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EXHIBIT A

STUART L. SOMACH
ADMITTED IN CALIFORNIA AND
IN THE DISTRICT OF COLUMBIA

DE CUIR & SOMACH
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW

400 CAPITOL MALL
SUITE 1900
SACRAMENTO, CA 95814-4407
TELEPHONE (916) 448-7979
FACSIMILE (916) 448-8199

August 28, 1997

HAND DELIVERED

Mr. David Kennedy
Department of Water Resources
1416 Ninth Street, Room 1115-1
Sacramento, CA 95814

Re: Sutter County -- Flood Protection

Dear Dave:

I represent Sutter County as Special Legal Counsel. I know that you are aware of the flood-related problems that exist within Sutter County and, as a consequence, will not belabor that point here. I am not certain, however, that you fully understand the dilemma that Sutter County currently faces. I have today forwarded the enclosed letter to the Corps of Engineers ("COE"). The letter is fairly frank and I can assure you that Sutter County is very serious about exhausting every avenue available to obtain the level of relief to which it is entitled. Your continued assistance in moving the COE toward prompt and responsible action would, of course, be welcome.

I am concerned also about actions that are more directly related to the Department of Water Resources' ("DWR") obligations. In the absence of COE relief, we believe that DWR is obligated to re-operate Oroville Reservoir in a manner that will relieve pressure on the various levees that currently protect Sutter County. Assuming no action by the COE, this letter constitutes Sutter County's notice to DWR that it expects this type of re-operation. We would be happy to meet with DWR to discuss how best this can be accomplished. (We believe that the United States Bureau of Reclamation ("USBR") is similarly obligated with respect to Shasta Dam and I have on this date forwarded a letter to Roger Patterson notifying him of our intention to insure re-operation of Shasta Dam so that facility can provide the level of protection to which Sutter County is entitled.)

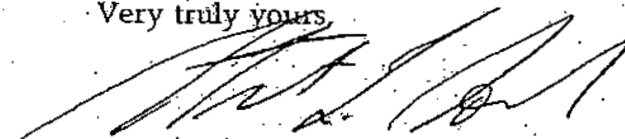
Mr. David Kennedy
August 28, 1997
Page 2

Also, Sutter County, last February, filed with DWR its Gilsizer Slough Blockage Contingency Plan ("Contingency Plan") and asked for DWR's review and concurrence in that plan. To date, Sutter County has heard nothing from DWR. Without feedback and concurrence from DWR, Sutter County is simply unable to take the advance steps necessary to insure that essential elements of the Contingency Plan are in place in a timely manner.

Dave, I know I do not have to underscore to you the seriousness of Sutter County's concerns; nor do I intend to convey to you an unwillingness on the part of Sutter County to continue to discuss these matters in order to obtain a reasonable and prompt resolution of this matter. Nonetheless, the County has few options and intends to pursue all appropriate means to obtain a reasonable level of protection and relief.

I will attempt to call you in the next week in order to answer any questions that you may have. In the meantime, please do not hesitate to contact me if you have any questions or need additional information.

Very truly yours,



Stuart L. Somach
Special Legal Counsel
County of Sutter

SLS:sb

Encl.

EXHIBIT B

DENNIS W. DE CUIR
STUART L. SOMACH

DE CUIR & SOMACH

A PROFESSIONAL CORPORATION

ATTORNEYS AT LAW

400 CAPITOL MALL

SUITE 1900

SACRAMENTO, CA 95814-4407

TELEPHONE (916) 446-7979

FACSIMILE (916) 446-8199

PAUL S. SIMMONS
SANDRA K. DUNN
WILLIAM E. HVIDSTEN
TIMOTHY M. TAYLOR
JOHN A. MENDEZ

DONALD B. MOONEY
DONALD B. GILBERT
ELIZABETH W. JOHNSON
ANDREW M. FITCHINGS
MICHAEL E. VERGARA

DAVID S. KAPLAN
OF COUNSEL

September 12, 1997

VIA HAND DELIVERY

Mr. David Kennedy
Department of Water Resources
1416 Ninth Street, Room 1115-1
Sacramento, CA 95814

Re: *Sutter County - Flood Protection*

Dear Mr. Kennedy:

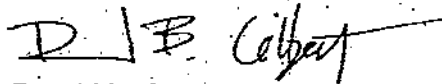
This follows Stuart Somach's August 28, 1997, letter regarding flood-related problems that currently exist within Sutter County. Enclosed please find a copy of our most recent letter to the Corps of Engineers ("COE") regarding this matter.

Sutter County continues to be concerned about COE's failure to complete, and in most cases begin, critical levee-related repair work. While Sutter County would like to avoid compelling revision of Oroville Dam and Reservoir ("Oroville Reservoir") flood control operations and to avoid impact on water supply, COE's failure to act promptly and adequately will soon leave Sutter County with no other option. Your continued assistance in moving COE toward prompt and responsible action is appreciated.

Please note as well that if a flood control emergency occurs again this winter, the Department of Water Resources may need to make flood control operational decisions without COE's input. This would include departing from the current, inadequate, Oroville Reservoir flood control plan. (Title 33 C.F.R., part 208, section 11(d)(9)(vii).) COE's proper attention to Sutter County's concerns, however, would significantly reduce that possibility.

Again, we appreciate your continued assistance. Please do not hesitate to contact this office if you have any questions or need additional information.

Very truly yours,



Donald B. Gilbert
Attorney

DBG:rf

Enclosure

cc: Larry T. Combs
Darrel Larsen
Stuart L. Somach, Esq.

EXHIBIT C

SOMACH, SIMMONS & DUNN

A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW

813 SIXTH STREET
THIRD FLOOR
SACRAMENTO, CA 95814-2403
19161 446-7979
FACSIMILE 19161 446-8199

June 30, 2004

HAND DELIVERED

Rick Ramirez, Program Manager
Oroville Facilities Relicensing Program
California Department of Water Resources
1416 9th Street, Room 1601
Sacramento, CA 95814

Re: Comments of Sutter County on Draft Application for FERC License Oroville
Division: State Water Facilities – FERC Project No. 2100

Dear Mr. Ramirez:

This firm represents Sutter County as its Special Legal Counsel. Sutter County has become increasingly frustrated with the Department of Water Resources' ("DWR") continued failure to substantively address flood control issues as a part of the reapplication process. This letter provides Sutter County's comments to the draft application documents distributed with your letter of April 30, 2004.

Sutter County first wrote DWR on November 21, 2000, urging it to give consideration to four specific suggestions for the re-operation of the Oroville facilities. The proposed re-operation would enhance the flood control benefits of those facilities. Shortly thereafter, Sutter County was pleased that the "Process Protocols" recognized the need for flood control to be given "equal consideration" to a number of other factors in the relicensing process. (March 22, 2001 Draft Process Protocols at 3.) Nevertheless, it has become increasingly apparent that DWR is only giving lip service to the requirement that flood control be given "equal consideration." By November of 2002 little or nothing had been done to evaluate the flood control opportunities presented by the relicensing effort. At the November, 2002 meeting of the Engineering and Operations workgroup, DWR did commit to asking the Corps of Engineers to revise the operations manual for Oroville Dam based upon changed conditions. Yet as of January 16, 2003, when Sutter County again wrote DWR, this had not been done. At that time, Sutter County expressed concern: "If decisions about flood control are not addressed soon, then flood control will not be included adequately in the re-licensing process."

On February 19, 2003, Janet Cohen of the Yuba-Feather Work Group, of which Sutter County is a Member, wrote to you expressing concern that the relicensing process was

Rick Ramirez, Program Manager

June 30, 2004

Page 2

not addressing five specific areas relating to flood control. Among these areas were the operations manual, spillway design and zone of impact. The letter also indicated encouragement that DWR had committed to engage the Corps of Engineers and other stakeholders in discussions of flood control issues but urged that these discussions be a part of the re-licensing effort.

On February 21, 2003, in the NEPA Scoping Document 2 at page 14, DWR again stated that flood management is a "major objective" of the project and committed that "Flood Management remains a key purpose of the Oroville Facilities." Nevertheless, as Sutter County noted in its letter to DWR dated April 22, 2003, there had been "virtually no discussion regarding flood control" in the working group meetings as yet. The letter also decried the lack of progress in the revision of the Oroville operations manual and again reiterated the concern that flood control was not and would not be adequately addressed in the relicense application process.

In a May 28, 2003 letter you sent in response to the Yuba-Feather Work Group letter of February 19, 2003, you agreed that the flood control issues raised in the February letter were "important" and "significant." Yet you indicated that these issues would be addressed outside the re-licensing process because of claimed primary jurisdiction of the Corps of Engineers. You cited the current license requirement that operations be in accord with regulations imposed by the Army and urged that any changes in operations as a result of a review process outside the licensing process could be addressed in "amendments to [the] license throughout the term of the license."

The approach urged by you ignores DWR's legal obligations in the relicensing process. As recognized in SP-E4, dated October 25, 2002, at page 13: "The relicensing process requires that the issues identified in the scoping process be addressed." The issue to be addressed by the process is described in SP-E4 at page 4 as Issue Statement No. E-5 described as follows:

Impact of flood releases on Lake Oroville dam (including need for access to north side of dam) and downstream facilities including downstream levee stability and potential for ameliorating downstream flooding through coordinated releases with other water storage facilities. Consider past floods, improvements in channel carrying capacities, need for more storage (e.g. including Obermeyer gates on the emergency spillway ogee), operational changes, early warning system for downstream releases, and updating of flood operational manual.

In the recent Draft License and draft Environmental Impact Statement ("EIS") this issue and the detailed study that was to be prepared pursuant to SP-E4 have been attenuated so that it does not address issue E-5 but merely proposes a document search to "identify opportunities for future improvements in flood management." (See Abstract: SP-E4,

Appendix E at E-56, Draft Application Volume II.) "Identifying opportunities" falls far short of addressing the issue E-5 and abrogates DWR's legal obligation as part of the FERC process to provide a plan in which flood control is given equal consideration with other issues of critical concern.

This obligation to address the issues identified in the scoping process arises out of the requirement of 16 U.S.C section 803 which provides, in part, that: "the project adopted...shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for...*flood control*..." (Emphasis added.) Section 803 proceeds to provide that the "recommendations of the Federal and State agencies exercising administration over flood control..." shall be considered by the Commission in issuing the license. (See, e.g., SP-E4 at 4-5.) This statutory provision contemplates that you and the Corps of Engineers *as part of the FERC relicensing process* will make recommendations based upon adequate studies for improved flood control operations. The current approach to flood control set forth in the documentation to which these comments are addressed is wholly inadequate to satisfy this obligation.

This failure to adhere to basic legal obligations is also apparent in the total failure of the draft EIS to consider alternatives that would enhance flood control: "Alternatives specifically designed to increase the existing level of downstream flood protection will not be evaluated in this document." (Draft Application Volume II at 4-7.) Under this view, any improvement in flood protection would be mere happenstance in the selection and the evaluation of alternatives. This hardly is the "equal consideration" promised at the outset of this process.

Given the failure of the levee near Holt on June 3, 2004, at low water, it is apparent that flood control needs to be given more attention. California has a primary interest in the adequate protection of flood prone lands pursuant to Water Code section 8532 and DWR's responsibility to protect that interest is set forth in the Water Code and cases such as *Paterno v. State of California*, 113 Cal.App.4th (2003). The failure of DWR to adequately address flood control in the relicensing process violates not only federal law but also DWR's obligations under California law.

Unless a greater effort is made to address flood control and to evaluate alternatives that might provide greater flood control protection and still provide equal consideration to the other areas that are required to be addressed in the relicensing process, Sutter County may oppose the relicensing proposed in your draft application.

Finally, in this regard, Sutter County reiterates its concern that the study area for flood control is too small. In times of flood, releases from Oroville Dam combine with outflows from the Yuba River and Bear River to affect lands downstream from the confluence of the Feather River and the Yuba River. The study area should extend below the confluence of the Feather River and the Bear River.

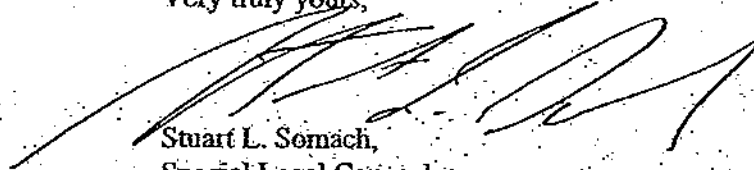
Rick Ramirez, Program Manager

June 30, 2004

Page 4

Sutter County has reviewed Friends of the River's June 7, 2004 comments on the Initial Settlement Agreement Offer which also voices the views of the Yuba-Feather Work Group. Sutter County adopts and endorses the substance of those comments.

Very truly yours,



Stuart L. Somach,
Special Legal Counsel
County of Sutter

SES:sb

cc: Board of Supervisors, Sutter County
Ron Erickson, County Counsel
Larry T. Combs
Yuba Feather Work Group
Ron Stork



June 7, 2004

Comments on the Initial Settlement Agreement Offer

The Department of Water Resources has taken the position that the failure of Oroville Dam's spillway to meet FERC's Engineering Guidelines is not properly a subject to be dealt with in the relicensing of Oroville Dam. This position is reflected in the list of ISA programs that the Department is attempting to negotiate in the Oroville ALP.

Friends of the River and other members of the Yuba Feather Task Force do not support the Department's position that compliance with FERC Engineering Guidelines and related flood control operational issues are not properly an issue to be confronted or resolved in this relicensing proceeding.

As we have repeatedly urged for several years, the Department needs to accept that these issues are properly a significant part of the Commission's and licensee's obligations under the Federal Power Act to the public. We urge the Department to add these issues to the ISA program list and begin discussions with members of the Yuba Feather Task Force.

Summary of the Workgroup View

Because of the absence of Marysville dam, the "interim without Marysville dam" flood control rules at Oroville Dam are effectively the long-term established rules for dam operations. This represents a "changed condition" from the time of the original license for Oroville Dam. Oroville's flood operation rules call for effective "suspension" of a portion of the Emergency Spillway Release Diagram (ESRD) and operational use of the ungated spillway to gain approximately 150,000 acre feet of additional flood space (an increase of 20% over Marysville dam "in place" flood space) while still maintaining regulated releases to meet downstream flow objectives (YCWA Technical Memo p. II-5). Under "interim" (now long-term) flood operational rules, the ungated spillway fails to meet FERC's criteria for appropriate use of an emergency spillway, but rather matches the uses expected for a service or auxiliary spillway. Under FERC's service or auxiliary spillway criteria, the lack of a spillway for the ungated spillway in the circumstances prevailing at Oroville Dam does not meet FERC's Engineering Guidelines. Because Oroville Dam is currently undergoing relicensing and the Dam violates the Commission's Engineering Guidelines, it is appropriate for the Commission to establish procedures to bring the Dam into compliance as part of its relicensing review. The Workgroup, the Corps of Engineers, and the Department have also recognized the desirability of developing refinements to the flood control operating criteria for Oroville Dam. Changes in operating criteria

may (or may not) involve or require changes to the Corps Reservoir Regulation Manual, but changes in physical facilities at the Dam will require approval by the Commission—either in relicensing or in a post licensing action by the Commission.

Summary of Department of Water Resources Argument

The Department's response has been to engage in discussions with the YCWA and Corps of Engineers on refining flood control operational rules—largely focusing on aspects of coordinated operations with other dam releases and flow conditions that affect flow targets downstream of Oroville Dam. This is a positive development. However, the Department has also taken the position that addressing the physical deficiencies of Oroville Dam's flood control works should be addressed at the Department's convenience, and that the Commission should not play a role in this matter during its relicensing of Oroville Dam—or perhaps not even in a Commission directed license amendment. The reasons for the Department's position are not clear. They have offered the explanation that the ungated spillway is an emergency spillway, and is not needed to pass a 100 year storm—apparently linking a flood insurance threshold to spillway design and dam operations for the much different Inflow Design Flood. An other Department argument could be that flood control features at Oroville Dam are the business of the Corps of Engineers, not the FERC—an argument that ignores the Commission's responsibilities under section 10 of the Federal Power Act and the Commission's Engineering Guidelines on spillway design and the Inflow Design Flood.

Ronald Stork

Friends of the River
915 20th Street
Sacramento, CA 95814
(916) 442-3155
rstork@friendsotheriver.org

Attachment: Memo to DWR from Yuba Feather Workgroup



collaborative solutions for flood control and habitat restoration

January 21, 2004

Participants:

- South Yuba River Citizens League
- CAIFED Agencies
- Friends of the River
- Nevada County
- Sutter County
- The Sierra Club
- Yuba County Water Agency

Mr. Stephen L. Kashiwada, Chief
 Division of Operations and Maintenance
 Department of Water Resources
 1416 Ninth Street
 Sacramento, CA 94236-0001

Dear Mr. Kashiwada

On behalf of the Yuba Feather Work Group, I want to thank DWR for its response to our inquiry regarding flood control coordination between the Yuba River and operation of the Oroville Facilities. The group found the information provided by Curtis Creel and Gary Bandini regarding a comprehensive Oroville/New Bullards Bar flood operations study intriguing, and is looking forward to the development of any information and actions resulting from DWR's efforts.

The Work Group is gratified that DWR has decided to actively address many of the concerns outlined in our previous correspondence, however they are somewhat disheartened of DWR's choice to investigate these issues outside of the FERC relicensing process. The Work Group has chosen to refrain from responding to DWR's rationale in this matter, leaving it to individual members to address the substance of DWR's action as they wish. Instead, the Work Group welcomes the opportunity to work proactively with DWR staff on these critical issues during the upcoming months.

If you have any questions do not hesitate to contact me:

Sincerely,

Janet Cohen
 Yuba-Feather Work Group

EXHIBIT D

SOMACH, SIMMONS & DUNN

A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW

813 SIXTH STREET
THIRD FLOOR
SACRAMENTO, CA 95814-2403
(916) 446-7979
FACSIMILE (916) 446-8199

July 26, 2004

Lester A. Snow
Director
Department of Water Resources
1416 Ninth Street, Room 1115-1
Sacramento, CA 95814-5589

Re: Sutter County – Flood Protection

Dear Lester:

I represent Sutter County as Special Legal Counsel. I know that you are aware of the flood-related problems that exist within Sutter County and, as a consequence, will not belabor that point here. I am not certain, however, that you fully understand the dilemma that Sutter County currently faces. I have today forwarded the enclosed letter to the Corps of Engineers ("Corps"). The letter is fairly frank and I can assure you that Sutter County is very serious about exhausting every avenue available to obtain the level of relief to which it is entitled. Your assistance in moving the Corps toward prompt and responsible action would, of course, be welcome.

The County is concerned also about actions that are more directly related to the Department of Water Resources' ("DWR") obligations. Sutter County has recently commented on the draft application for the relicensing of Oroville Dam and the associated draft Environmental Impact Statement. (A copy of this comment letter is attached.) The thrust of the County's comments address the inadequacy of the draft application to address flood control issues as a part of the relicensing process. The County has not received any response or positive action as a result of its comments. DWR is obligated to address re-operation of Oroville Dam and Reservoir as part of the relicensing effort.

In addition, and notwithstanding the letter to the Corps and its obligations or responsibilities that may exist by virtue of the relicensing, DWR is, nonetheless, obligated to address flood control issues associated with Oroville. This letter constitutes the County's notice to DWR that it expects this type of re-operation one way or another. We would be happy to meet with DWR to discuss how best this can be accomplished. (We believe that the United States Bureau of Reclamation is similarly obligated with respect to Shasta Dam and I have on this date forwarded a letter to Kirk Rodgers notifying him of our intention to insure

Lester A. Snow
July 26, 2004
Page 2

re-operation of Shasta Dam so that facility can provide the level of protection to which Sutter County is entitled.)

The County is also concerned about the well-known poor condition of levees within specific portions of the County for which the State Reclamation Board within DWR is responsible. The poor condition of the levees constitutes a threat to public health and safety and inhibits the free use of property within the County which, by definition, constitutes a public nuisance and a dangerous condition of public property. Civil Code section 3479 defines a nuisance as "[a]nything which is injurious to health...or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property...." Civil Code section 3480 defines a public nuisance as "one which affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal." The remedies against a public nuisance are indictment, a civil action or abatement. (Civ. Code, § 3491.) Any public body, such as the County, may abate a public nuisance. (Civ. Code, § 3494.)

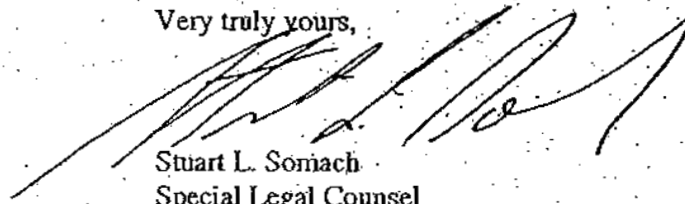
We are aware that Government Code section 830.6 provides immunity against liability for a dangerous condition of public property for certain government activities. This immunity is not unlimited nor is it perpetual. "Once the involved public entity has actual or constructive notice that the plan or design has, under changed physical conditions, produced a dangerous condition of public property, the entity must act reasonably to correct or alleviate the hazard." (*Baldwin v. State* (1971) 6 Cal.3d 424.) Even where a plan or design of a construction or improvement to public property has been shown to have been reasonably approved in advance or prepared in conformity with standards previously approved as being safe, if its actual operation under changed physical conditions produces a dangerous condition of public property and causes injury, the public entity does not retain the statutory immunity conferred by Government Code section 830.6. (*Id.*) In *Paterno v. State* (2003) 113 Cal.App. 4th 998, the court found that the failure of the state to maintain levees that it knew would not perform to design standards breached its duty to persons whose property was damaged and formed the basis of an inverse condemnation action for damages caused by a breach of the Linda levee in the 1986 flood. Although the immunity provided by section 830.6 continues for a reasonable period after notice that the public property no longer conforms to the design sufficient to allow the entity to obtain funds for the repair, the reasonable period is not endless. Here there are numerous studies done by DWR and by others of which DWR is aware documenting the poor condition of levees within specific portions of the County and the proper means to fix the levees to bring them within the standards to which they were originally constructed. These studies are many years old, yet very little has been done to make the levees in the County safe. Moreover, DWR has never provided adequate warnings of the dangerous condition of the levee system. The recent breach of the levee near Holt, at time of low water, emphasizes the poor condition of the levees and the need to bring the levees up to snuff. In this regard, DWR may not avoid its responsibility merely through an attempt to shift obligations and burdens to local interests.

Lester A. Snow
July 26, 2004
Page 3

The County's concerns are serious and it has expended considerable resources, both fiscal and manpower, to the study of these problems. The County is willing to meet to discuss these matters in order to obtain a reasonable and prompt resolution of this matter. Nonetheless, the County has few options and intends to pursue all appropriate means to obtain a reasonable level of protection and relief.

I will call you in the near future to set up a meeting, which would include representatives of Sutter County, to discuss the issues raised in this letter before taking any further action. In the meantime, please do not hesitate to contact me if you have any questions or need additional information.

Very truly yours,



Stuart L. Somach
Special Legal Counsel
County of Sutter

SLS:sb

Encl.

cc: Sutter County Board of Supervisors
Larry T. Combs, Sutter County Administrative Officer
Ron Erickson, Sutter County Counsel

EXHIBIT E

County of Sutter

... established 1850

Office of the County Administrator

October 24, 2005

Lester Snow, Director
State of California
Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236

Re: Flood Control – Yuba and Feather Rivers

Dear Lester:

The undersigned public agencies and political subdivisions are responsible for cooperating with the Federal Government and the State of California in providing flood protection to hundreds of thousands of the State's citizens occupying portions of the Sacramento Valley downstream of Oroville Dam and Reservoir (Oroville). The purpose of this letter is to enlist the support of the State Department of Water Resources (DWR) in taking a series of steps involving the operation of Oroville that would improve this coordinated flood risk management effort. These steps, which are described in detail below, include:

- Joining the undersigned in issuing the attached letter to Colonel Ronald N. Light, Sacramento District Engineer, U. S. Army Corps of Engineers (Corps), requesting the Corps to exercise its statutory duty under Section 7 of the Flood Control Act of 1944 to revise the water control plans for Oroville and for Yuba County Water Agency's New Bullards Bar Reservoir (New Bullards Bar) to account for the changed conditions since the publication of the currently effective plans.
- Developing and implementing a plan to augment the storage space available for controlling large floods in the Feather River basin by evacuating Thermolito Afterbay (Thermolito) in advance of forecasted peak inflows to Oroville so that the evacuated space can be used in conjunction with Oroville for peak flood detention.
- Ensuring that local agencies responsible for emergency flood response activities in the levee-protected floodplains downstream of Oroville have access to the most timely information on forecasted and observed river and

Lester Snow
October 24, 2005
Page 2

stream flows during flood events in the Feather River and Yuba River watersheds.

Water Control Plans

The core concern regarding the current water control plans for Oroville and New Bullards Bar is the fact that construction of Marysville Reservoir, which is an assumed condition of these plans, has never occurred. This unfulfilled assumption dictates an operational regime for Oroville and New Bullards Bar that diminishes the level of flood protection that could be provided by these facilities. As set forth in the attached letter to Colonel Light, the Corps needs to revise the current water control plans for these facilities to permit the kind of operational flexibility that is needed in the absence of Marysville Reservoir. Specifically, flexibility is needed with respect to allowable rates of change for reservoir outflows, required release rates under the current Emergency Spillway Release Diagrams for Oroville and New Bullards Bar, and coordination of the flood control operations at both facilities based on improved weather forecasting and updated specifications for collecting stream gauge data.

The undersigned believe such operational improvements are long overdue. In order to secure these improvements, which rest almost entirely within the authority of the Corps, it is imperative that the affected local and state interests speak with a single voice as reflected in the attached letter to the Corps. The undersigned agencies recognize that the Corps is currently engaged with DWR, the National Weather Service, and the Yuba County Water Agency in the Forecast-Coordinated Operations project; however, this project is a multi-year program which has only recently been initiated. Accordingly, we request that DWR to join us as a signatory to this letter.

Thermolito Afterbay

In connection with the operational improvements discussed above, the undersigned also believe that the risk of flooding downstream of Oroville could be reduced by using the storage capacity available at Thermolito for peak flood detention in connection with very large flood events. This could be accomplished through early evacuation of water stored in this space based on forecasted peak inflows to Oroville. The additional storage capacity would increase DWR's flexibility in responding to large flood events and reduce the risk of having to make releases from Oroville that might trigger downstream levee failures. In light of DWR's ongoing effort to renew its license for the hydropower operation at Oroville, the undersigned believe that this is a particularly appropriate time for DWR to develop a plan and implementation schedule for using Thermolito in the proposed manner. Accordingly, we request that DWR to make clear its intention to produce such a plan and to provide a timetable for its completion and implementation.

Lester Snow
October 24, 2005
Page 3

Emergency Response Activities

Several of the undersigned agencies are responsible for emergency response activities in the levee-protected floodplains downstream of Oroville. In order to effectively discharge these responsibilities, the responders must have access to timely information on forecasted and observed watershed run-off conditions. Such access is currently impeded due to overly broad confidentiality procedures, inefficient information sharing systems, or inadequate gauging facilities. The undersigned believe that many of these deficiencies are being addressed through appropriate cooperative efforts at the state and local level. Accordingly, we request that DWR continue to work with the affected local emergency flood responders to develop and implement a plan to improve local access to timely information on watershed run-off conditions.

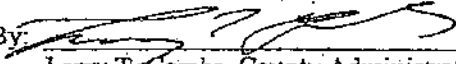
Conclusion

The undersigned believe that the matters discussed herein are urgent and worthy of an immediate response from DWR. Accordingly, we invite you or your designated representative to meet with us at the earliest practicable date to discuss your response to our requests. Toward that end, we would appreciate your contacting Sutter County through the office of Larry Combs, the County's Chief Executive Officer, to arrange the proposed meeting.

Very truly yours,

SUTTER COUNTY

Dated: October 24, 2005

By: 
Larry T. Combs, County Administrator

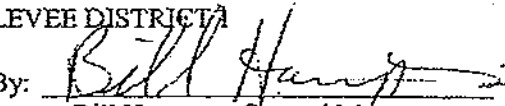
YUBA CITY

Dated: OCT. 25, 2005

By: 
Jeff Folger, City Manager

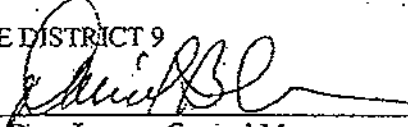
LEVEE DISTRICT A

Dated: 10-25-05

By: 
Bill Hampton, General Manger

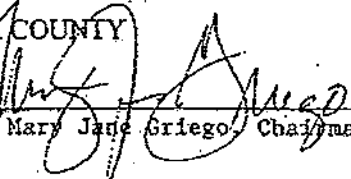
LEVEE DISTRICT 9

Dated: 11-2-05

By: 
Dave Lamon, General Manager

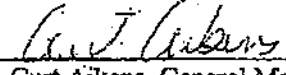
YUBA COUNTY

Dated: 10-28-05

By: 
Mary Jane Griego, Chairman of the Board

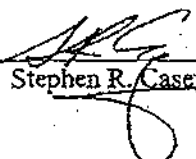
YUBA COUNTY WATER AGENCY

Dated: 10-25-05

By: 
Curt Aikens, General Manager

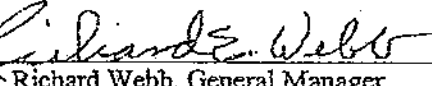
CITY OF MARYSVILLE

Dated: 11-2-05

By: 
Stephen R. Casey, City Manager

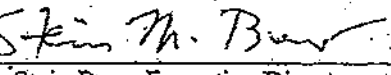
RECLAMATION DISTRICT 784

Dated: 11-3-05

By: 
Richard Webb, General Manager

SACRAMENTO AREA FLOOD CONTROL
AGENCY

Dated: 11/4/05

By: 
Stein Buer, Executive Director

SOMACH, SIMMONS & DUNN

A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW

813 SIXTH STREET
THIRD FLOOR
SACRAMENTO, CA 95814-2403
(916) 446-7979
FACSIMILE (916) 446-8199
WEBSITE: www.lawssd.com

December 19, 2006

ELECTRONIC FILING

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Comments on DEIS for the Oroville Facilities, FERC Project No. P-2100

Dear Ms. Salas:

This letter is submitted on behalf of the County of Sutter, City of Yuba City, and Levee District No. 1 of Sutter County (collectively "Sutter County"), and provides comments regarding the draft environmental impact statement ("DEIS") for the Oroville Facilities, FERC Project No. P-2100. Sutter County's comments, which are set forth below, focus on the failure of the DEIS to adequately address flood control issues associated with the Oroville Facilities project. In summary, (1) FERC's failure to address the flood control issues raised by Sutter County and other parties violates section 10(a)(1) of the Federal Power Act; and (2) the DEIS is fatally flawed because it lacks adequate analysis of the environmental consequences of flood control issues associated with the Project.

A. The Federal Power Act Requires FERC to Adopt Licenses Containing Terms and Conditions Addressing Flood Control Issues

The DEIS contains no analysis of flood control issues associated with the Oroville Facilities based on the erroneous claim that "[b]ecause the Corps is primarily responsible for flood control operations, these issues are outside of the FERC relicensing process." DEIS at 75. This faulty assumption is unsupported by citation to any legal authority. In fact, the Federal Power Act *mandates* that FERC exercise its judgment in adopting a licensing order that "will be best adapted to a comprehensive plan for ... flood control," and FERC "shall have authority to require the modification of *any* project ... before approval." 16 U.S.C. § 803(a)(1) (emphasis added).

Through the plain language of Federal Power Act, Congress has directly spoken to FERC's duty to adopt licenses that address flood control. Although neither cited nor discussed in the DEIS, other statutes and regulations are relevant to flood control at the Oroville Facilities, but none preempt the express mandates of the Federal Power Act. In particular, provisions of the 1944 Flood Control Act direct the Army Corps of Engineers ("Corps") "to prescribe regulations for the use of storage allocated for flood control or navigation at all reservoirs constructed wholly or in part with Federal funds provided on the basis of such purposes, and the operation of any such project shall be in accordance with such regulations." 33 U.S.C. § 709. Regulations subsidiary to the 1944 Flood Control Act require the Secretary of the Army to develop a water control plan for the operation of such reservoirs, and to revise the water control plan to reflect any "changed conditions." 33 C.F.R. § 208.11(10). In 1970, the Corps prepared a water control plan for the Oroville Facilities which is entitled, "Report on Reservoir Regulation for Flood Control" (1970 Report).¹ Thus, while the statutes and regulations authorizing the Corps to prepare a water control plan for the Oroville Facilities are relevant to the FERC licensing process, FERC is also obligated to independently address flood control issues in the license and, importantly, to analyze the environmental impacts of flood control matters in the DEIS.

Sutter County and other parties have previously submitted comments to FERC describing FERC's duty to address flood control in the license. FERC's apparent failure to even consider the flood control issues and actions raised by Sutter County means this is not a situation where FERC has reached different conclusions than Sutter County, but supported its conclusions with findings of fact. Instead, a FERC argument that it lacks jurisdiction to consider flood control matters relevant to relicensing the Oroville Project and its further failure to, in fact, discuss flood control issues and reach reasoned legal conclusions supported by findings of fact is an arbitrary and capricious interpretation of Federal Power Act section 10(a)(1), under even the most deferential application of the test outlined in *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842-843 (1984). As a consequence, section 10(a)(1) of the Federal Power Act will have been violated.

B. History of the 1970 Report and Associated Flood Control Issues

At the time the 1970 Report was written, a project on the Yuba River known as the Marysville Dam had been authorized but not yet built.² Marysville Dam was expected to provide an additional measure of flood control regulation on the Yuba River before its confluence with the Feather River. This would have provided additional regulation of peak flow conditions on the Feather River, when Marysville Dam was

¹ Pertinent pages from the 1970 Report are attached hereto as Exhibit A.

² Marysville Dam was authorized by the Flood Control Act of 1966, Pub. L. No. 89-789, 80 Stat. 1405 (1966).

operated in conjunction with other facilities on the Yuba River.³ Accordingly, the 1970 Report prescribed two sets of operating rules for Oroville: a set of "permanent" rules for when Marysville Dam was complete, and a set of "interim" rules to be followed before Marysville Dam was in place.

The "permanent" rules for flood control contained in the 1970 Report called for a 750,000 acre-foot flood pool in Oroville Reservoir, in order to keep overall Feather River flows within downstream channel capacities both above and below the confluence of the Yuba River.⁴ At the same time, however, the "interim" rules (in place until the construction of Marysville Dam) provided for "surcharge" operations at Oroville Dam which could temporarily increase the available flood pool in Oroville Reservoir to over 900,000 acre feet. These surcharge operations would occur, when necessary, by reducing flows from the main gated spillways as the reservoir filled during a flood event, creating up to ten feet of surcharge above the ungated spillway. In effect, the "interim" rules substituted Oroville's ungated, emergency spillway for the dam's gated, main spillways as a temporary measure to boost flood control capacity until Marysville Dam could be built.⁵

Marysville Dam was never built. As such, the Yuba River's flow into the Feather River at Yuba City is not as regulated as was expected at the time the 1970 Report was generated.⁶ In the meantime, for more than thirty-five years a set of "interim" flood control rules has been applied to the operation of Oroville, resulting in an increased risk

³ Other facilities on the Yuba River include New Bullards Bar Reservoir, which controls about 36 percent of the Yuba River drainage. See 1970 Report at 3. The remaining 64 percent of the Yuba River drainage is uncontrolled, without the addition of Marysville Dam and Reservoir. As the Corps put it in the 1970 Report, "[c]omplete protection on the Yuba River is not possible without the authorized Marysville Reservoir." *Id.*

⁴ The intent is to keep flows to a maximum of 300,000 cubic feet per second ("cfs") below the mouth of the Yuba River, because the channel capacity of the Feather River levees there is 300,000 cfs.

⁵ Both sets of operating rules for Oroville Dam and Reservoir are contained in two diagrams contained in the 1970 report known as the "Flood Control Diagram" and the "Emergency Spillway Release Diagram", respectively. See Exhibit A, 1970 Report, Charts A-1 and A-2.

⁶ The County has engaged the licensee since at least 1997 on the subject of the flood control operations of Oroville Dam and Reservoir. See letter from Stuart Somach, Special Legal Counsel to Sutter County, to David Kennedy, Director of the Department of Water Resources ("DWR") (Aug. 28, 1997), attached hereto as Exhibit B; see also letter from Donald B. Gilbert, Special Legal Counsel to Sutter County, to David Kennedy (Sept. 12, 1997), attached hereto as Exhibit C. Most recently, Sutter County has diligently engaged the licensee on flood control operations within the specific context of the relicensing process, without result. See letter from Stuart Somach, Special Legal Counsel to Sutter County, to Rick Ramirez, Program Manager, Oroville Facilities Relicensing Program (June 30, 2004), attached hereto as Exhibit D; see also letter from Stuart Somach to Lester Snow, Director of DWR (July 26, 2004), attached hereto as Exhibit E; letter from Larry T. Combs, County Administrator, and eight other local signatories, to Lester Snow (October 24, 2005), attached hereto as Exhibit F. Sutter County has also met with Lester Snow on two occasions prior to the filing of this petition.

that its emergency spillway will be used to effect flood control. While the surcharge operations involved in the interim flood control regime may not pose a risk to dam safety, they certainly pose a reduced flood control capability at Oroville.⁷ It is self-evident that the use of the "surcharge" space above the emergency spillway crest removes any flexibility that Oroville Reservoir may have to account for unforeseen circumstances in the floodplain below.

Moreover, there is circumstantial evidence that the storage boost or surcharge provided by the interim operating rules creates no real flood storage. During the 1997 New Year's flood, DWR increased releases above the objective maximum release called for in the 1970 Report, even though storage never reached the surcharge space above the ungated-spillway crest.⁸ The 1997 experience shows that whatever the Corps' plan for "interim" operations was in 1970, and in spite of the theoretical 900,000 acre-feet of storage that can be counted on due to surcharge operations, the "interim" plan is simply not workable when the licensee has demonstrated a hesitancy to use the emergency spillway in major flood events. It bears repetition that the *1997 flood event shows that the licensee will exceed design release flows of 150,000 cfs before the surcharge storage is exhausted*. In the case of the 1997 flood event, levee breaks downstream underscored the inadequacy of this state of affairs.⁹

An additional element of concern that must be addressed as part of the current FERC proceedings is the effect that operation of the Oroville Dam and Reservoir may have on downstream levees. The hydroelectric releases licensed or relicensed in these proceedings, as well as the water supply conveyance utilizing the Feather River, create a flow condition on the Feather River not contemplated when those levees were first constructed and subsequently engineered and maintained. The licensee and its contractor receive the benefit of the conveyance and use of the levee system on the Feather River during times when, but for their actions, little flow would exist on the Feather River. Consequently, they must be made to also bear the burden of maintaining those levees,

⁷ Neither the County, City, nor District discount the issues raised by Friends of the River, the Sierra Club, and the South Yuba River Citizen's League. In particular, the County, City, and District concur that the surcharge operations ultimately pose a great risk of downstream erosion and damage due to utilization of the ungated and unarmored emergency spillway.

⁸ Indeed, DWR notified the City of Oroville, Sutter County, and Yuba County that evacuations could be imminent due to full pass-through (i.e., uncontrolled releases) at the dam. Yet reservoir storage peaked at 200,000 acre-feet below the gross pool. The conclusion is inescapable that DWR did not intend to operate the dam to the full amount of surcharge storage, making the approximately 150,000 acre feet of additional surcharge storage highly questionable as actually usable flood control space.

⁹ The County, City, and District acknowledge that the licensee is currently engaged with the National Weather Service, the Corps, and the Yuba County Water Agency in a Forecast-Coordinated Operations project for the watershed that may ultimately result in recommendations for the update of the 1970 Report. This is a positive development. However, the project is open-ended in timeframe and uncertain in outcome, and is being overtaken by the current relicensing process.

including the incremental degradation of those levees caused by high summer and fall flows, through the flood related operations described above.

C. Even if FERC Does Not Directly Impose Flood Control Measures, FERC Should Order the Licensee to Consult with the Corps on Specific Flood Control Issues

Harmonizing the flood control laws found in the Flood Protection Act of 1944 with the mandates on FERC contained in section 10(a)(1) of the Federal Power Act is probably best accomplished by FERC imposing license conditions requiring the licensee to consult with the Corps on specific flood control issues.¹⁰ Sutter County requests, therefore, that FERC:

1. Issue a relicensing order, consistent with FERC's duty under section 10(a) of the Federal Power Act, which directs the licensee to make a formal request to the Corps that the Corps immediately develop a revised operational plan for Oroville to establish flood-control management on the Feather River system that accounts for the absence of Marysville Dam and full regulation of the Yuba River, without the necessity for surcharge operations of or at Project 2100-52 above the ungated spillway;

2. Issue a relicensing order, consistent with the Commission's duty under section 10(a) of the Federal Power Act, which directs the licensee to investigate the adequacy and structural integrity of Oroville Dam's ungated auxiliary spillway that may currently pose a risk to the Project facilities and downstream levees in Sutter County in the event extreme flood releases are required, as recently experienced in flood release events of 1986 and 1997, and to take all necessary actions to correct any identified deficiencies in this regard;

3. Issue a relicensing order, consistent with the Commission's duty under section 10(a) of the Federal Power Act, which directs the licensee to investigate the adequacy and structural integrity of levees on the Feather River, in the context of its hydroelectric, water supply and flood control operations and to repair, replace and maintain those levees to provide appropriate levels of flood protection, in light of license operations; and

4. Issue the above orders in the event the licensing action is delayed and annual licenses become necessary under section 15 of the Federal Power Act for the continued operation of the Oroville facilities.

¹⁰ This proposed course of action does not relieve FERC of its aforementioned duty to perform a reasonable analysis of the environmental consequences associated with the existing flood control protocol.

D. The DEIS Is Fatally Flawed Because It Fails to Analyze and Discuss the Environmental Consequences of Flood Control Issues Associated with the Oroville Facilities

The National Environmental Policy Act ("NEPA") has two main objectives: (1) preventing environmental damage; and (2) ensuring that agency decisionmakers take environmental factors into account. See 42 U.S.C. § 4321; *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). "The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government." 40 C.F.R. § 1502.1. "By focusing the agency's attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or under-estimated only to be discovered after resources have been committed or the die otherwise cast." *Robertson*, 490 U.S. at 349.

NEPA mandates that the DEIS analyze the environmental consequences of each proposed alternative project. 40 C.F.R. § 1502.16. This section of the DEIS "forms the scientific and analytic basis for the [comparison of alternatives]." *Id.* The DEIS must analyze direct, indirect and cumulative impacts of the proposed alternatives. *Id.*; see also *Natural Resources Defense Council, et al. v. United States Forest Service, et al.* ("NRDC"), 421 F.3d 797, 815 (9th Cir. 2005). In the Ninth Circuit, the sufficiency of this analysis is determined under the "rule of reason." *NRDC* at 810, n.27.

