APPROXIMATE SCALE 1 INCH = 1000 FEET
ENLARGED FROM EXPOSURE NO. WR-AFV-1-44

PHOTOGRAPHED AUGUST 1976
SYMBOL WR-AFV
FOCAL LENGTH 152.66 mm

STATE OF CALIFORNIA
THE RESOURCES AGENCY
UPPER SACRAMENTO RIVER TASK FORCE

SACRAMENTO RIVER

PROPOSED
VEGETATION RETENTION
SITES

SHEET
29

Cover Photo:

January 21, 1974
Murphy Slough and Golden State Island;
vicinity Sites 34, 35, and 36.

Inside Cover Photo:

Climax Riparian Vegetation on the
Upper Sacramento River
Photo by Larry Puckett
Department of Fish and Game, Red Bluff