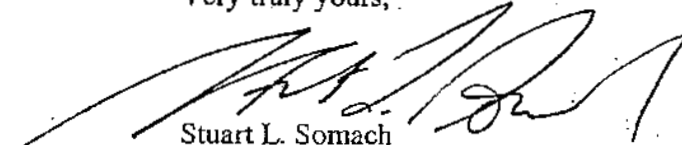
The DEIS is legally insufficient because it fails to analyze the environmental consequences of flood control operations at the Oroville Facilities. FERC erroneously attempts to justify not performing this analysis based on the claim that the Corps is responsible for flood control regulation. Regardless of whether the provisions of the 1944 Flood Control Act – or any other legal authority – somehow nullifies the plain language of section 10(a)(1) of the Federal Power Act and the Corps has the only authority to implement flood control measures at Oroville, FERC is *still* required to analyze the environmental consequences of flood control operations at the Oroville Facilities. 40 C.F.R. § 1502.16. Under the rule of reason, this effort would require analysis of the issues highlighted by Sutter County (e.g., Marysville Dam, "interim" operations criteria, etc.), and recent reports that address relevant flood control matters (e.g., 2002 Sacramento and San Joaquin River Basins Comprehensive Study; Yuba County Water Agency Technical Memoranda 2002a and 2002b; Yuba-Feather River Forecast-Coordinated Operations Program; and environmental review documents associated with the Yuba-Feather Supplemental Flood Control Project).

In conclusion, major flood events on the Feather River system were recorded in 1950, 1955, 1986 and 1997. In the New Year's flood of 1997 alone, more than 250 square miles were flooded, resulting in nine deaths, the damage or destruction of almost 20,000 homes, and an estimated \$1.8 billion in economic losses. California courts have found the State at fault for this lack of reasonable flood protection. *Paterno v. State of*

Magalie R. Salas, Secretary
December 19, 2006
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California, 113 Cal.App.4th 998 (2003). Sutter County's now decade-long effort to compel new flood protection protocol at the Oroville Facilities has been largely ignored. In this context, the DEIS's failure to even analyze the environmental consequences associated with the existing flood protection protocol was shocking to Sutter County. While DWR earns *billions* of dollars from energy generation over the life of the proposed FERC license, Sutter County will be at flood risk from Oroville's operations. This situation is unacceptable. Sutter County respectfully requests, therefore, that FERC perform the additional analysis described above and then recirculate an amended DEIS. In addition, Sutter County requests that FERC take the four actions described above to require DWR to consult with the Corps and downstream flood control stakeholders in Sutter County on these important flood control matters.

Very truly yours,



Stuart L. Somach
Attorney

SLS:sb

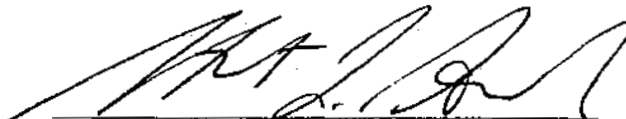
Encl. (Exhibits)

cc: Official Service List

CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission, I hereby certify that I have this day caused the foregoing document to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Sacramento, California, this 19th day of December, 2006.



Stuart L. Somach
Somach, Simmons & Dunn
A Professional Corporation
813 Sixth Street, 3rd Floor
Sacramento, CA 95814-2403
Email: ssomach@lawssd.com
Telephone: 916-446-7979
Facsimile: 916-446-8199

EXHIBIT F



OROVILLE DAM AND RESERVOIR

Feather River, California

REPORT ON RESERVOIR REGULATION FOR FLOOD CONTROL

AUGUST 1970

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

APPENDIX IV
TO
MASTER MANUAL OF RESERVOIR REGULATION
SACRAMENTO RIVER BASIN, CALIFORNIA

August 1970 .

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

PERSONNEL CONCERNED IN FLOOD-CONTROL OPERATION OF OROVILLE DAM AND RESERVOIR

	UNIT	OFFICE PHONE	NAME	HOME PHONE
STATE OF CALIFORNIA OROVILLE FIELD DIVISION OROVILLE, CALIFORNIA	FIELD DIVISION	916-534-2413**	PHILIP F. JOHNS, CHIEF	916-534-1697
	OPERATIONS SECTION	916-534-2322**	ROBERT B. CLARK CHIEF OPERATOR	916-877-1270
STATE OF CALIFORNIA SACRAMENTO, CALIFORNIA	DEPARTMENT OF WATER RESOURCES	916-445-6582	Wm. R. STANELLI, DIRECTOR	
	DIVISION OF OPERATION AND MAINTENANCE	916-445-1295	ROBERT JANSEN, CHIEF	916-422-6848
	OPERATIONS ENGINEERING BRANCH	916-445-8104	WELBEY MADSEN, CHIEF	916-421-1983
	SWP OPERATIONS CONTROL CENTER	916-445-6279	KENNETH B. MAYO, CHIEF	916-428-1285
	DISPATCHING SECTION	916-445-7788	GEORGE W. KREBS, CHIEF	916-421-5296
	SCHEDULING SECTION	916-445-3630	A. J. BROWN, CHIEF	916-483-2330
	FLOOD FORECASTING AND CONTROL BRANCH	916-445-5140	WILLIAM L. HORN, CHIEF	916-925-6147
	STATE FLOOD CONTROL CENTER	916-445-6242 (916-445-6763, 916-445-6765)	G. M. NORRIS CHIEF OF FLOOD OPERATIONS	916-442-0084
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA	CENTRAL DISTRICT	916-445-5631	CARL A. WERNER DISTRICT ENGINEER	916-445-1822
	DISTRICT ENGINEER	916-449-2232*	COL. GEORGE B. FINK DISTRICT ENGINEER	
	RESERVOIR REGULATION	916-449-2378* 916-449-3167* 916-449-3168*	R. P. LEATHAM CHIEF, RES. REG. SECTION	916-483-2010
	HYDROLOGY STATE FLOOD CENTER LIAISON	916-449-2817* 916-449-3577	R. E. BENTON CHIEF, HYDROLOGY SECTION	916-456-9942

FTS: SACRAMENTO 916-449-2000 ATSS: 916-445-4711
 NOTES: *BETWEEN 4:30 PM AND 7:45 AM; OR SATURDAY, SUNDAY, OR HOLIDAYS USE 916-452-1535.
 **STATE ATSS PHONE SYSTEM

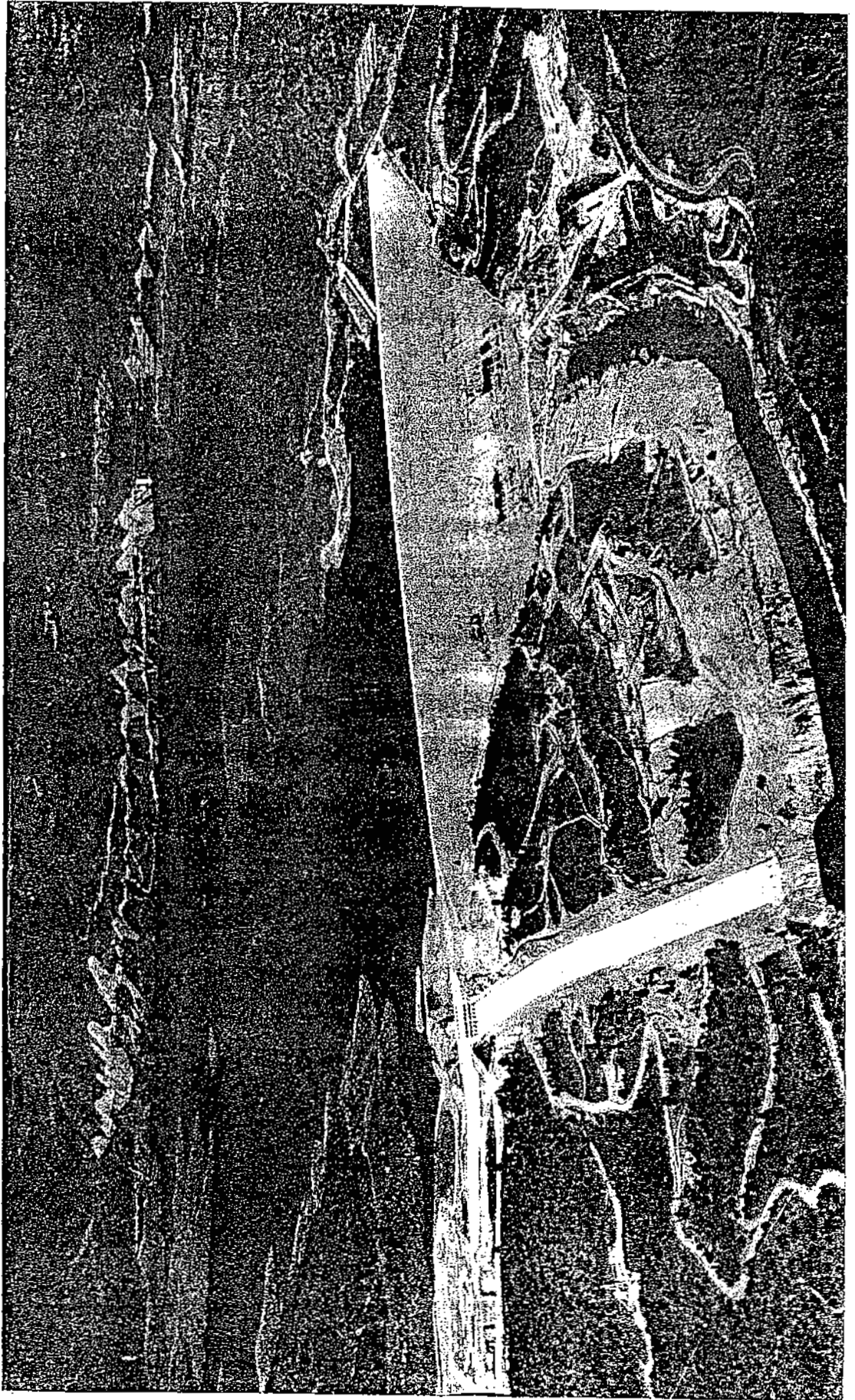


Photo by D.W.R.

OROVILLE DAM AND RESERVOIR

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

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REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

CHAPTER 1 - GENERAL INFORMATION

1. AUTHORITY AND SCOPE

a. This report on reservoir regulation for flood control, Oroville Dam and Reservoir, Feather River Basin (a major tributary to Sacramento River), California, is an appendix to the Master Manual of Reservoir Regulation, Sacramento River Basin, California, and is prepared in accordance with instructions contained in ER 1110-2-240, EM 1110-2-3600, and EC 1110-2-67, which pertain to requirements for reports on reservoir regulation for projects subject to the provisions of Section 7 of the Flood Control Act of 1944 (58 Stat. 890). The pertinent portion of that act reads as follows:

"Hereafter it shall be the duty of the Secretary of War to prescribe regulations for the use of storage allocated for flood control or navigation at all reservoirs constructed wholly or in part with Federal funds provided on the basis of such purposes, and the operation of any such project shall be in accordance with such regulations. . ."

b. This report covers present conditions which include Oroville Reservoir and New Bullards Bar Reservoir, and will cover future conditions after completion of Marysville Reservoir. It contains descriptive information about the project, the method of operation, and the prescribed regulations for flood control operation. Location of the project is shown on Chart 1. A portion of the material used in preparation of this report and some of the charts showing features of the project were furnished by the State of California, Department of Water Resources. A description of the overall Sacramento River Basin plan of flood control is given in the Master Manual of Reservoir Regulation, Sacramento River, California.

2. AUTHORIZATION FOR FLOOD CONTROL ALLOCATION

a. A monetary contribution by the Federal Government toward the construction cost of Oroville Dam and Reservoir in the interest of flood control was authorized by the Flood Control Act of 1958 (Public Law 85-500, 3 July 1958, 85th Congress, 2nd Session). Based on the flood control benefits to be derived, 22 percent of the construction cost of the dam and reservoir, exclusive of power and recreational facilities, was allocated to flood control with total sum not to exceed \$85 million. The cost allocation was approved by the President on 10 January 1962.

b. A contract No. DA-04-167-CIVENG-62-56 was executed between the United States and the State of California on 8 March 1962, and was approved by the Secretary of the Army on 19 April 1962. Under the terms of this contract, the State agreed to construct and to maintain Oroville Dam and Reservoir, to reserve 750,000 acre-feet of storage space for flood control, providing for operation of the reservoir in such manner as will produce the flood control benefits upon which the monetary contribution was predicated, and to operate the dam for flood control in accordance with rules and regulations prescribed by the Secretary of the Army pursuant to the provisions of Section 7 of the Flood Control Act of 1944 (58 Stat. 890).*

* A draft of proposed flood control regulations is included as Appendix A to this report.

CHAPTER II - BASIN DESCRIPTION

3. DESCRIPTION OF THE AREA.

a. Feather River Basin lies on the eastern side of the Sacramento River Valley and on the northern end of the Sierra Nevada Range. The location of the basin is shown on charts 1 and 2.

b. Feather River, a major tributary of Sacramento River, rises high in the Sierra Nevada at elevations close to 10,000 feet, and flows for about 200 miles to its junction with Sacramento River on the valley floor. Its upper reaches branch into several forks: West Branch and South Fork lie on the western slope of Sierra Nevada, North and Middle Forks rise on a high plateau east of the mountains. These streams flow in a generally southwesterly direction, cutting through steep rugged canyons to their respective confluences with the main stream in the foothills above the mouth of Feather River Canyon. Oroville Dam is located below the junction of the forks, six miles above the town of Oroville. After leaving the mountains near Oroville, Feather River turns south and flows through the rich agricultural lands of the Sacramento River Valley for about 50 miles to its mouth at Verona on Sacramento River, 20 miles above the city of Sacramento. Feather River has two main tributaries that join it in the valley, Yuba River (with 1,350 square miles drainage area) at Yuba City, and Bear River (with 550 square miles) at Nicolaus.

(1) About 36 percent of the Yuba River drainage basin area is controlled by recently completed New Bullards Bar Reservoir located about 35 miles upstream from the Feather River. The remaining 64 percent will be uncontrolled area until authorized Marysville Dam and Reservoir is built and put into operation. Complete protection on the Yuba River is not possible without the authorized Marysville Reservoir.

(2) The Bear River drainage basin has a total area of about 550 square miles above its confluence with the Feather River. The four existing reservoirs on Bear River have no storage allocated to flood control. The largest of these reservoirs is the New Camp Far West Dam and Reservoir completed in 1963. Studies are being conducted for construction of Garden Bar Dam and Reservoir which would have storage allocated to flood control.

(3) An extensive levee system has been constructed to protect the Feather River flood plain downstream from Oroville Reservoir. A levee extends along the right bank of Feather River from Hamilton Bend to the mouth of Feather River. Levees have also been constructed along the lower reaches of Bear and Yuba Rivers, around the city of Marysville and around a local reclamation district. The extent of the levee system is shown on charts 1 and 28.

c. The watershed above Oroville Dam drains 3,611 square miles and includes mountain crests over 8,000 feet high, mountain valleys at elevations as high as 5,000 feet above sea level, deep canyons, and rolling foothills. Elevations range from 10,466 feet at Mt. Lassen Peak to

900 feet at the damsite. About 55 percent of the area is above an elevation of 5,000 feet, and only 7 percent is below 2,500 feet. The following tabulation gives area-elevation data for Feather River Basin above Oroville Dam.

Area	Elevation	Basin Area	
	(feet)	(sq. miles)	(percent)
Area above	5,000	1,986	55
Area between	5,000-2,500	1,372	38
Area below	2,500	253	7
Total area	10,500-900	3,611	100

The topography of the basin is shown on chart 3.

d. The vegetation in the basin varies from heavy timber growth on the mountainous slopes in the western part to a sparse cover on semi-desert valleys on the eastern side. Mixed conifers grow at higher elevations, ponderosa pines and hardwoods appear at lower elevations, native brush and grasses cover the alpine meadows and the foothills, and sagebrush spreads over the eastern slopes. The rich soil of the valley floor below the dam grows a great variety of farm crops.

e. The economy of the area below Oroville Dam depends on irrigation farming, livestock raising, and on industry connected with producing and processing agricultural products. The economy of the basin above the dam is centered around lumbering, mining, and recreation facilities. There are many small mountain communities throughout the basin, with more populous and important towns located in the valley, as shown on chart 2.

f. California State Highway 70 (a major east-west connection) and a number of State and county highways serve the area. The Western Pacific Railroad traverses the basin generally following Feather River Canyon from Oroville into Nevada. The location of highways and railroad is shown on chart 2.

4. CLIMATE

a. The climate of Feather River Basin is closely associated with the topography of the area and there is a marked difference in temperature and in precipitation within short distances. A detailed discussion of topographic influence on climatic characteristics of the area is included in the Master Manual. In general, the climate of the basin is divided into two seasons: hot, dry summer lasting from May through October, and cold, wet winter with heavy rains and snowfall in the mountains from November through April.

b. In the valley below Oroville Dam the climate is temperate with hot summers and mild winters, without extreme temperature variations, although as high as 118° F. and as low as 16° F. have been recorded. In the mountainous basin above Oroville Dam temperature changes are more pronounced; summer days are dry and warm with 95 percent of possible sunshine and occasional temperatures above 100° F., but summer nights are cool with a chance of frost occurring in any month, especially at higher elevations. Winters are moderately severe with minimum temperatures below freezing during the period from November through April. The monthly distribution of maximum, minimum, and normal mean temperatures at representative stations is as follows:

MONTHLY MEAN TEMPERATURES (F.°)

MONTH	MARYSVILLE			OROVILLE 7 SE**			QUINCY RS			SIERRAVILLE RS		
	El. 64'			El. 530'			El. 3,409'			El. 4,975'		
	Max	Min	Normal*	Max	Min	Average	Max	Min	Normal*	Max	Min	Normal*
January	54	37	46	53	36	45	45	22	33	41	14	28
February	60	41	50	58	40	49	50	24	37	45	18	32
March	66	44	55	63	42	53	55	28	42	61	23	38
April	73	47	61	71	46	58	65	32	48	60	28	45
May	80	52	67	80	51	65	72	37	54	68	34	51
June	89	58	74	89	56	72	81	42	61	76	38	58
July	96	60	79	97	60	79	89	43	66	85	41	64
August	95	59	77	95	58	77	88	41	64	85	39	62
September	89	55	74	90	56	73	81	36	59	78	34	58
October	79	49	64	79	50	64	70	31	51	68	28	49
November	66	42	54	65	42	54	56	28	41	55	22	38
December	55	38	47	55	38	46	46	24	35	45	17	32
Annual			62			61			49			46
Years of Record	57	57		28	28	29	66	66		52	52	

* Normals for all stations are climatological normals based on period 1930-1960, as published by USWB.

** Station closed in February 1961.

Observed temperature extremes for these stations are as tabulated below:

TEMPERATURE EXTREMES

STATION	MAXIMUM		MINIMUM	
	MONTH	F°	MONTH	F°
Marysville	July	118	December	16
Oroville 7 SE	August	115	December	16
Quincy RS	July	106	January	-28
Sierraville RS	July	104	January	-34

c. Normal annual precipitation over Feather River Basin varies greatly as illustrated on chart 5, ranging from about 15 inches on the portion of the basin draining the eastern slopes of the Sierra Nevada to close to 90 inches over the higher ridges on the western slopes near the headwaters of West Branch and North Fork of Feather River. Precipitation during the winter season normally falls as rain at elevations below 5,000 feet, and as snow at higher elevations, although during major warm storms rain may fall over the entire basin. About 88 percent of annual precipitation in the valley, and close to 85 percent in the mountains, occurs during the November-April period. During the summer months precipitation results from isolated thunderstorms that cover small areas and are of short duration. Monthly distribution of precipitation at selected representative stations based on data published by the US Weather Bureau for the period 1931-1960 (except Brush Creek R.S. which is based on averages of the period of record 1937-1967) is given in the following table.

MONTHLY PRECIPITATION

MONTH	MARYSVILLE : (El. 64') :		OROVILLE BRIDGE : (El. 165') :		QUINCY RS : (El. 3409') :		BRUSH CR. RS : (El. 3560') :		CANYON DAM : (El. 4555') :		SIERRAVILLE RS : (El. 4975') :	
	inches:	% :	inches:	% :	inches:	% :	inches:	% :	inches:	% :	inches:	% :
July	0.01	0.0	.01	0.0	0.12	0.3	.04	0.1	0.20	0.5	0.29	1.1
August	0.02	0.1	.03	0.1	0.11	0.3	.17	0.2	0.12	0.3	0.15	0.6
September	0.23	1.1	.37	1.3	0.51	1.3	.72	1.0	0.54	1.4	0.44	1.7
October	1.13	5.5	1.30	4.7	2.43	6.1	4.39	6.3	2.28	5.9	1.83	7.2
November	2.03	9.9	2.90	10.4	4.14	10.4	8.04	11.6	4.03	10.5	2.76	10.9
December	3.88	18.8	5.22	18.7	6.87	17.2	12.39	17.8	6.67	17.4	4.49	17.7
January	3.99	19.4	5.47	19.6	7.21	18.0	13.59	19.5	7.08	18.5	4.94	19.5
February	3.86	18.7	4.93	17.7	7.26	18.1	11.42	16.4	6.86	17.9	4.23	16.7
March	2.68	13.0	3.89	13.9	5.38	13.4	9.44	13.6	5.06	13.2	2.84	11.2
April	1.74	8.5	2.27	8.1	3.21	8.0	5.62	8.1	2.83	7.4	1.63	6.4
May	0.80	3.9	1.16	4.2	2.01	5.0	2.80	4.0	1.90	4.9	1.25	4.9
June	0.22	1.1	0.35	1.3	0.74	1.9	.98	1.4	0.80	2.1	0.54	2.1
Total	20.59	100.0	27.90	100.0	39.99	100.0	69.60	100.0	38.37	100.0	25.39	100.0
Nov-Apr	18.18		24.68	88.4	34.07	85.2	60.50	86.9	32.53	89.8	20.89	82.3

Isohyets of normal annual precipitation and the location of climatological stations are shown on chart 5. Average annual precipitation for Feather River Basin above Oroville Dam is estimated as 44 inches.

d. Winter snowfall above about 5,000 feet elevation normally accumulates until about the first of April, when increasing temperatures mark the beginning of the snowmelt season. Snow falling at lower elevations usually melts away within a short period of time. Basin snow pack data for a wet year (1952), a near normal year (1954), and normal 1 April values at selected representative snow courses are given in the following tabulation.

1 APRIL SNOW SURVEY DATA

No.	Snow Course Name	Elev. : Feet	Depth in :		Water Equivalent				
			in	Inches	Inches		% Normal		
			1952:	1954 :	1952:	1954:	Normal:	1952:	1954
336	Upper Lassen Park	8,500	267	204	131	89	79	166	113
48	Mount Dyer No. 1	7,100	118	66	52	30	25	208	120
280	Rowland Creek	6,700	101	39	44	14	17	259	82
52	Eureka Lake	6,200	166	69	73	33	32	228	103
49	Letterbox	5,600	222	107	106	52	47	226	111
61	Chester Flat	4,600	77	20	29	10	7.3	392	137

A complete list of snow courses and their location is given on chart 5.

5. RUNOFF CHARACTERISTICS

The runoff of Feather River is produced mostly by intense precipitation in winter, augmented by snowmelt in spring. Highest flows occur normally during the months of December through June, with the largest sustained flows usually in April and May. Flows decrease during the summer, reaching the lowest ebb in August and September. The monthly distribution of average runoff of various Feather River tributaries including Yuba River at Marysville is as follows:

AVERAGE MONTHLY RUNOFF

MONTH	NO. FK. FEATHER R: MID FK FEATHER R: SO. FK. FEATHER R: FEATHER RIVER : YUBA RIVER NEAR		AT PULGA (a) : NEAR MERRIMAC : AT ENTERPRISE : AT OROVILLE (b) : MARYSVILLE (c)							
	DA = 1,953 sq mi	DA = 1,068 sq mi	DA = 132 sq mi	DA = 3,624 sq mi	DA = 1,340 sq mi					
	Thousand	Percent	Thousand	Percent	Thousand	Percent	Thousand	Percent	Thousand	Percent
	ac-ft		ac-ft		ac-ft		ac-ft		ac-ft	
October	101	5.2	24	2.4	1.8	0.8	129	3.1	33	1.8
November	108	5.5	25	2.5	5.8	2.6	182	4.3	52	2.8
December	159	8.1	103	10.3	20.0	9.1	223	7.7	216	11.8
January	167	8.5	95	9.5	25.0	11.4	414	9.8	220	12.0
February	209	10.7	127	12.7	37.0	16.8	530	12.6	252	13.8
March	225	11.5	121	12.1	36.0	16.4	617	14.7	237	13.0
April	292	14.9	204	20.5	44.0	20.0	724	17.2	305	16.6
May	253	12.9	176	17.6	37.0	16.8	604	14.4	314	17.2
June	142	7.2	75	7.6	11.0	5.0	302	7.2	146	8.0
July	109	5.6	25	2.5	1.6	0.7	151	3.6	29	1.6
August	103	5.3	13	1.3	0.4	0.2	120	2.9	12	0.6
September	90	4.6	10	1.0	0.5	0.2	105	2.5	14	0.8
Annual	1,958	100.0	998	100.0	220.0	100.0	4,201	100.0	1,830	100.0
Years of Record	56		15		55		65		23	

(a) Prior to October 1962 published as "at Big Bar"
 (b) October 1934 to September 1961 published as "near Oroville"
 (c) Prior to September 1957 published as "at Marysville"

Runoff in Feather River and tributaries varies both seasonally and from year to year. The average annual runoff of Feather River at Oroville for 65 years of record is 4,201,000 acre-feet, the maximum recorded value

being 9,330,000 acre-feet (222 percent) for the 1903-04 water-year and the minimum, 1,180,000 acre-feet (28 percent) in 1923-24. Recorded and computed data for a comparison of extreme and mean flows in Feather River and tributaries above Oroville are given in the table facing this page.

A list of stream gaging stations, their locations, drainage areas, periods of record, and peak flows is given on chart 3.

6. FLOOD CHARACTERISTICS

a. Damaging floods in the Feather River Basin usually result from winter rain storms, occasionally augmented by melting snow. A typical flood producing storm may last several days, and is actually not a single storm but usually a rapid succession of several individual storms. Runoff produced by these storms may combine to produce high intensity peak flows in all streams in the basin. During large floods a wide range of flooding conditions prevails. Runoff accumulates rapidly in the upstream tributary areas and the floods produced are of high intensity but relatively short duration. In the lower reaches of the Feather River the stream gradient decreases, velocities are less, and prolonged inundation may occur. Large floods may also result in failure or overtopping of existing project levees with consequent flooding of large areas of highly developed farmland and urban-suburban developments.

b. Rain floods are characterized by high-peaks and short durations of a few days, while snowmelt floods have lower peaks and moderately high flows for periods up to several weeks. Flood peaks on the streams in the basin above Oroville Dam are often impaired and delayed by numerous upstream check dams, diversions, and reservoirs. Below the dam, peaks are reduced when the flood flows leave the channel and are stored by flooding over the adjoining flat lands.

c. Flood flows in the streams above Oroville Dam are usually confined within the natural narrow canyon stream channels, descending rapidly without causing extensive damage. Below the dam and below the town of Oroville, flood flows tend to spread over wide areas where not confined by levees. In the leveed reaches of the river when high flows in Feather River coincide with high flows in the downstream tributaries, the combined flows may exceed the project channel capacity and cause flooding of adjacent protected areas.

d. The largest recorded flow on Feather River at Oroville happened in December 1964, when record breaking peaks were produced on many streams of the Feather River Basin. The flood of December 1964 - January 1965 resulted from a winter rainstorm which followed a meteorological pattern typical of other flood-producing winter storms over the basin. Heavy precipitation occurred in the preceding 60 days over the general area, with up to 5 inches of rain recorded at some valley stations. The storm came in four distinct waves. The first wave, which occurred during 18-20 December, was cold, and deposited 2-3 inches of snow in the mountains down to the 3,000 foot level. The following wave brought rising temperatures and heavy rains up to 6,000 feet elevation.

Recorded and Computed Runoff Data

Drainage area(sq. mi.) PERIOD OF RECORD YEARS OF RECORD	NORTH FORK FEATHER RIVER AT PULGA (a)			MIDDLE FORK FEATHER RIVER AT MERRIMAC			SOUTH FORK FEATHER RIVER AT ENTERPRISE			FEATHER RIVER AT OROVILLE (b)			
	1,935 1910-1966 56			1,062 1951-1966 15			132 1911-1966 55			3,624 1901-1966 65			
	Date	cfs	cfs sq mi	Date	cfs	cfs sq mi	Date	cfs	cfs sq mi	Date	cfs	cfs sq mi	
INSTANTANEOUS FLOW	MAXIMUM	22 Dec 64	73,000	37.7	22 Dec 64	86,200	81.2	22 Dec 55	19,200	146	22 Dec 64	250,000(c)	69.0
	MINIMUM	25 Jun 61	33	0.02	2 Jan 60	92	0.09	Aug, Sep '50	0	0	9 Nov 31	300	0.08
	MEAN DAILY FLOW												
	MAXIMUM	22 Dec 64	55,400	28.6	23 Dec 64	51,000	48.0	22 Dec 55	15,400	117	19 Mar 07	187,000	51.6
	MINIMUM	23 Jul 58	39	0.02	13 Sep 59	99	0.09	1 Aug 50	0.4	0	3 Oct 33	577	0.16
	MEAN		2,890	1.50		1,380	1.30		303	2.30		5,800	1.60
ANNUAL FLOW	Water-year	1,000 ac-ft	in.	Water-year	1,000 ac-ft	in.	Water-year	1,000 ac-ft	in.	Water-year	1,000 ac-ft	in.	
	MAXIMUM	1938	4,200	40.7	1952	2,000	35.3	1938	491.6	69.8	1904	9,330	48.3
	MINIMUM	1924	802	7.77	1961	450	7.95	1942	42.7	6.07	1924	1,180	6.11
	MEAN		2,094	20.3		996.9	17.6		219.4	31.2		4,201	21.7

- (a) Prior to October 1962 published as "at Big Bar"
 (b) October 1934 to September 1961 published as "near Oroville"
 (c) Computed flow

Within the 4 day period, 20-23 December, about 13 inches of rain fell. The warm winds and rain melted most of the new snow accumulated during the initial storm. Another cold wave, occurred during 26 December-4 January, and brought rain to lower elevations and snow to the mountains. The final wave of this storm series occurred 4-6 January when from 3 to 10 inches of precipitation fell on the Feather and Yuba River Basins. A local storm of high intensity occurred on 26 December over the mountain slope south of Oroville causing the highest recorded runoff in South Honcut Creek, a small tributary entering Feather River below Oroville. Inflow to Oroville Reservoir peaked at 250,000 cubic feet per second, compared to the previous maximum of 230,000 c.f.s. at Oroville in 1907. Flow at Oroville was controlled by the partially constructed dam to a maximum out flow of 158,000 c.f.s. Peak flows of Feather River and its tributaries at various stations in 1964 and the previous maximums are tabulated as follows:

Stream	Gaging Station	1964 Peak Flow (c.f.s.)	Previous Maximum (c.f.s.)	Date
No. Fork Feather R.	at Pulga	73,000	72,400	Dec 1955
Mid "	" near Merrimac	86,200	65,400	Feb 1963
So. "	" at Enterprise	11,800	19,200	Dec 1955
West Br. "	" near Paradise	26,300	21,200	Jan 1963
Feather River	inflow to Oroville res	250,000	230,000	Mar 1907
Feather River	at Oroville*	158,000	290,000	Mar 1907
South Honcut Creek	near Bangor	17,600	8,280	Oct 1962

* The Oroville embankment temporarily stored 155,000 acre-feet of flood water, reducing the peak flow from 250,000 c.f.s. to 158,000 c.f.s. and delaying the peak for about 20 hours.

Major flood flows also occurred in March 1907, December 1955, and January-February 1963. The flood of March 1907 occurred when heavy rainfall accompanied by unusually warm weather caused rapid melting of snow and runoff second only in magnitude to the flood of 1964, with the peak flow at Oroville reaching 230,000 c.f.s. The flood of December 1955 had the third highest peak at Oroville, 203,000 c.f.s., and was also the result of excessive rain and snowmelt, as were most of the other floods on Feather River. The floods of 1907, 1904, 1937, 1909, and 1955 produced the largest annual runoff volumes, while the floods of 1907, 1964, 1955, 1909, and 1928 had the highest 3-day volumes. Preliminary data indicate that 1969 water year will rank among the larger floods on Feather River. The peak inflow to Oroville Reservoir of about 125,000 c.f.s. occurred 21 January 1969, with a maximum 3-day flow of about 543,000AF. A list of the 13 largest recorded floods on Feather River at Oroville follows:

HISTORICAL FLOODS
FEATHER RIVER AT OROVILLE

Year	Date of Peak Flow	Peak Flow : (cfs)	Max. 1-Day : (cfs)	Max. 3-Day : (ac-ft)	Annual Water-Year : (ac-ft)	Mean Annual : (cfs)
1964	22 Dec	250,000	156,000	864,800	6,448,000	8,908
1907	19 Mar	230,000	187,000	894,600	9,310,000	12,900
1955	23 Dec	203,000	172,000	818,800	7,303,000	10,060
1963	31 Jan	191,000	125,000	538,700	5,673,000	7,835
1937	11 Dec	185,000	145,000	567,700	8,175,000	11,290
1928	26 Mar	185,000	122,000	642,600	3,650,000	5,030
1940	27 Feb	152,000	131,000	598,600	5,275,000	7,270
1909	16 Jan	140,000	137,000	772,000	7,380,000	10,200
1962	13 Oct	138,000	101,000	455,400	5,673,000	5,825
1960	8 Feb	135,000	95,800	310,200	2,971,000	4,090
1906	18 Jan	128,000	96,300	415,000	6,650,000	9,180
1913	31 Dec	122,000	121,000	616,000	6,540,000	9,030
1904	24 Feb	118,000	106,000	492,000	9,330,000	12,900

- (a) Inflow to Oroville Reservoir, reduced to 158,000 cfs peak outflow by partially constructed Oroville Dam embankment.
 (b) Flows "at Oroville", partially controlled by Oroville Dam embankment.

7. DOWNSTREAM AREA SUBJECT TO FLOODING

a. Historically, large areas outside the low-water channel were inundated by Feather River flows in the valley floor from Hamilton Bend, about 6 miles below Oroville, to the confluence of Feather and Sacramento Rivers. The overflow along the left bank, from Oroville to Honcut Creek, is confined by bench lands paralleling the river channel; from Honcut Creek to the confluence of Yuba and Feather Rivers at Marysville, a wider, more extensive area is subject to inundation. From the Yuba River to the Bear River, extensive flooding of low areas adjacent to the left bank of the Feather River has occurred, whereas

below the Bear River, overbank flows flood vast areas southward to the Sacramento River. Under natural conditions, at Hamilton Bend, flood flows enter Hamilton Slough and cross Butte Basin to join Sacramento River overflows near Colusa. Below Hamilton Bend, overbank flows occur through a number of slough channels leading to Sutter Basin. The entire area between Feather River and Sutter Basin south of Gridley, with the exception of the Sutter Buttes, is subject to inundation.

b. This flood plain area, generally extends from the city of Oroville to the Sacramento River near Verona and encompasses 292,000 acres consisting of about 9,000 acres of urban and suburban lands, and 283,000 acres of agricultural land. About 100,000 people reside within the flood plain. The communities of Marysville and Yuba City, with a combined population of about 32,100, are located within the flood plain and are particularly vulnerable to inundation. The general elevation of these two cities varies from 5 to 20 feet below the high water level in the river. The cities are protected by levees, but failure of a levee might cause the loss of many lives. The agricultural area consists primarily of orchards, dairy farms, truck crops, and other intense agricultural crop production.

CHAPTER 3 - FLOOD POTENTIAL

8. RAIN FLOOD POTENTIAL

High intensity rain floods may occur in Feather River Basin any time from November to April. These floods can cause flooding of extensive areas and result in great damages to agricultural and urban developments in the Feather River flood plain. Protection is afforded by a levee and channel system (see chart 1) against floods of the magnitude exceeded on the average once in about 25 years. (Rain flood frequency curves are given on chart 6.) The need for additional protection was illustrated by the extent of damages produced by the December 1955 flood which caused a loss of 40 lives and inundated virtually all of Yuba City, several rural communities and about 100,000 acres of agricultural land. The peak flow of the December 1955 flood at Oroville was 203,000 c.f.s., and the volume of 72-hour flow was 830,000 acre-feet.

9. STANDARD PROJECT FLOOD

By comparison, the standard project flood at Oroville has a peak flow of 440,000 c.f.s. and 72-hour volume of 1,520,000 acre-feet, and it is estimated, would inundate close to 292,000 acres. This standard project flood results from the standard project rain storm of 96-hour duration depositing 14.3 inches of precipitation on wet ground in the drainage basin above Oroville Reservoir. It was derived according to criteria published in the office report "Standard Project Rain Flood Criteria, Sacramento-San Joaquin Valley, California," April 1957. These criteria are summarized on charts 7 and 8. Regulation by existing upstream reservoirs during the standard project flood is assumed to be equivalent to regulation experienced during major observed floods. That is, complete regulation by Lake Almanor, Butt Valley Reservoir and Bucks Lake, and incidental regulation by all other reservoirs within the basin. The standard project flood inflow to Oroville Reservoir and the concurrent runoff from the uncontrolled area contributing to the Feather River downstream from Oroville Dam to above the mouth of Yuba River, are tabulated on chart 9.

10. SPILLWAY DESIGN FLOOD

A probable maximum rain flood on the Feather River above Oroville Dam, developed for spillway design purposes, has a peak flow of 720,000 c.f.s. and a 72-hour runoff value of 2,510,000 acre-feet, and results from a 72-hour storm depositing 21.1 inches of precipitation on the drainage area above Oroville Reservoir. This probable maximum flood was derived using the probable maximum storm precipitation as determined by the Hydrometeorological Section of the US Weather Bureau, in conjunction with the worst ground conditions that are reasonably consistent with meteorological conditions necessary to produce the probable maximum precipitation.

11. FLOOD MAGNITUDES

A comparison of the standard project flood with major historical floods and the probable maximum flood, expressed as ratios of standard project

values to those of the major floods, is tabulated as follows:

Flood	Peak Flows		72-hour Volumes	
	Flow	Ratio	Volume	Ratio
	(1000 c.f.s.)	(SPF/Flood)	(1000 ac-ft.)	(SPF/Flood)
Standard Project	440	1.0	1,520	1.0
Dec 1964	250 *	1.76	886 *	1.72
Mar 1907	230	1.91	895	1.70
Dec 1955	203	2.17	830	1.83
Probable Maximum	720	0.61	2,510	0.61

* Computed value.

12. SEASONAL VARIATION OF RAIN FLOOD POTENTIAL

Large rain storms in the Feather River Basin occur most frequently in the months of November through March, and are not known to occur in the months of June through August. For a specified ground condition, the seasonal variation of rain flood potential is dependent on the seasonal variation of storm potential, which is a function of latitude and the amount of storm precipitation that normally occurs at any location. This seasonal variation of storm potential, indicated by criteria contained in office report, "Reservoir Operation Criteria for Flood Control, Sacramento-San Joaquin Valley, California," October 1959, is shown on chart 10.

13. SNOWMELT FLOOD POTENTIAL

Since maximum flows on Feather River from snowmelt do not exceed the existing channel capacities, these flows by themselves do not present a serious flood threat in the Feather River Basin. However, melting of antecedent snow cover augments peak flows and volumes of rain floods, and therefore has been included in derivation of the standard project and probable maximum floods.

CHAPTER 4 - FLOOD CONTROL DESIGN REQUIREMENTS

14. HYDROLOGIC BASIS FOR DESIGN

By agreement between the State of California and the Corps of Engineers, selection of the maximum flood control space requirement for Oroville Reservoir was based primarily on protection of urban and agricultural areas along Feather River below the reservoir against winter floods (rain or rain augmented by snowmelt) up to the magnitude of the standard project flood, with permissible releases limited to a maximum of 150,000 c.f.s.

15. FLOOD CONTROL SPACE REQUIREMENTS

Advance planning studies indicated that to control the standard project flood (through the initially determined 3,484,000 acre-foot capacity reservoir) with outlet capacity at the bottom of the flood control space limited to 75,000 c.f.s., and assuming 100 percent efficiency of operation, required a flood control reservation of 750,000 acre-feet (as illustrated by Routing No. 1, chart 11). This space must be provided whenever the meteorological potential for the full standard project storm, and ground conditions conducive to maximum runoff exist. These conditions are defined on the Flood Control Diagram (chart A-1) and in paragraph 16 below.

16. MINIMUM RELEASE REQUIREMENTS

a. In order to fully utilize downstream channel capacities and flood control space under all possible flood conditions, a release capability of 150,000 c.f.s. throughout the range of flood control space is desirable. However, since some reduction in this release capacity in the lower range of flood control space would not seriously reduce flood control accomplishments but would reduce costs appreciably, it was mutually agreed between the State of California and the United States that a smaller release capacity at the lower levels would be acceptable. The full 150,000 c.f.s. release capacity must be provided when storage is within the upper half of the flood control space, and sufficient capacity in the lower levels to enable control of the standard project flood using the routing criteria found on the flood control diagram, chart A-1.

b. It was determined in design studies that a release capacity of 75,000 c.f.s. with the reservoir level at the bottom of the flood control storage space, and 150,000 c.f.s. release capacity with the water level at elevation 863.5 feet would satisfy the flood control requirements, as demonstrated by routing No. 1, chart 11. The spillway and flood control outlet rating curves are shown on chart 19. Subsequent detailed expansion of area-capacity data indicated that the gross pool reservoir capacity (elevation 900.0 feet) is actually 3,538,000 acre-feet, and the bottom of the 750,000 acre-foot flood control pool is at 848.5 foot elevation. The release capacity of the flood control outlet with the reservoir water level at elevation 848.5 feet is 85,000 c.f.s. These values will be used for reservoir regulation purposes.

17. MULTIPLE USE OF RESERVOIR SPACE

The flood control diagram is designed to permit use of flood control space for conservation purposes when use of such space is not required for accomplishment of flood control objectives. This is accomplished by use of a ground wetness index computed from accumulated basin mean precipitation which directly relates flood potential to wetness of the drainage basin. The adopted ground wetness index incorporates a daily reduction in the weight given previously occurring precipitation and will be computed each day by multiplying the preceding day's index by 0.97 and adding the current day's precipitation in inches, i.e.;

$$\text{Par} = \text{Par}' \times 0.97 + \text{Precip}$$

Par = ground wetness index for the present day's operation

Par' = previous day's index

Precip = precipitation occurring since Par' was computed

18. FLOOD CONTROL DIAGRAM

a. The criteria contained on chart 10 indicates that Oroville project drainage basin, with an average latitude of about 40° and an average 3-day storm precipitation of about 9.3 inches, can experience full storm potential as early as 15 October and as late as 1 April. These criteria also show that the basin could have 80 percent of its potential as early as 2 October and as late as 27 April, and 60 percent of its full storm potential could be experienced as early as 18 September and as late as 23 May. Standard project protection, then, would require that sufficient space be available on these dates to control the flood that would result from these various percentages of the standard project storm, considering ground conditions existing at the time. Under wet ground conditions, control of the full standard project storm would require 750,000 acre-feet of flood control space, as shown on chart 11. Under dry ground conditions it would require almost half of this, as shown by Routing No. 2, chart 11. Accordingly, 750,000 acre-feet of flood control space should be provided when the ground is wet, and 375,000 acre-feet should be provided under dry ground conditions between 15 October and 1 April of each year.

b. In order to determine space requirements prior to 15 October and subsequent to 1 April, alternative standard project floods were computed for both wet and dry ground conditions using 80 percent of the standard project storm, and for wet ground conditions using 60 percent of the standard project storm. A summary of the results of these routings is shown on chart 12, where space requirements from 100 percent, 80 percent, and 60 percent routings on wet and dry ground conditions are compared with the adopted space provisions. The slope of the drawdown line prior to 15 October was selected to equal exactly 25,000 acre-feet per day,

and filling lines subsequent to 31 March slope at the rate of 10,000 acre-feet per day, so that exact computation of flood control space is facilitated. These drawdown and filling rates can be easily accomplished within project operation restrictions.

c. In order to be reasonably conservative in providing protection against the standard project flood, a wetness index of 11.0 was selected for provision of the full 750,000 acre-feet flood control space during the season of maximum storm potential. In the major storms studied, standard project ground conditions were not observed until a wetness index of 12.5 had been reached. A value of 3.5 was selected to represent dry ground conditions; this is approximately equal to the index of the beginning of the January 1943 storm. The adopted flood control diagram with wetness index parameters is shown on chart A-1 of appendix A.

d. When inflow and flood control storage are decreasing and no storms are forecasted, releases may be decreased safely by steps to the rate which will maintain the currently required flood control storage reservation, or to the rate required by other uses of the reservoir, whichever is greater. For this purpose, the maximum safe rate of reducing releases may be determined using chart 14.

19. MONTHLY SPACE REQUIREMENTS

In order to permit multiple-purpose routings of monthly runoff to be made for the period of record, the wetness index used in the flood control diagram was computed for the first day of each month of record through water year 1968. These values, in conjunction with the flood control diagram (chart A-1), determine the monthly storage space requirement. Computed values are tabulated on chart 13 (2 sheets) in order that routing studies made by the different agencies will be consistent.

CHAPTER 5 - PROJECT FEATURES

20. DESCRIPTION OF PROJECT

a. The Oroville Dam and Reservoir is a unit of the Feather River Project, which is a part of the California State Water Plan for development and utilization of water resources of California. Oroville Dam is located on Feather River, a tributary of Sacramento River, in the Feather River Canyon, about 6 miles upstream from the town of Oroville. It was built for multi-purpose functions: water supply, flood control, power generation, recreation, and conservation. It will satisfy water demands of the areas adjacent to the Feather River, and supply additional water for diversion from Sacramento-San Joaquin Delta to areas of need in the San Joaquin Valley, San Francisco Bay area, and Southern California. It will provide 750,000 acre-feet flood control storage space in Oroville Reservoir to provide flood protection to the cities of Marysville, Yuba City, Oroville, and many smaller communities located in the flood plain; it will prevent flood damages to about 283,000 acres of highly developed agricultural lands and to important highway and railroad routes. The Oroville Complex will generate at least 725,000 kilowatts of dependable power. The reservoirs created by the project will provide excellent recreational facilities and controlled releases to the downstream channel will enhance the fish and wildlife resources of the Feather River. The location of the Feather River Project is shown on charts 1 and 2.

b. The main features of the Oroville Project are the dam, reservoir, and powerplant. Additional components of the development are the Thermaito Diversion Dam, Power Canal, Forebay Dam, Powerplant, and Afterbay, as shown on chart 1 (2 sheets).

(1) Oroville Reservoir gross pool capacity at 900.0 foot elevation is 3,538,000 acre-feet, of which 750,000 acre-feet are allocated for flood control storage. The minimum power pool of 852,000 acre-feet corresponds to elevation 640.0 feet. Maximum storage during the spillway design flood is 3,814,000 acre-feet at elevation 917.0 feet. The water surface area at gross pool is 15,800 acres and the length of shoreline is close to 170 miles. An area-capacity curve for Oroville Reservoir is shown on chart 15, and an area-capacity table is given on chart 16.

(2) Oroville Dam, the highest dam in the United States, is a zoned earth and rockfill structure rising 770 feet above streambed. It is the third largest embankment dam in the world, containing 80,000,000 cubic yards of fill. The crest is 6,920 feet long, 50.6 feet wide, and is at 922.0 feet elevation above mean sea level. The maximum base width is 3,500 feet. Chart 17 (2 sheets) shows the plan and sections of the dam. There are two auxiliary earth and rockfill dams required on the periphery of the reservoir: Parish Camp Saddle and Bidwell Canyon Saddle. The total length of these two dams is 2,530 feet, and the maximum height is 47 feet above natural ground. Location of these dams is shown on chart 1, sheet 2.

(3) The spillway structure, located in a saddle on the right abutment of the dam consists of an uncontrolled concrete weir with a 1,730 feet long ogee crest at 901.0 feet elevation and the flood control outlet structure which has a broad-crested weir forming a sill for eight top-seal steel radial gates, 17.6 feet by 33.0 feet each, at elevation 813.6 feet. The maximum release through the flood control outlet with the reservoir water level at spillway design flood pool elevation (917.0 feet) is 296,000 c.f.s. A concrete lined chute conducts water from the gated outlet to the river. Chart 17, Sheet 1, shows location, and chart 18 shows plan and sections of the flood control outlet and the overpour spillway. Spillway and flood control outlet rating curves are given on chart 19. Rating curve of Feather River below the dam is shown on chart 20.

(4) There are two service outlets from Oroville Reservoir: Palermo outlet and the river outlet. Palermo outlet is located at 551.25 feet elevation in a tunnel in the left abutment of the dam, is controlled by a 12-inch hollow cone valve, and has a capacity of 40 c.f.s. The river outlet is located in diversion tunnel No. 2 at 228.0 feet elevation, is controlled by two 54-inch hollow cone valves, and has a capacity of 5,000 c.f.s. The location of these outlets is shown on chart 17, Sheet 1.

(5) Oroville powerplant is located underground in the left abutment of the dam. The installed capacity is 644,250 kilowatts, and its annual output under full project development will be 2,475,000,000 kilowatt-hours. Chart 21 (2 sheets) shows plan and sections of the powerhouse.

(6) Thermalito Diversion Dam, located about 1 mile upstream from the city of Oroville, diverts water to service the Thermalito power development facilities. The dam is a concrete-gravity structure 143 feet above streambed, with a crest length of 1,300 feet. The reservoir behind it has a capacity of 13,300 acre-feet at gross pool elevation of 225 feet. The overflow section is controlled by radial gates and has a discharge capacity of 180,000 c.f.s. with gross pool head of 225 feet and 320,000 c.f.s. with upstream pool at 233 feet. A capacity of 646,000 c.f.s. (probable maximum flood) can be reached only by overtopping the structure. Thermalito Diversion Dam location, plan and elevation are shown on chart 22 (2 sheets) and the rating curve is given on chart 23. A 17,000 cubic feet per second diversion canal conveys water from the diversion reservoir to the forebay under normal power generating operations, and in reverse direction under pumping operations. The forebay, created by an earthfill dam rising 71 feet above the foundation, and with a crest length of 15,900 feet, has a storage capacity of 11,800 acre-feet at normal pool elevation, 225 feet. A powerhouse below the forebay dam with three reversible pump-turbines and one conventional turbine has a total rated generating capacity of 115,100 kilowatts. The design pumping rate of each pump-turbine is 3,650 cubic feet per second, requiring a motor input of 35,000 kilowatts. An unlined tailrace channel conveys the Thermalito Powerhouse release to the

Thermalito Afterbay Reservoir formed by a 37.0 foot high earthfill dam. The Afterbay Reservoir has 57,000 acre-feet storage at gross pool elevation of 136.5 feet. Outlets are provided to release irrigation flows to the local service area and to return reregulated flows to the Feather River. Plan and sections of the Forebay are shown on chart 24 (2 sheets), and of the Afterbay on chart 25.

(7) The Feather River Fish Hatchery with capacity for 20,000,000 salmon and steelhead eggs yearly, will substitute for spawning areas inundated by Oroville Reservoir. The Feather River Fish Barrier Dam located a short distance below Thermalito Diversion Dam, will divert migrating fish into a fish ladder leading to the hatchery. Location of the Fish Barrier Dam and the Fish Hatchery is shown on chart 1, sheet 2.

c. The vital statistics for Oroville Project and for Thermalito features are given in pertinent data on the inside cover of this report.

21. POWER DEVELOPMENT

The Pacific Gas and Electric Company owns and operates several power plants on the North Fork of Feather River above Oroville Dam, with a combined installed capacity of 750,000 KVA. Numerous storage reservoirs developed and operated by the Pacific Gas and Electric Company, provide the water storage necessary for operating these power plants.

22. RECREATION FACILITIES

a. Recreation facilities at the Oroville Project will be developed and operated by the State of California, Department of Parks and Recreation, as a part of the State Parks System.

b. Facilities for camping, picnicking, fishing, boating, swimming, and other related activities are planned for ten separate areas around Oroville Reservoir. A visitor center opened during construction of the dam, serves as headquarters for guided tours of the dam area, and houses an exhibit display, a gift shop, and sanitary facilities. Recreational development is also planned at Thermalito Forebay and Afterbay. The recreation areas will range in size from a few acres to more than a square mile. Chart 26 shows the locations of the proposed recreation areas.

23. CONSTRUCTION HISTORY

The cost allocation for the Oroville Project was approved by the President on 10 January 1962. The main dam construction contract was awarded in August 1962. The initial Federal contribution was made in November 1962. Construction of the Oroville Powerplant was started in June 1963, and construction of the spillway began in July 1965. In December 1964, the partially completed Oroville Dam embankment provided detention which helped to prevent disastrous flooding in Marysville-Yuba City area by

greatly reducing the highest historical peak flow at Oroville. The Oroville Dam embankment was completed in October 1967, and Diversion Tunnel No. 1 was closed 14 November 1967. The initial filling of Oroville Reservoir began on 14 November 1967; regulated releases from the reservoir commenced on 15 November 1967. The Thermalito facilities became operative on a limited basis on 11 October 1967, when water was released from the Thermalito Diversion Dam pool into the Thermalito power canal and thence into Thermalito Forebay. The initial filling of Thermalito Afterbay began on 15 November 1967, with the commencement of releases from Oroville Reservoir. Releases from the afterbay to Feather River began on 26 December 1967. Oroville Dam and Oroville Lake were formally dedicated on 4 May 1968. All units in Oroville Powerplant and Thermalito Powerplant were operational in July 1969. A more detailed schedule of construction and activation dates of different components for the overall project is presented in the following tabulation:

CONSTRUCTION SCHEDULE, OROVILLE PROJECT

	Construction		Activation
	Commenced	Completed	
Oroville Dam Embankment	13 Aug 1962	Oct 1967	
Oroville Reservoir			
Initial filling began			14 Nov 1967
Initial release			15 Nov 1967
Oroville Powerplant	Jun 1963	Jul 1969	
Power generation by first unit			Mar 1968
Oroville Spillway	Jul 1965	Feb 1968	
Feather River Fish Barrier	Aug 1962	May 1964	
Feather River Fish Hatchery	May 1966	Dec 1967	26 Jun 1968
Dedicated			11 Oct 1967
Parish Camp Saddle Dam		Oct 1967	
Bidwell Canyon Saddle Dam		Oct 1967	
Palermo Outlet Works		May 1964	
River Outlet Works		Nov 1967	
Thermalito Diversion Dam	Aug 1962	Oct 1967	
Thermalito Power Canal	Sep 1965	Oct 1967	

	Construction		Activation
	Commenced	Completed	
Thermalito Forebay	Oct 1965	Jan 1968	
Thermalito Powerplant 2 pump-generators became operational	Dec 1964	Jul 1969	Apr 1968
Thermalito Afterbay	Oct 1965	Jan 1968	
Road Relocation			
US Highway 40-A		Jan 1964	
Middle Fork Bridge		Jul 1965	
Oroville-Quincy		Mar 1968	
Oroville-Feather River Falls		Mar 1968	
Western-Pacific Railroad Relo- cation			
Feather River Bridge		Mar 1960	
North Fork Bridge		Jun 1960	
West Branch Bridge		Feb 1962	
Tunnel No. 1		Nov 1961	
Tunnel No. 2 & 3		Sep 1961	
Tunnel No. 4 & 5		Dec 1960	
Railroad grading		Apr 1962	
Big Bend Powerplant			
Purchased from PG&E Co.			28 Jan 1966
Decomissioned			30 Sep 1967
Oroville Project Dedication			4 May 1968

CHAPTER 6 - GENERAL PROJECT OPERATION

24. RESPONSIBILITY FOR OPERATION

a. Oroville Reservoir is operated for flood control, irrigation, municipal and industrial water supply, and power generation. The Department of Water Resources of the State of California is responsible for the operation of Oroville Project.

b. The flood control operation is accomplished in accordance with rules and regulations prescribed by the Secretary of the Army pursuant to Section 7 of the Flood Control Act of 1944 (see Appendix A). The flood control diagram is shown on chart A-1, and the emergency spillway release diagram on chart A-2. Details concerning the responsibility for flood control operation are discussed in paragraph 38 below.

25. UPSTREAM REGULATION

a. Water resources development in the Feather River system consists of structures for hydroelectric power generation, irrigation, mining, domestic, recreation, and debris-control uses. The principal existing and proposed reservoirs are tabulated on chart 27. The largest of these are shown on chart 2. The total combined storage capacity of all the existing reservoirs is close to 2,000,000 acre-feet, of which 1,630,000 acre-feet is operated by the Pacific Gas & Electric Company for hydroelectric power generation.

b. Of the many reservoirs located in the basin above Oroville Dam, the most important are: Lake Almanor, with a storage capacity of 1,308,000 acre-feet, completely controlling runoff from 507 square miles; Butt Valley Reservoir, with a capacity of 50,000 acre-feet, completely controlling runoff from 75 square miles; and Bucks Lake, with a capacity of 103,000 acre-feet, completely controlling runoff from 28 square miles. The flood control function of these three reservoirs is reduction of the area tributary to Oroville Reservoir from 3,611 square miles to 3,001 square miles. They have a combined storage capacity of 1,470,000 acre-feet and in the past they have completely regulated historical flood flows originating from their drainage areas. Other existing reservoirs have negligible influence on large floods.

26. DOWNSTREAM CHANNEL CAPACITIES

a. Feather River is leveed from its mouth to Hamilton Bend near Oroville on the right bank, and from its mouth to Honcut Creek on the left bank. In addition, levees have been constructed along the lower reaches of the Bear and Yuba Rivers, around the city of Marysville, and around a local reclamation district. The extent of the levee system is indicated on charts 1 and 28.

b. The system of levees gives partial protection to the entire Feather River flood plain, with the exception of the left bank area above Honcut Creek, the Simmerly Slough area, and the areas between the levees.

The Feather River levees and floodways, from near Oroville to the mouth of the river, are units of the Sacramento River Flood Control Project. Project design channel capacities in the Feather River system are as follows:

Reach	Project design capacity (c.f.s.)
Feather River:	
Oroville to Honcut Creek	210,000
Honcut Creek to Yuba River	210,000
Yuba River to Bear River	300,000
Bear River to Sutter Bypass	320,000
Yuba River	120,000
Bear River	40,000

The reach of river between the city of Oroville and Hamilton Bend is upstream from the project levee system. Significant damage begins in this reach with a flow of about 170,000 cubic feet per second. From Hamilton Bend to the upper end of the project levee on the left bank of the river, overflow over a narrow strip of agricultural area begins at a flow of about 80,000 cubic feet per second with relatively minor damage. Area subject to flooding and flood damage reaches are shown on chart 28.

27. FLOOD DAMAGES

a. Preproject flood damages consist of damages along the Feather River below Oroville Dam. The amount of damages caused by several Feather River floods based on 1968 prices and conditions are as follows:

<u>Floods</u>	<u>Damages (\$)</u>
December 1964	4,452,000
February 1963	760,000
October 1962	458,000
February 1958	348,000
December 1955	82,215,000
December 1937	2,500,000

b. Following closure of Oroville Dam, a rapid increase in agricultural development occurred in the Feather River floodway. Consequently an upward adjustment would be necessary to reflect damages which would occur from the above selected flood events under current conditions.

28. PROTECTION PROVIDED

Oroville Project provides a high degree of flood protection to the cities of Oroville, Marysville, Yuba City, Gridley, and to a number of unincorporated communities; to about 283,000 acres of rural land, much of which is intensively developed to fruit, nut and row crop production; to numerous utility lines and services, and to important highway and railroad routes. Since the criteria for operating Oroville Reservoir are based on the Yuba River being controlled to 120,000 c.f.s. at its mouth, the entire Feather River from Oroville Reservoir to its junction with the Bear River will be provided complete standard project flood protection. During the interim period until storage is provided on the Yuba River, control is achieved by use of maximum surcharge at Oroville Dam.

29. CONSERVATION OPERATION

a. Operation for conservation will be as follows:

- (1) All inflow in excess of irrigation and power demands will be stored to the extent that conservation space is available.
- (2) Releases will be in accordance with daily requirements as determined by the Department of Water Resources, State of California.
- (3) Releases to benefit downstream fishery will be in accordance with fish agreement controls established by the State Department of Fish and Game and the US Fish and Wildlife Service.

b. Oroville Reservoir will satisfy the water needs of the Feather River service area and, being a unit of the huge State Water Project, will also furnish (through the Delta Pool) a water supply to other areas in the State in need of water. With the exception of the water need in the local area, the conservation yield of Oroville Reservoir will be integrated with surplus waters in the San Joaquin Delta for diversion and export, through extensive conveyance and enroute-storage facilities, to the areas of water deficiency in the San Joaquin Valley, San Francisco Bay area, and Southern California. The estimated maximum conservation gross yield of 937,000 acre-feet at Oroville Reservoir will result in 870,000 acre-feet of water delivered in the service areas, 506,000 acre-feet of which will be for municipal and industrial water supply, and 364,000 acre-feet for irrigation use, including 113,000 acre-feet for the local Feather River Service areas. The municipal and industrial water supply will be distributed on a uniform monthly basis, whereas the irrigation water demand is supplied primarily during the summer months. It has been estimated that the full demand on Oroville Reservoir will not develop until 1991. The projected growth of the demand is indicated in the following tabulation:

TOTAL WATER DEMAND ON OROVILLE RESERVOIR

Year	M&I demand in 1,000 ac.-ft.	Irrigation demand in 1,000 ac.-ft.	Total demand 1,000 ac.-ft.
1970	27	40	67
71	59	63	122
72	82	84	166
73	109	104	213
74	134	126	260
75	157	146	303
76	184	166	350
77	207	187	394
78	231	206	437
79	258	227	485
1980	281	249	530
81	299	265	564
82	338	284	622
83	358	301	659
84	378	317	695
85	398	334	732
86	418	346	764
87	435	349	784
88	454	353	807
89	472	358	830
1990	490	362	852
1991-2019	506	364	870
Total	20,443	15,423	35,866
50-year average	408.8	308.5	717.3

30. POWER OPERATION

a. Operation of Oroville Project for power production will be based on integrating its power generating facilities with all other area power generating facilities to supply the area load. Minimum monthly kilowatt-hour output will be as provided under contract with the Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas and Electric Company (pre-1985).

b. Water releases will conform with irrigation demands and flood control storage space requirements.

31. RELATION TO OTHER PROJECTS

A coordinated reservoir plan for the entire Feather-Yuba-Bear system is essential to proper regional flood control. The flood control operation of Oroville Reservoir will ultimately be directly related to that of

other flood control reservoirs in the Feather-Yuba-Bear system. Of these, only Bullards Bar reservoir has been constructed, however, in order to insure future coordination, the channel capacities in Feather River below Yuba and Bear Rivers have been designed for controlled flows from these major tributaries.

CHAPTER 7 - FLOOD CONTROL OPERATION

32. FLOOD CONTROL OPERATION REQUIREMENTS

a. Oroville Dam and Reservoir will be operated for flood control in accordance with flood control regulations prescribed by the Secretary of the Army, a draft of which is contained in Appendix A. Accompanying the regulations are the flood control diagram, chart A-1, and the emergency spillway release diagram, chart A-2, which together define the schedule for flood control operation of Oroville Reservoir. The primary objectives of flood control operation are (1) to minimize flood damages downstream, and (2) to avoid causing damage, insofar as practicable, that would not have occurred under conditions without the project. The release schedule shown on chart A-1 will provide protection for agricultural development within the floodway from frequently occurring floods, without sacrificing reservoir design flood (SPF) protection for lands outside the floodway.

b. A maximum of 750,000 acre-feet of space is dedicated to flood control, and whenever any part of this space is not required for flood control, it may be used temporarily for other purposes.

33. LIMITATIONS ON STORAGE

Operational limitations on storage in Oroville Reservoir are specified on the flood control diagram which accompanies the draft of regulations given in Appendix A of this report.

34. LIMITATIONS ON RELEASES

a. Whenever water is stored in the flood control space it should be released as rapidly as possible in accordance with the flood control diagram, chart A-1. Feather River flows should not exceed 150,000 c.f.s. at Oroville, nor 180,000 c.f.s. and 300,000 c.f.s. above and below the mouth of Yuba River, respectively. Insofar as possible, the Feather River below Bear River should be limited to 320,000 c.f.s.

b. During very large floods releases greater than 150,000 c.f.s. may be required, as indicated by the emergency spillway release diagram, in order to minimize uncontrolled spillway discharges.

c. Releases from Oroville Dam are not to be increased more than 10,000 c.f.s. nor decreased more than 5,000 c.f.s. in any 2-hour period.

35. SCHEDULE OF FLOOD CONTROL OPERATION

The schedule for flood control operation of Oroville Dam and Reservoir in accordance with regulations prescribed by the Secretary of the Army shown on the flood control diagram and the emergency spillway release diagram in Appendix A. Releases for purposes other than flood control are not covered in this report.

36. EMERGENCY OPERATION OF GATED SPILLWAY

a. Whenever water is stored in the flood control space and the reservoir is rising rapidly because of flood inflow, the necessity for emergency spillway releases should be determined. The emergency spillway release diagram (chart A-2) accompanying the attached draft of regulations, indicates the release considered necessary to avoid endangering the structure without releasing quantities in excess of natural runoff.

b. The diagram is derived in accordance with procedures outlined in EM 1110-2-3600, and is based on computations of outflow required to limit storage to the capacity available, when only reservoir elevations and rate of rise are known and remaining inflow volume is estimated on the basis that inflow peak is past and that recession of flow will be somewhat steeper than the average recession observed in past floods. The diagram is thus designed to defer increases in emergency releases until it is certain that larger releases will be necessary. Accordingly, when such releases are indicated by the diagram, it is essential that they be made immediately in order that it will not subsequently become necessary to make larger releases. For this reason, the reservoir operators at the dam should be thoroughly familiar with the emergency spillway release diagram and should be supplied with standing instructions to initiate use of the diagram, if required, when communication with the Division of Operations and Maintenance, Department of Water Resources, State of California, is disrupted.

37. FLOOD CONTROL REGULATIONS

The flood control regulations for Oroville Dam and Reservoir, prepared for publication in the Federal Register, are contained in Appendix A to this report.

CHAPTER 8 - OPERATIONAL CONTROLS

38. OPERATIONAL RESPONSIBILITIES

Responsibilities for flood control operation of Oroville Reservoir are summarized in the following paragraphs. A list of personnel involved in operation of the reservoir for flood control is included at the front of this report.

a. The Director, Department of Water Resources, State of California, is responsible for:

(1) Accomplishing the physical operation of the reservoir and associated facilities in accordance with the official regulations.

(2) Advising the District Engineer, Sacramento District, Corps of Engineers, of any need for emergency change in operation.

(3) Annually inspecting channel conditions to determine if any deterioration in flow capacity has occurred that could inhibit release of water corresponding to flows of 150,000 c.f.s. below Oroville Dam or 180,000 c.f.s. in the Feather River above Yuba River, 300,000 c.f.s. below Yuba River, and 320,000 c.f.s. below Bear River.

(4) Reporting to the District Engineer, Sacramento District, Corps of Engineers, any unusual condition in the reservoir or along downstream channels that might temporarily interfere with the planned flood control operation of the reservoir.

(5) Keeping downstream interests advised of impending changes in flood control releases which may affect them.

(6) Reporting by telephone to the Reservoir Regulation Section, Sacramento District, Corps of Engineers, the data outlined in paragraph 42-a below, and other data that may be requested from time to time.

(7) Keeping informed of the rules and regulations contained in these instructions and bringing to the attention of the District Engineer, Sacramento District, Corps of Engineers, any feature contained herein that may require clarification or revision.

(8) Immediately after the end of each month, transmitting to the Reservoir Regulation Section, Sacramento District, Corps of Engineers, data specified in paragraph 42-b below.

b. In connection with the operation of this project for flood control, the District Engineer, Sacramento District, Corps of Engineers, is responsible for:

(1) Approving or disapproving emergency changes in operation recommended by the operating agency, or issuing instructions for such changes on his own initiative.

(2) Advising the operating agency and the Chief of Engineers of any departure from the flood control regulations.

(3) Preparing monthly operation and other special reports, required by the Office, Chief of Engineers, relative to operation of the reservoir.

39. STANDING INSTRUCTIONS

When communication between Oroville Reservoir and the State Water Plan Operations Control Center is interrupted during a flood period, releases should be maintained in accordance with the last instructions received. If the inflow to the reservoir is increasing and communications cannot be re-established, releases should be increased at a rate not faster than 5,000 c.f.s. per hour to the lesser of inflow or 150,000 c.f.s. until emergency operation in accordance with the Emergency Spillway Release Diagram, chart A-2, and paragraph 36 of these instructions becomes necessary.

40. MODIFICATION OF REGULATIONS

The official regulations are subject to temporary modification during emergencies by the District Engineer, Corps of Engineers. Permanent changes in the regulations may be made by reissuing them in the same manner as when originally prescribed.

41. HYDROLOGIC FACILITIES

a. In order to insure dependable operation of Oroville Reservoir flood control, provisions for continuously measuring total outflows up to 150,000 c.f.s. have been provided. In addition, provisions for continuously measuring reservoir stage within 0.01 foot, for the purpose of determining reservoir storage and inflow, have been provided with indicating dials of these gages in the operating room. An external system of reservoir staff gages has been installed in order to provide a positive check on reservoir stage. Measurement of all principal sources of reservoir inflow will be obtained by stream gaging stations on the main reservoir tributaries. Stream-gaging stations will be maintained at key locations along downstream channels on Yuba River, Bear River, and Honcut Creek and on Feather River above and below Yuba River and below Bear River for the purpose of coordinating project operation with downstream tributary inflows. For the purpose of forecasting floods, 6 to 12 recording precipitation stations in the Feather River drainage basin above Oroville will be established and/or maintained, and provisions are being made to obtain reports from these stations by radio at 2-hour or more frequent intervals during storms.

b. Location and description of the existing facilities are included on charts 3 and 5.

42. OPERATION REPORTS

a. The reservoir operator or operating agency shall report by telephone to the Reservoir Regulation Section of the Corps of Engineers each work day between 8:00 and 9:00 a.m. during flood periods, and at other times upon request, data as follows:

- (1) The amount of flood control space required in Oroville Reservoir.
- (2) Storage, inflow, outflow, and anticipated outflow changes at Oroville Reservoir.
- (3) Precipitation at the dam and at pertinent reporting stations in or adjacent to the drainage basin.

b. Immediately after the end of each month, the operating agency shall dispatch to the Reservoir Regulation Section, Sacramento District, Corps of Engineers, a summary of the following operation data:

- (1) Daily inflow, outflow, and storage at Oroville Reservoir.
- (2) Daily requirement of flood control space at Oroville Reservoir.
- (3) Precipitation at Oroville Dam.

43. COORDINATION WITH OTHER AGENCIES

In order to insure that the flood control operation of Oroville Reservoir will be as effective and reasonable as possible, it is essential that the operating agency keep advised at all times of possible flood hazards, weather conditions, inflow to the reservoir, flow in downstream tributaries, and at various locations in the Feather River below Oroville Dam. This requires close liaison with other agencies, including the Yuba County Water Agency, the Weather Bureau, and the Corps of Engineers, on a daily or hourly basis as required.

44. FORECASTS OF FLOOD RUNOFF

a. Since channel capacities of the Feather River system far exceed maximum expected snowmelt flood flows, it is not considered necessary to forecast snowmelt runoff for flood control operation; however, to operate Oroville Reservoir for control of rain floods it will be necessary to make frequent forecasts of inflow to Oroville Reservoir and of local inflow to the Feather River System downstream from the reservoir.

b. Reliable computerized methods of forecasting the inflow hydrograph to Oroville Reservoir and local inflow below the reservoir have been developed by a State-Federal River Forecast Center. These forecasting schemes are based upon an analysis of historical periods of precipitation and involve the combining of precomputed antecedent indexes (AI), base flow, antecedent and forecasted rainfall, and unitgraph ordinates.

(1) The AI is an index of the loss potential of the stream basin, or an index of the relationship between rainfall and surface runoff for a particular storm period. For the Feather River Basin above Oroville this index is computed from Brush Creek Ranger Station's precipitation data and Manzanita Lake's snow depth. The numerical value of this AI indicates the approximate number of inches of rain that would be required to produce one inch of surface runoff.

(2) The effective basin-mean precipitation for six-hour intervals is estimated by using all available precipitation information adjusted for wind, freezing level, and snowpack data. This effective precipitation forecasted for succeeding intervals is based upon an analysis of the past, present, and forecasted synoptic weather situation used in conjunction with the actual observed antecedent precipitation and the US Weather Bureau's Quantitative Precipitation Forecast (QPF).

(3) The estimated effective basin-mean precipitation, along with the prestorm AI value and the base flow, are applied to the unitgraph ordinates and the basin AI-loss-rain relationships (developed from historical storms) to determine a 6-hourly inflow hydrograph to Oroville Reservoir.

CHAPTER 9 - PROJECT ACCOMPLISHMENTS

45. EXAMPLES OF OPERATION

a. Routings of the December 1955 flood, January-February 1963 flood, and December 1964 flood in accordance with the flood control diagram (chart A-1) is graphically presented on chart 31.

b. Coordination of reservoir operation for flood control purposes between Oroville and Yuba River Reservoirs is shown on chart 32. Routing No. 1 on this chart shows the results of a coordinated operation of Oroville and New Bullards Bar Reservoir, with the primary standard project storm centered on Feather River Basin above Oroville Dam; Routing No. 2 shows the results of a coordinated operation of Oroville and New Bullards Bar Reservoirs, with primary standard project storm centered on Yuba River Basin below New Bullards Bar Dam; and Routing No. 3 shows the results of a coordinated operation of Oroville, New Bullards Bar Dam and the future Marysville reservoirs, with primary standard project storm centered on Yuba River below New Bullards Bar and above Marysville Dams.

c. Hypothetical operation of Oroville Reservoir during the spillway design flood is shown in graphical form on chart 33. The routing of this flood by the Department of Water Resources starts at gross pool elevation, and attains a maximum storage of 3,817,000 acre-feet (at 91.7 ft. elevation) and a maximum outflow of 623,200 c.f.s.

d. Stage-duration curves are presented on chart 34, a stage frequency curve on chart 35, and seasonal variation of reservoir storage frequency on chart 36.

e. Project and preproject rain-flood frequency curves are shown on chart 6 (sheet 2).

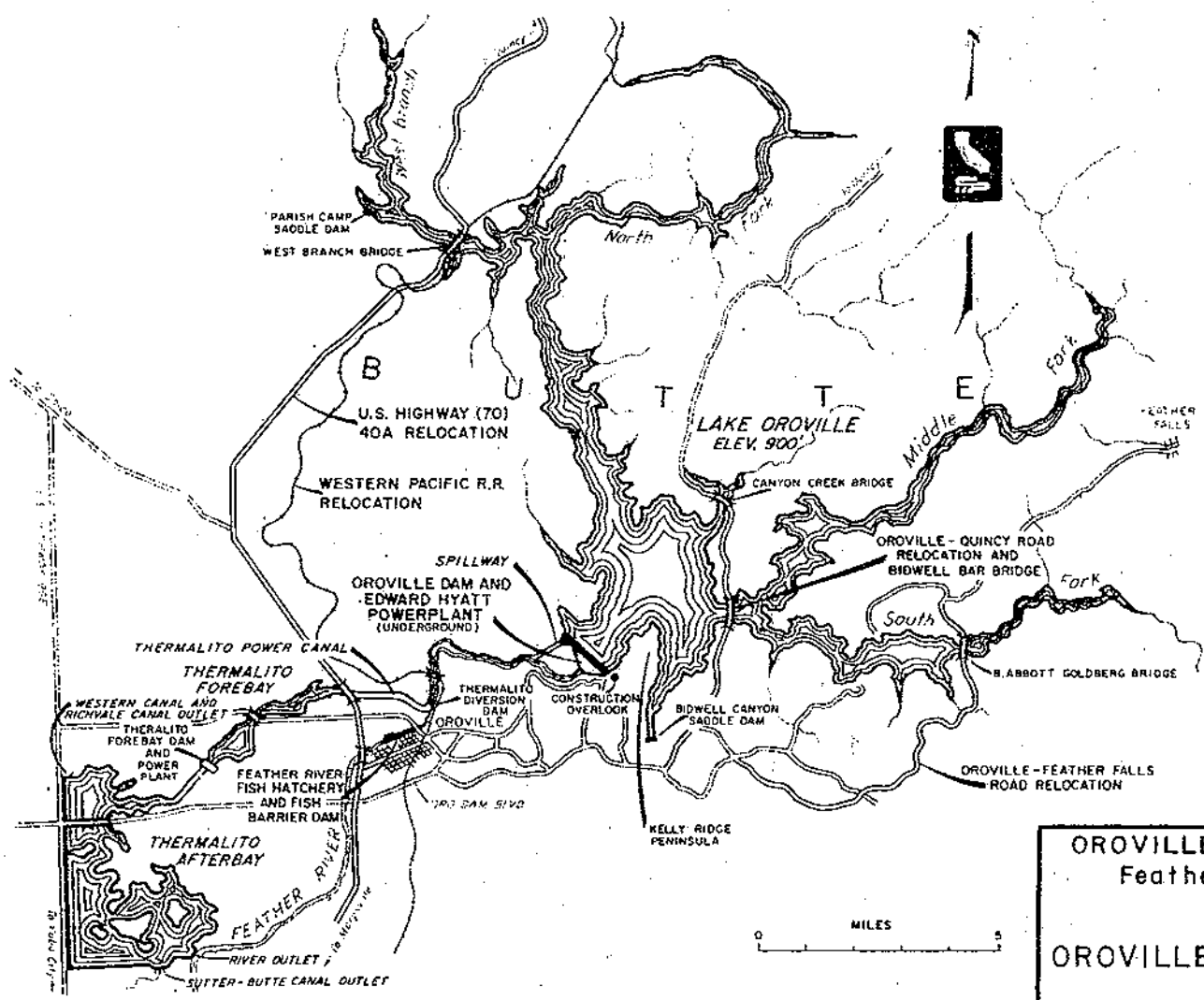
46. OPERATION RECORD

a. The official operating record of storage and outflow value is published in the Water Supply Papers of the US Geological Survey.

b. The operation of Oroville Reservoir began in November 1967, and is shown in graphical form on chart 37.

c. A record of flood control requirements, and of storage and flow pertinent to the flood control operation is contained in the monthly reports submitted to the Chief of Engineers by the District Engineer, Corps of Engineers, Sacramento, California. A copy of this monthly report form is shown on chart 38.

Sheet 2 CHART 1

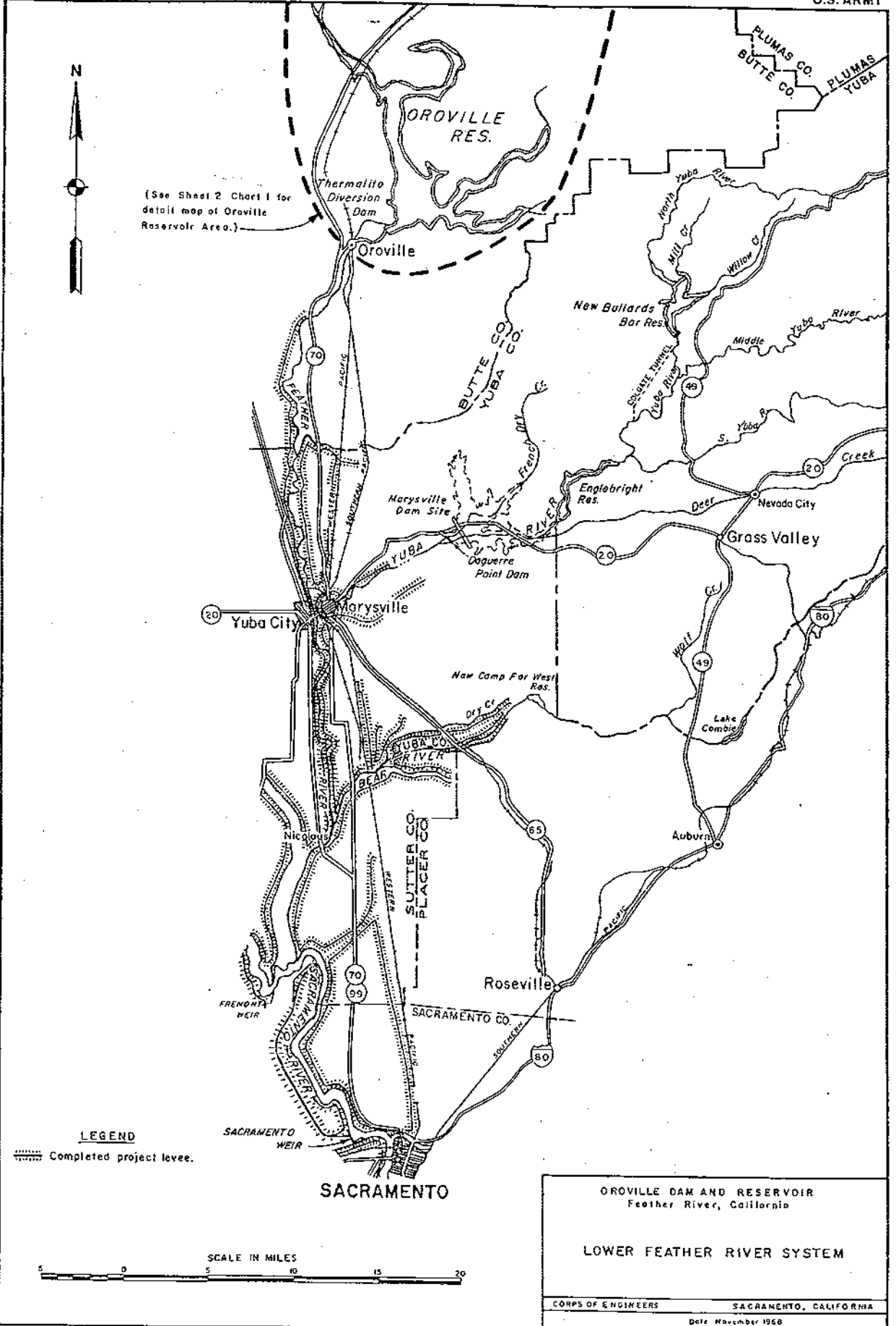


OROVILLE DAM AND RESERVOIR Feather River, California	
OROVILLE RESERVOIR AREA	
CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA	
Prepared:	Date: December 1968
Drawn:	

Chart furnished by DWR Oct 1968



(See Sheet 2 Chart 1 for detail map of Oroville Reservoir Area.)



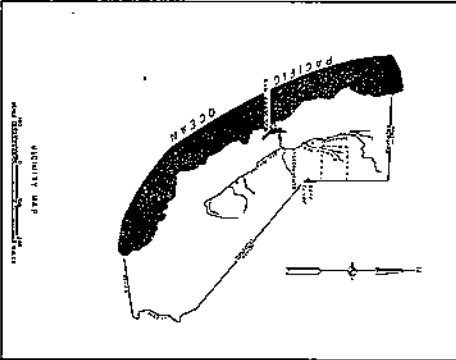
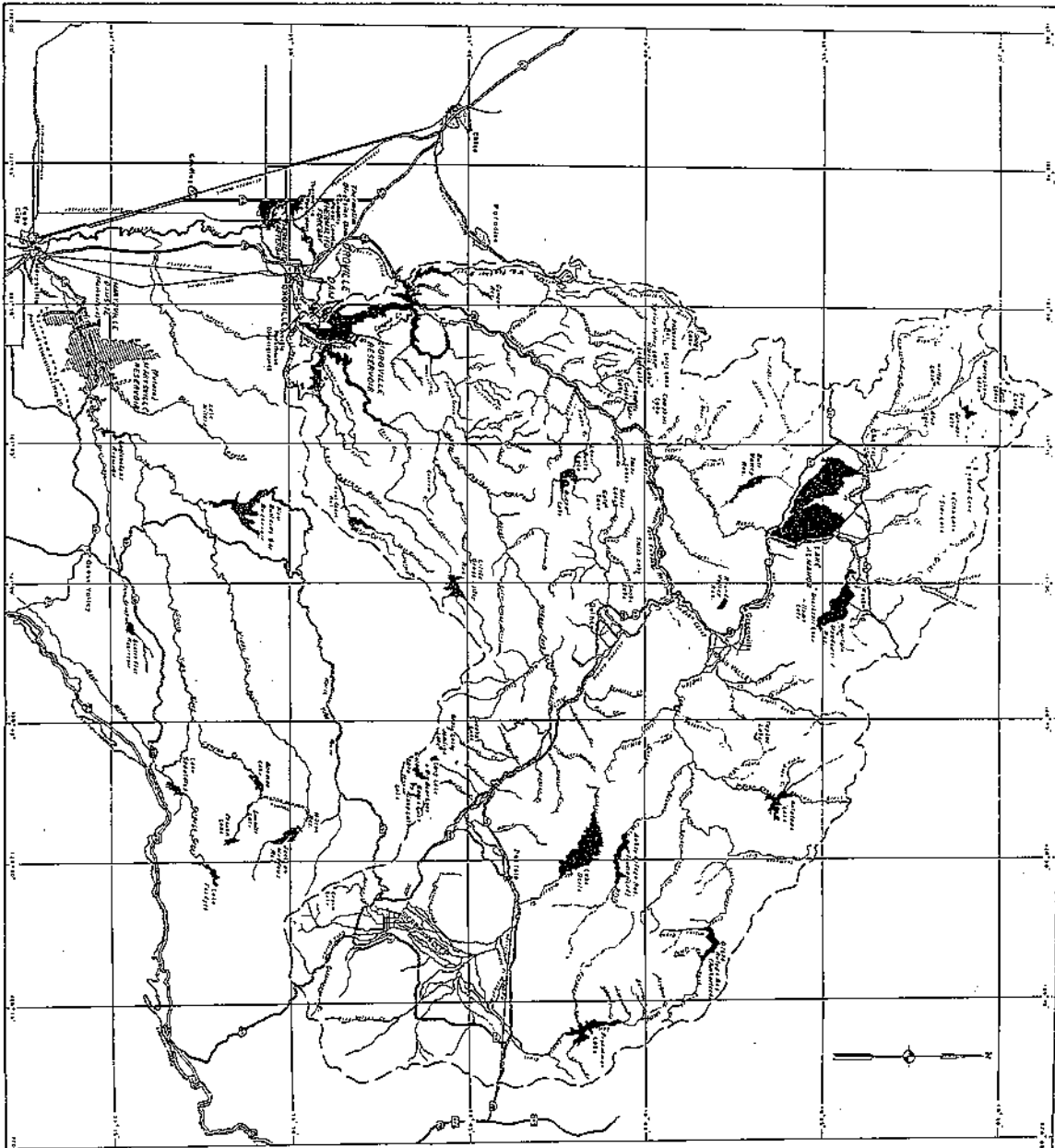
LEGEND
Completed project levee.

SCALE IN MILES
0 5 10 15 20

OROVILLE DAM AND RESERVOIR
Feather River, California

LOWER FEATHER RIVER SYSTEM

CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
Date November 1968

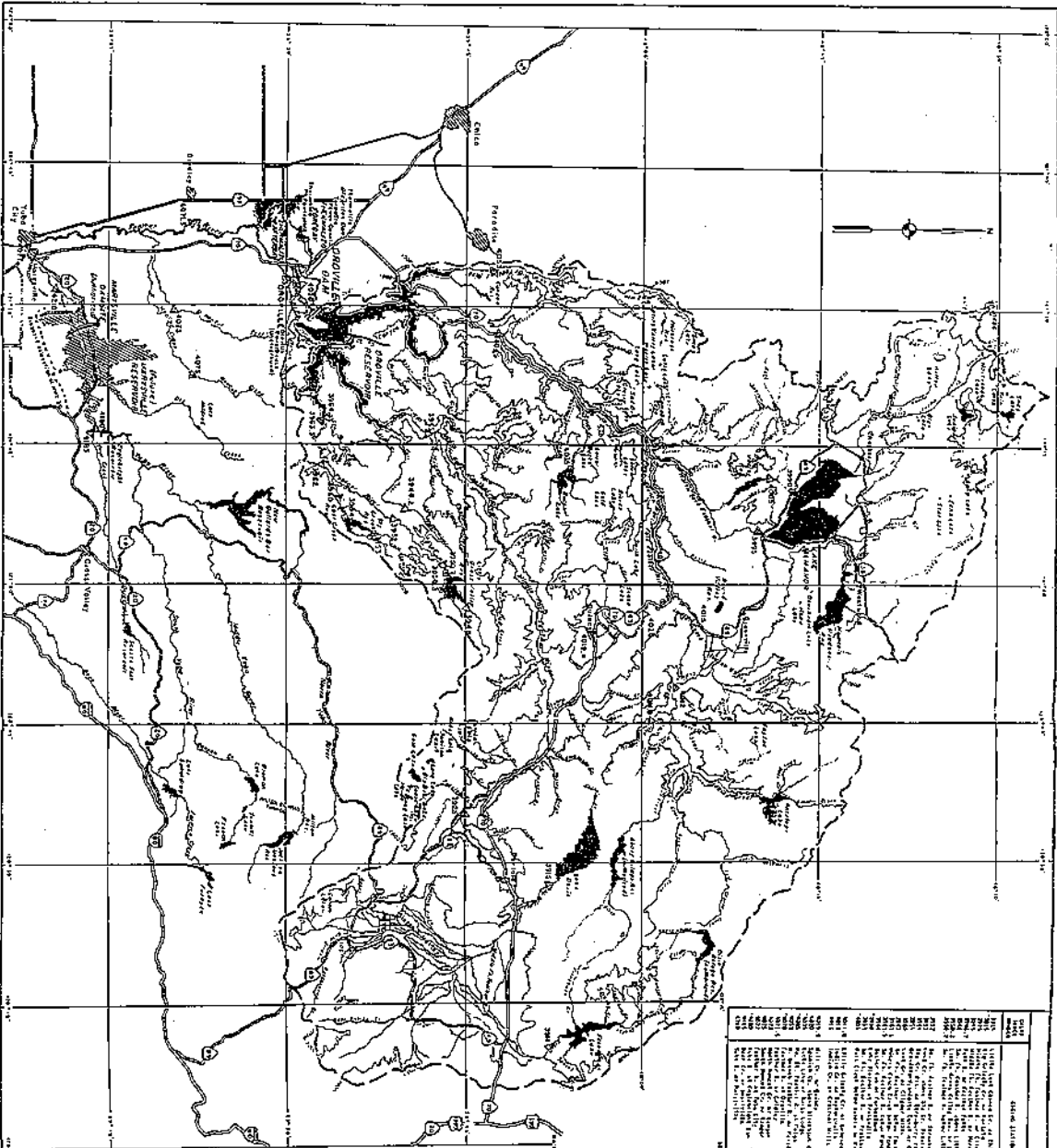


LEGEND

--- BOUNDARY
 --- HIGHWAY
 --- RAILROAD
 --- CANAL
 --- DAM
 --- RESERVOIR
 --- RIVER
 --- STREAM
 --- CREEK
 --- LAKE
 --- SWAMP
 --- MOUNTAIN
 --- HILL
 --- VALLEY
 --- PLAIN
 --- SANDHILL
 --- CLIFF
 --- CANYON
 --- PASS
 --- TUNNEL
 --- BRIDGE
 --- FERRY
 --- AIRFIELD
 --- PORT
 --- LIGHTHOUSE
 --- TOWER
 --- MONUMENT
 --- GRAVE
 --- CHURCH
 --- SCHOOL
 --- HOSPITAL
 --- POST OFFICE
 --- TELEPHONE
 --- POWER PLANT
 --- WATER TOWER
 --- WINDMILL
 --- MILL
 --- FACTORY
 --- STORE
 --- HOUSE
 --- FARM
 --- GARDEN
 --- ORCHARD
 --- VINEYARD
 --- PASTURE
 --- WOODLAND
 --- FOREST
 --- SWAMP
 --- MARSH
 --- BEACH
 --- CLIFF
 --- CANYON
 --- PASS
 --- TUNNEL
 --- BRIDGE
 --- FERRY
 --- AIRFIELD
 --- PORT
 --- LIGHTHOUSE
 --- TOWER
 --- MONUMENT
 --- GRAVE
 --- CHURCH
 --- SCHOOL
 --- HOSPITAL
 --- POST OFFICE
 --- TELEPHONE
 --- POWER PLANT
 --- WATER TOWER
 --- WINDMILL
 --- MILL
 --- FACTORY
 --- STORE
 --- HOUSE
 --- FARM
 --- GARDEN
 --- ORCHARD
 --- VINEYARD
 --- PASTURE
 --- WOODLAND
 --- FOREST
 --- SWAMP
 --- MARSH
 --- BEACH

GENERAL MAP

UNITED STATES GOVERNMENT
 DEPARTMENT OF ENGINEERS
 SACRAMENTO DISTRICT
 SACRAMENTO, CALIFORNIA
 DRAWN BY
 DATE NOVEMBER 1949
 SHEET 2



STATION NO.	NAME	ELEVATION (M)	STRAIN		DATE	REMARKS
			TYPE	PERCENTAGE		
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120

NOTE: This map is based on the Canadian National Topographic Survey, 1:50,000 scale, and is not a true representation of the actual terrain. The map is intended for general reference only and should not be used for engineering or other purposes without the aid of a surveyor.

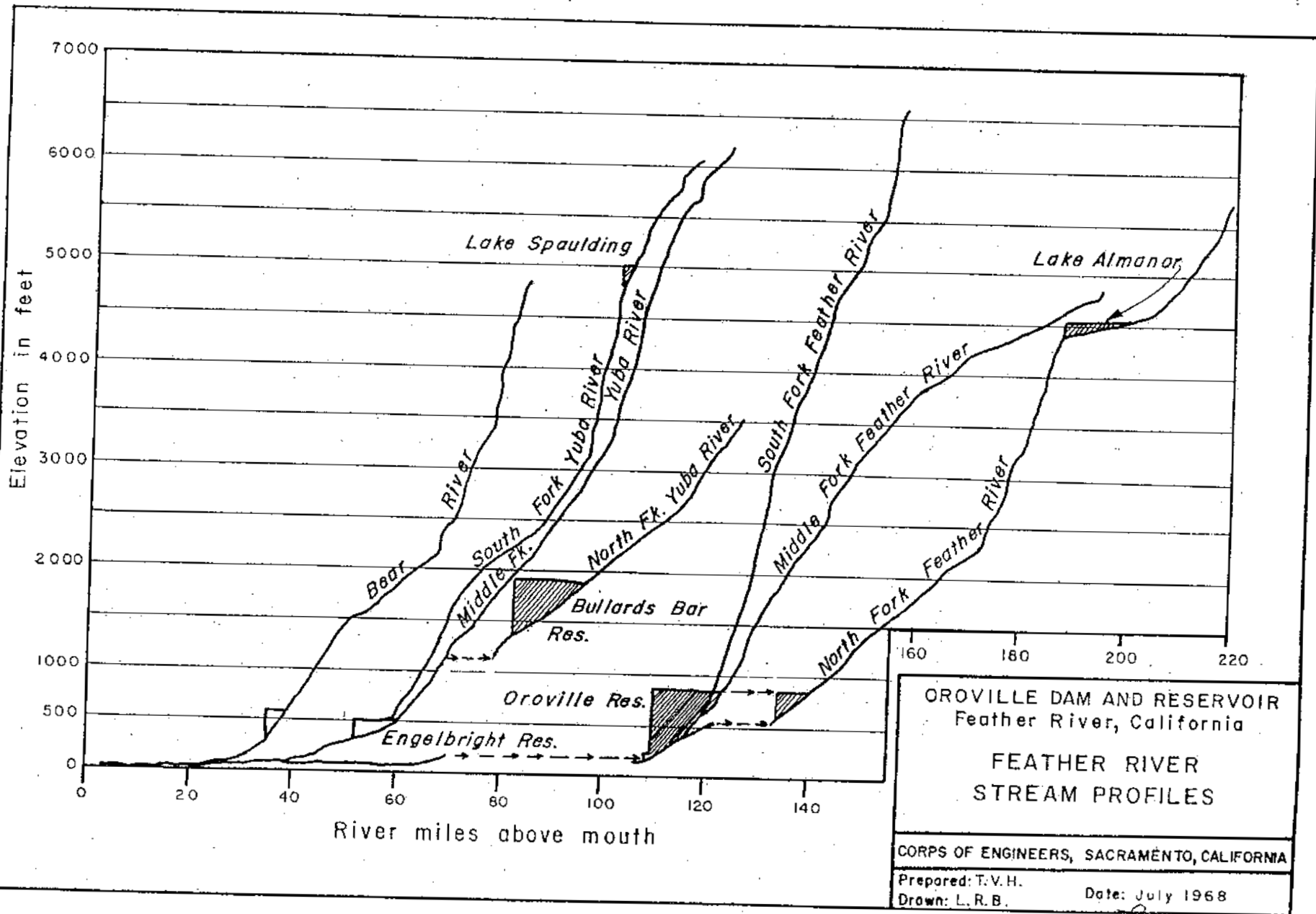
- LEGEND**
- ▲ Reservoir system gaging station
 - Existing dam site
 - ▭ Abandoned stream gaging station
 - Existing dam
 - Stream
 - Channel marker
 - Contour

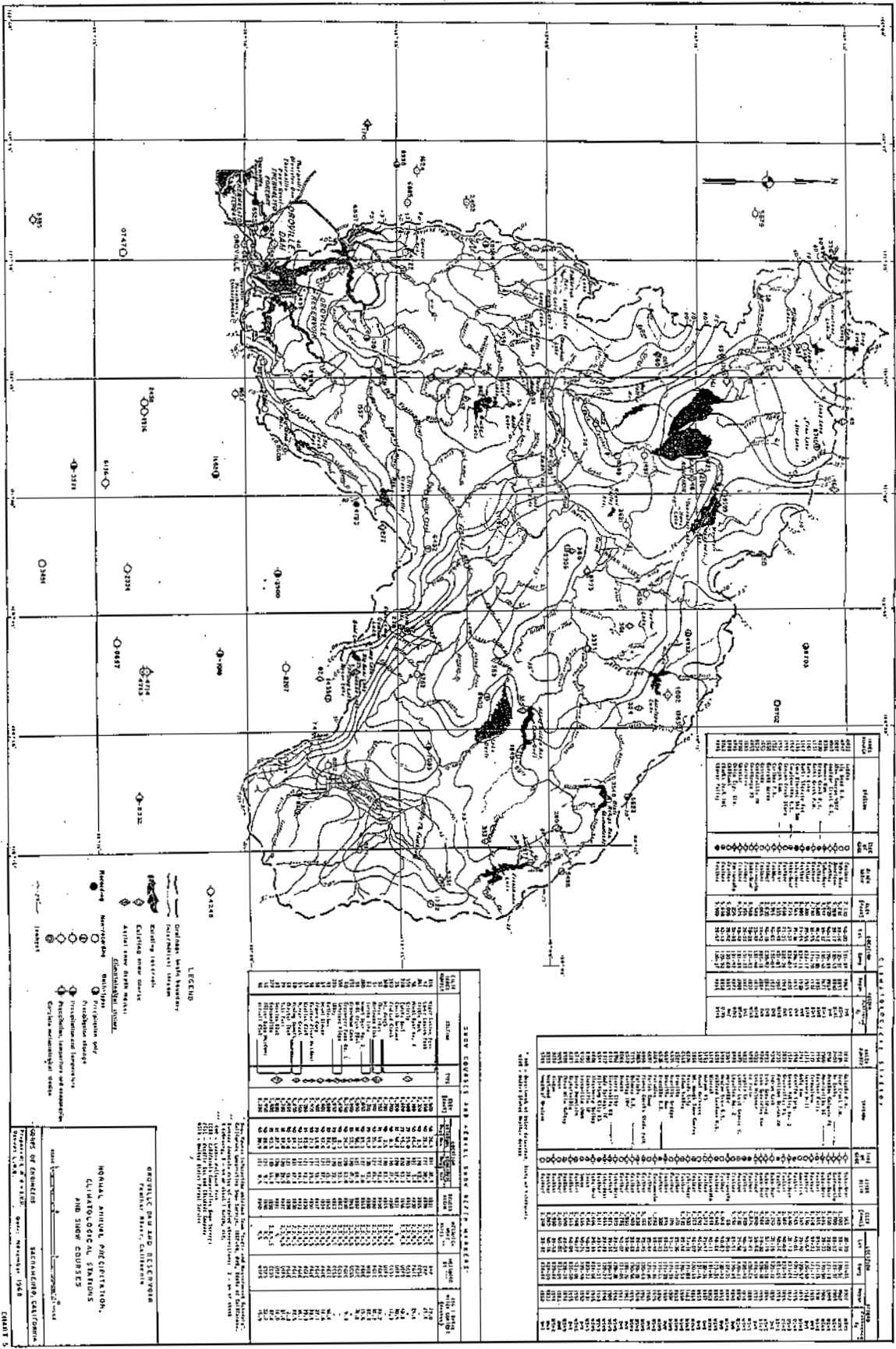
TOPOGRAPHY AND STREAM GAGING STATIONS

DRAYVILLE DAM AND RESERVOIR
 SASKATCHEWAN, CANADA

Scale: 1:50,000
 Date: 1960

CHART 4





CLIMATOLOGICAL TABLE

STATION	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980			
1. Precipitation (inches)	10.0	12.0	11.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0		
2. Maximum temperature (°F)	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250		
3. Minimum temperature (°F)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230

SIERRA CASCADIA AND CENTRAL SIERRA NEVADA RANGES

STATION	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980			
1. Precipitation (inches)	10.0	12.0	11.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0		
2. Maximum temperature (°F)	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250		
3. Minimum temperature (°F)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230

LEGEND

- Contour with houses
- Existing (dashed)
- Proposed
- Water
- Marsh
- Swamp
- Shrub
- Forest
- Open
- Barren
- Rock
- Gravel
- Sand
- Silt
- Clay
- Shale
- Slate
- Schist
- Gneiss
- Quartzite
- Granite
- Diorite
- Basalt
- Andesite
- Rhyolite
- Tuff
- Volcanic ash
- Lava flow
- Pyroclastic flow
- Glacial drift
- Glacial till
- Glacial outwash
- Glacial moraine
- Glacial erratics
- Glacial kames
- Glacial eskers
- Glacial cirques
- Glacial horns
- Glacial cirques
- Glacial horns
- Glacial cirques
- Glacial horns

GRAPHIC SCALE

1:50,000

UNITED STATES GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

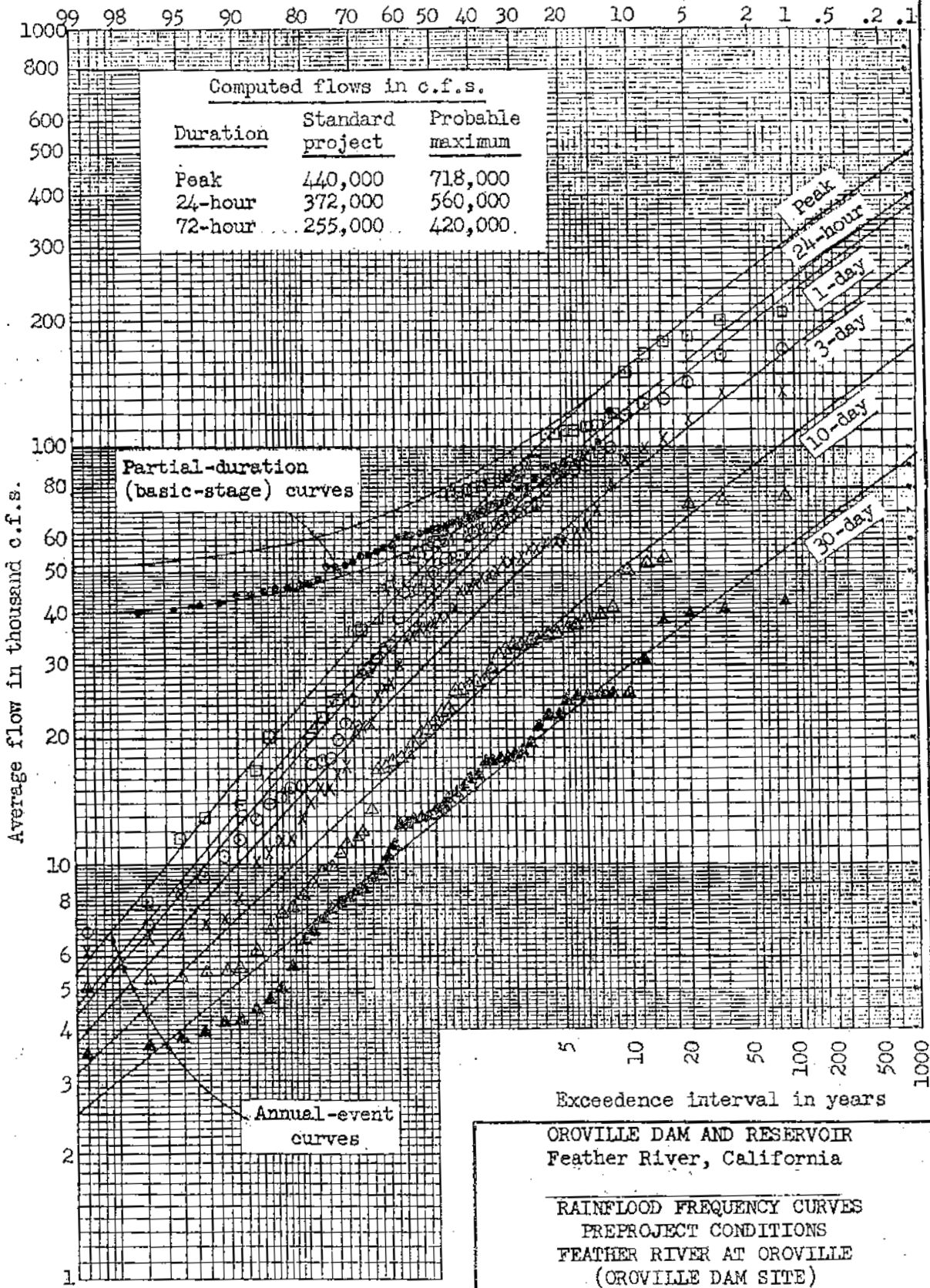
CLIMATOLOGICAL TABLES

SIERRA CASCADIA AND CENTRAL SIERRA NEVADA RANGES

NOVEMBER 1968

DAWG 5

Exceedence frequency per hundred years



Drainage area: 3611 sq. miles

OROVILLE DAM AND RESERVOIR
Feather River, California

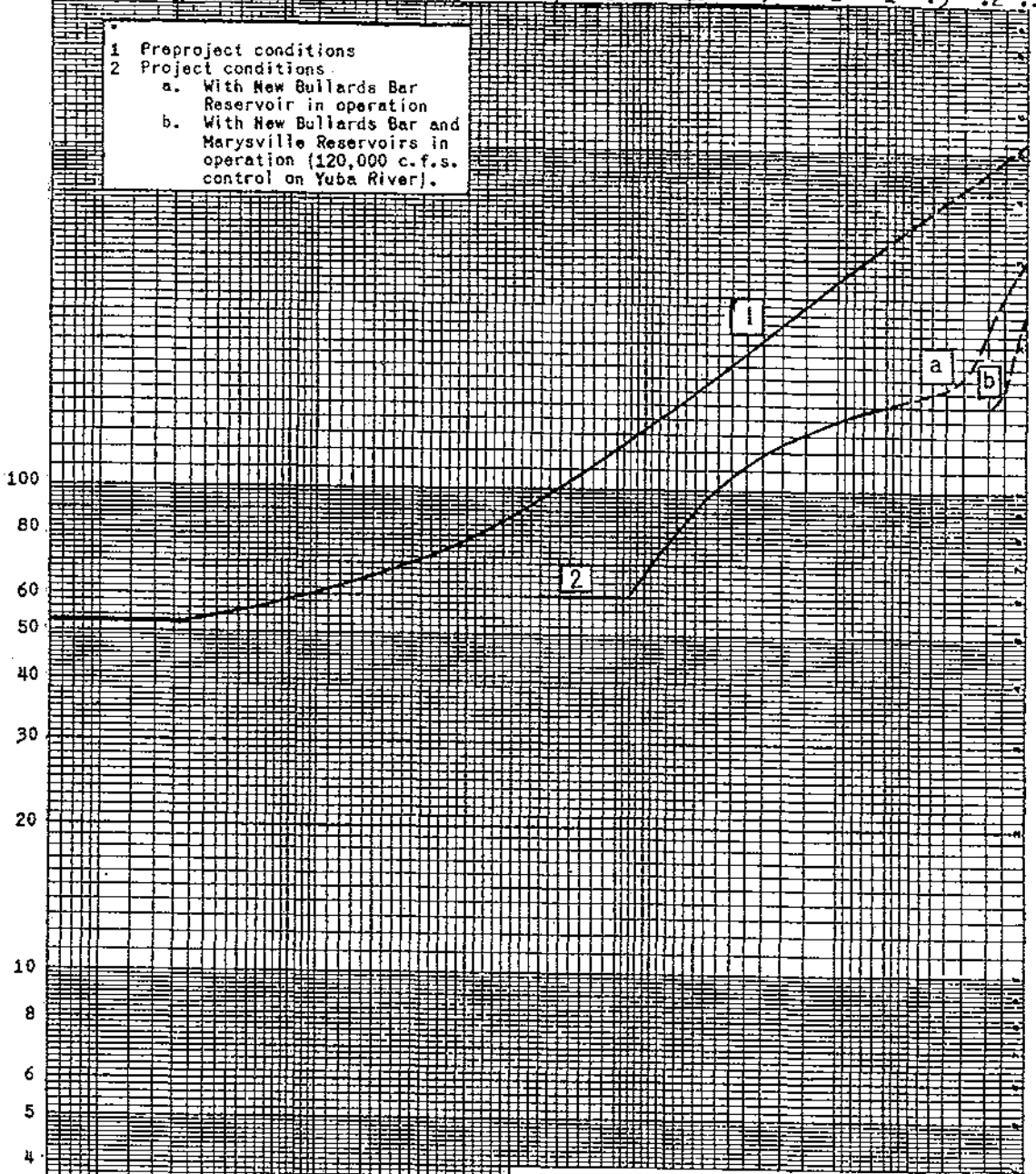
RAINFLOOD FREQUENCY CURVES
PREPROJECT CONDITIONS
FEATHER RIVER AT OROVILLE
(OROVILLE DAM SITE)

Corps of Engineers Sacramento, Calif.
V.G.K. Mar 1958 File: FE-26-34

Exceedence frequency per hundred years

99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 .5 .2 .1

- 1 Preproject conditions
- 2 Project conditions
 - a. With New Bullards Bar Reservoir in operation
 - b. With New Bullards Bar and Marysville Reservoirs in operation (120,000 c.f.s. control on Yuba River).



Exceedence interval in years

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

RAINFLOOD FREQUENCY CURVES
FEATHER RIVER AT OROVILLE DAM

Corps of Engineers, Sacramento, Calif.

Prepared: R.F.C. Date: June 1970

FEATHER RIVER AT OROVILLS, CALIFORNIA
(OROVILLE DAM SITE)

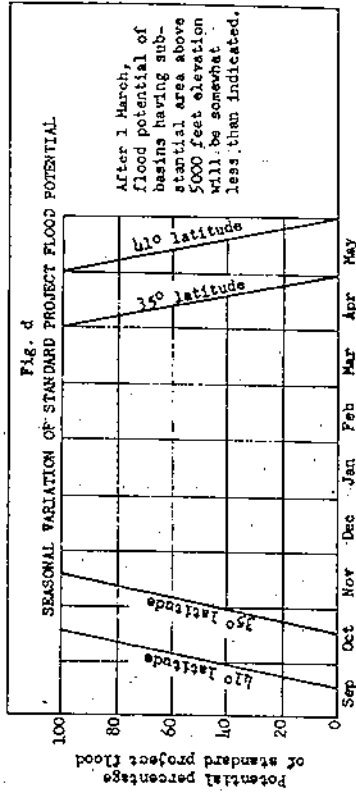
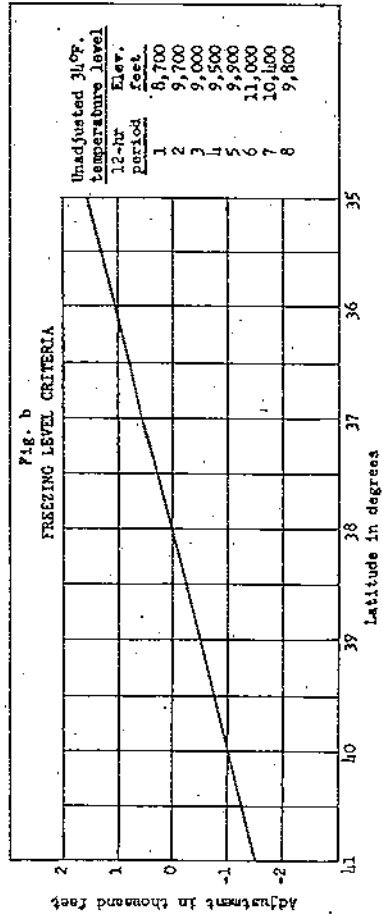
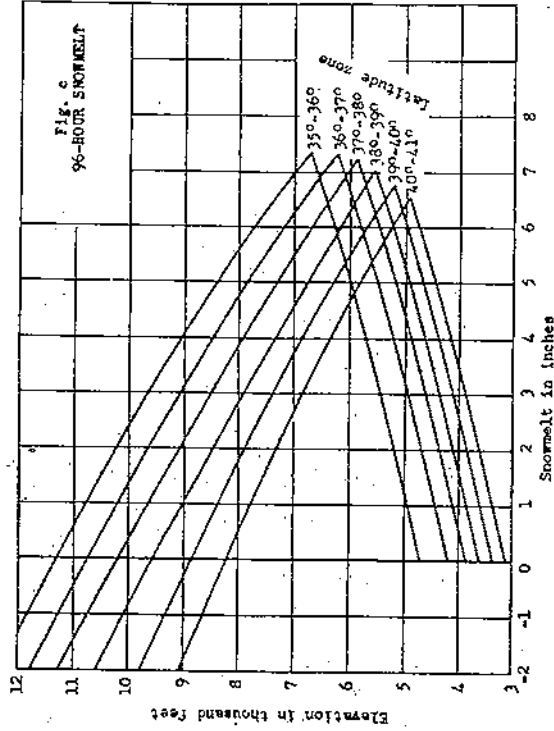
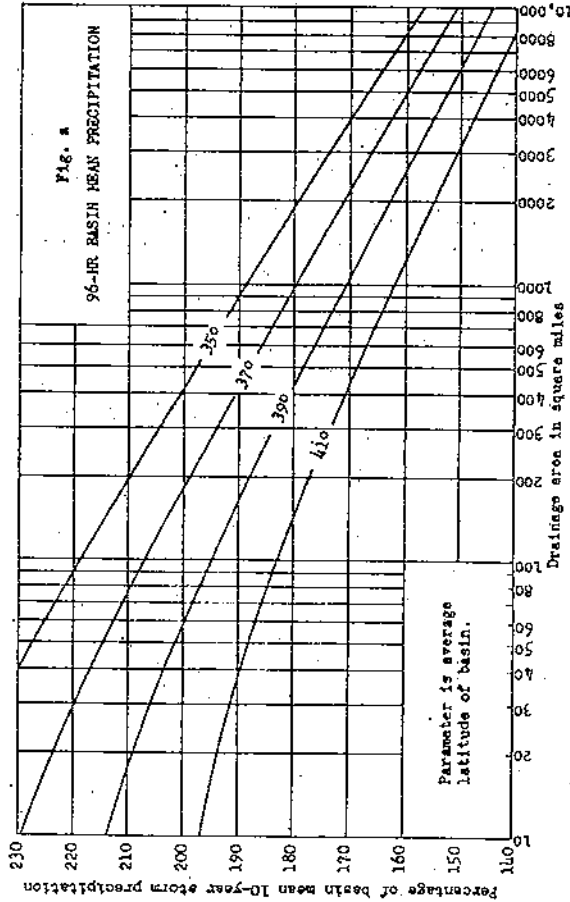
Water year	Present-impaired Average Flows in Thousand c.f.s.								
	Peak	Date	Max 1-day	1st day	Max 3-day	1st day	Max 10-day	1st day	Max 30-day
1902-03	110.	30Mar	88.4	22Mar	62.9	29Mar	35.2	12Mar	18.0
03-04	109.	24Feb	100.2	18Mar	82.5	22Feb	51.2	22Feb	43.1
04-05		30Dec	65.7	30Dec	37.1	19Mar	18.6	12Mar	14.8
05-06	113.	18Jan	91.5	18Jan	65.5	24Mar	38.8	20Mar	25.4
06-07	211.	19Mar	172.8	18Mar	135.4	17Mar	74.4	17Mar	41.3
07-08		3Feb	15.3	2Feb	14.1	19Jan	10.0	14Jan	8.7
08-09	168.	16Jan	128.0	14Jan	117.2	14Jan	73.2	6Jan	38.1
09-10		9Dec	29.9	20Mar	27.0	17Mar	21.0	25Feb	18.1
10-11	86.	31Jan	72.2	5Apr	49.5	1Apr	39.8	17Mar	25.4
11-12		26Jan	15.4	26Jan	10.3	26Jan	5.3	6Mar	4.0
12-13		18Jan	10.5	18Jan	7.5	13Jan	5.4	13Jan	3.5
13-14	116.	31Dec	83.8	31Dec	70.3	31Dec	37.9	31Dec	31.0
14-15	78.	11May	63.4	11May	54.1	10May	33.4	31Jan	16.0
15-16	56.1	20Mar	55.0	20Mar	48.8	15Mar	34.6	14Mar	25.8
16-17	77.0	25Feb	68.6	24Feb	47.9	21Feb	23.6	23Feb	11.2
17-18	36.6	26Mar	33.7	26Mar	27.4	25Mar	18.0	18Mar	13.2
18-19	81.1	11Feb	52.6	10Feb	35.3	7Feb	17.1	7Feb	9.4
19-20	24.6	16Apr	20.0	15Apr	16.6	15Apr	7.0	1Mar	3.9
20-21	79.0	18Jan	61.7	18Nov	37.5	18Jan	17.8	28Feb	14.5
21-22		19Feb	21.9	19Feb	17.3	19Feb	11.4	19Feb	8.2
22-23	21.3	6Apr	17.8	5Apr	15.4	5Apr	12.0	17Mar	7.9
23-24	47.9	8Feb	33.4	7Feb	21.7	7Feb	9.0	27Jan	4.5
24-25	88.1	6Feb	63.7	4Feb	53.2	4Feb	26.1	3Feb	13.2
25-26	59.7	6Apr	54.5	7Apr	45.6	5Apr	27.4	17Mar	12.9
26-27	93.0	21Feb	79.4	21Feb	58.3	16Feb	36.8	3Feb	21.3
27-28	179.	26Mar	120.0	25Mar	106.1	23Mar	54.3	17Mar	24.9
28-29	14.0	4Feb	11.6	3Feb	8.4	9Mar	5.65	10Mar	5.04
29-30	85.1	15Dec	73.4	13Dec	57.3	10Dec	32.8	10Dec	13.6
30-31	11.6	19Mar	8.44	18Mar	7.3	18Mar	5.21	11Mar	3.72
31-32	22.6	20Mar	17.4	19Mar	15.3	19Mar	11.6	19Mar	9.75
32-33		29Mar	6.88	28Mar	6.2	28Mar	5.53	12Mar	4.45
33-34	20.3	29Mar	14.1	31Dec	11.6	29Dec	7.88	5Mar	4.79
34-35	58.6	8Apr	51.3	7Apr	39.4	4Apr	26.3	15Mar	12.66
35-36	85.4	22Feb	54.2	21Feb	46.0	16Feb	26.9	12Feb	18.0
36-37		12Mar	14.4	12Mar	13.2	12Mar	9.77	12Mar	8.34
37-38	185.0	11Dec	145.0	10Dec	95.4	10Dec	41.4	10Dec	18.47
38-39	8.08	27Mar	7.20	25Mar	6.9	21Mar	6.33	14Mar	5.64
39-40	152.0	30Mar	131.0	27Feb	100.6	26Feb	52.8	15Mar	25.56
40-41	84.2	11Feb	70.4	10Feb	52.7	9Feb	29.6	9Feb	22.8
41-42	110.0	6Feb	88.4	5Feb	59.9	2Feb	36.2	23Jan	25.9
42-43	108.0	23Jan	64.5	21Jan	60.3	21Jan	35.4	21Jan	18.8
43-44	24.9	4Mar	18.1	4Mar	11.3	4Mar	7.76	4Mar	6.62
44-45	60.1	2Feb	45.8	2Feb	34.5	1Feb	22.1	1Feb	12.5
45-46	54.4	29Dec	45.8	27Dec	41.5	22Dec	32.0	21Dec	18.14
46-47	45.6	12Feb	29.2	12Feb	21.9	12Feb	10.7	12Feb	7.41
47-48	36.7	17Apr	31.1	16Apr	25.3	15Apr	19.8	9Apr	15.29
48-49	16.8	11Mar	12.9	11Mar	10.7	11Mar	8.54	9Mar	6.96
49-50	46.4	6Feb	39.1	5Feb	30.2	4Feb	16.9	17Jan	10.5
50-51	92.1	21Nov	67.1	19Nov	50.4	17Nov	27.8	18Nov	22.7
51-52	59.5	2Feb	47.6	1Feb	38.0	1Feb	23.0	24Jan	16.2
52-53	113.0	9Jan	97.1	9Jan	57.3	9Jan	33.8	7Jan	19.8
53-54	54.8	10Mar	45.2	9Mar	39.0	9Mar	20.4	5Mar	13.9
54-55	13.0	6Dec	7.59	6Dec	6.8	2Dec	5.58	15Nov	4.49
55-56	203.0	23Dec	172.0	22Dec	138.0	19Dec	77.3	19Dec	40.0
56-57	38.9	19May	24.6	18May	21.3	18May	13.5	1May	8.65

Additional items above 40,000 c.f.s. and separated by 10 days:

1904	14Nov	80.1
	18Mar	90.2
	29Mar	57.3
1906	26Mar	51.2
1907	26Dec	41.9
	3Feb	75.0
1911	7Mar	40.1
	6Apr	62.5
1914	26Jan	63.6
	21Feb	73.3
	10Apr	40.1
1915	2Feb	57.1
1916	3Jan	40.5
	11Feb	42.0
1921	21Nov	60.1
1926	4Feb	46.5
1936	15Jan	46.4
1938	24Mar	44.5
1940	28Feb	120.0
1941	27Dec	40.4
1942	16Dec	51.6
	27Jan	61.1
1956	15Jan	61.9
	23Feb	44.0

Note:

Flows prior to October 1928 adjusted for effects of Lake Almenor and Bucks Lake as operated since that date. Other flows are as recorded.



STANDARD PROJECT GENERAL STORM
PRECIPITATION AND SNOWMELT BY PERIODS IN PERCENT OF TOTAL

Period ending to	Total storm precipitation in inches										Snow-melt	Period ending to	Total storm precipitation in inches										Snow-melt	
	9 to 11	11 to 13	13 to 15	15 to 17	17 to 19	19 to 21	21 to 23 plus	1-hour percentages																
1-1	0	0	0	0	0	0	0	0	0	0	0	1-2	0	0	0	0	0	0	0	0	0	0	0	
1-2	0	0	0	0	0	0	0	0	0	0	0	1-4	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0
1-3	0	0	0	0	0	0	0	0	0	0	0	1-6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0
1-4	0	0	0	0	0	0	0	0	0	0	0	1-8	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	0
1-5	0	0	0	0	0	0	0	0	0	0	0	1-10	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	0
1-6	0	0	0	0	0	0	0	0	0	0	0	1-12	3.0	3.1	3.2	3.4	3.5	3.6	3.8	3.9	4.0	4.0	4.0	0
1-7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1-14	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.2	6.2	0
1-8	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1-16	3.7	3.8	3.8	3.9	4.0	4.1	4.2	4.4	4.5	4.5	4.5	0
1-9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1-18	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	0
1-10	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1-20	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0
1-11	1.4	1.4	1.5	1.6	1.6	1.6	1.6	1.7	1.8	1.8	1.8	1-22	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0
1-12	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.2	1-24	0	0	0	0	0	0	0	0	0	0	0	0
1-13	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.7	2.8	2.9	2.9	2-2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1
1-14	2.5	2.6	2.7	2.8	2.9	2.9	3.0	3.1	3.2	3.3	3.3	2-4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
1-15	2.1	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.6	2.6	2-6	0	0	0	0	0	0	0	0	0	0	0	2
1-16	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.9	1.9	2.0	2-8	0	0	0	0	0	0	0	0	0	0	0	2
1-17	0.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	2-10	0	0	0	0	0	0	0	0	0	0	0	2
1-18	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	2-12	0	0	0	0	0	0	0	0	0	0	0	2
1-19	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	2-14	0	0	0	0	0	0	0	0	0	0	0	2
1-20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2-16	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	2
1-21	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	2-18	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	2
1-22	0	0	0	0	0	0	0	0	0	0	0	2-20	4.3	4.4	4.5	4.6	4.6	4.7	4.8	4.8	4.9	4.9	4.9	4
1-23	0	0	0	0	0	0	0	0	0	0	0	2-22	2.7	2.8	2.8	2.8	2.9	3.0	3.0	3.1	3.2	3.2	3.2	4
1-24	0	0	0	0	0	0	0	0	0	0	0	2-24	3.6	3.6	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	4
2-1	0	0	0	0	0	0	0	0	0	0	0	3-2	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2
2-2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	3-4	3.4	3.4	3.4	3.4	3.4	3.3	3.2	3.1	3.1	3.1	3.1	4
2-3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3-6	5.0	5.0	4.9	4.9	4.8	4.7	4.7	4.6	4.5	4.5	4.5	4
2-4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3-8	4.4	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.1	4.1	4.1	4
2-5	0	0	0	0	0	0	0	0	0	0	0	3-10	4.3	4.5	4.5	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4
2-6	0	0	0	0	0	0	0	0	0	0	0	3-12	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4
2-7	0	0	0	0	0	0	0	0	0	0	0	3-14	6.0	6.0	5.9	5.9	5.9	5.9	5.8	5.7	5.7	5.7	5.7	4
2-8	0	0	0	0	0	0	0	0	0	0	0	3-16	7.0	6.8	6.7	6.5	6.3	6.1	6.0	5.9	5.7	5.7	5.7	3
2-9	0	0	0	0	0	0	0	0	0	0	0	3-18	12.1	11.7	11.2	10.8	10.3	9.9	9.5	9.0	8.6	8.6	8.6	2
2-10	0	0	0	0	0	0	0	0	0	0	0	3-20	5.7	5.6	5.6	5.5	5.5	5.5	5.4	5.4	5.3	5.3	5.3	2
2-12	0	0	0	0	0	0	0	0	0	0	0	3-22	4.5	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	2
2-13	0	0	0	0	0	0	0	0	0	0	0	3-24	4.3	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	2
2-14	0	0	0	0	0	0	0	0	0	0	0	4-2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	0
2-15	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	4-4	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	0	
2-16	0	0	0	0	0	0	0	0	0	0	0	4-6	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	2
2-17	0	0	0	0	0	0	0	0	0	0	0	4-8	0	0	0	0	0	0	0	0	0	0	0	1
2-18	0	0	0	0	0	0	0	0	0	0	0	4-10	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
2-19	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.6	2.6	2.6	4-12	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1
2-20	2.0	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	4-14	0.9	0.9	0.9	0.9	1.0	1.1	1.1	1.1	1.1	1.1	1.1	2
2-21	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	4-16	0	0	0	0	0	0	0	0	0	0	0	0
2-22	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	4-18	0	0	0	0	0	0	0	0	0	0	0	0
2-23	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	4-20	0	0	0	0	0	0	0	0	0	0	0	0
2-24	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	4-22	0	0	0	0	0	0	0	0	0	0	0	0
3-1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	4-24	0	0	0	0	0	0	0	0	0	0	0	0
3-2	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	3-hour percentages												
3-3	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	3-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
3-4	2.0	2.0	2.1	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	3-6	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0
3-5	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.4	2.4	3-9	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5	2.5	3
3-6	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3-12	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.5	4.6	4.6	4.6	3
3-7	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	3-15	6.7	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.8	8.8	8.8	9
3-8	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	3-18	3.1	3.2	3.4	3.5	3.6	3.7	3.5	4.0	4.1	4.1	4.1	4
3-9	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	1-21	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	3
3-10	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	1-24	0	0	0	0	0	0	0	0	0	0	0	0
3-11	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2-3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2
3-12	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2-6	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3
3-13	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2-9	0	0	0	0	0	0	0	0	0	0	0	3
3-14	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	2-12	0	0	0	0	0	0	0	0	0	0	0	3
3-15	2.7	2.6	2.6	2.6	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2-15	0.9	0.9	1.0	1.0								

STANDARD PROJECT FLOOD HYDROGRAPH

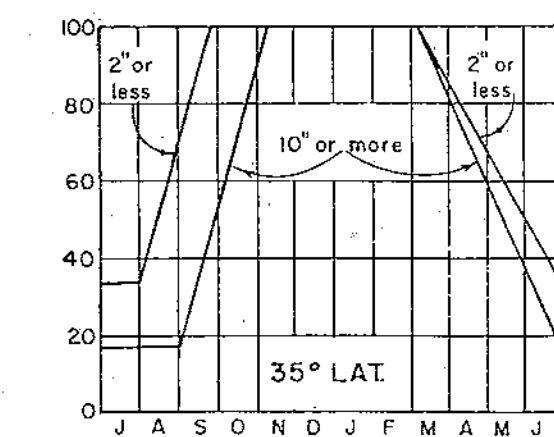
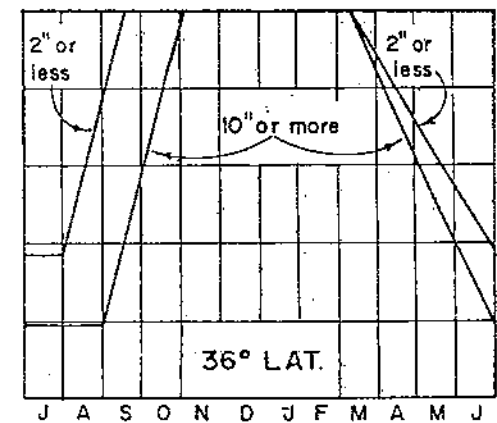
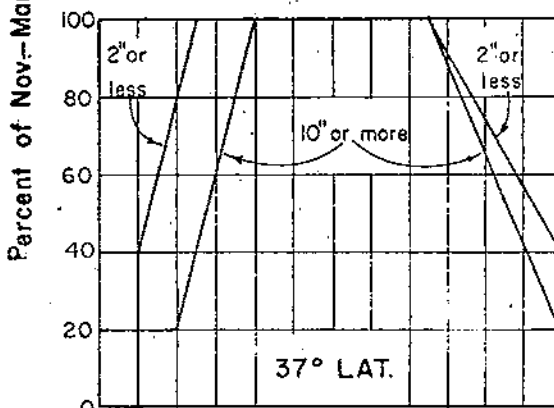
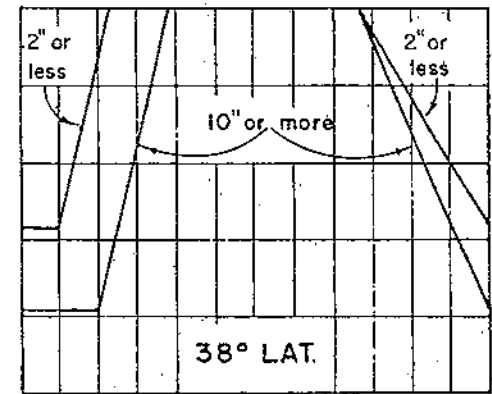
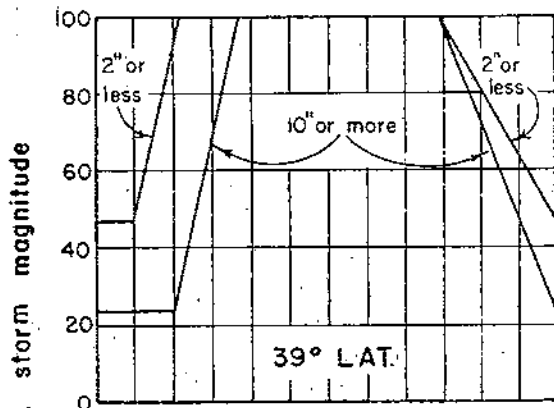
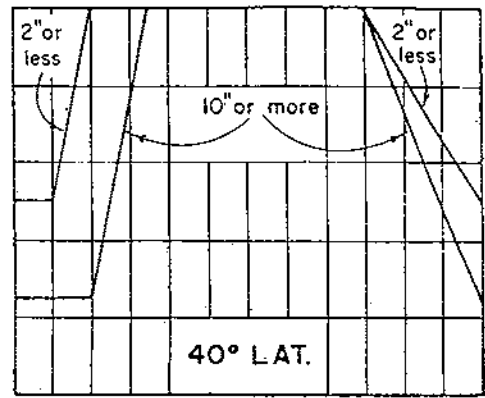
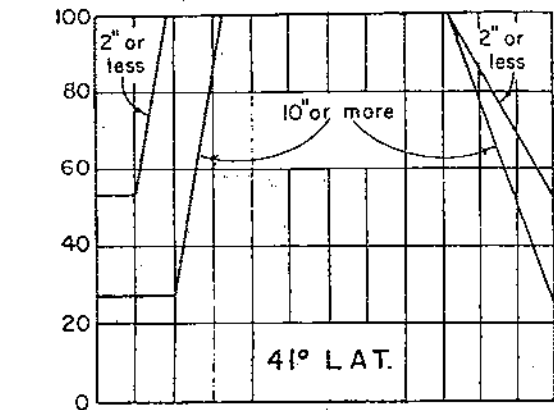
Feather River above Oroville Reservoir, with Concurrent Local
Runoff between Oroville Dam and the Mouth of Yuba River

2-hour average flows in thousand c.f.s.

PERIOD ENDING	OROVILLE INFLOW	LOCAL RUNOFF	PERIOD ENDING	OROVILLE INFLOW	LOCAL RUNOFF	PERIOD ENDING	OROVILLE INFLOW	LOCAL RUNOFF
1-2	42	.2	3-10	254	13.2	5-18	139	1.7
4	40	.4	12	277	15.5	20	134	1.3
6	41	.3	14	300	17.7	22	130	1.2
8	45	.5	16	326	20.4	24	126	.9
10	54	1.0	18	361	23.9	6-2	122	.8
12	69	1.0	20	402	28.1	4	118	.8
14	95	1.1	22	428	30.8	6	114	.7
16	131	1.5	24	440	33.2	8	111	.5
18	163	2.5	4-2	431	36.2	10	107	.4
20	170	3.9	4	411	38.1	12	104	.4
22	158	5.2	6	395	38.4	14	100	.4
24	148	6.6	8	353	36.6	16	97	.4
2-2	133	7.3	10	322	33.3	18	94	.3
4	118	7.3	12	296	31.6	20	91	.3
6	107	6.7	14	281	28.7	22	87	.3
8	99	5.7	16	268	20.6	24	84	.3
10	92	4.8	18	254	17.1	7-2	82	.2
12	90	3.9	20	238	14.2	4	79	.2
14	86	3.2	22	224	11.9	6	76	.2
16	85	2.6	24	210	9.9	8	72	.2
18	88	2.3	5-2	199	8.1	10	70	.2
20	99	2.0	4	189	6.7	12	68	.2
22	128	2.7	6	180	5.6	14	66	.1
24	149	3.4	8	172	4.6	16	64	.1
3-2	173	4.5	10	164	3.7	18	61	.1
4	189	5.9	12	158	3.2	20	59	.1
6	208	8.1	14	151	2.4	22	58	.1
8	230	10.8	16	145	1.9	24	57	.1

NOTES:

1. Local Runoff includes uncontrolled runoff from all local areas contributing to Feather River flows from below Oroville Dam to above the mouth of Yuba River.
2. Local Runoff is concurrent with the standard project flood over the basin above Oroville Dam.



Note:

Parameter is 3-day precipitation exceeded once in 10 years.

OROVILLE DAM AND RESERVOIR
Feather River, California

SEASONAL PRECIPITATION
DISTRIBUTION CRITERIA
CENTRAL VALLEY OF CALIFORNIA

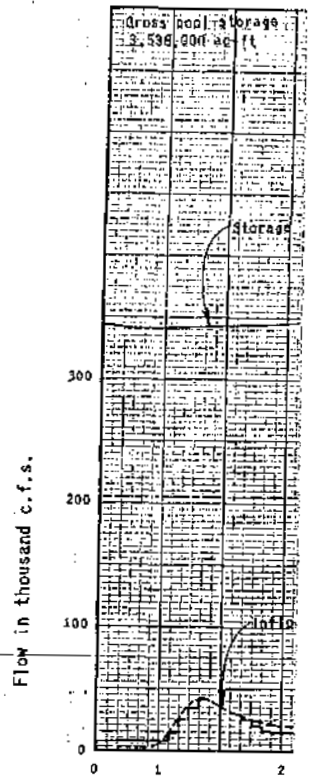
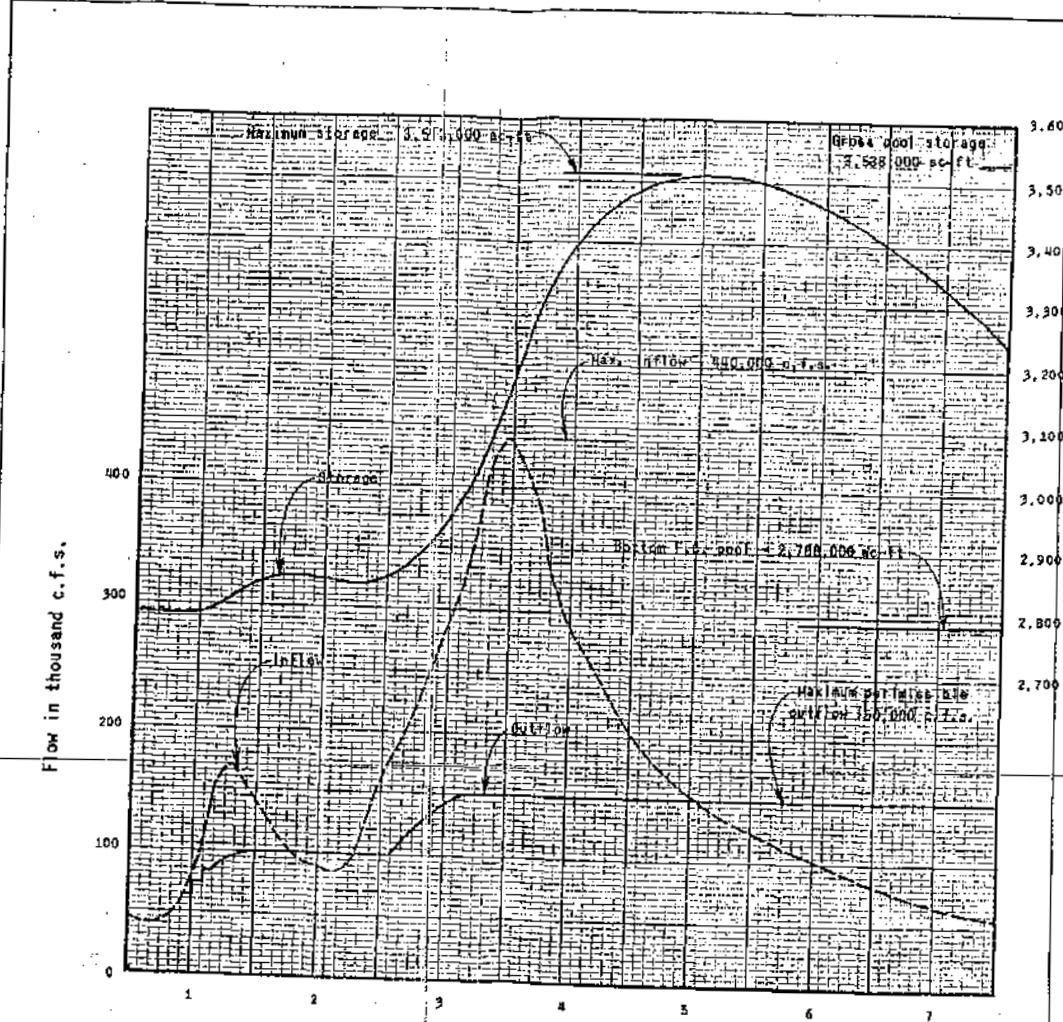
Corps of Engineers

Sacramento, California

L. R. B.

Nov. 1958

CHART 10



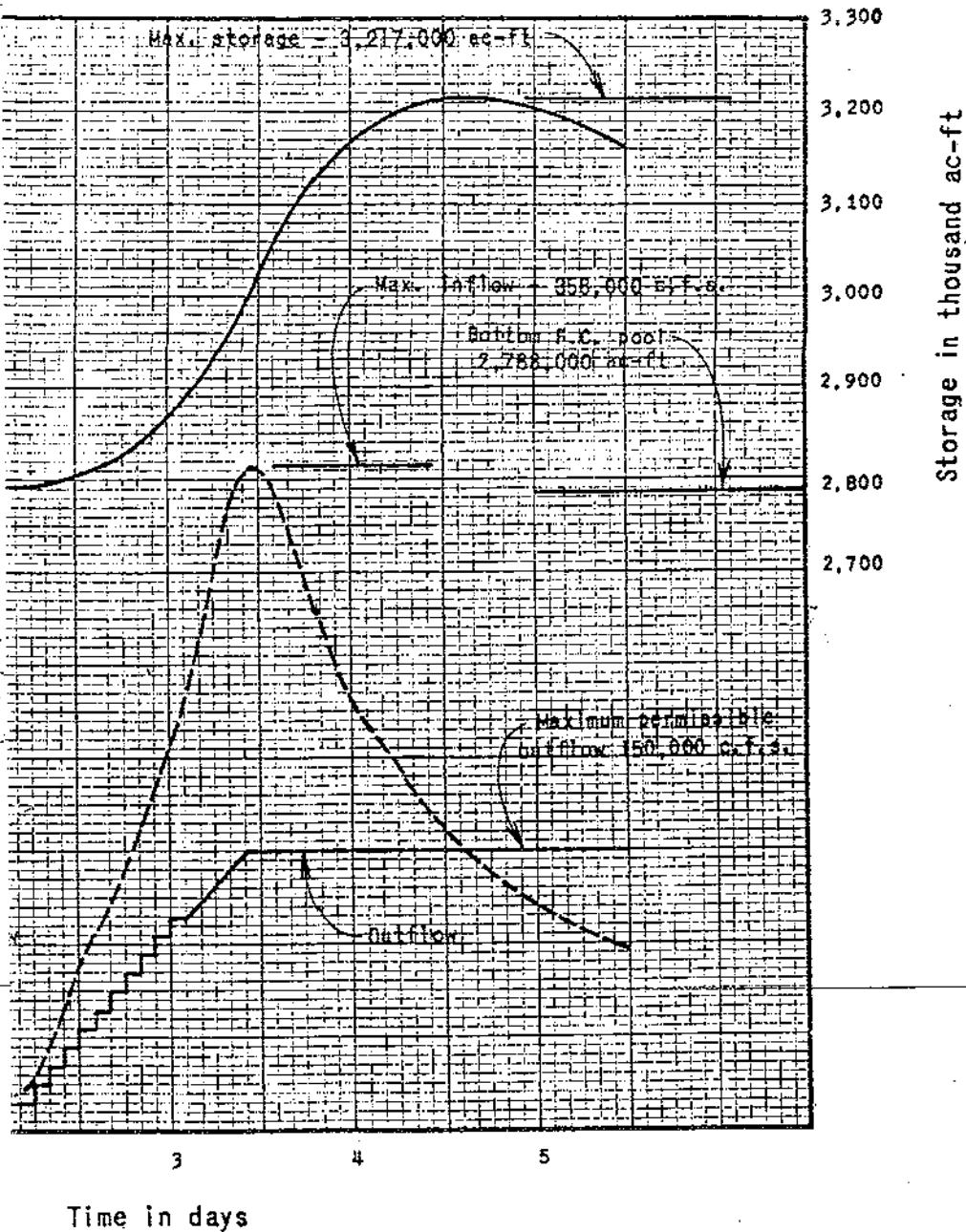
Routing No. 1
Standard Project Storm on Wet Ground

NOTES:

1. Routing No. 1 is based on maxi at bottom of flood control spa 150,000 cfs at elevation 863.5
2. Dry ground conditions are defi January 943 storm.

* Based on Preliminary Reser

Standard



Routing No. 2
Project Storm on Dry Ground

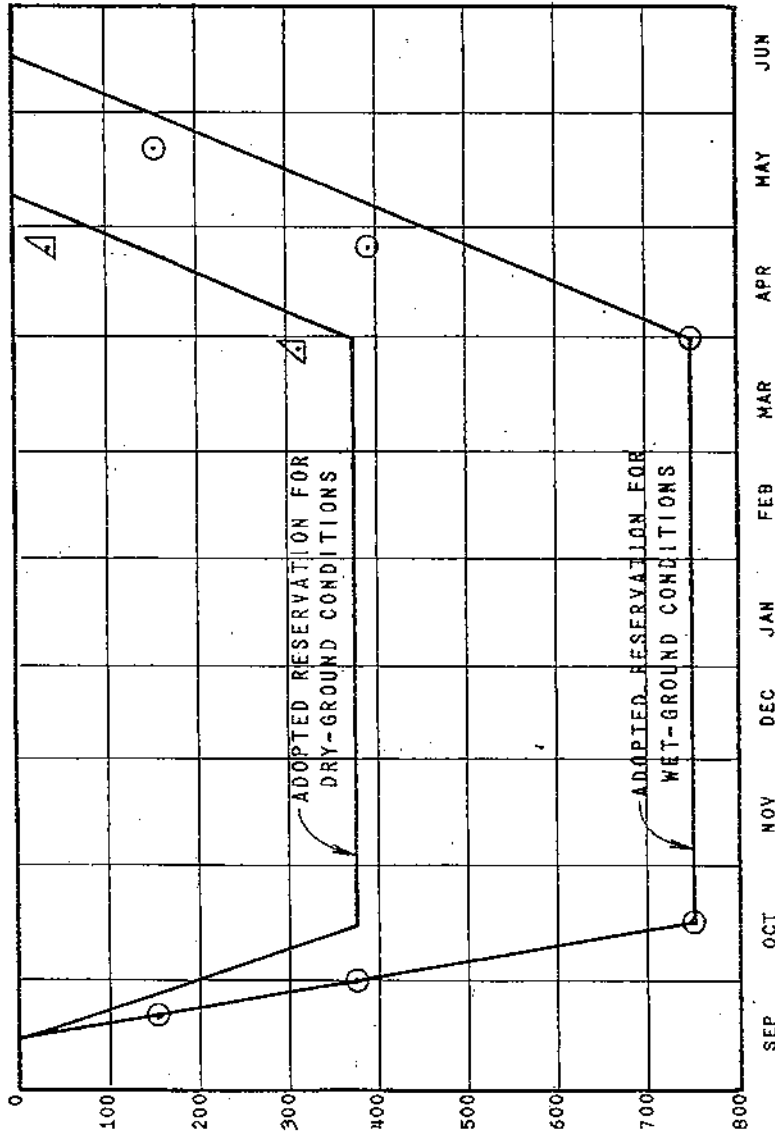
Minimum release capacity of 75,000 cfs
space (750,000 ac-ft empty space) and
ft (535,000 ac-ft empty space).

ned as those observed during

voir data

GROVILLE DAM AND RESERVOIR FEATHER RIVER, CALIFORNIA	
ROUTING OF STANDARD PROJECT FLOOD TO DETERMINE FLOOD CONTROL SPACE REQUIREMENT	
CORPS OF ENGINEERS,	SACRAMENTO, CALIFORNIA
Prepared: J.A.M. Drawn: R.E.Y. & S.K.W.	Date: July 1970

CHART 11



- Requirement under wet-ground conditions
- Δ Requirement under dry-ground conditions

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

OROVILLE RESERVOIR
SEASONAL FLOOD CONTROL
SPACE REQUIREMENT

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R.F.C. Date: June 1970
Drawn: R.E.Y. & S.K.H.

MONTHLY REQUIRED FLOOD CONTROL SPACE
OROVILLE RESERVOIR

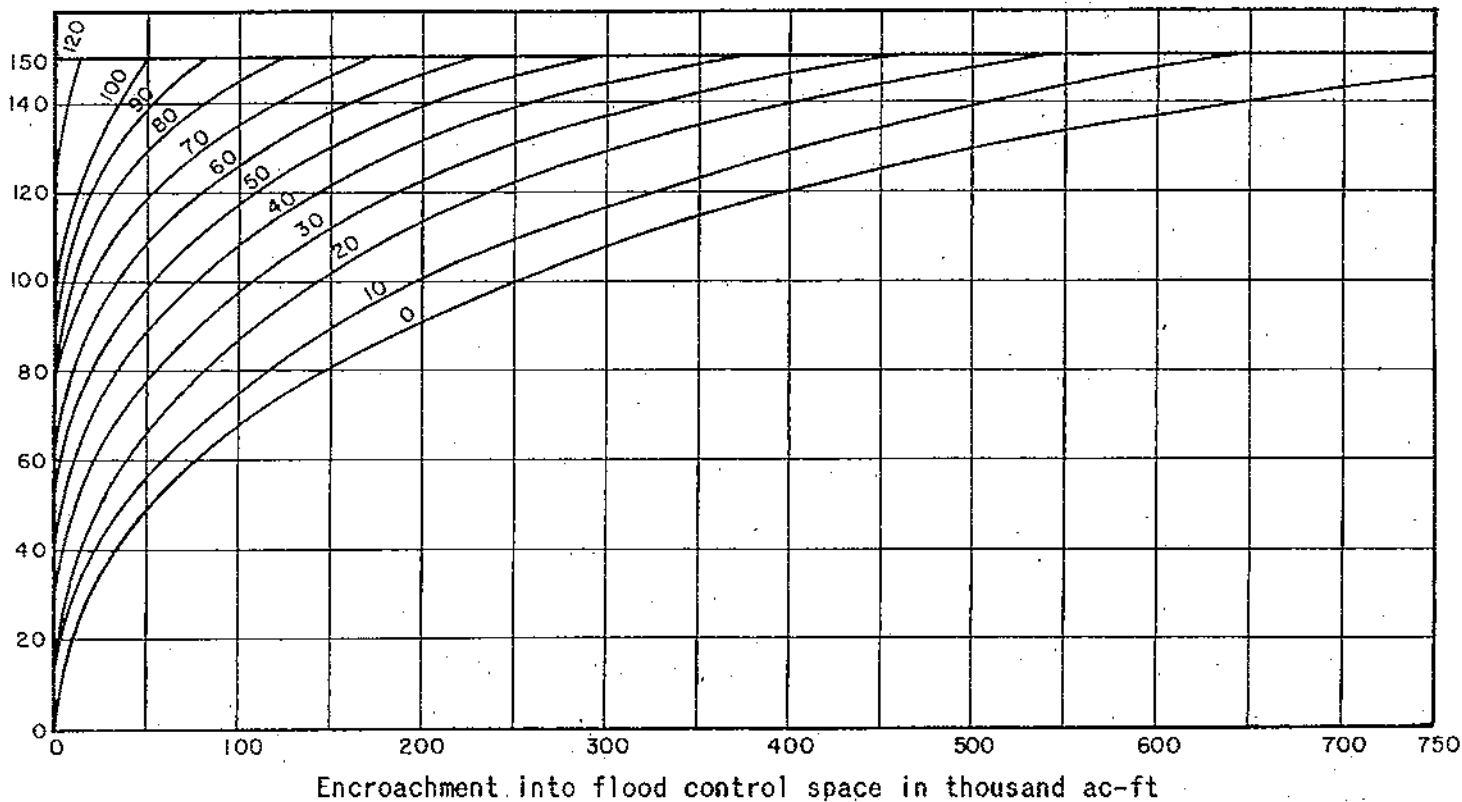
15 JUNE 1970

Flood Control Space in thousand acre-feet at end of month												
Year :	Jan :	Feb :	Mar :	Apr :	May :	Jun :	Jul :	Aug :	Sep :	Oct :	Nov :	Dec :
1906									187.5	375.0	375.0	750.0
1907	750.0	750.0	750.0	293.0	0.0	0.0	0.0	0.0	187.5	375.0	375.0	580.3
1908	592.5	552.7	375.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	404.1	382.1
1909	750.0	750.0	750.0	137.4	0.0	0.0	0.0	0.0	187.5	375.0	495.3	596.0
1910	599.7	593.2	532.4	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1911	750.0	740.7	629.6	178.2	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1912	556.9	390.9	481.9	149.7	0.0	0.0	0.0	0.0	187.5	375.0	442.2	424.9
1913	604.1	463.9	466.6	105.6	0.0	0.0	0.0	0.0	187.5	375.0	546.9	750.0
1914	750.0	750.0	585.7	175.0	0.0	0.0	0.0	0.0	187.5	375.0	375.0	442.6
1915	750.0	750.0	750.0	207.5	0.0	0.0	0.0	0.0	187.5	375.0	375.0	490.7
1916	750.0	735.2	503.9	78.9	0.0	0.0	0.0	0.0	187.5	375.0	398.2	517.9
1917	410.1	750.0	523.3	203.7	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1918	375.0	491.6	641.7	143.2	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1919	464.7	750.0	603.4	116.2	0.0	0.0	0.0	0.0	187.5	375.0	375.0	379.8
1920	375.0	415.0	508.1	160.1	0.0	0.0	0.0	0.0	187.5	375.0	750.0	750.0
1921	750.0	679.8	524.2	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	606.7
1922	432.2	724.8	615.7	91.5	0.0	0.0	0.0	0.0	187.5	375.0	375.0	615.3
1923	561.8	400.6	375.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1924	388.1	441.1	375.0	78.9	0.0	0.0	0.0	0.0	187.5	379.2	375.0	443.2
1925	375.0	641.8	535.4	174.7	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1926	525.8	665.6	392.3	190.1	0.0	0.0	0.0	0.0	187.5	375.0	750.0	491.8
1927	552.5	750.0	538.2	141.8	0.0	0.0	0.0	0.0	187.5	375.0	572.0	492.8
1928	465.6	429.9	740.5	188.1	0.0	0.0	0.0	0.0	187.5	375.0	375.0	404.9
1929	375.0	375.0	375.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	715.4
1930	611.0	565.3	432.7	104.4	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1931	375.0	375.0	378.9	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	750.0
1932	606.3	417.3	375.0	104.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1933	581.7	402.3	457.0	78.9	0.0	0.0	0.0	0.0	187.5	422.3	375.0	596.3
1934	430.0	528.3	442.7	78.9	0.0	0.0	0.0	0.0	187.5	375.0	492.9	482.3
1935	573.0	535.2	511.0	303.1	0.0	0.0	0.0	0.0	187.5	375.0	375.0	394.3
1936	587.9	750.0	583.3	129.6	0.0	0.0	0.0	0.0	187.5	375.0	375.0	395.0
1937	524.9	638.0	633.8	152.2	0.0	0.0	0.0	0.0	187.5	375.0	672.3	670.6
1938	613.7	750.0	750.0	260.8	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1939	403.3	375.0	404.8	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	383.8
1940	667.8	750.0	750.0	299.7	0.0	0.0	0.0	0.0	187.5	375.0	375.0	750.0
1941	750.0	750.0	619.8	203.2	0.0	0.0	0.0	0.0	187.5	375.0	375.0	750.0
1942	750.0	731.8	479.8	257.0	0.0	0.0	0.0	0.0	187.5	375.0	452.2	571.3
1943	750.0	647.3	600.3	188.0	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1944	437.5	621.3	468.9	112.3	0.0	0.0	0.0	0.0	187.5	375.0	506.1	555.8
1945	421.1	556.4	515.9	78.9	0.0	0.0	0.0	0.0	187.5	519.4	590.7	750.0
1946	531.0	473.8	475.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	530.9	461.1
1947	375.0	438.7	555.6	90.9	0.0	0.0	0.0	0.0	187.5	456.6	375.0	375.0
1948	397.9	375.0	574.2	453.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	426.5
1949	375.0	434.0	533.9	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1950	655.7	602.6	597.3	164.9	0.0	0.0	0.0	0.0	187.5	553.9	750.0	671.8
1951	691.8	612.2	432.3	103.0	0.0	0.0	0.0	0.0	187.5	375.0	539.8	750.0
1952	750.0	705.4	549.4	86.0	0.0	0.0	0.0	0.0	187.5	375.0	375.0	619.3
1953	728.2	436.9	478.5	253.7	0.0	0.0	0.0	0.0	187.5	375.0	422.5	375.0
1954	619.8	634.2	594.2	246.1	0.0	0.0	0.0	0.0	187.5	375.0	375.0	463.1
1955	442.3	432.6	375.0	171.1	0.0	0.0	0.0	0.0	187.5	375.0	380.9	750.0
1956	750.0	750.0	519.9	110.8	0.0	0.0	0.0	0.0	187.5	458.0	375.0	375.0
1957	421.2	690.4	548.1	149.1	0.0	0.0	0.0	0.0	187.5	381.5	375.0	541.8
1958	677.9	750.0	750.0	302.6	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1959	559.2	698.4	483.4	78.9	0.0	0.0	0.0	0.0	187.5	375.0	375.0	375.0
1960	572.8	601.7	628.8	173.0	0.0	0.0	0.0	0.0	187.5	375.0	536.2	420.7
1961	482.6	460.8	516.7	121.7	0.0	0.0	0.0	0.0	187.5	375.0	457.0	431.5
1962	421.8	750.0	602.0	112.0	0.0	0.0	0.0	0.0	187.5	698.6	527.8	487.0
1963	597.2	480.7	610.9	357.9	0.0	0.0	0.0	0.0	187.5	375.0	513.2	375.0
1964	503.3	375.0	375.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	469.9	750.0
1965	750.0	540.2	441.8	183.7	0.0	0.0	0.0	0.0	187.5	375.0	594.4	591.3
1966	522.6	437.8	375.0	78.9	0.0	0.0	0.0	0.0	187.5	375.0	624.0	564.4
1967	750.0	586.8	690.2	302.0	0.0	0.0	0.0	0.0	187.5	375.0	375.8	396.7
1968	614.9	575.7	501.1	78.9								

Feather River Basin, California

R.F.C.

Release during next 2-hour period in thousand c.f.s.



NOTES:

1. For use only when peak inflow is past or no large increase in inflow is anticipated.
2. Parameter is current inflow in thousand c.f.s.
3. This chart should be used for determining reductions in outflows. Reduction of releases should be limited to 5,000 c.f.s. in any two hour period.

ORVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

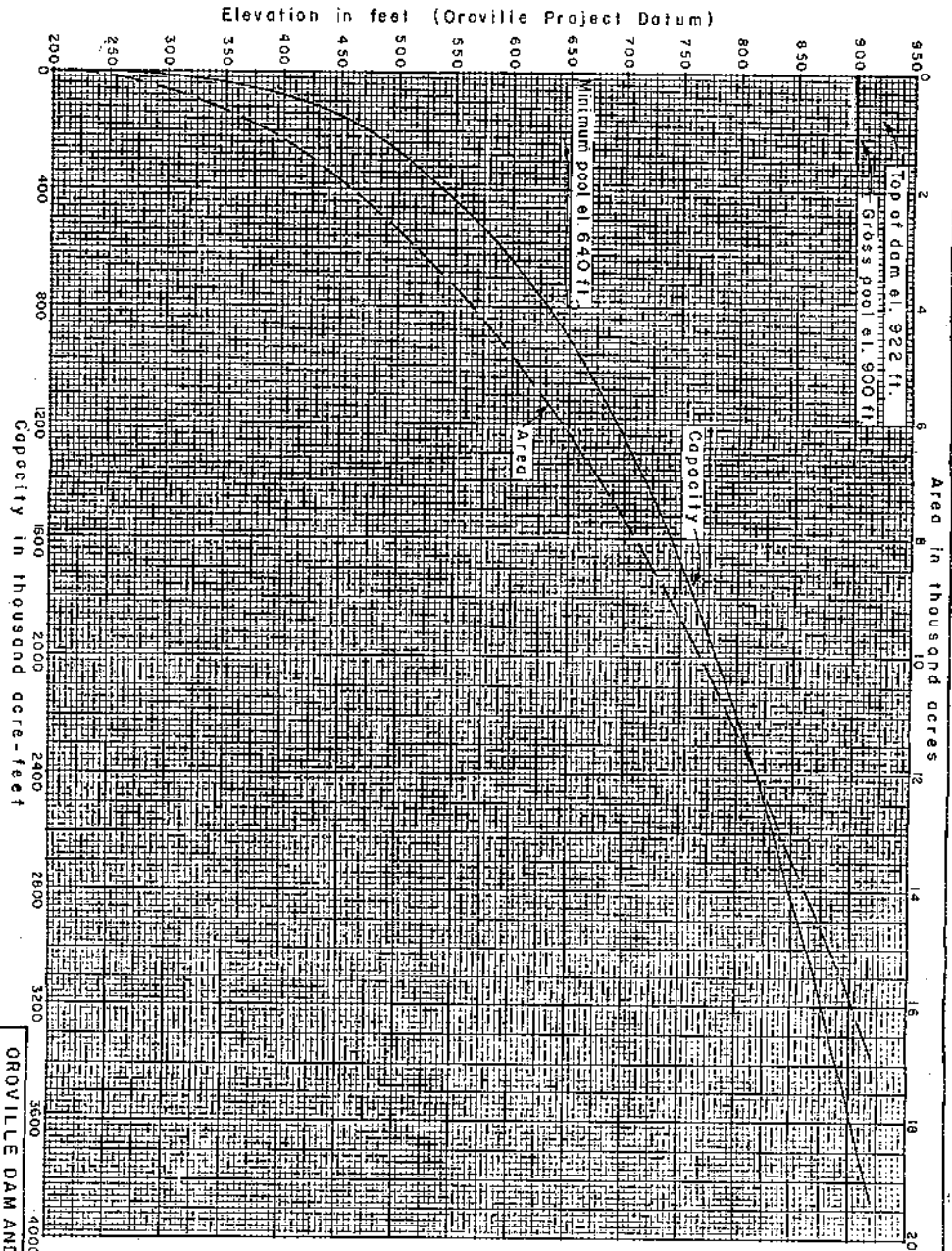
CRITERIA FOR REDUCTION
OF
FLOOD RELEASES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: J.D.C.

Date: February 1969

Drawn: R.E.Y.-B.C.



NOTES:
 1. Curves based on data furnished by the State of California.

OROVILLE DAM AND RESERVOIR
 Feather River, California

AREA AND CAPACITY
CURVES

CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
 Prepared: T.V.H. Date: March 1968
 Drawn: L.R.B.

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
210	1	1	1	2	2	2	2	2	2	2	2
211	2	2	3	3	3	3	3	4	4	4	4
212	2	4	5	5	5	6	6	6	6	7	7
213	3	7	8	8	9	9	9	10	10	11	11
214	5	12	12	13	13	14	14	15	15	16	17
215	7	17	18	19	19	20	21	22	23	23	24
216	9	25	26	27	28	29	30	31	32	33	35
217	12	36	37	38	40	41	42	44	45	47	48
218	16	50	51	53	55	56	58	60	62	64	66
219	20	68	70	72	74	76	79	81	84	86	88
220	26	91	94	96	99	102	104	107	110	112	115
221	28	118	121	123	126	129	132	135	138	141	143
222	29	146	149	152	155	158	161	164	167	170	173
223	31	177	180	183	186	189	192	195	199	202	205
224	33	208	212	215	218	222	225	228	232	235	238
225	34	242	245	249	252	256	259	263	266	270	274
226	36	277	281	284	288	292	295	299	303	307	310
227	38	314	318	322	326	329	333	337	341	345	349
228	40	353	357	361	365	369	373	377	381	385	389
229	41	393	398	402	406	410	414	419	423	427	431
230	43	436	440	444	449	453	458	462	466	471	475
231	45	480	484	489	493	498	503	507	512	516	521
232	47	526	531	535	540	545	550	554	559	564	569
233	49	574	579	583	588	593	598	603	608	613	618
234	51	623	628	633	639	644	649	654	659	664	670
235	52	675	680	685	691	696	701	707	712	717	723
236	54	728	734	739	745	750	756	761	767	772	778
237	56	784	789	795	800	806	812	818	823	829	835
238	58	841	847	852	858	864	870	876	882	888	894
239	60	900	906	912	918	924	930	936	942	948	955
240	62	961	967	973	980	986	992	999	1,005	1,011	1,018
241	65	1,024	1,031	1,037	1,044	1,051	1,057	1,064	1,071	1,077	1,084
242	68	1,091	1,098	1,105	1,112	1,118	1,125	1,132	1,139	1,146	1,154
243	71	1,161	1,168	1,175	1,182	1,189	1,197	1,204	1,211	1,219	1,226
244	75	1,234	1,241	1,249	1,256	1,264	1,271	1,279	1,287	1,294	1,302
245	78	1,310	1,318	1,325	1,333	1,341	1,349	1,357	1,365	1,373	1,381
246	81	1,389	1,398	1,406	1,414	1,422	1,430	1,439	1,447	1,456	1,464
247	85	1,472	1,481	1,489	1,498	1,507	1,515	1,524	1,533	1,541	1,550
248	88	1,559	1,568	1,577	1,586	1,594	1,603	1,612	1,622	1,631	1,640
249	92	1,649	1,658	1,667	1,677	1,686	1,695	1,705	1,714	1,724	1,733
250	96	1,743	1,752	1,762	1,771	1,781	1,791	1,801	1,810	1,820	1,830
251	99	1,840	1,850	1,860	1,870	1,880	1,890	1,900	1,910	1,921	1,931
252	103	1,941	1,951	1,962	1,972	1,983	1,993	2,004	2,014	2,025	2,035
253	107	2,046	2,057	2,068	2,078	2,089	2,100	2,111	2,122	2,133	2,144
254	111	2,155	2,166	2,177	2,189	2,200	2,211	2,222	2,234	2,245	2,256
255	115	2,268	2,279	2,291	2,303	2,314	2,326	2,338	2,349	2,361	2,373
256	119	2,385	2,397	2,409	2,421	2,433	2,445	2,457	2,469	2,481	2,494
257	123	2,506	2,518	2,531	2,543	2,556	2,568	2,581	2,593	2,606	2,618
258	127	2,631	2,644	2,657	2,670	2,682	2,695	2,708	2,721	2,734	2,747
259	132	2,761	2,774	2,787	2,800	2,814	2,827	2,840	2,854	2,867	2,881
260	136	2,894	2,908	2,922	2,935	2,949	2,963	2,977	2,990	3,004	3,018
261	140	3,032	3,046	3,060	3,074	3,088	3,102	3,117	3,131	3,145	3,159
262	143	3,174	3,188	3,202	3,217	3,231	3,246	3,260	3,275	3,289	3,304
263	147	3,319	3,333	3,348	3,363	3,378	3,392	3,407	3,422	3,437	3,452
264	150	3,467	3,482	3,497	3,512	3,528	3,543	3,558	3,573	3,589	3,604
265	154	3,619	3,635	3,650	3,666	3,681	3,697	3,712	3,728	3,744	3,760
266	158	3,775	3,791	3,807	3,823	3,839	3,855	3,871	3,887	3,903	3,919
267	162	3,935	3,951	3,967	3,984	4,000	4,016	4,033	4,049	4,065	4,082
268	165	4,098	4,115	4,132	4,148	4,165	4,182	4,198	4,215	4,232	4,249
269	169	4,266	4,283	4,300	4,317	4,334	4,351	4,368	4,385	4,402	4,419

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
270	173	4,437	4,454	4,471	4,489	4,506	4,524	4,541	4,559	4,576	4,594
271	177	4,612	4,629	4,647	4,665	4,683	4,700	4,718	4,736	4,754	4,772
272	181	4,790	4,808	4,827	4,845	4,863	4,881	4,900	4,918	4,936	4,955
273	185	4,973	4,992	5,010	5,029	5,047	5,066	5,085	5,103	5,122	5,141
274	189	5,160	5,179	5,197	5,216	5,235	5,254	5,274	5,293	5,312	5,331
275	193	5,350	5,370	5,389	5,408	5,428	5,447	5,467	5,486	5,506	5,525
276	197	5,545	5,565	5,584	5,604	5,624	5,644	5,664	5,684	5,704	5,724
277	201	5,744	5,764	5,784	5,804	5,824	5,844	5,865	5,885	5,905	5,926
278	205	5,946	5,967	5,987	6,008	6,029	6,049	6,070	6,091	6,111	6,132
279	209	6,153	6,174	6,195	6,216	6,237	6,258	6,279	6,300	6,322	6,343
280	213	6,364	6,385	6,407	6,428	6,450	6,471	6,493	6,514	6,536	6,558
281	218	6,580	6,601	6,623	6,645	6,667	6,689	6,711	6,733	6,756	6,778
282	223	6,800	6,822	6,845	6,867	6,890	6,912	6,935	6,957	6,980	7,003
283	228	7,026	7,048	7,071	7,094	7,117	7,140	7,163	7,186	7,210	7,233
284	233	7,256	7,279	7,303	7,326	7,350	7,373	7,397	7,421	7,444	7,468
285	238	7,492	7,516	7,540	7,564	7,588	7,612	7,636	7,660	7,684	7,708
286	244	7,733	7,757	7,782	7,806	7,831	7,855	7,880	7,905	7,929	7,954
287	249	7,979	8,004	8,029	8,054	8,079	8,104	8,129	8,154	8,180	8,205
288	254	8,230	8,256	8,281	8,307	8,332	8,358	8,384	8,410	8,435	8,461
289	260	8,487	8,513	8,539	8,565	8,591	8,618	8,644	8,670	8,697	8,723
290	265	8,749	8,776	8,803	8,829	8,856	8,883	8,909	8,936	8,963	8,990
291	270	9,017	9,044	9,071	9,098	9,126	9,153	9,180	9,208	9,235	9,263
292	276	9,290	9,318	9,346	9,373	9,401	9,429	9,457	9,485	9,513	9,541
293	282	9,569	9,597	9,625	9,654	9,682	9,710	9,739	9,767	9,796	9,825
294	287	9,853	9,882	9,911	9,940	9,969	9,998	10,027	10,056	10,085	10,114
295	293	10,143	10,173	10,202	10,231	10,261	10,290	10,320	10,350	10,379	10,409
296	299	10,439	10,469	10,499	10,529	10,559	10,589	10,619	10,649	10,680	10,710
297	304	10,740	10,771	10,801	10,832	10,863	10,893	10,924	10,955	10,986	11,017
298	310	11,048	11,079	11,110	11,141	11,172	11,203	11,235	11,266	11,298	11,329
299	316	11,361	11,392	11,424	11,456	11,488	11,520	11,552	11,584	11,616	11,648
300	322	11,680	11,712	11,744	11,777	11,809	11,842	11,874	11,907	11,939	11,972
301	328	12,005	12,038	12,070	12,103	12,136	12,169	12,202	12,236	12,269	12,302
302	333	12,335	12,369	12,402	12,436	12,469	12,503	12,536	12,570	12,604	12,638
303	339	12,672	12,706	12,740	12,774	12,808	12,842	12,876	12,910	12,945	12,979
304	345	13,014	13,048	13,083	13,117	13,152	13,187	13,222	13,257	13,291	13,326
305	351	13,361	13,397	13,432	13,467	13,502	13,538	13,573	13,608	13,644	13,680
306	357	13,715	13,751	13,787	13,822	13,858	13,894	13,930	13,966	14,002	14,038
307	362	14,075	14,111	14,147	14,184	14,220	14,257	14,293	14,330	14,367	14,403
308	368	14,440	14,477	14,514	14,551	14,588	14,625	14,662	14,700	14,737	14,774
309	374	14,812	14,849	14,887	14,924	14,962	15,000	15,038	15,075	15,113	15,151
310	380	15,189	15,227	15,265	15,304	15,342	15,380	15,419	15,457	15,496	15,534
311	387	15,573	15,611	15,650	15,689	15,728	15,767	15,806	15,845	15,884	15,923
312	393	15,962	16,002	16,041	16,081	16,120	16,160	16,199	16,239	16,279	16,318
313	399	16,358	16,398	16,438	16,478	16,518	16,558	16,599	16,639	16,679	16,720
314	405	16,760	16,801	16,841	16,882	16,923	16,964	17,004	17,045	17,086	17,127
315	411	17,168	17,210	17,251	17,292	17,333	17,375	17,416	17,458	17,499	17,541
316	418	17,583	17,625	17,666	17,708	17,750	17,792	17,834	17,877	17,919	17,961
317	424	18,004	18,046	18,088	18,131	18,174	18,216	18,259	18,302	18,345	18,388
318	430	18,431	18,474	18,517	18,560	18,603	18,647	18,690	18,733	18,777	18,820
319	437	18,864	18,908	18,952	18,995	19,039	19,083	19,127	19,171	19,215	19,260
320	443	19,304	19,348	19,393	19,437	19,482	19,526	19,571	19,616	19,661	19,705
321	450	19,750	19,795	19,841	19,886	19,931	19,976	20,022	20,067	20,113	20,158
322	457	20,204	20,250	20,295	20,341	20,387	20,433	20,479	20,526	20,572	20,618
323	464	20,665	20,711	20,758	20,804	20,851	20,898	20,944	20,991	21,038	21,085
324	472	21,132	21,180	21,227	21,274	21,322	21,369	21,417	21,464	21,512	21,560
325	479	21,607	21,655	21,703	21,751	21,800	21,848	21,896	21,944	21,993	22,041
326	486	22,090	22,138	22,187	22,236	22,285	22,334	22,383	22,432	22,481	22,530
327	493	22,580	22,629	22,678	22,727	22,776	22,825	22,874	22,923	22,972	23,021
328	501	23,077	23,127	23,177	23,227	23,276	23,326	23,375	23,425	23,474	23,524
329	508	23,581	23,632	23,683	23,734	23,785	23,836	23,887	23,938	23,990	24,042

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA
AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
330	516	24,093	24,145	24,197	24,248	24,300	24,352	24,404	24,456	24,508	24,561
331	523	24,613	24,665	24,718	24,770	24,823	24,875	24,928	24,981	25,034	25,087
332	531	25,140	25,193	25,246	25,300	25,353	25,407	25,460	25,514	25,567	25,621
333	539	25,675	25,729	25,783	25,837	25,891	25,945	25,999	26,054	26,108	26,163
334	546	26,217	26,272	26,327	26,382	26,437	26,492	26,547	26,602	26,657	26,712
335	554	26,768	26,823	26,879	26,934	26,990	27,046	27,102	27,158	27,214	27,270
336	562	27,326	27,382	27,438	27,495	27,551	27,608	27,664	27,721	27,778	27,835
337	570	27,892	27,949	28,006	28,063	28,120	28,178	28,235	28,293	28,350	28,408
338	578	28,466	28,524	28,581	28,639	28,698	28,756	28,814	28,872	28,931	28,989
339	586	29,048	29,106	29,165	29,224	29,283	29,342	29,401	29,460	29,519	29,578
340	594	29,638	29,697	29,756	28,816	29,876	29,936	29,995	30,055	30,115	30,175
341	602	30,236	30,296	30,356	30,416	30,477	30,537	30,598	30,659	30,720	30,780
342	610	30,841	30,902	30,964	31,025	31,086	31,147	31,209	31,270	31,332	31,394
343	618	31,455	31,517	31,579	31,641	31,703	31,765	31,827	31,890	31,952	32,015
344	626	32,077	32,140	32,203	32,265	32,328	32,391	32,454	32,517	32,581	32,644
345	634	32,707	32,771	32,834	32,898	32,961	33,025	33,089	33,153	33,217	33,281
346	642	33,345	33,410	33,474	33,538	33,603	33,667	33,732	33,797	33,862	33,926
347	650	33,991	34,057	34,122	34,187	34,252	34,318	34,383	34,449	34,514	34,580
348	659	34,646	34,712	34,778	34,844	34,910	34,976	35,043	35,109	35,175	35,242
349	667	35,309	35,375	35,442	35,509	35,576	35,643	35,710	35,777	35,845	35,912
350	675	35,980	36,047	36,115	36,183	36,250	36,318	36,386	36,454	36,522	36,591
351	684	36,659	36,727	36,796	36,864	36,933	37,002	37,071	37,140	37,209	37,278
352	692	37,347	37,416	37,485	37,555	37,624	37,694	37,764	37,833	37,903	37,973
353	700	38,043	38,113	38,183	38,254	38,324	38,394	38,465	38,535	38,606	38,677
354	709	38,748	38,819	38,890	38,961	39,032	39,103	39,175	39,246	39,318	39,389
355	718	39,461	39,533	39,605	39,677	39,749	39,821	39,893	39,965	40,038	40,110
356	726	40,183	40,255	40,328	40,401	40,474	40,547	40,620	40,693	40,766	40,840
357	735	40,913	40,987	41,060	41,134	41,208	41,282	41,356	41,430	41,504	41,578
358	744	41,652	41,727	41,801	41,876	41,951	42,025	42,100	42,175	42,250	42,325
359	752	42,400	42,476	42,551	42,626	42,702	42,778	42,853	42,929	43,005	43,081
360	761	43,157	43,233	43,309	43,386	43,462	43,539	43,615	43,692	43,769	43,846
361	770	43,922	44,000	44,077	44,154	44,231	44,309	44,386	44,464	44,541	44,619
362	779	44,697	44,775	44,853	44,931	45,009	45,088	45,166	45,245	45,323	45,402
363	788	45,481	45,560	45,639	45,718	45,797	45,876	45,956	46,035	46,114	46,194
364	798	46,274	46,354	46,433	46,513	46,594	46,674	46,754	46,834	46,915	46,995
365	807	47,076	47,157	47,238	47,318	47,399	47,481	47,562	47,643	47,724	47,806
366	816	47,887	47,969	48,051	48,133	48,215	48,297	48,379	48,461	48,543	48,626
367	826	48,708	48,791	48,874	48,956	49,039	49,122	49,205	49,289	49,372	49,455
368	835	49,539	49,622	49,706	49,789	49,873	49,957	50,041	50,125	50,210	50,294
369	844	50,378	50,463	50,547	50,632	50,717	50,802	50,887	50,972	51,057	51,142
370	854	51,227	51,313	51,398	51,484	51,570	51,656	51,742	51,828	51,914	52,000
371	864	52,086	52,173	52,259	52,346	52,432	52,519	52,606	52,693	52,780	52,867
372	873	52,955	53,042	53,129	53,217	53,305	53,392	53,480	53,568	53,656	53,744
373	883	53,832	53,921	54,009	54,098	54,186	54,275	54,364	54,453	54,542	54,631
374	893	54,720	54,809	54,899	54,988	55,078	55,168	55,257	55,347	55,437	55,527
375	902	55,618	55,708	55,798	55,889	55,979	56,070	56,161	56,252	56,343	56,434
376	912	56,525	56,616	56,708	56,799	56,891	56,982	57,074	57,166	57,258	57,350
377	922	57,442	57,534	57,627	57,719	57,812	57,904	57,997	58,090	58,183	58,276
378	932	58,369	58,462	58,556	58,649	58,743	58,836	58,930	59,024	59,118	59,212
379	942	59,306	59,400	59,495	59,589	59,684	59,778	59,873	59,968	60,063	60,158
380	952	60,253	60,348	60,444	60,539	60,635	60,730	60,826	60,922	61,018	61,114
381	962	61,210	61,307	61,403	61,500	61,596	61,693	61,790	61,887	61,984	62,081
382	973	62,178	62,275	62,373	62,470	62,568	62,666	62,764	62,862	62,960	63,058
383	983	63,156	63,254	63,353	63,451	63,550	63,649	63,748	63,847	63,946	64,045
384	994	64,144	64,244	64,343	64,443	64,543	64,642	64,742	64,842	64,942	65,043
385	1,004	65,143	65,243	65,344	65,445	65,545	65,646	65,747	65,848	65,949	66,051
386	1,014	66,152	66,254	66,355	66,457	66,559	66,661	66,763	66,865	66,967	67,069
387	1,025	67,172	67,274	67,377	67,480	67,583	67,686	67,789	67,892	67,995	68,098
388	1,036	68,202	68,306	68,409	68,513	68,617	68,721	68,825	68,929	69,034	69,138
389	1,046	69,243	69,347	69,452	69,557	69,662	69,767	69,872	69,978	70,083	70,189
390	1,057	70,294	70,400	70,506	70,612	70,718	70,824	70,930	71,037	71,143	71,250

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
391	1.068	71,356	71,463	71,570	71,677	71,784	71,891	71,999	72,106	72,214	72,321
392	1.078	72,429	72,537	72,645	72,753	72,861	72,970	73,078	73,187	73,295	73,404
393	1.089	73,513	73,622	73,731	73,840	73,949	74,059	74,168	74,278	74,388	74,497
394	1.100	74,607	74,717	74,828	74,938	75,048	75,159	75,269	75,380	75,491	75,602
395	1.111	75,713	75,824	75,935	76,047	76,158	76,270	76,381	76,493	76,605	76,717
396	1.122	76,829	76,942	77,054	77,166	77,279	77,392	77,504	77,617	77,730	77,843
397	1.133	77,957	78,070	78,184	78,297	78,411	78,525	78,638	78,753	78,867	78,981
398	1.144	79,095	79,210	79,324	79,439	79,554	79,669	79,784	79,899	80,014	80,129
399	1.155	80,245	80,360	80,476	80,592	80,708	80,824	80,940	81,056	81,173	81,289
400	1.166	81,406	81,522	81,639	81,756	81,873	81,990	82,108	82,225	82,343	82,460
401	1.179	82,578	82,696	82,814	82,932	83,051	83,169	83,288	83,406	83,525	83,644
402	1.191	83,763	83,882	84,002	84,121	84,241	84,360	84,480	84,600	84,720	84,840
403	1.204	84,961	85,081	85,202	85,322	85,443	85,564	85,685	85,806	85,928	86,049
404	1.216	86,171	86,292	86,414	86,536	86,658	86,781	86,903	87,025	87,148	87,271
405	1.229	87,393	87,516	87,639	87,763	87,886	88,009	88,133	88,257	88,381	88,505
406	1.242	88,629	88,753	88,877	89,002	89,126	89,251	89,376	89,501	89,626	89,751
407	1.254	89,877	90,002	90,128	90,254	90,379	90,505	90,632	90,758	90,884	91,011
408	1.267	91,137	91,264	91,391	91,518	91,645	91,773	91,900	92,028	92,155	92,283
409	1.280	92,411	92,539	92,667	92,796	92,924	93,053	93,181	93,310	93,439	93,568
410	1.293	93,698	93,827	93,956	94,086	94,216	94,346	94,476	94,606	94,736	94,867
411	1.306	94,997	95,128	95,259	95,390	95,521	95,652	95,783	95,915	96,046	96,178
412	1.319	96,310	96,442	96,574	96,706	96,839	96,971	97,104	97,237	97,369	97,502
413	1.332	97,636	97,769	97,902	98,036	98,170	98,304	98,437	98,572	98,706	98,840
414	1.346	98,975	99,109	99,244	99,379	99,514	99,649	99,784	99,920	100,055	100,191
415	1.359	100,327	100,463	100,599	100,735	100,872	101,008	101,145	101,282	101,418	101,555
416	1.372	101,693	101,830	101,967	102,105	102,243	102,380	102,518	102,657	102,795	102,933
417	1.386	103,072	103,210	103,349	103,488	103,627	103,766	103,906	104,045	104,185	104,324
418	1.399	104,464	104,604	104,744	104,885	105,025	105,166	105,306	105,447	105,588	105,729
419	1.413	105,870	106,012	106,153	106,295	106,437	106,578	106,721	106,863	107,005	107,147
420	1.427	107,290	107,433	107,576	107,719	107,862	108,005	108,149	108,292	108,436	108,580
421	1.441	108,724	108,868	109,012	109,157	109,302	109,446	109,591	109,736	109,882	110,027
422	1.456	110,172	110,318	110,464	110,610	110,756	110,902	111,049	111,195	111,342	111,489
423	1.470	111,636	111,783	111,930	112,077	112,225	112,373	112,521	112,669	112,817	112,965
424	1.485	113,113	113,262	113,411	113,560	113,709	113,858	114,007	114,157	114,306	114,456
425	1.500	114,606	114,756	114,906	115,057	115,207	115,358	115,509	115,660	115,811	115,962
426	1.515	116,114	116,265	116,417	116,569	116,721	116,873	117,025	117,178	117,331	117,483
427	1.530	117,636	117,789	117,943	118,096	118,250	118,403	118,557	118,711	118,865	119,019
428	1.545	119,174	119,328	119,483	119,638	119,793	119,948	120,104	120,259	120,415	120,571
429	1.560	120,727	120,883	121,039	121,195	121,352	121,509	121,666	121,823	121,980	122,137
430	1.576	122,295	122,452	122,610	122,768	122,926	123,084	123,243	123,401	123,560	123,719
431	1.591	123,878	124,037	124,196	124,356	124,516	124,675	124,835	124,995	125,156	125,316
432	1.606	125,477	125,637	125,798	125,959	126,120	126,282	126,443	126,605	126,767	126,929
433	1.622	127,091	127,253	127,416	127,578	127,741	127,904	128,067	128,230	128,393	128,557
434	1.638	128,721	128,884	129,048	129,212	129,377	129,541	129,706	129,871	130,036	130,201
435	1.653	130,366	130,531	130,697	130,863	131,028	131,194	131,361	131,527	131,693	131,860
436	1.669	132,027	132,194	132,361	132,528	132,696	132,863	133,031	133,199	133,367	133,535
437	1.685	133,704	133,872	134,041	134,210	134,379	134,548	134,717	134,887	135,057	135,227
438	1.701	135,397	135,567	135,737	135,907	136,078	136,249	136,420	136,591	136,762	136,934
439	1.717	137,105	137,277	137,449	137,621	137,793	137,966	138,138	138,311	138,484	138,657
440	1.733	138,830	139,003	139,177	139,350	139,524	139,698	139,872	140,046	140,220	140,395
441	1.747	140,569	140,744	140,919	141,094	141,269	141,444	141,620	141,795	141,971	142,147
442	1.761	142,323	142,499	142,676	142,852	143,029	143,206	143,383	143,560	143,737	143,914
443	1.776	144,092	144,270	144,448	144,626	144,804	144,982	145,161	145,339	145,518	145,697
444	1.791	145,876	146,055	146,234	146,414	146,594	146,773	146,953	147,133	147,314	147,494
445	1.806	147,675	147,855	148,036	148,217	148,398	148,580	148,761	148,943	149,125	149,306
446	1.822	149,489	149,671	149,853	150,036	150,218	150,401	150,584	150,767	150,951	151,134
447	1.837	151,318	151,501	151,685	151,869	152,053	152,238	152,422	152,607	152,792	152,977
448	1.852	153,162	153,347	153,533	153,718	153,904	154,090	154,276	154,462	154,648	154,835
449	1.867	155,021	155,208	155,395	155,582	155,769	155,957	156,144	156,332	156,520	156,708
450	1.882	156,896	157,085	157,273	157,462	157,650	157,839	158,029	158,218	158,407	158,597

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
451	1,898	158,786	158,976	159,166	159,357	159,547	159,737	159,928	160,119	160,310	160,501
452	1,914	160,692	160,884	161,075	161,267	161,459	161,651	161,843	162,035	162,228	162,421
453	1,929	162,613	162,806	163,000	163,193	163,386	163,580	163,774	163,968	164,162	164,356
454	1,945	164,550	164,745	164,939	165,134	165,329	165,525	165,720	165,915	166,111	166,307
455	1,960	166,503	166,699	166,895	167,092	167,288	167,485	167,682	167,879	168,076	168,273
456	1,976	168,471	168,669	168,866	169,064	169,263	169,461	169,659	169,858	170,057	170,256
457	1,992	170,455	170,654	170,854	171,053	171,253	171,453	171,653	171,853	172,054	172,254
458	2,008	172,455	172,656	172,857	173,058	173,259	173,461	173,662	173,864	174,066	174,268
459	2,024	174,471	174,673	174,876	175,078	175,281	175,484	175,688	175,891	176,095	176,298
460	2,040	176,502	176,706	176,911	177,115	177,320	177,524	177,729	177,934	178,139	178,345
461	2,055	178,550	178,756	178,961	179,167	179,373	179,579	179,786	179,992	180,199	180,406
462	2,070	180,613	180,820	181,027	181,234	181,442	181,649	181,857	182,065	182,273	182,482
463	2,085	182,690	182,899	183,107	183,316	183,525	183,734	183,944	184,153	184,363	184,572
464	2,100	184,782	184,992	185,203	185,413	185,624	185,834	186,045	186,256	186,467	186,678
465	2,115	186,890	187,101	187,313	187,525	187,737	187,949	188,161	188,374	188,586	188,799
466	2,130	189,012	189,225	189,438	189,652	189,865	190,079	190,293	190,507	190,721	190,935
467	2,145	191,149	191,364	191,579	191,794	192,009	192,224	192,439	192,654	192,870	193,086
468	2,160	193,302	193,518	193,734	193,951	194,167	194,384	194,601	194,818	195,035	195,252
469	2,175	195,469	195,687	195,905	196,123	196,341	196,559	196,777	196,996	197,214	197,433
470	2,190	197,652	197,871	198,091	198,310	198,530	198,749	198,969	199,189	199,410	199,630
471	2,206	199,850	200,071	200,292	200,513	200,734	200,955	201,177	201,398	201,620	201,842
472	2,221	202,064	202,286	202,508	202,731	202,953	203,176	203,399	203,622	203,846	204,069
473	2,236	204,293	204,516	204,740	204,964	205,188	205,413	205,637	205,862	206,087	206,312
474	2,252	206,537	206,762	206,987	207,213	207,439	207,665	207,891	208,117	208,343	208,570
475	2,267	208,796	209,023	209,250	209,477	209,704	209,932	210,159	210,387	210,615	210,843
476	2,283	211,071	211,300	211,528	211,757	211,986	212,215	212,444	212,673	212,903	213,132
477	2,298	213,362	213,592	213,822	214,052	214,283	214,513	214,744	214,975	215,206	215,437
478	2,314	215,668	215,900	216,131	216,363	216,595	216,827	217,059	217,292	217,524	217,757
479	2,330	217,990	218,223	218,456	218,690	218,923	219,157	219,391	219,625	219,859	220,093
480	2,346	220,328	220,562	220,797	221,032	221,267	221,503	221,738	221,974	222,210	222,446
481	2,363	222,682	222,918	223,155	223,391	223,628	223,865	224,103	224,340	224,577	224,815
482	2,380	225,053	225,291	225,529	225,768	226,006	226,245	226,484	226,723	226,963	227,202
483	2,397	227,442	227,681	227,921	228,162	228,402	228,642	228,883	229,124	229,365	229,606
484	2,415	229,848	230,089	230,331	230,573	230,815	231,057	231,299	231,542	231,785	232,028
485	2,432	232,271	232,514	232,758	233,001	233,245	233,489	233,733	233,978	234,222	234,467
486	2,450	234,712	234,957	235,202	235,447	235,693	235,939	236,185	236,431	236,677	236,923
487	2,467	237,170	237,417	237,664	237,911	238,158	238,406	238,654	238,901	239,149	239,398
488	2,485	239,646	239,895	240,143	240,392	240,641	240,891	241,140	241,390	241,640	241,890
489	2,502	242,140	242,390	242,641	242,891	243,142	243,393	243,644	243,896	244,147	244,399
490	2,520	244,651	244,903	245,156	245,408	245,661	245,914	246,167	246,420	246,673	246,927
491	2,538	247,180	247,434	247,688	247,943	248,197	248,452	248,706	248,961	249,217	249,472
492	2,556	249,727	249,983	250,239	250,495	250,751	251,008	251,264	251,521	251,778	252,035
493	2,574	252,292	252,550	252,808	253,065	253,323	253,582	253,840	254,099	254,357	254,616
494	2,592	254,875	255,135	255,394	255,654	255,914	256,174	256,434	256,694	256,955	257,216
495	2,610	257,476	257,738	257,999	258,260	258,522	258,784	259,046	259,308	259,570	259,833
496	2,628	260,096	260,359	260,622	260,885	261,148	261,412	261,676	261,940	262,204	262,468
497	2,646	262,733	262,998	263,263	263,528	263,793	264,059	264,324	264,590	264,856	265,122
498	2,665	265,389	265,655	265,922	266,189	266,456	266,723	266,991	267,258	267,526	267,794
499	2,683	268,063	268,331	268,600	268,868	269,137	269,406	269,676	269,945	270,215	270,485
500	2,702	270,755	271,025	271,295	271,566	271,836	272,107	272,378	272,649	272,921	273,192
501	2,718	273,464	273,736	274,008	274,280	274,553	274,825	275,098	275,371	275,644	275,918
502	2,736	276,191	276,466	276,739	277,013	277,287	277,562	277,836	278,111	278,386	278,661
503	2,754	278,936	279,212	279,488	279,764	280,040	280,316	280,592	280,869	281,146	281,423
504	2,773	281,700	281,978	282,255	282,533	282,811	283,089	283,367	283,646	283,924	284,203
505	2,791	284,482	284,761	285,041	285,320	285,600	285,880	286,160	286,440	286,721	287,002
506	2,810	287,283	287,564	287,845	288,126	288,408	288,690	288,972	289,254	289,536	289,819
507	2,828	290,101	290,384	290,667	290,951	291,234	291,518	291,802	292,086	292,370	292,654
508	2,847	292,939	293,223	293,508	293,793	294,079	294,364	294,650	294,936	295,222	295,508
509	2,865	295,795	296,081	296,368	296,655	296,942	297,230	297,517	297,805	298,093	298,381
510	2,884	298,669	298,958	299,246	299,535	299,824	300,113	300,403	300,692	300,982	301,272

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
511	2,903	301,562	301,853	302,143	302,434	302,725	303,016	303,307	303,599	303,890	304,182
512	2,921	304,474	304,767	305,059	305,352	305,644	305,937	306,231	306,524	206,817	307,111
513	2,940	307,405	307,699	307,994	308,288	308,583	308,878	309,173	309,468	309,763	310,059
514	2,959	310,355	310,651	310,947	311,243	311,540	311,837	312,134	312,431	312,728	313,026
515	2,978	313,323	313,621	313,919	314,218	314,516	314,815	315,114	315,413	315,712	316,011
516	2,997	316,311	316,611	316,911	317,211	317,511	317,812	318,113	318,414	318,715	319,016
517	3,016	319,318	319,619	319,921	320,223	320,526	320,828	321,131	321,434	321,737	322,040
518	3,035	322,343	322,647	322,951	323,255	323,559	323,863	324,168	324,473	324,778	325,083
519	3,055	325,388	325,694	326,000	326,306	326,612	326,918	327,225	327,531	327,838	328,145
520	3,074	328,453	328,760	329,068	329,376	329,684	329,992	330,300	330,609	330,918	331,227
521	3,092	331,536	331,845	332,155	332,464	332,774	333,084	333,394	333,705	334,015	334,326
522	3,111	334,637	334,948	335,260	335,571	335,883	336,195	336,507	336,819	337,132	337,444
523	3,129	337,757	338,070	338,383	338,697	339,010	339,324	339,638	339,952	340,266	340,581
524	3,148	340,895	341,210	341,525	341,840	342,156	342,471	342,787	343,103	343,419	343,736
525	3,166	344,052	344,369	344,686	345,003	345,320	345,637	345,955	346,273	346,591	346,909
526	3,185	347,227	347,546	347,865	348,184	348,503	348,822	349,141	349,461	349,781	350,101
527	3,203	350,421	350,742	351,062	351,383	351,704	352,025	352,347	352,668	352,990	353,312
528	3,222	353,634	353,956	354,279	354,601	354,924	355,247	355,570	355,894	356,217	356,541
529	3,241	356,865	357,189	357,513	357,838	358,163	358,488	358,813	359,138	359,463	359,789
530	3,259	360,115	360,441	360,767	361,094	361,420	361,747	362,074	362,401	362,728	363,056
531	3,278	363,384	363,712	364,040	364,368	364,696	365,025	365,354	365,683	366,012	366,342
532	3,297	366,671	367,001	367,331	367,661	367,992	368,322	368,653	368,984	369,315	369,646
533	3,316	369,978	370,310	370,641	370,973	371,306	371,638	371,971	372,304	372,637	372,970
534	3,335	373,303	373,637	373,971	374,305	374,639	374,973	375,308	375,642	375,977	376,312
535	3,354	376,648	376,983	377,319	377,655	377,991	378,327	378,664	379,000	379,337	379,674
536	3,373	380,011	380,349	380,686	381,024	381,362	381,700	382,038	382,377	382,716	383,055
537	3,392	383,394	383,733	384,073	384,412	384,752	385,092	385,433	385,773	386,114	386,455
538	3,411	386,796	387,137	387,478	387,820	388,162	388,504	388,846	389,188	389,531	389,874
539	3,431	390,217	390,560	390,903	391,247	391,590	391,934	392,278	392,623	392,967	393,312
540	3,450	393,657	394,002	394,347	394,693	395,039	395,385	395,731	396,078	396,425	396,771
541	3,472	397,119	397,466	397,813	398,161	398,509	398,857	399,206	399,554	399,903	400,253
542	3,493	400,601	400,950	401,300	401,650	402,000	402,350	402,700	403,051	403,402	403,753
543	3,514	404,104	404,456	404,807	405,159	405,511	405,863	406,216	406,569	406,922	407,275
544	3,534	407,628	407,982	408,335	408,689	409,043	409,398	409,752	410,107	410,462	410,817
545	3,555	411,173	411,528	411,884	412,240	412,597	412,953	413,310	413,667	414,024	414,381
546	3,576	414,738	415,096	415,454	415,812	416,171	416,529	416,888	417,247	417,606	417,965
547	3,597	418,325	418,685	419,045	419,405	419,766	420,126	420,487	420,848	421,209	421,571
548	3,618	421,933	422,295	422,657	423,019	423,382	423,744	424,107	424,471	424,834	425,198
549	3,639	425,561	425,925	426,290	426,654	427,019	427,384	427,749	428,114	428,480	428,845
550	3,660	429,211	429,577	429,944	430,310	430,677	431,044	431,411	431,779	432,146	432,514
551	3,682	433,882	433,251	433,619	433,988	434,357	434,726	435,095	435,465	435,834	436,204
552	3,703	436,575	436,945	437,316	437,686	438,057	438,429	438,800	439,172	439,544	439,916
553	3,724	440,288	440,661	441,033	441,406	441,780	442,153	442,527	442,900	443,274	443,649
554	3,746	444,023	444,398	444,773	445,148	445,523	445,899	446,274	446,650	447,027	447,403
555	3,767	447,780	448,156	448,534	448,911	449,288	449,666	450,044	450,422	450,800	451,179
556	3,789	451,558	451,937	452,316	452,695	453,075	453,455	453,835	454,215	454,596	454,976
557	3,810	455,357	455,738	456,120	456,501	456,883	457,265	457,647	458,030	458,412	458,795
558	3,832	459,178	459,562	459,945	460,329	460,713	461,097	461,482	461,866	462,251	462,636
559	3,854	463,021	463,407	463,792	464,178	464,565	464,951	465,337	465,724	466,111	466,498
560	3,876	466,886	467,274	467,661	468,050	468,438	468,826	469,215	469,604	469,993	470,383
561	3,897	470,772	471,162	471,552	471,942	472,333	472,724	473,115	473,506	473,897	474,289
562	3,919	474,680	475,072	475,465	475,857	476,250	476,643	477,036	477,429	477,823	478,217
563	3,941	478,611	479,005	479,399	479,794	480,189	480,584	480,979	481,375	481,770	482,166
564	3,963	482,563	482,959	483,356	483,752	484,150	484,547	484,944	485,342	485,740	486,138
565	3,985	486,537	486,935	487,334	487,733	488,132	488,532	488,932	489,332	489,732	490,132
566	4,007	490,533	490,934	491,335	491,736	492,137	492,539	492,941	493,343	493,746	494,148
567	4,029	494,551	494,954	495,357	495,761	496,165	496,569	496,973	497,377	497,782	498,187
568	4,052	498,592	498,997	499,402	499,808	500,214	500,620	501,027	501,433	501,840	502,247
569	4,074	502,654	503,062	503,470	503,878	504,286	504,694	505,103	505,512	505,921	506,330
570	4,096	506,740	507,149	507,559	507,970	508,380	508,791	509,201	509,613	510,024	510,435

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
571	4,119	510,847	511,259	511,671	512,084	512,497	512,909	513,323	513,736	514,149	514,563
572	4,141	514,977	515,391	515,806	516,221	516,636	517,051	517,466	517,882	518,297	518,714
573	4,164	519,130	519,546	519,963	520,380	520,797	521,215	521,632	522,050	522,468	522,886
574	4,186	523,305	523,724	524,143	524,562	524,981	525,401	525,821	526,241	526,661	527,082
575	4,209	527,503	527,924	528,345	528,766	529,188	529,610	530,032	530,455	530,877	531,300
576	4,232	531,723	532,147	532,570	532,994	533,418	533,842	534,266	534,691	535,116	535,541
577	4,255	535,966	536,392	536,818	537,244	537,670	538,097	538,523	538,950	539,378	539,805
578	4,278	540,233	540,660	541,089	541,517	541,945	542,374	542,803	543,233	543,662	544,092
579	4,300	544,522	544,952	545,382	545,813	546,244	546,675	547,106	547,538	547,969	548,401
580	4,324	548,834	549,266	549,699	550,131	550,565	550,998	551,431	551,865	552,299	552,733
581	4,346	553,168	553,603	554,037	554,473	554,908	555,344	555,779	556,215	556,652	557,088
582	4,369	557,525	557,962	558,399	558,837	559,274	559,712	560,150	560,589	561,027	561,466
583	4,392	561,905	562,345	562,784	563,224	563,664	564,104	564,544	564,985	565,426	565,867
584	4,415	566,309	566,750	567,192	567,634	568,076	568,519	568,962	569,405	569,848	570,291
585	4,438	570,735	571,179	571,623	572,067	572,512	572,957	573,402	573,847	574,293	574,739
586	4,461	575,185	575,631	576,077	576,524	576,971	577,418	577,865	578,313	578,761	579,209
587	4,484	579,657	580,106	580,555	581,004	581,453	581,903	582,352	582,802	583,252	583,703
588	4,508	584,154	584,604	585,056	585,507	585,959	586,410	586,862	587,315	587,767	588,220
589	4,531	588,673	589,126	589,580	590,034	590,487	590,942	591,396	591,851	592,306	592,761
590	4,555	593,216	593,672	594,127	594,584	595,040	595,496	595,953	596,410	596,867	597,325
591	4,578	597,783	598,240	598,699	599,157	599,616	600,075	600,534	600,993	601,453	601,913
592	4,602	602,373	602,833	603,293	603,754	604,215	604,676	605,138	605,600	606,062	606,524
593	4,626	606,986	607,449	607,912	608,375	608,838	609,302	609,766	610,230	610,694	611,159
594	4,649	611,624	612,089	612,554	613,019	613,485	613,951	614,417	614,884	615,351	615,818
595	4,673	616,285	616,752	617,220	617,688	618,156	618,624	619,093	619,562	620,031	620,500
596	4,697	620,970	621,439	621,909	622,380	622,850	623,321	623,792	624,263	624,735	625,206
597	4,721	625,678	626,151	626,623	627,096	627,569	628,042	628,515	628,989	629,463	629,937
598	4,745	630,411	630,886	631,360	631,836	632,311	632,786	633,262	633,738	634,214	634,691
599	4,769	635,168	635,645	636,122	636,599	637,077	637,555	638,033	638,512	638,990	639,469
600	4,793	639,948	640,428	640,908	641,388	641,868	642,348	642,829	643,310	643,791	644,273
601	4,818	644,754	645,236	645,719	646,201	646,684	647,167	647,650	648,133	648,617	649,101
602	4,843	649,585	650,070	650,554	651,039	651,524	652,010	652,496	652,981	653,468	653,954
603	4,868	654,441	654,928	655,415	655,902	656,390	656,878	657,366	657,854	658,343	658,832
604	4,893	659,321	659,811	660,300	660,790	661,280	661,771	662,262	662,752	663,244	663,735
605	4,918	664,227	664,719	665,211	665,703	666,196	666,689	667,182	667,676	668,169	668,663
606	4,943	669,157	669,652	670,147	670,641	671,137	671,632	672,128	672,624	673,120	673,616
607	4,968	674,113	674,610	675,107	675,605	676,103	676,600	677,099	677,597	678,096	678,595
608	4,994	679,094	679,594	680,093	680,593	681,094	681,594	682,095	682,596	683,097	683,599
609	5,019	684,100	684,602	685,105	685,607	686,110	686,613	687,116	687,620	688,124	688,628
610	5,044	689,132	689,637	690,141	690,646	691,152	691,657	692,163	692,669	693,176	693,682
611	5,070	694,189	694,696	695,203	695,711	696,219	696,727	697,235	697,744	698,253	698,762
612	5,095	699,271	699,781	700,291	700,801	701,312	701,822	702,333	702,844	703,356	703,868
613	5,121	704,379	704,892	705,404	705,917	706,430	706,943	707,457	707,970	708,484	708,999
614	5,146	709,513	710,028	710,543	711,058	711,574	712,090	712,606	713,122	713,638	714,155
615	5,172	714,672	715,190	715,707	716,225	716,743	717,262	717,780	718,299	718,818	719,338
616	5,198	719,857	720,377	720,897	721,418	721,939	722,460	722,981	723,502	724,024	724,546
617	5,224	725,068	725,591	726,113	726,636	727,160	727,683	728,207	728,731	729,255	729,780
618	5,250	730,305	730,830	731,355	731,881	732,407	732,933	733,459	733,986	734,513	735,040
619	5,276	735,567	736,095	736,623	737,151	737,680	738,208	738,737	739,267	739,796	740,326
620	5,302	740,856	741,386	741,917	742,447	742,978	743,509	744,041	744,573	745,104	745,637
621	5,326	746,169	746,702	747,235	747,768	748,302	748,836	749,370	749,904	750,439	750,974
622	5,353	751,509	752,044	752,580	753,116	753,652	754,188	754,725	755,262	755,799	756,337
623	5,379	756,875	757,413	757,951	758,489	759,028	759,567	760,107	760,646	761,186	761,726
624	5,406	762,267	762,808	763,348	763,890	764,431	764,973	765,515	766,057	766,600	767,143
625	5,432	767,686	768,229	768,773	769,316	769,861	770,405	770,950	771,495	772,040	772,585
626	5,459	773,131	773,677	774,223	774,770	775,317	775,864	776,411	776,958	777,506	778,054
627	5,485	778,603	779,152	779,700	780,250	780,799	781,349	781,899	782,449	783,000	783,550
628	5,512	784,102	784,653	785,204	785,756	786,308	786,861	787,414	787,966	788,520	789,073
629	5,539	789,627	790,181	790,735	791,290	791,845	792,400	792,955	793,511	794,067	794,623
630	5,566	795,179	795,736	796,293	796,850	797,408	797,965	798,523	799,082	799,640	800,199

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
631	5,593	800,758	801,318	801,877	802,437	802,997	803,558	804,119	804,680	805,241	805,802
632	5,620	806,964	806,926	807,489	808,051	808,614	809,177	809,741	810,305	810,869	811,433
633	5,647	811,997	812,562	813,127	813,693	814,258	814,824	815,390	815,957	816,523	817,090
634	5,674	817,658	818,225	818,793	819,361	819,929	820,498	821,067	821,636	822,205	822,775
635	5,701	823,345	823,915	824,486	825,056	825,628	826,199	826,770	827,342	827,914	828,487
636	5,728	829,060	829,633	830,206	830,779	831,353	831,927	832,501	833,076	833,651	834,226
637	5,756	834,801	835,377	835,953	836,529	837,106	837,683	838,260	838,837	839,415	839,993
638	5,783	840,571	841,149	841,728	842,307	842,886	843,466	844,045	844,625	845,206	845,786
639	5,810	846,367	846,949	847,530	848,112	848,694	849,276	849,859	850,441	851,025	851,608
640	5,838	852,192	852,776	853,360	853,945	854,530	855,115	855,701	856,287	856,873	857,459
641	5,868	858,046	858,633	859,220	859,807	860,395	860,983	861,571	862,160	862,749	863,338
642	5,895	863,927	864,517	865,107	865,697	866,288	866,879	867,470	868,061	868,653	869,244
643	5,923	869,837	870,429	871,022	871,615	872,208	872,801	873,395	873,989	874,584	875,178
644	5,950	875,773	876,368	876,964	877,560	878,156	878,752	879,348	879,945	880,542	881,140
645	5,978	881,737	882,335	882,934	883,532	884,131	884,730	885,329	885,929	886,529	887,129
646	6,006	887,729	888,330	888,931	889,532	890,134	890,736	891,338	891,940	892,543	893,146
647	6,034	893,749	894,353	894,956	895,560	896,165	896,769	897,374	897,979	898,585	899,191
648	6,061	899,797	900,403	901,009	901,616	902,223	902,831	903,438	904,046	904,655	905,263
649	6,089	905,872	906,481	907,090	907,700	908,310	908,920	909,531	910,141	910,752	911,364
650	6,117	911,975	912,587	913,199	913,812	914,424	915,037	915,651	916,264	916,878	917,492
651	6,145	918,107	918,721	919,336	919,951	920,567	921,183	921,799	922,415	923,032	923,649
652	6,174	924,266	924,883	925,501	926,119	926,738	927,356	927,975	928,594	929,214	929,833
653	6,202	930,453	931,074	931,694	932,315	932,936	933,558	934,180	934,802	935,424	936,046
654	6,230	936,669	937,292	937,916	938,539	939,163	939,788	940,412	941,037	941,662	942,288
655	6,258	942,913	943,539	944,165	944,792	945,419	946,046	946,673	947,301	947,929	948,557
656	6,286	949,186	949,814	950,443	951,073	951,702	952,332	952,963	953,593	954,224	954,855
657	6,315	955,486	956,118	956,750	957,382	958,015	958,647	959,280	959,914	960,547	961,181
658	6,344	961,816	962,450	963,085	963,720	964,355	964,991	965,627	966,263	966,899	967,536
659	6,372	968,173	968,811	969,448	970,086	970,724	971,363	972,002	972,641	973,280	973,920
660	6,401	974,560	975,200	975,840	976,481	977,121	977,763	978,404	979,046	979,688	980,330
661	6,428	980,973	981,616	982,259	982,902	983,546	984,190	984,834	985,479	986,124	986,769
662	6,457	987,415	988,061	988,707	989,353	990,000	990,647	991,294	991,942	992,589	993,237
663	6,486	993,886	994,535	995,184	995,833	996,483	997,132	997,783	998,433	999,084	999,735
664	6,515	1,000,386	1,001,038	1,001,690	1,002,342	1,002,994	1,003,647	1,004,300	1,004,954	1,005,607	1,006,261
665	6,544	1,006,916	1,007,570	1,008,225	1,008,880	1,009,536	1,010,191	1,010,847	1,011,504	1,012,160	1,012,817
666	6,573	1,013,474	1,014,132	1,014,790	1,015,448	1,016,106	1,016,765	1,017,424	1,018,083	1,018,742	1,019,402
667	6,603	1,020,062	1,020,723	1,021,383	1,022,044	1,022,706	1,023,367	1,024,029	1,024,691	1,025,354	1,026,017
668	6,632	1,026,680	1,027,343	1,028,007	1,028,671	1,029,335	1,030,000	1,030,664	1,031,330	1,031,995	1,032,661
669	6,662	1,033,327	1,033,993	1,034,660	1,035,326	1,035,994	1,036,661	1,037,329	1,037,997	1,038,665	1,039,334
670	6,691	1,040,003	1,040,672	1,041,342	1,042,012	1,042,682	1,043,352	1,044,023	1,044,694	1,045,366	1,046,037
671	6,721	1,046,709	1,047,381	1,048,054	1,048,727	1,049,400	1,050,073	1,050,747	1,051,421	1,052,095	1,052,770
672	6,750	1,053,445	1,054,120	1,054,795	1,055,471	1,056,147	1,056,824	1,057,500	1,058,177	1,058,855	1,059,532
673	6,780	1,060,210	1,060,888	1,061,567	1,062,246	1,062,925	1,063,604	1,064,284	1,064,964	1,065,644	1,066,325
674	6,810	1,067,005	1,067,687	1,068,368	1,069,050	1,069,732	1,070,414	1,071,097	1,071,780	1,072,463	1,073,147
675	6,840	1,073,831	1,074,515	1,075,199	1,075,884	1,076,569	1,077,254	1,077,940	1,078,626	1,079,312	1,079,999
676	6,870	1,080,686	1,081,373	1,082,060	1,082,748	1,083,436	1,084,124	1,084,813	1,085,502	1,086,191	1,086,881
677	6,900	1,087,571	1,088,261	1,088,951	1,089,642	1,090,333	1,091,024	1,091,716	1,092,408	1,093,100	1,093,793
678	6,930	1,094,486	1,095,179	1,095,872	1,096,566	1,097,260	1,097,954	1,098,649	1,099,344	1,100,039	1,100,735
679	6,960	1,101,431	1,102,127	1,102,824	1,103,520	1,104,217	1,104,915	1,105,613	1,106,311	1,107,009	1,107,707
680	6,991	1,108,406	1,109,106	1,109,806	1,110,506	1,111,206	1,111,907	1,112,608	1,113,309	1,114,011	1,114,713
681	7,024	1,115,415	1,116,117	1,116,820	1,117,523	1,118,227	1,118,931	1,119,635	1,120,339	1,121,044	1,121,749
682	7,056	1,122,455	1,123,160	1,123,867	1,124,573	1,125,280	1,125,987	1,126,694	1,127,401	1,128,109	1,128,818
683	7,087	1,129,526	1,130,235	1,130,944	1,131,654	1,132,364	1,133,074	1,133,784	1,134,495	1,135,206	1,135,917
684	7,119	1,136,629	1,137,341	1,138,054	1,138,766	1,139,479	1,140,193	1,140,906	1,141,620	1,142,334	1,143,049
685	7,150	1,143,764	1,144,479	1,145,195	1,145,910	1,146,627	1,147,343	1,148,060	1,148,777	1,149,494	1,150,212
686	7,182	1,150,930	1,151,649	1,152,367	1,153,086	1,153,806	1,154,525	1,155,245	1,155,966	1,156,686	1,157,407
687	7,214	1,158,128	1,158,850	1,159,572	1,160,294	1,161,017	1,161,740	1,162,463	1,163,186	1,163,910	1,164,634
688	7,246	1,165,359	1,166,083	1,166,808	1,167,534	1,168,260	1,168,986	1,169,712	1,170,439	1,171,166	1,171,893
689	7,278	1,172,621	1,173,349	1,174,077	1,174,805	1,175,534	1,176,264	1,176,993	1,177,723	1,178,453	1,179,184
690	7,310	1,179,915	1,180,646	1,181,377	1,182,109	1,182,841	1,183,574	1,184,307	1,185,040	1,185,773	1,186,507

GROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
691	7,342	1,187,241	1,187,975	1,188,710	1,189,445	1,190,180	1,190,916	1,191,652	1,192,388	1,193,125	1,193,862
692	7,374	1,194,599	1,195,337	1,196,075	1,196,813	1,197,552	1,198,291	1,199,030	1,199,769	1,200,509	1,201,249
693	7,407	1,201,990	1,202,731	1,203,472	1,204,213	1,204,955	1,205,697	1,206,440	1,207,183	1,207,926	1,208,669
694	7,439	1,209,413	1,210,157	1,210,901	1,211,646	1,212,391	1,213,136	1,213,882	1,214,628	1,215,375	1,216,121
695	7,472	1,216,868	1,217,616	1,218,363	1,219,111	1,219,859	1,220,608	1,221,357	1,222,106	1,222,856	1,223,606
696	7,504	1,224,356	1,225,107	1,225,858	1,226,609	1,227,360	1,228,112	1,228,864	1,229,617	1,230,370	1,231,123
697	7,537	1,231,877	1,232,630	1,233,385	1,234,139	1,234,894	1,235,649	1,236,404	1,237,160	1,237,916	1,238,673
698	7,569	1,239,430	1,240,187	1,240,944	1,241,702	1,242,460	1,243,218	1,243,977	1,244,736	1,245,496	1,246,255
699	7,602	1,247,015	1,247,776	1,248,536	1,249,298	1,250,059	1,250,821	1,251,583	1,252,345	1,253,108	1,253,871
700	7,635	1,254,634	1,255,397	1,256,161	1,256,925	1,257,689	1,258,454	1,259,219	1,259,984	1,260,750	1,261,516
701	7,664	1,262,282	1,263,049	1,263,816	1,264,583	1,265,350	1,266,118	1,266,886	1,267,655	1,268,423	1,269,192
702	7,696	1,269,962	1,270,732	1,271,502	1,272,272	1,273,043	1,273,814	1,274,585	1,275,357	1,276,129	1,276,901
703	7,727	1,277,673	1,278,446	1,279,219	1,279,993	1,280,767	1,281,541	1,282,315	1,283,090	1,283,865	1,284,641
704	7,759	1,285,417	1,286,193	1,286,969	1,287,746	1,288,523	1,289,300	1,290,078	1,290,856	1,291,634	1,292,413
705	7,791	1,293,192	1,293,971	1,294,751	1,295,530	1,296,311	1,297,091	1,297,872	1,298,653	1,299,435	1,300,217
706	7,823	1,300,999	1,301,781	1,302,564	1,303,347	1,304,130	1,304,914	1,305,698	1,306,483	1,307,267	1,308,052
707	7,855	1,308,838	1,309,623	1,310,409	1,311,196	1,311,982	1,312,769	1,313,556	1,314,344	1,315,132	1,315,920
708	7,887	1,316,709	1,317,498	1,318,287	1,319,076	1,319,866	1,320,656	1,321,447	1,322,238	1,323,029	1,323,820
709	7,919	1,324,612	1,325,404	1,326,196	1,326,989	1,327,782	1,328,576	1,329,369	1,330,163	1,330,958	1,331,752
710	7,951	1,332,547	1,333,343	1,334,138	1,334,934	1,335,730	1,336,527	1,337,324	1,338,121	1,338,919	1,339,717
711	7,984	1,340,515	1,341,313	1,342,112	1,342,911	1,343,711	1,344,511	1,345,311	1,346,111	1,346,912	1,347,713
712	8,016	1,348,515	1,349,316	1,350,119	1,350,921	1,351,724	1,352,527	1,353,330	1,354,134	1,354,938	1,355,742
713	8,048	1,356,547	1,357,352	1,358,157	1,358,963	1,359,769	1,360,575	1,361,382	1,362,189	1,362,996	1,363,804
714	8,081	1,364,612	1,365,420	1,366,228	1,367,037	1,367,847	1,368,656	1,369,466	1,370,276	1,371,087	1,371,898
715	8,114	1,372,709	1,373,520	1,374,332	1,375,144	1,375,957	1,376,770	1,377,583	1,378,396	1,379,210	1,380,024
716	8,146	1,380,839	1,381,653	1,382,469	1,383,284	1,384,100	1,384,916	1,385,732	1,386,549	1,387,366	1,388,183
717	8,179	1,389,001	1,389,819	1,390,638	1,391,456	1,392,275	1,393,095	1,393,914	1,394,734	1,395,555	1,396,375
718	8,212	1,397,196	1,398,018	1,398,839	1,399,661	1,400,484	1,401,306	1,402,129	1,402,952	1,403,776	1,404,600
719	8,244	1,405,424	1,406,249	1,407,074	1,407,899	1,408,725	1,409,551	1,410,377	1,411,203	1,412,030	1,412,858
720	8,277	1,413,685	1,414,513	1,415,342	1,416,171	1,417,000	1,417,830	1,418,659	1,419,490	1,420,320	1,421,151
721	8,314	1,421,982	1,422,814	1,423,646	1,424,478	1,425,311	1,426,143	1,426,977	1,427,810	1,428,644	1,429,478
722	8,348	1,430,313	1,431,148	1,431,983	1,432,819	1,433,655	1,434,491	1,435,327	1,436,164	1,437,002	1,437,839
723	8,381	1,438,677	1,439,516	1,440,354	1,441,193	1,442,032	1,442,872	1,443,712	1,444,552	1,445,393	1,446,234
724	8,415	1,447,075	1,447,917	1,448,759	1,449,601	1,450,444	1,451,287	1,452,130	1,452,974	1,453,818	1,454,662
725	8,449	1,455,507	1,456,352	1,457,197	1,458,043	1,458,889	1,459,736	1,460,582	1,461,429	1,462,277	1,463,125
726	8,483	1,463,973	1,464,821	1,465,670	1,466,519	1,467,368	1,468,218	1,469,068	1,469,919	1,470,770	1,471,621
727	8,516	1,472,472	1,473,324	1,474,176	1,475,029	1,475,882	1,476,735	1,477,588	1,478,442	1,479,296	1,480,151
728	8,551	1,481,006	1,481,861	1,482,717	1,483,572	1,484,429	1,485,285	1,486,142	1,486,999	1,487,857	1,488,715
729	8,585	1,489,573	1,490,432	1,491,291	1,492,150	1,493,009	1,493,870	1,494,730	1,495,591	1,496,452	1,497,313
730	8,619	1,498,175	1,499,037	1,499,900	1,500,762	1,501,625	1,502,489	1,503,353	1,504,217	1,505,081	1,505,946
731	8,653	1,506,811	1,507,677	1,508,542	1,509,409	1,510,275	1,511,142	1,512,009	1,512,877	1,513,745	1,514,613
732	8,687	1,515,481	1,516,350	1,517,219	1,518,089	1,518,959	1,519,829	1,520,700	1,521,571	1,522,442	1,523,314
733	8,722	1,524,186	1,525,058	1,525,931	1,526,804	1,527,677	1,528,551	1,529,425	1,530,300	1,531,174	1,532,049
734	8,756	1,532,925	1,533,801	1,534,677	1,535,553	1,536,430	1,537,307	1,538,185	1,539,063	1,539,941	1,540,820
735	8,791	1,541,698	1,542,578	1,543,457	1,544,337	1,545,218	1,546,098	1,546,979	1,547,860	1,548,742	1,549,624
736	8,825	1,550,507	1,551,389	1,552,272	1,553,156	1,554,039	1,554,924	1,555,808	1,556,693	1,557,578	1,558,463
737	8,860	1,559,349	1,560,235	1,561,122	1,562,009	1,562,896	1,563,784	1,564,672	1,565,560	1,566,448	1,567,337
738	8,895	1,568,227	1,569,116	1,570,006	1,570,897	1,571,787	1,572,678	1,573,570	1,574,462	1,575,354	1,576,246
739	8,930	1,577,139	1,578,032	1,578,925	1,579,819	1,580,713	1,581,608	1,582,503	1,583,398	1,584,294	1,585,190
740	8,964	1,586,086	1,586,983	1,587,880	1,588,777	1,589,675	1,590,573	1,591,472	1,592,371	1,593,270	1,594,170
741	9,002	1,595,070	1,595,970	1,596,871	1,597,772	1,598,674	1,599,575	1,600,478	1,601,380	1,602,283	1,603,186
742	9,038	1,604,090	1,604,994	1,605,898	1,606,803	1,607,708	1,608,613	1,609,519	1,610,425	1,611,332	1,612,239
743	9,074	1,613,146	1,614,054	1,614,962	1,615,870	1,616,779	1,617,688	1,618,597	1,619,507	1,620,417	1,621,327
744	9,110	1,622,238	1,623,149	1,624,061	1,624,973	1,625,885	1,626,798	1,627,711	1,628,624	1,629,538	1,630,452
745	9,146	1,631,367	1,632,281	1,633,197	1,634,112	1,635,028	1,635,944	1,636,861	1,637,778	1,638,695	1,639,613
746	9,183	1,640,531	1,641,450	1,642,369	1,643,288	1,644,207	1,645,127	1,646,048	1,646,968	1,647,889	1,648,811
747	9,219	1,649,732	1,650,654	1,651,577	1,652,500	1,653,423	1,654,346	1,655,270	1,656,195	1,657,119	1,658,044
748	9,256	1,658,970	1,659,896	1,660,822	1,661,748	1,662,675	1,663,602	1,664,530	1,665,458	1,666,386	1,667,315
749	9,292	1,668,244	1,669,173	1,670,103	1,671,033	1,671,964	1,672,894	1,673,826	1,674,757	1,675,689	1,676,622
750	9,329	1,677,554	1,678,487	1,679,421	1,680,355	1,681,289	1,682,223	1,683,158	1,684,094	1,685,029	1,685,965

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
751	9,366	1,686,902	1,687,838	1,688,775	1,689,713	1,690,651	1,691,589	1,692,528	1,693,466	1,694,406	1,695,345
752	9,402	1,696,286	1,697,226	1,698,167	1,699,108	1,700,049	1,700,991	1,701,934	1,702,876	1,703,819	1,704,763
753	9,439	1,705,706	1,706,650	1,707,595	1,708,540	1,709,485	1,710,431	1,711,377	1,712,323	1,713,270	1,714,217
754	9,476	1,715,164	1,716,112	1,717,060	1,718,009	1,718,957	1,719,907	1,720,856	1,721,806	1,722,757	1,723,708
755	9,513	1,724,659	1,725,610	1,726,562	1,727,514	1,728,467	1,729,420	1,730,373	1,731,327	1,732,281	1,733,236
756	9,550	1,734,190	1,735,146	1,736,101	1,737,057	1,738,014	1,738,970	1,739,927	1,740,885	1,741,843	1,742,801
757	9,588	1,743,759	1,744,718	1,745,678	1,746,637	1,747,597	1,748,558	1,749,519	1,750,480	1,751,441	1,752,403
758	9,625	1,753,365	1,754,328	1,755,291	1,756,255	1,757,218	1,758,182	1,759,147	1,760,112	1,761,077	1,762,043
759	9,662	1,763,009	1,763,975	1,764,942	1,765,909	1,766,877	1,767,844	1,768,813	1,769,781	1,770,750	1,771,720
760	9,699	1,772,690	1,773,659	1,774,628	1,775,598	1,776,568	1,777,539	1,778,510	1,779,482	1,780,453	1,781,426
761	9,728	1,782,398	1,783,371	1,784,345	1,785,318	1,786,292	1,787,267	1,788,242	1,789,217	1,790,193	1,791,169
762	9,766	1,792,145	1,793,122	1,794,099	1,795,077	1,796,055	1,797,033	1,798,012	1,798,991	1,799,970	1,800,950
763	9,805	1,801,931	1,802,911	1,803,892	1,804,874	1,805,856	1,806,838	1,807,820	1,808,803	1,809,787	1,810,770
764	9,843	1,811,755	1,812,739	1,813,724	1,814,709	1,815,695	1,816,681	1,817,667	1,818,654	1,819,641	1,820,629
765	9,882	1,821,617	1,822,605	1,823,594	1,824,583	1,825,573	1,826,563	1,827,553	1,828,544	1,829,535	1,830,526
766	9,920	1,831,518	1,832,510	1,833,503	1,834,496	1,835,489	1,836,483	1,837,477	1,838,472	1,839,467	1,840,462
767	9,959	1,841,458	1,842,454	1,843,451	1,844,448	1,845,445	1,846,443	1,847,441	1,848,439	1,849,438	1,850,437
768	9,998	1,851,437	1,852,437	1,853,437	1,854,438	1,855,439	1,856,441	1,857,443	1,858,445	1,859,448	1,860,451
769	10,037	1,861,454	1,862,458	1,863,463	1,864,467	1,865,472	1,866,478	1,867,484	1,868,490	1,869,497	1,870,504
770	10,076	1,871,511	1,872,519	1,873,527	1,874,536	1,875,545	1,876,554	1,877,564	1,878,574	1,879,584	1,880,595
771	10,115	1,881,607	1,882,618	1,883,631	1,884,643	1,885,656	1,886,669	1,887,683	1,888,697	1,889,711	1,890,726
772	10,154	1,891,742	1,892,757	1,893,773	1,894,790	1,895,807	1,896,824	1,897,841	1,898,859	1,899,878	1,900,897
773	10,194	1,901,916	1,902,935	1,903,955	1,904,976	1,905,996	1,907,017	1,908,039	1,909,061	1,910,083	1,911,106
774	10,233	1,912,129	1,913,153	1,914,177	1,915,201	1,916,226	1,917,251	1,918,276	1,919,302	1,920,328	1,921,355
775	10,273	1,922,382	1,923,409	1,924,437	1,925,466	1,926,494	1,927,523	1,928,553	1,929,582	1,930,613	1,931,643
776	10,312	1,932,674	1,933,706	1,934,738	1,935,770	1,936,802	1,937,835	1,938,869	1,939,902	1,940,937	1,941,971
777	10,352	1,943,006	1,944,042	1,945,077	1,946,114	1,947,150	1,948,187	1,949,224	1,950,262	1,951,300	1,952,339
778	10,391	1,953,378	1,954,417	1,955,457	1,956,497	1,957,538	1,958,578	1,959,620	1,960,662	1,961,704	1,962,746
779	10,431	1,963,789	1,964,832	1,965,876	1,966,920	1,967,965	1,969,010	1,970,055	1,971,101	1,972,147	1,973,193
780	10,471	1,974,240	1,975,288	1,976,336	1,977,384	1,978,433	1,979,482	1,980,531	1,981,581	1,982,632	1,983,682
781	10,513	1,984,734	1,985,785	1,986,837	1,987,889	1,988,942	1,989,995	1,991,049	1,992,102	1,993,157	1,994,211
782	10,553	1,995,266	1,996,322	1,997,378	1,998,434	1,999,491	2,000,548	2,001,605	2,002,663	2,003,722	2,004,780
783	10,593	2,005,839	2,006,899	2,007,959	2,009,019	2,010,079	2,011,141	2,012,202	2,013,264	2,014,326	2,015,389
784	10,633	2,016,452	2,017,515	2,018,579	2,019,643	2,020,708	2,021,773	2,022,839	2,023,904	2,024,971	2,026,037
785	10,672	2,027,104	2,028,172	2,029,240	2,030,308	2,031,377	2,032,446	2,033,515	2,034,585	2,035,655	2,036,726
786	10,713	2,037,797	2,038,868	2,039,940	2,041,013	2,042,085	2,043,158	2,044,232	2,045,306	2,046,380	2,047,455
787	10,753	2,048,530	2,049,605	2,050,681	2,051,757	2,052,834	2,053,911	2,054,989	2,056,066	2,057,145	2,058,223
788	10,793	2,059,303	2,060,382	2,061,462	2,062,542	2,063,623	2,064,704	2,065,786	2,066,868	2,067,950	2,069,033
789	10,833	2,070,116	2,071,199	2,072,283	2,073,368	2,074,452	2,075,537	2,076,623	2,077,709	2,078,795	2,079,882
790	10,874	2,080,969	2,082,057	2,083,145	2,084,233	2,085,322	2,086,411	2,087,501	2,088,591	2,089,681	2,090,772
791	10,914	2,091,863	2,092,955	2,094,047	2,095,139	2,096,232	2,097,325	2,098,419	2,099,513	2,100,607	2,101,702
792	10,955	2,102,798	2,103,893	2,104,989	2,106,086	2,107,183	2,108,280	2,109,378	2,110,476	2,111,574	2,112,673
793	10,995	2,113,773	2,114,872	2,115,973	2,117,073	2,118,174	2,119,275	2,120,377	2,121,479	2,122,582	2,123,685
794	11,036	2,124,788	2,125,892	2,126,996	2,128,101	2,129,206	2,130,312	2,131,417	2,132,524	2,133,630	2,134,737
795	11,077	2,135,845	2,136,953	2,138,061	2,139,170	2,140,279	2,141,388	2,142,498	2,143,609	2,144,719	2,145,831
796	11,118	2,146,942	2,148,054	2,149,167	2,150,279	2,151,393	2,152,506	2,153,620	2,154,735	2,155,850	2,156,965
797	11,159	2,158,080	2,159,197	2,160,313	2,161,430	2,162,547	2,163,665	2,164,783	2,165,902	2,167,021	2,168,140
798	11,200	2,169,260	2,170,380	2,171,501	2,172,622	2,173,743	2,174,865	2,175,987	2,177,110	2,178,233	2,179,356
799	11,241	2,180,480	2,181,604	2,182,729	2,183,854	2,184,980	2,186,106	2,187,232	2,188,359	2,189,486	2,190,614
800	11,282	2,191,742	2,192,870	2,193,999	2,195,128	2,196,258	2,197,388	2,198,518	2,199,649	2,200,780	2,201,912
801	11,323	2,203,044	2,204,177	2,205,309	2,206,443	2,207,576	2,208,711	2,209,845	2,210,980	2,212,115	2,213,251
802	11,363	2,214,387	2,215,524	2,216,661	2,217,798	2,218,936	2,220,074	2,221,212	2,222,351	2,223,491	2,224,630
803	11,404	2,225,771	2,226,911	2,228,052	2,229,194	2,230,335	2,231,478	2,232,620	2,233,763	2,234,907	2,236,050
804	11,444	2,237,195	2,238,339	2,239,484	2,240,630	2,241,776	2,242,922	2,244,069	2,245,216	2,246,363	2,247,511
805	11,485	2,248,660	2,249,808	2,250,957	2,252,107	2,253,257	2,254,407	2,255,558	2,256,709	2,257,861	2,259,013
806	11,526	2,260,165	2,261,318	2,262,471	2,263,625	2,264,779	2,265,933	2,267,088	2,268,244	2,269,399	2,270,555
807	11,567	2,271,712	2,272,869	2,274,026	2,275,184	2,276,342	2,277,500	2,278,659	2,279,819	2,280,979	2,282,139
808	11,608	2,283,299	2,284,460	2,285,622	2,286,784	2,287,946	2,289,108	2,290,271	2,291,435	2,292,599	2,293,763
809	11,649	2,294,928	2,296,093	2,297,258	2,298,424	2,299,591	2,300,757	2,301,925	2,303,092	2,304,260	2,305,429
810	11,690	2,306,597	2,307,767	2,308,936	2,310,106	2,311,277	2,312,448	2,313,619	2,314,791	2,315,963	2,317,135

OCTOBER 1967

OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
811	11.731	2,318,308	2,319,482	2,320,655	2,321,829	2,323,004	2,324,179	2,325,354	2,326,530	2,327,707	2,328,883
812	11.773	2,330,060	2,331,238	2,332,416	2,333,594	2,334,773	2,335,952	2,337,131	2,338,311	2,339,492	2,340,672
813	11.814	2,341,854	2,343,035	2,344,217	2,345,400	2,346,583	2,347,766	2,348,950	2,350,134	2,351,318	2,352,503
814	11.856	2,353,688	2,354,874	2,356,060	2,357,247	2,358,434	2,359,621	2,360,809	2,361,998	2,363,186	2,364,375
815	11.897	2,365,565	2,366,755	2,367,945	2,369,136	2,370,327	2,371,518	2,372,710	2,373,903	2,375,096	2,376,289
816	11.939	2,377,483	2,378,677	2,379,871	2,381,066	2,382,261	2,383,457	2,384,653	2,385,850	2,387,047	2,388,244
817	11.980	2,389,442	2,390,640	2,391,839	2,393,038	2,394,238	2,395,438	2,396,638	2,397,839	2,399,040	2,400,241
818	12.022	2,401,443	2,402,646	2,403,849	2,405,052	2,406,256	2,407,460	2,408,664	2,409,869	2,411,074	2,412,280
819	12.064	2,413,486	2,414,693	2,415,900	2,417,107	2,418,315	2,419,524	2,420,732	2,421,941	2,423,151	2,424,361
820	12.106	2,425,571	2,426,783	2,427,995	2,429,208	2,430,421	2,431,634	2,432,848	2,434,062	2,435,277	2,436,492
821	12.157	2,437,707	2,438,923	2,440,140	2,441,356	2,442,574	2,443,791	2,445,009	2,446,228	2,447,447	2,448,666
822	12.200	2,449,886	2,451,106	2,452,326	2,453,547	2,454,769	2,455,991	2,457,213	2,458,436	2,459,659	2,460,883
823	12.242	2,462,107	2,463,331	2,464,556	2,465,781	2,467,007	2,468,233	2,469,460	2,470,687	2,471,914	2,473,142
824	12.285	2,474,370	2,475,599	2,476,828	2,478,057	2,479,287	2,480,518	2,481,749	2,482,980	2,484,212	2,485,444
825	12.328	2,486,676	2,487,909	2,489,143	2,490,377	2,491,611	2,492,845	2,494,081	2,495,316	2,496,552	2,497,788
826	12.370	2,499,025	2,500,263	2,501,500	2,502,738	2,503,977	2,505,216	2,506,455	2,507,695	2,508,935	2,510,176
827	12.413	2,511,417	2,512,659	2,513,901	2,515,143	2,516,386	2,517,629	2,518,873	2,520,117	2,521,361	2,522,606
828	12.456	2,523,852	2,525,098	2,526,344	2,527,591	2,528,838	2,530,085	2,531,333	2,532,582	2,533,831	2,535,080
829	12.499	2,536,330	2,537,580	2,538,830	2,540,081	2,541,333	2,542,585	2,543,837	2,545,090	2,546,343	2,547,596
830	12.542	2,548,850	2,550,105	2,551,360	2,552,615	2,553,871	2,555,127	2,556,384	2,557,641	2,558,898	2,560,156
831	12.586	2,561,414	2,562,673	2,563,932	2,565,192	2,566,452	2,567,713	2,568,974	2,570,235	2,571,497	2,572,759
832	12.629	2,574,022	2,575,285	2,576,548	2,577,812	2,579,077	2,580,342	2,581,607	2,582,873	2,584,139	2,585,405
833	12.672	2,586,672	2,587,940	2,589,208	2,590,476	2,591,745	2,593,014	2,594,283	2,595,554	2,596,824	2,598,095
834	12.716	2,599,366	2,600,638	2,601,910	2,603,183	2,604,456	2,605,730	2,607,004	2,608,278	2,609,553	2,610,828
835	12.759	2,612,104	2,613,380	2,614,657	2,615,934	2,617,211	2,618,489	2,619,767	2,621,046	2,622,325	2,623,605
836	12.803	2,624,885	2,626,165	2,627,446	2,628,728	2,630,010	2,631,292	2,632,574	2,633,858	2,635,141	2,636,425
837	12.847	2,637,710	2,638,994	2,640,280	2,641,566	2,642,852	2,644,138	2,645,425	2,646,713	2,648,001	2,649,289
838	12.890	2,650,578	2,651,867	2,653,157	2,654,447	2,655,738	2,657,029	2,658,320	2,659,612	2,660,904	2,662,197
839	12.934	2,663,490	2,664,784	2,666,078	2,667,372	2,668,667	2,669,963	2,671,259	2,672,555	2,673,852	2,675,149
840	12.978	2,676,446	2,677,743	2,679,041	2,680,339	2,681,637	2,682,936	2,684,235	2,685,535	2,686,835	2,688,136
841	13.013	2,689,437	2,690,738	2,692,040	2,693,343	2,694,646	2,695,949	2,697,253	2,698,557	2,699,861	2,701,166
842	13.057	2,702,472	2,703,778	2,705,084	2,706,391	2,707,698	2,709,006	2,710,314	2,711,622	2,712,931	2,714,241
843	13.101	2,715,551	2,716,861	2,718,172	2,719,483	2,720,795	2,722,107	2,723,419	2,724,732	2,726,046	2,727,360
844	13.146	2,728,674	2,729,989	2,731,304	2,732,620	2,733,936	2,735,252	2,736,569	2,737,887	2,739,205	2,740,523
845	13.190	2,741,842	2,743,161	2,744,481	2,745,801	2,747,121	2,748,442	2,749,764	2,751,086	2,752,408	2,753,731
846	13.234	2,755,054	2,756,378	2,757,702	2,759,026	2,760,351	2,761,677	2,763,003	2,764,329	2,765,656	2,766,983
847	13.279	2,768,311	2,769,639	2,770,968	2,772,297	2,773,626	2,774,956	2,776,286	2,777,617	2,778,948	2,780,280
848	13.324	2,781,612	2,782,945	2,784,278	2,785,611	2,786,945	2,788,280	2,789,615	2,790,950	2,792,286	2,793,622
849	13.368	2,794,958	2,796,296	2,797,633	2,798,971	2,800,309	2,801,648	2,802,988	2,804,327	2,805,668	2,807,008
850	13.413	2,808,349	2,809,691	2,811,033	2,812,375	2,813,718	2,815,062	2,816,405	2,817,750	2,819,094	2,820,440
851	13.458	2,821,785	2,823,131	2,824,478	2,825,825	2,827,172	2,828,520	2,829,868	2,831,217	2,832,566	2,833,916
852	13.503	2,835,266	2,836,616	2,837,967	2,839,319	2,840,671	2,842,023	2,843,376	2,844,729	2,846,083	2,847,437
853	13.548	2,848,792	2,850,147	2,851,502	2,852,858	2,854,215	2,855,572	2,856,929	2,858,287	2,859,645	2,861,004
854	13.594	2,862,363	2,863,722	2,865,082	2,866,443	2,867,804	2,869,165	2,870,527	2,871,889	2,873,252	2,874,615
855	13.639	2,875,979	2,877,343	2,878,708	2,880,073	2,881,438	2,882,804	2,884,170	2,885,537	2,886,904	2,888,272
856	13.684	2,889,640	2,891,009	2,892,378	2,893,748	2,895,118	2,896,488	2,897,859	2,899,230	2,900,602	2,901,974
857	13.730	2,903,347	2,904,720	2,906,094	2,907,468	2,908,843	2,910,218	2,911,593	2,912,969	2,914,345	2,915,722
858	13.775	2,917,099	2,918,477	2,919,855	2,921,234	2,922,613	2,923,993	2,925,373	2,926,753	2,928,134	2,929,515
859	13.821	2,930,897	2,932,279	2,933,662	2,935,045	2,936,429	2,937,813	2,939,198	2,940,583	2,941,968	2,943,354
860	13.866	2,944,741	2,946,128	2,947,515	2,948,903	2,950,292	2,951,681	2,953,070	2,954,460	2,955,850	2,957,241
861	13.915	2,958,632	2,960,024	2,961,416	2,962,809	2,964,202	2,965,595	2,966,989	2,968,384	2,969,779	2,971,174
862	13.961	2,972,570	2,973,966	2,975,363	2,976,760	2,978,158	2,979,556	2,980,955	2,982,354	2,983,754	2,985,154
863	14.007	2,986,554	2,987,955	2,989,357	2,990,758	2,992,161	2,993,564	2,994,967	2,996,371	2,997,775	2,999,180
864	14.054	3,000,585	3,001,990	3,003,396	3,004,803	3,006,210	3,007,617	3,009,025	3,010,434	3,011,843	3,013,252
865	14.100	3,014,662	3,016,072	3,017,483	3,018,894	3,020,306	3,021,718	3,023,130	3,024,543	3,025,957	3,027,371
866	14.147	3,028,785	3,030,200	3,031,616	3,033,032	3,034,448	3,035,865	3,037,282	3,038,700	3,040,118	3,041,537
867	14.194	3,042,956	3,044,375	3,045,795	3,047,216	3,048,637	3,050,058	3,051,480	3,052,903	3,054,326	3,055,749
868	14.240	3,057,173	3,058,597	3,060,022	3,061,447	3,062,873	3,064,299	3,065,726	3,067,153	3,068,580	3,070,008
869	14.287	3,071,437	3,072,866	3,074,295	3,075,725	3,077,155	3,078,586	3,080,018	3,081,449	3,082,882	3,084,314
870	14.334	3,085,747	3,087,181	3,088,615	3,090,050	3,091,485	3,092,920	3,094,356	3,095,793	3,097,230	3,098,667

OCTOBER 1967

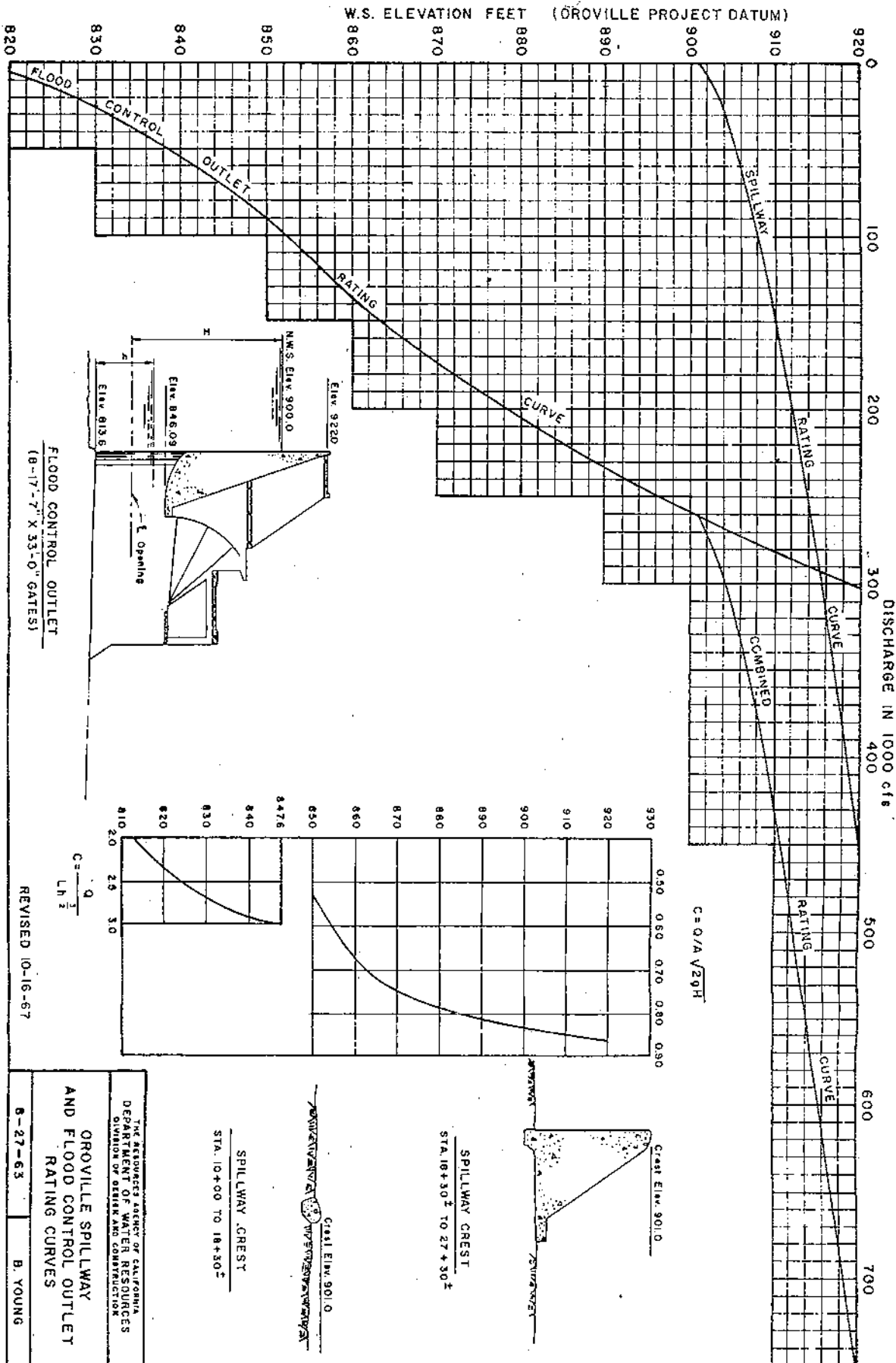
OROVILLE RESERVOIR, FEATHER RIVER, CALIFORNIA

AREA AND CAPACITY TABLE

Elev in feet	Area in acres	Capacity in acre-feet									
		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
871	14,381	3,100,105	3,101,544	3,102,982	3,104,422	3,105,862	3,107,302	3,108,742	3,110,184	3,111,625	3,113,067
872	14,428	3,114,510	3,115,953	3,117,397	3,118,841	3,120,285	3,121,730	3,123,176	3,124,621	3,126,068	3,127,515
873	14,476	3,128,962	3,130,410	3,131,858	3,133,307	3,134,756	3,136,206	3,137,656	3,139,107	3,140,558	3,142,009
874	14,523	3,143,461	3,144,914	3,146,367	3,147,820	3,149,274	3,150,729	3,152,184	3,153,639	3,155,095	3,156,551
875	14,570	3,158,008	3,159,465	3,160,923	3,162,381	3,163,840	3,165,299	3,166,759	3,168,219	3,169,679	3,171,140
876	14,618	3,172,602	3,174,064	3,175,526	3,176,989	3,178,453	3,179,917	3,181,381	3,182,846	3,184,311	3,185,777
877	14,665	3,187,243	3,188,710	3,190,177	3,191,645	3,193,113	3,194,582	3,196,051	3,197,521	3,198,991	3,200,461
878	14,713	3,201,932	3,203,404	3,204,876	3,206,348	3,207,821	3,209,295	3,210,769	3,212,243	3,213,718	3,215,193
879	14,761	3,216,669	3,218,145	3,219,622	3,221,099	3,222,577	3,224,055	3,225,534	3,227,013	3,228,493	3,229,973
880	14,808	3,231,454	3,232,935	3,234,417	3,235,900	3,237,383	3,238,866	3,240,351	3,241,835	3,243,320	3,244,806
881	14,862	3,246,292	3,247,778	3,249,265	3,250,752	3,252,240	3,253,729	3,255,218	3,256,707	3,258,197	3,259,687
882	14,911	3,261,178	3,262,670	3,264,161	3,265,654	3,267,147	3,268,640	3,270,134	3,271,628	3,273,123	3,274,618
883	14,960	3,276,114	3,277,610	3,279,107	3,280,604	3,282,102	3,283,600	3,285,099	3,286,598	3,288,097	3,289,598
884	15,009	3,291,098	3,292,599	3,294,101	3,295,603	3,297,106	3,298,609	3,300,112	3,301,616	3,303,121	3,304,626
885	15,058	3,306,132	3,307,638	3,309,144	3,310,651	3,312,159	3,313,667	3,315,175	3,316,684	3,318,194	3,319,704
886	15,107	3,321,214	3,322,725	3,324,237	3,325,749	3,327,261	3,328,774	3,330,287	3,331,801	3,333,316	3,334,831
887	15,156	3,336,346	3,337,862	3,339,378	3,340,895	3,342,413	3,343,930	3,345,449	3,346,968	3,348,487	3,350,007
888	15,206	3,351,527	3,353,048	3,354,569	3,356,091	3,357,613	3,359,136	3,360,660	3,362,183	3,363,708	3,365,232
889	15,255	3,366,758	3,368,283	3,369,810	3,371,336	3,372,864	3,374,391	3,375,920	3,377,448	3,378,978	3,380,507
890	15,305	3,382,038	3,383,568	3,385,100	3,386,631	3,388,163	3,389,696	3,391,229	3,392,763	3,394,297	3,395,832
891	15,354	3,397,367	3,398,903	3,400,439	3,401,976	3,403,513	3,405,051	3,406,589	3,408,127	3,409,666	3,411,206
892	15,404	3,412,746	3,414,287	3,415,828	3,417,370	3,418,912	3,420,455	3,421,998	3,423,541	3,425,085	3,426,630
893	15,454	3,428,175	3,429,721	3,431,267	3,432,814	3,434,361	3,435,908	3,437,456	3,439,005	3,440,554	3,442,104
894	15,504	3,443,654	3,445,204	3,446,756	3,448,307	3,449,859	3,451,412	3,452,965	3,454,519	3,456,073	3,457,627
895	15,554	3,459,182	3,460,738	3,462,294	3,463,851	3,465,408	3,466,965	3,468,523	3,470,082	3,471,641	3,473,201
896	15,604	3,474,761	3,476,321	3,477,883	3,479,444	3,481,006	3,482,569	3,484,132	3,485,696	3,487,260	3,488,824
897	15,654	3,490,390	3,491,955	3,493,521	3,495,088	3,496,655	3,498,223	3,499,791	3,501,360	3,502,929	3,504,498
898	15,704	3,506,069	3,507,639	3,509,210	3,510,782	3,512,354	3,513,927	3,515,500	3,517,074	3,518,648	3,520,222
899	15,754	3,521,798	3,523,373	3,524,950	3,526,526	3,528,103	3,529,681	3,531,259	3,532,838	3,534,417	3,535,997
900	15,805	3,537,577	3,539,158	3,540,738	3,542,320	3,543,902	3,545,484	3,547,067	3,548,651	3,550,235	3,551,820
901	15,855	3,553,405	3,554,991	3,556,577	3,558,164	3,559,751	3,561,339	3,562,928	3,564,517	3,566,106	3,567,696
902	15,909	3,569,287	3,570,878	3,572,470	3,574,062	3,575,655	3,577,248	3,578,842	3,580,436	3,582,031	3,583,627
903	15,963	3,585,223	3,586,819	3,588,416	3,590,014	3,591,612	3,593,211	3,594,810	3,596,410	3,598,010	3,599,611
904	16,017	3,601,213	3,602,815	3,604,417	3,606,020	3,607,624	3,609,228	3,610,833	3,612,438	3,614,044	3,615,650
905	16,071	3,617,257	3,618,864	3,620,472	3,622,081	3,623,690	3,625,299	3,626,910	3,628,520	3,630,131	3,631,743
906	16,126	3,633,355	3,634,968	3,636,582	3,638,196	3,639,810	3,641,425	3,643,041	3,644,657	3,646,273	3,647,891
907	16,180	3,649,508	3,651,127	3,652,745	3,654,365	3,655,985	3,657,605	3,659,226	3,660,848	3,662,470	3,664,093
908	16,235	3,665,716	3,667,340	3,668,964	3,670,589	3,672,214	3,673,840	3,675,466	3,677,094	3,678,721	3,680,349
909	16,289	3,681,978	3,683,607	3,685,237	3,686,867	3,688,498	3,690,129	3,691,761	3,693,394	3,695,027	3,696,661
910	16,344	3,698,295	3,699,929	3,701,565	3,703,200	3,704,837	3,706,474	3,708,111	3,709,749	3,711,388	3,713,027
911	16,399	3,714,666	3,716,306	3,717,947	3,719,589	3,721,230	3,722,873	3,724,516	3,726,159	3,727,803	3,729,448
912	16,454	3,731,093	3,732,739	3,734,385	3,736,032	3,737,679	3,739,327	3,740,975	3,742,624	3,744,274	3,745,924
913	16,509	3,747,575	3,749,226	3,750,878	3,752,530	3,754,183	3,755,836	3,757,490	3,759,145	3,760,800	3,762,455
914	16,564	3,764,111	3,765,768	3,767,425	3,769,083	3,770,742	3,772,401	3,774,060	3,775,720	3,777,381	3,779,042
915	16,620	3,780,704	3,782,366	3,784,029	3,785,692	3,787,356	3,789,020	3,790,685	3,792,351	3,794,017	3,795,684
916	16,675	3,797,351	3,799,019	3,800,687	3,802,356	3,804,026	3,805,696	3,807,366	3,809,037	3,810,709	3,812,381
917	16,731	3,814,054	3,815,727	3,817,401	3,819,076	3,820,751	3,822,426	3,824,102	3,825,779	3,827,456	3,829,134
918	16,786	3,830,813	3,832,491	3,834,171	3,835,851	3,837,532	3,839,213	3,840,894	3,842,577	3,844,260	3,845,943
919	16,842	3,847,627	3,849,311	3,850,996	3,852,682	3,854,368	3,856,055	3,857,742	3,859,430	3,861,118	3,862,807
920	16,898	3,864,497									

NOTES:

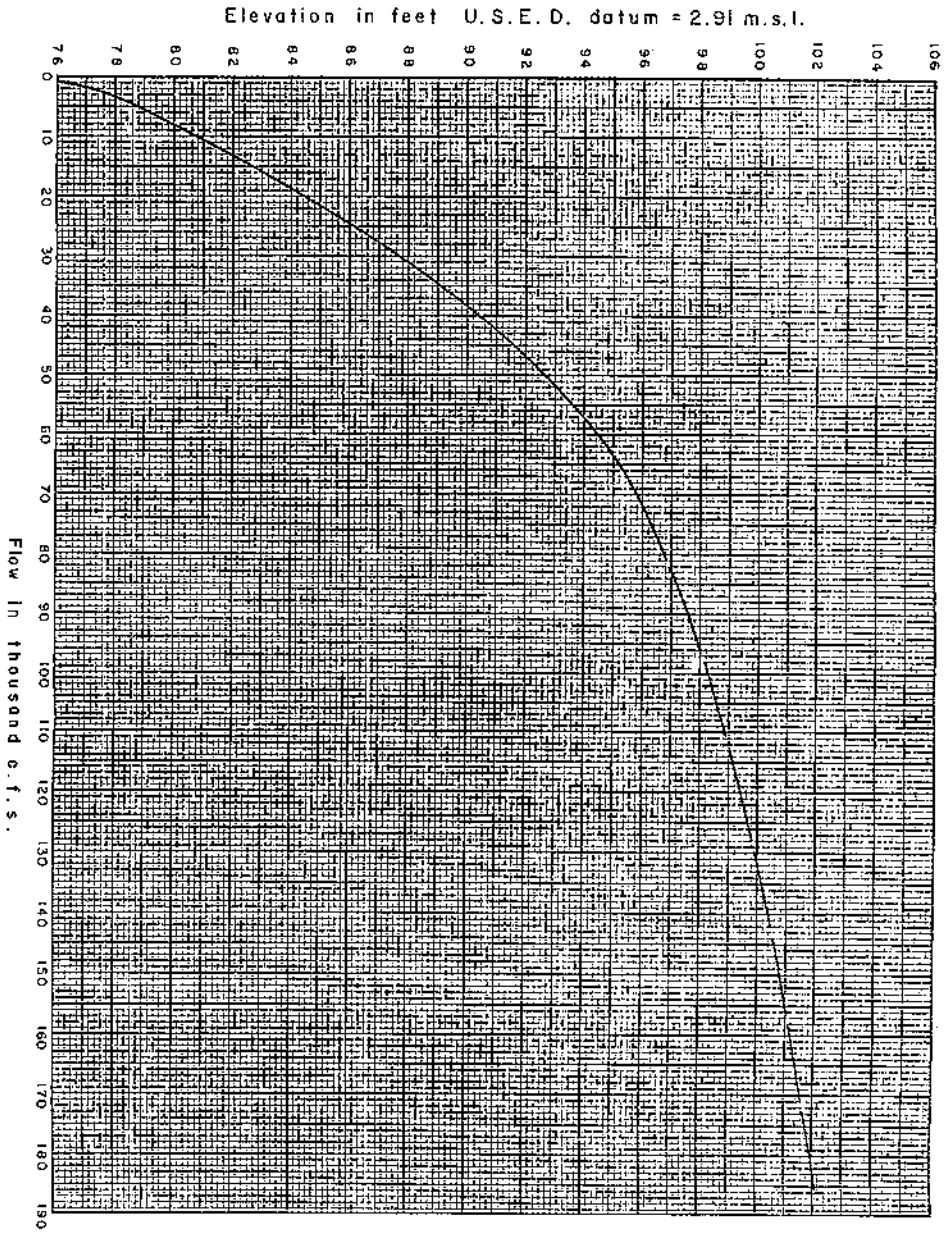
1. TABLE WAS FURNISHED BY THE STATE OF CALIFORNIA. ELEVATIONS GIVEN ARE U.S.G.S. DATUM.
2. MINIMUM POWER POOL ELEVATION 640.0 FEET.
3. GROSS POOL ELEVATION 900.0 FEET.
4. TOP OF DAM ELEVATION 922.0 FEET.



THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
DIVISION OF DESIGN AND CONSTRUCTION

OROVILLE SPILLWAY
AND FLOOD CONTROL OUTLET
RATING CURVES

6-27-63 B. YOUNG



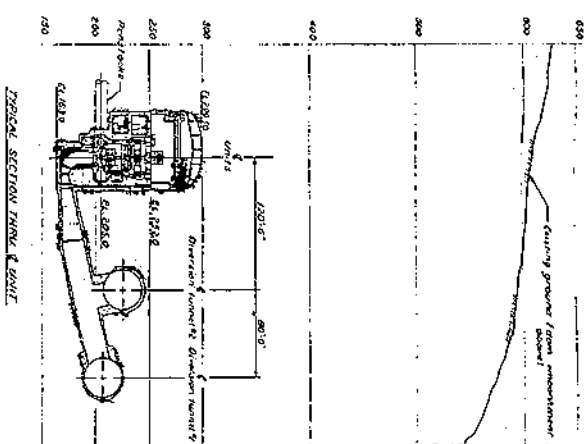
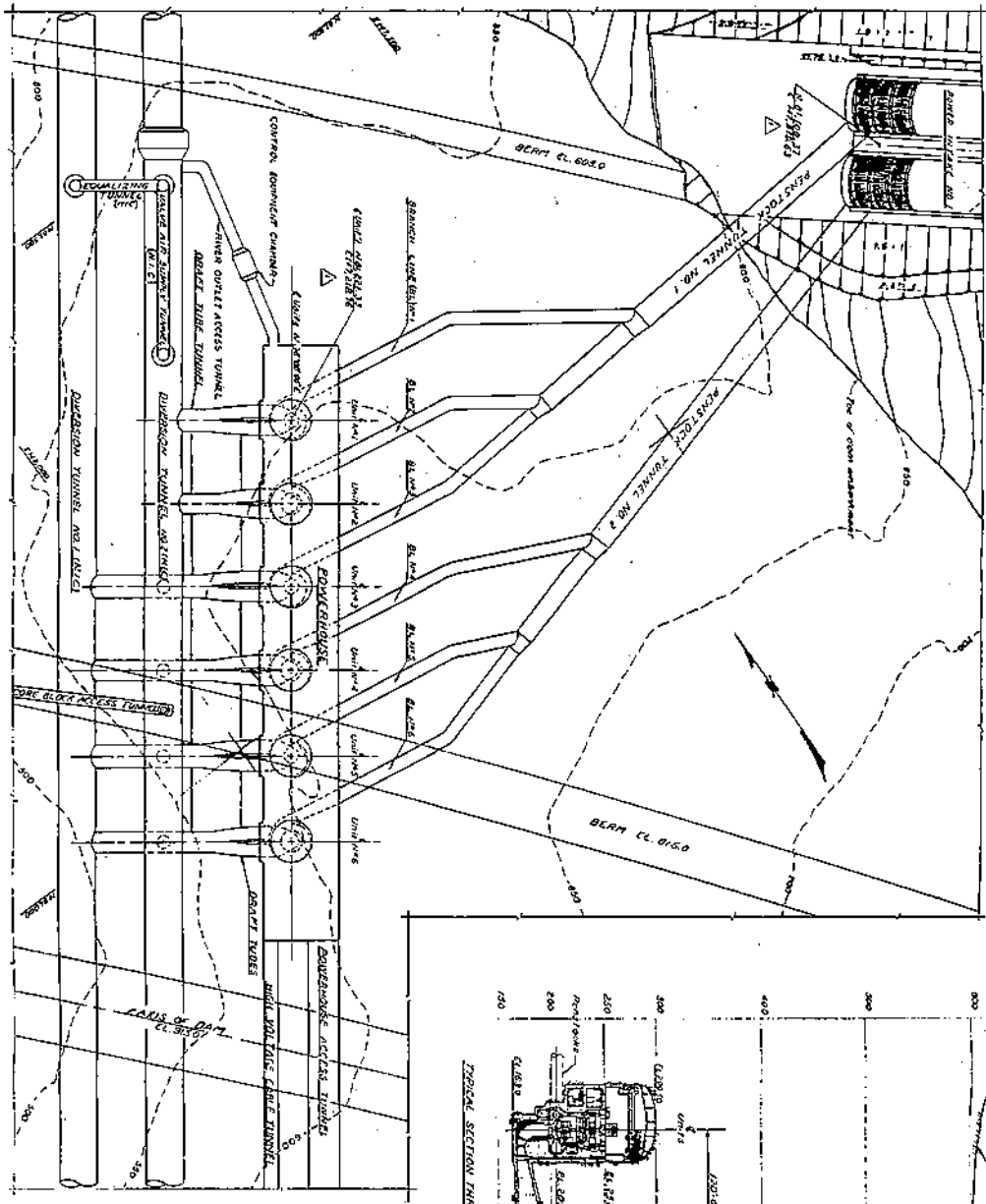
NOTE:
 Based on 1962-63 conditions
 with extension based on December
 1955 flows.

OROVILLE DAM AND RESERVOIR
 Feather River, California

RATING CURVE
 FEATHER RIVER NEAR GRIDLEY

CORPS OF ENGINEERS
 Prepared: J. B. P.
 Drawn: L. R. B.

SACRAMENTO, CALIFORNIA
 Date: January 1965



PROJECT NO.	100-100
DATE	11-1-50
DESIGNED BY	W. H. HARRIS
CHECKED BY	W. H. HARRIS
APPROVED BY	W. H. HARRIS
SCALE	1" = 40'-0"
PROJECT NAME	ORVILLE POWER PLANT
LOCATION	ORVILLE, MISSISSIPPI
CONTRACT NO.	100-100
DATE OF CONTRACT	11-1-50
DATE OF DRAWING	11-1-50
DATE OF REVISION	11-1-50
REVISION NO.	1
REVISION DESCRIPTION	11-1-50
DESIGNED BY	W. H. HARRIS
CHECKED BY	W. H. HARRIS
APPROVED BY	W. H. HARRIS
SCALE	1" = 40'-0"
PROJECT NAME	ORVILLE POWER PLANT
LOCATION	ORVILLE, MISSISSIPPI
CONTRACT NO.	100-100
DATE OF CONTRACT	11-1-50
DATE OF DRAWING	11-1-50
DATE OF REVISION	11-1-50
REVISION NO.	1
REVISION DESCRIPTION	11-1-50

SAFETY - INFLUENCE ON WATER
 THE RATING AND SAFETY OF THE POWERHOUSE
 SHALL BE THE RESPONSIBILITY OF THE DESIGNER
 AND THE OPERATOR. THE DESIGNER SHALL
 BE RESPONSIBLE FOR THE SAFETY OF THE
 POWERHOUSE AND THE OPERATOR SHALL
 BE RESPONSIBLE FOR THE SAFETY OF THE
 OPERATOR.

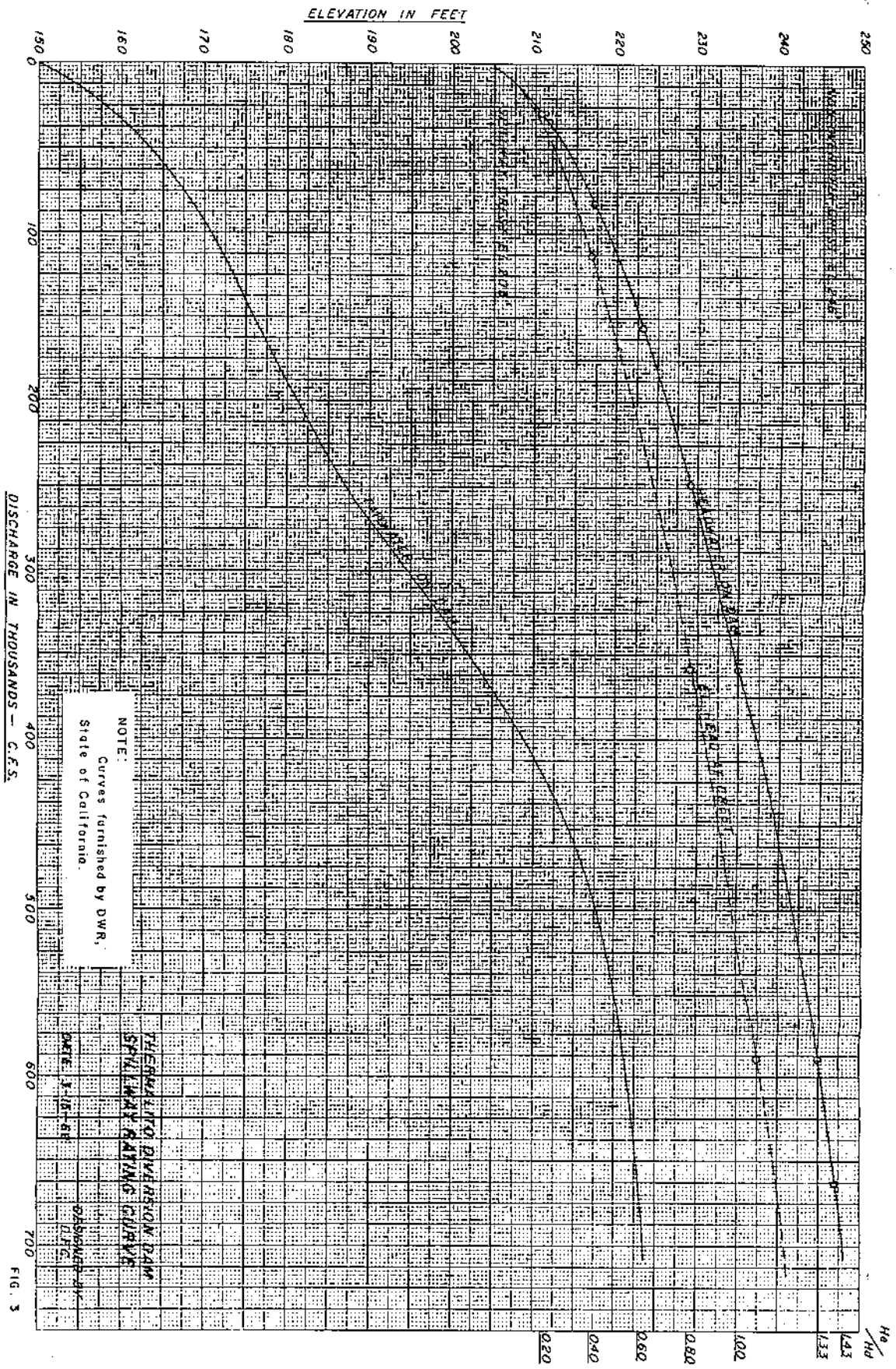
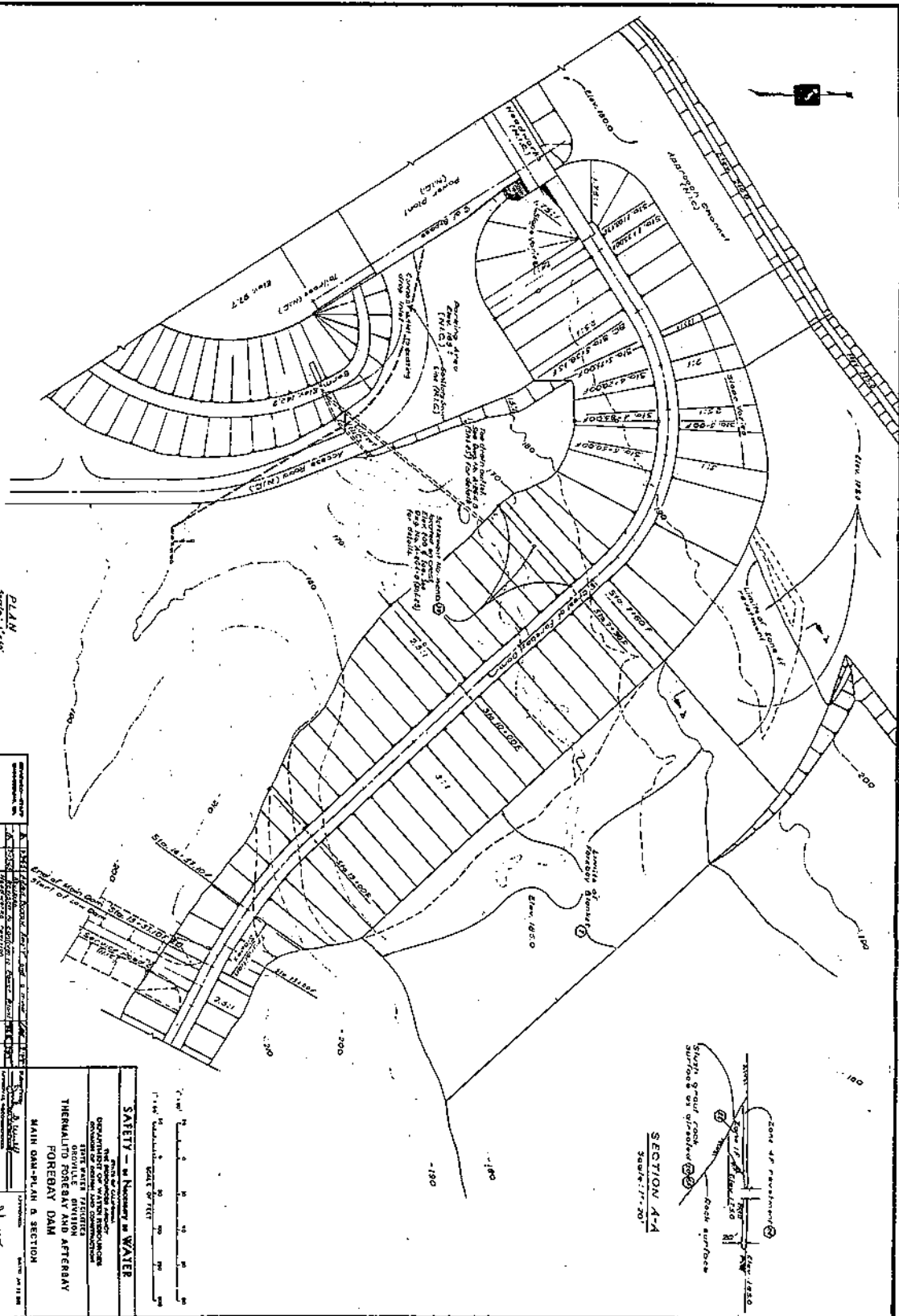
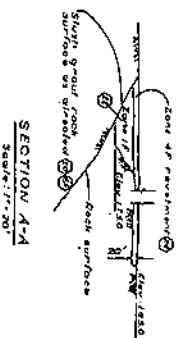


CHART 23

FIG. 3



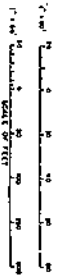
PLAN
Scale: 1"=100'



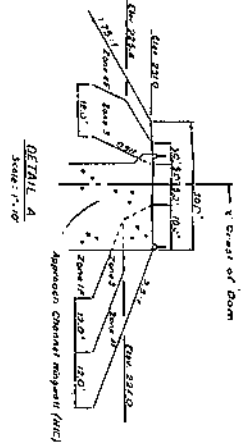
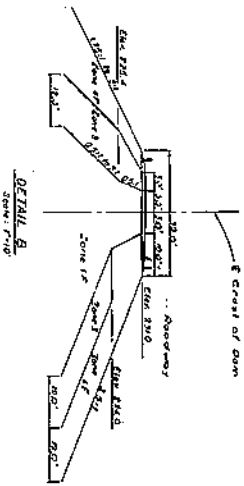
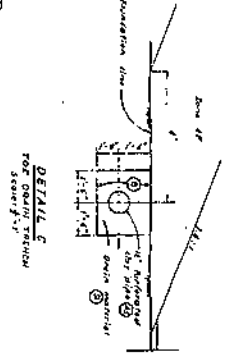
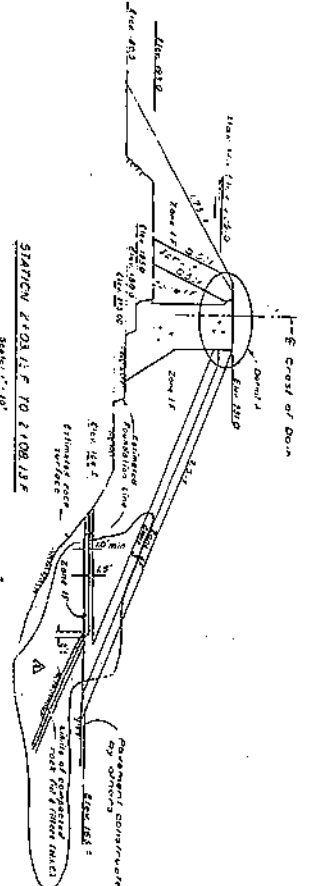
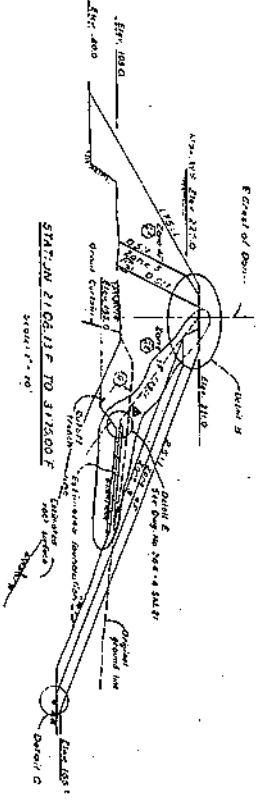
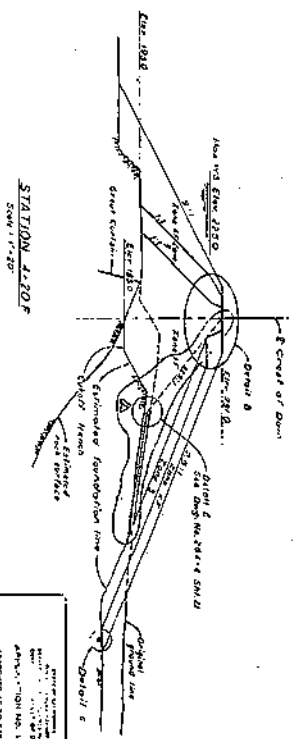
SECTION A-A
Scale: 1"=20'

SAFETY - IN RESPECT TO WATER

Division of Dam Safety
 DEPARTMENT OF WATER RESOURCES
 DIVISION OF DAM SAFETY
 THERMILTO FOREBAY AND AFTERBAY
 FOREBAY DAM
 MAIN DAM-PLAN & SECTION

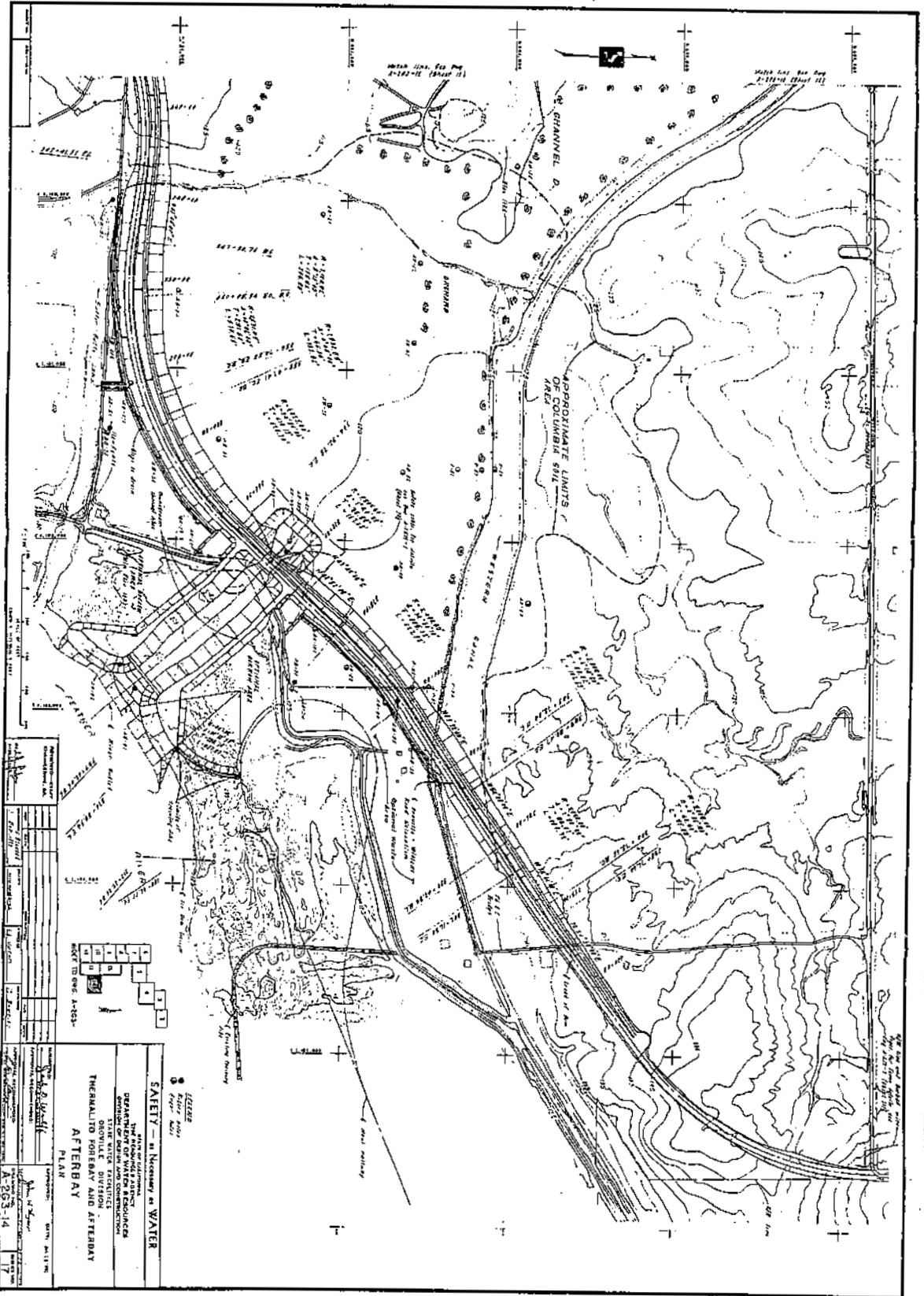


Project No.	100-100-100
Sheet No.	19
Scale	1"=100'
Author	J. H. Smith
Checked	M. J. Jones
Approved	R. L. Brown
Date	1950



SAFETY - IN NEARNESS OF WATER
 THE ENGINEER HAS REVIEWED THE DRAWINGS AND SPECIFICATIONS FOR THE FOREBAY DAM AND AFTERBAY FOREBAY DAM
 SECTION A & DETAILS

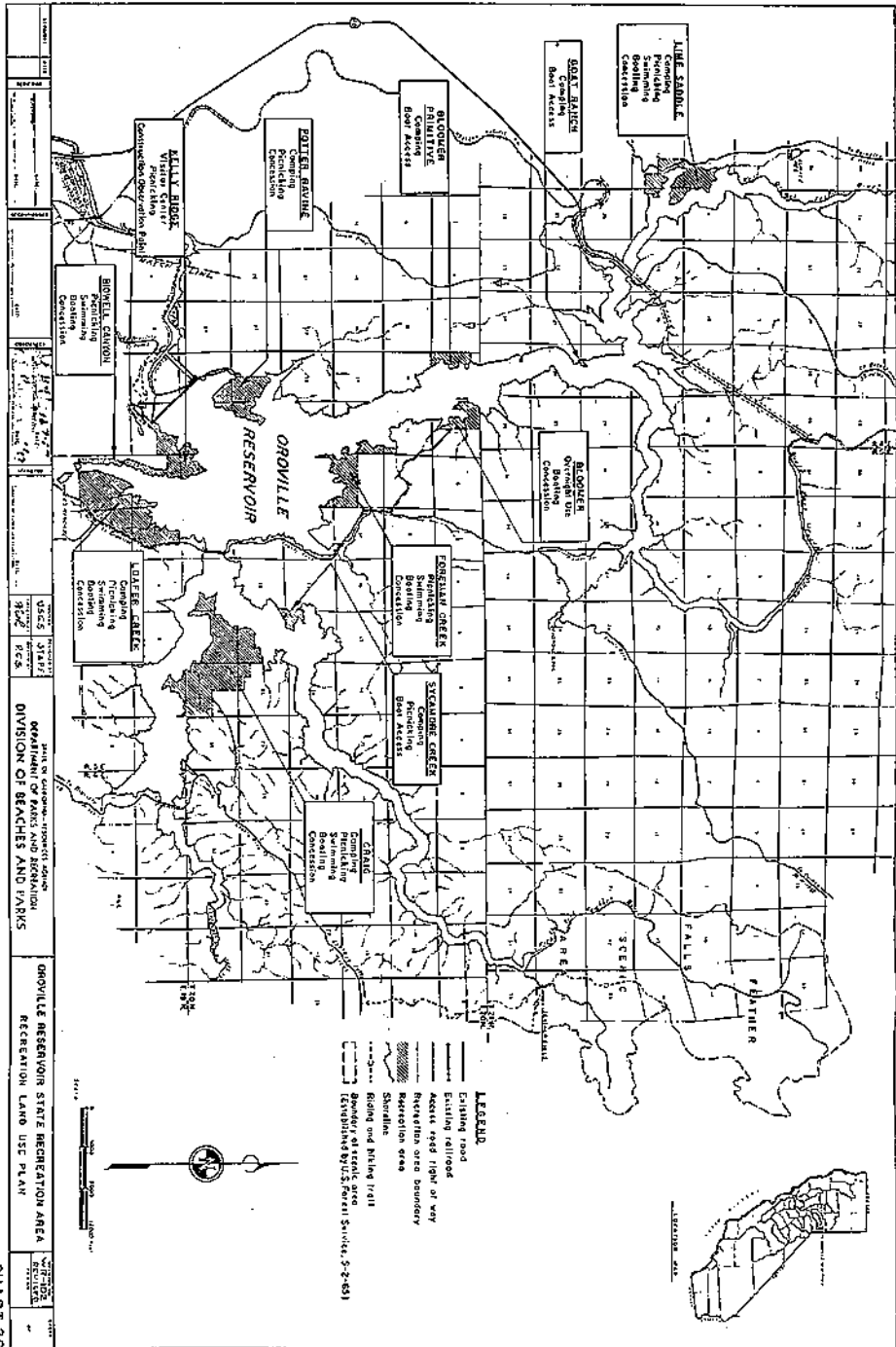
NO.	DATE	DESCRIPTION	BY	CHECKED
1	10/1/58	ISSUED FOR CONSTRUCTION	J. R. [Signature]	[Signature]
2	10/1/58	REVISED	J. R. [Signature]	[Signature]
3	10/1/58	REVISED	J. R. [Signature]	[Signature]
4	10/1/58	REVISED	J. R. [Signature]	[Signature]
5	10/1/58	REVISED	J. R. [Signature]	[Signature]
6	10/1/58	REVISED	J. R. [Signature]	[Signature]
7	10/1/58	REVISED	J. R. [Signature]	[Signature]
8	10/1/58	REVISED	J. R. [Signature]	[Signature]
9	10/1/58	REVISED	J. R. [Signature]	[Signature]
10	10/1/58	REVISED	J. R. [Signature]	[Signature]



APPROXIMATE LIMITS
OF COLUMBIA 5914

SAFETY - It is necessary at WATER
 DEPARTMENT OF WATER RESOURCES
 DIVISION OF WATER CONTROL
 OROVILLE DIVISION
 THERMALITO FOREBAY AND AFTERBAY
 PLAN

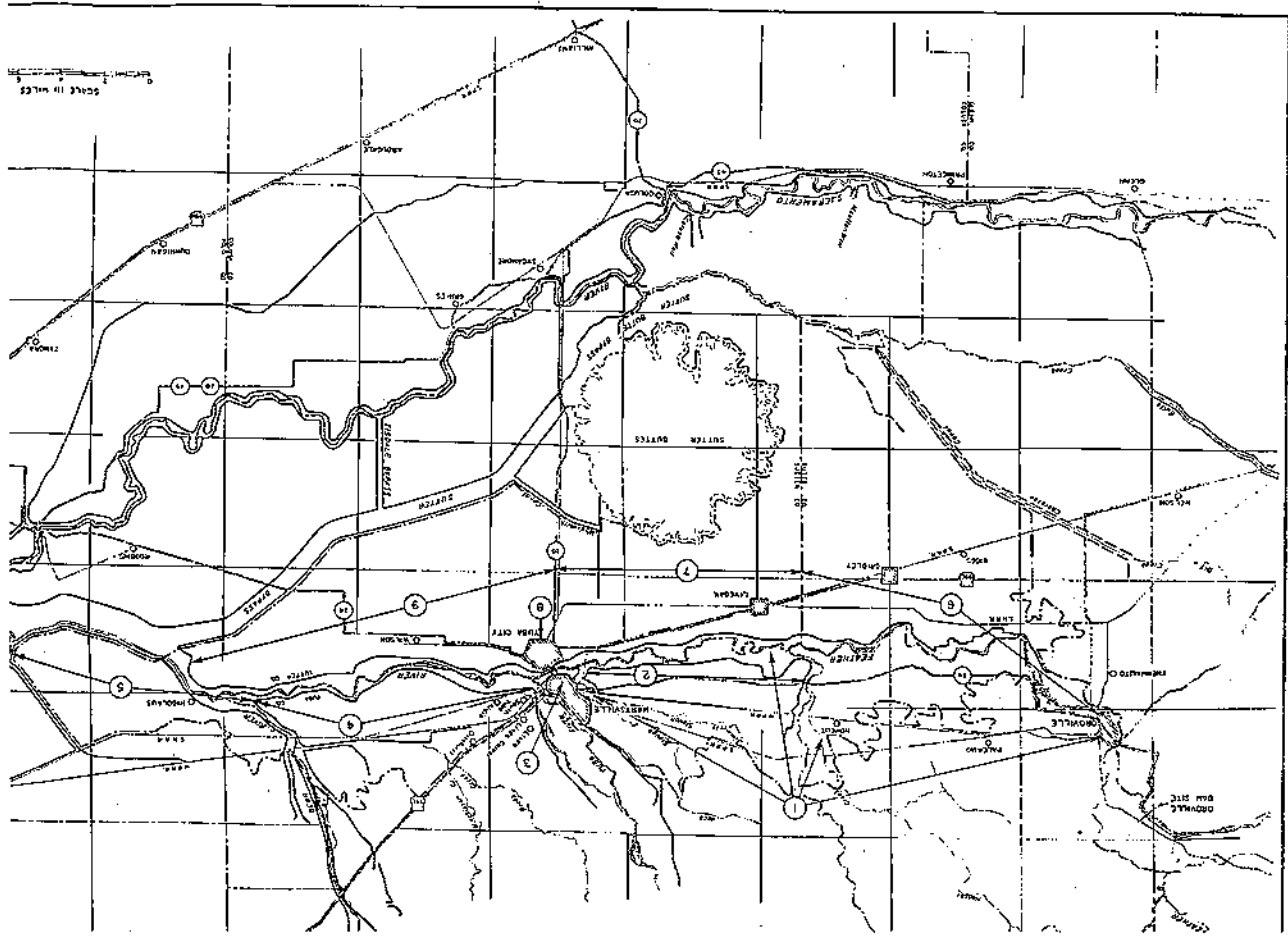
PROJECT NO.	DATE	SCALE	BY	CHECKED
10-10-59	10-10-59	AS SHOWN	J. J. [unclear]	[unclear]
DESIGNED BY	DRAWN BY	IN CHARGE	APPROVED	DATE
[unclear]	[unclear]	[unclear]	[unclear]	[unclear]
THERMALITO FOREBAY AND AFTERBAY PLAN SHEET NO. 14 OF 14				



NO.	STATE	PROJECT NAME	OWNER	DATE	AMOUNT	TYPE	CONTRACT NO.	CONTRACT VALUE	STATUS	DESCRIPTION	EST. COST	ACT. COST	REMARKS
3	NEVADA	SMALL LAKE	K CANTON CR	1965	8,000	EARTH & ROCK	280	35 4496	5	CHANEL L ABUT	4920	75 6	N.S. 3,386 NONE
4	NEVADA	TRIB. RUCKER CR	2 P	1970	1,120	EARTH & ROCK	239	23 5908	6	BROAD CR WEIR L ABUT	5920	12 4	- 300 NONE PIPE
7	NEVADA	TRIB. RUCKER CR	2 P	1970	1,120	EARTH & ROCK	240	24 5908	7	BROAD CR WEIR R ABUT	5920	12 4	- 300 NONE PIPE
8	NEVADA	STERLING CR	1 P,R	1977	4,450	ROCK FILL	225	25 4700	8	RECT WEIR R ABUT	6093.0	13 6.2	1 400 FLASHBOARDS
9	NEVADA	STERLING CR	1 P,R	1977	4,450	ROCK FILL	225	25 4700	9	RECT WEIR R ABUT	6093.0	13 6.2	1 400 FLASHBOARDS
10	NEVADA	STERLING CR	1 P,R	1977	4,450	ROCK FILL	225	25 4700	10	RECT WEIR R ABUT	6093.0	13 6.2	1 400 FLASHBOARDS
11	YUBA	LAKE FRANCIS	DORRIS CR	1901	1,900	HYD FILL	4,300	17 1650	11	OGEE	1443	112 7	- 4,600 2-5'x20" RAD GATES
12	NEVADA	WATER BUTTE DIV	FEATHER R	1909	2,000	ROCK FILL CRIB	600	31 120	12	RECT WEIR DAM	109	700 11	10 40,000 FLASHBOARDS
13	NEVADA	WATER BUTTE DIV	FEATHER R	1909	2,000	ROCK FILL	304	50 5780	13	CONC SILL L ABUT	3775	224 5	- 14,500 FLASHBOARDS
14	NEVADA	WATER BUTTE DIV	FEATHER R	1909	2,000	CONC ARCH	690	273 5014	14	OGEE	4599	102 15	- 32,200 6-37'x15" RAD GATES
15	YUBA	LAKE VERDE	ORY CR	1915	1,850	MULTI ARCH	210	56 1555	15	BROAD CR WEIR L & R ABUT	1351	160 4	- 2,800 NONE
16	NEVADA	LAKE VAN BORDAN	3 YUBA R	1916	5,470	EARTH	1,437	27 4700	16	CONC SILL L ABUT	4765	111 6	3 3,200 FLASHBOARDS
17	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	17	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
18	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	18	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
19	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	19	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
20	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	20	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
21	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	21	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
22	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	22	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
23	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	23	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
24	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	24	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
25	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	25	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
26	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	26	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
27	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	27	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
28	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	28	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
29	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	29	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
30	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	30	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
31	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	31	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
32	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	32	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
33	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	33	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
34	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	34	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
35	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	35	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
36	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	36	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
37	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	37	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
38	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	38	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
39	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	39	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
40	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	40	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
41	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	41	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
42	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	42	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
43	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	43	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
44	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	44	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
45	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	45	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
46	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	46	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
47	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	47	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
48	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	48	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
49	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	49	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
50	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	50	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
51	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	51	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
52	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	52	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
53	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	53	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
54	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	54	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
55	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	55	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
56	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	56	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
57	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	57	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
58	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	58	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
59	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	59	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS
60	NEVADA	MOUNTAIN MEADOWS	MOUNTAIN MEADOWS DAM	1924	24,900	FLASHBO & BUTT	765	27 4922	60	RECT WEIR DAM	4955.5	169 6.5	- 6,000 FLASHBOARDS

NOTES:
 D - DOMESTIC
 I - IRRIGATION
 R - RECREATION
 M - MUNICIPAL
 P - POWER
 W - WINDING
 FC - FLOOD CONTROL
 PG&E - PACIFIC GAS AND ELECTRIC CO.
 ID - IRRIGATION DISTRICT
 WC - WATER COMPANY
 US C of E - UNITED STATES COMPS OF ENGINEERS
 DWR - DEPARTMENT OF WATER RESOURCES
 W - WATER DISTRICT
 WA - WATER AGENCY

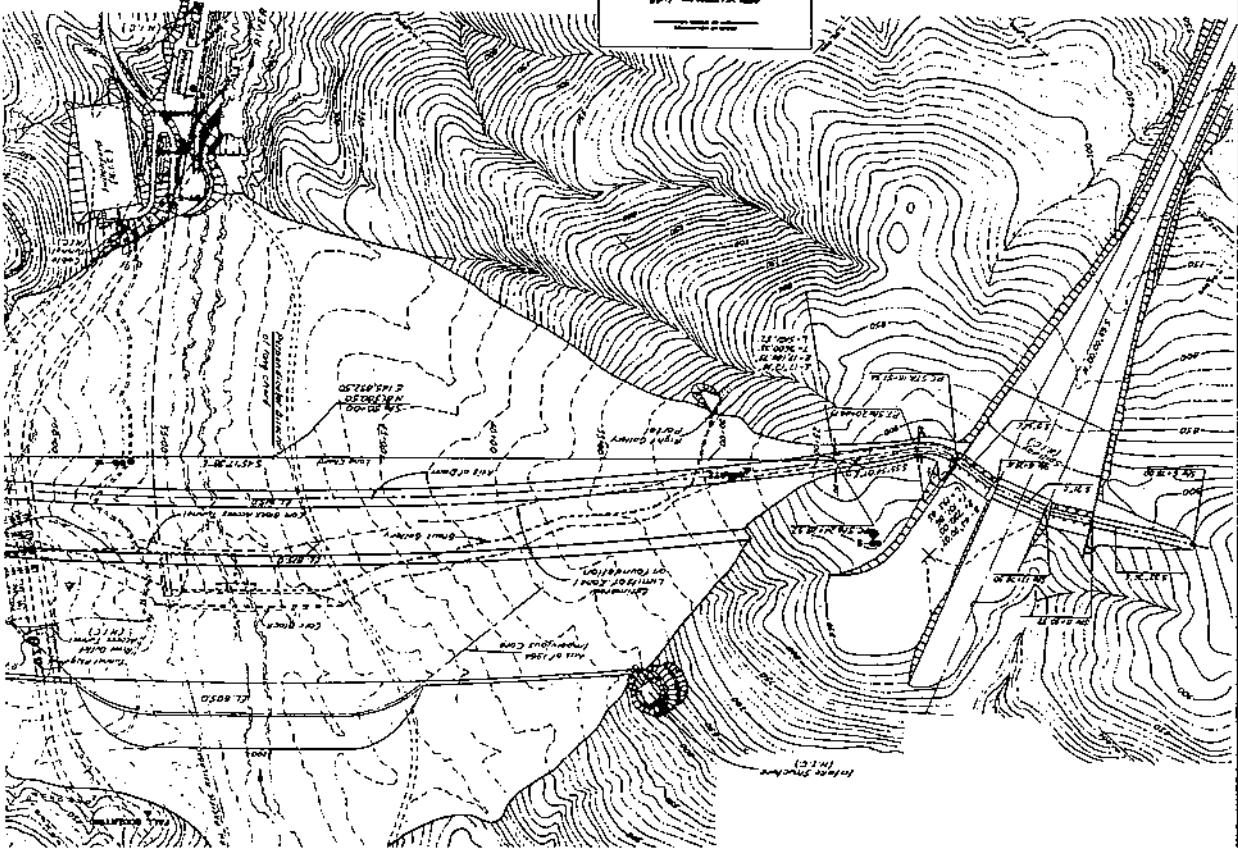
U - UNDER CONSTRUCTION
 A - AUTHORIZED

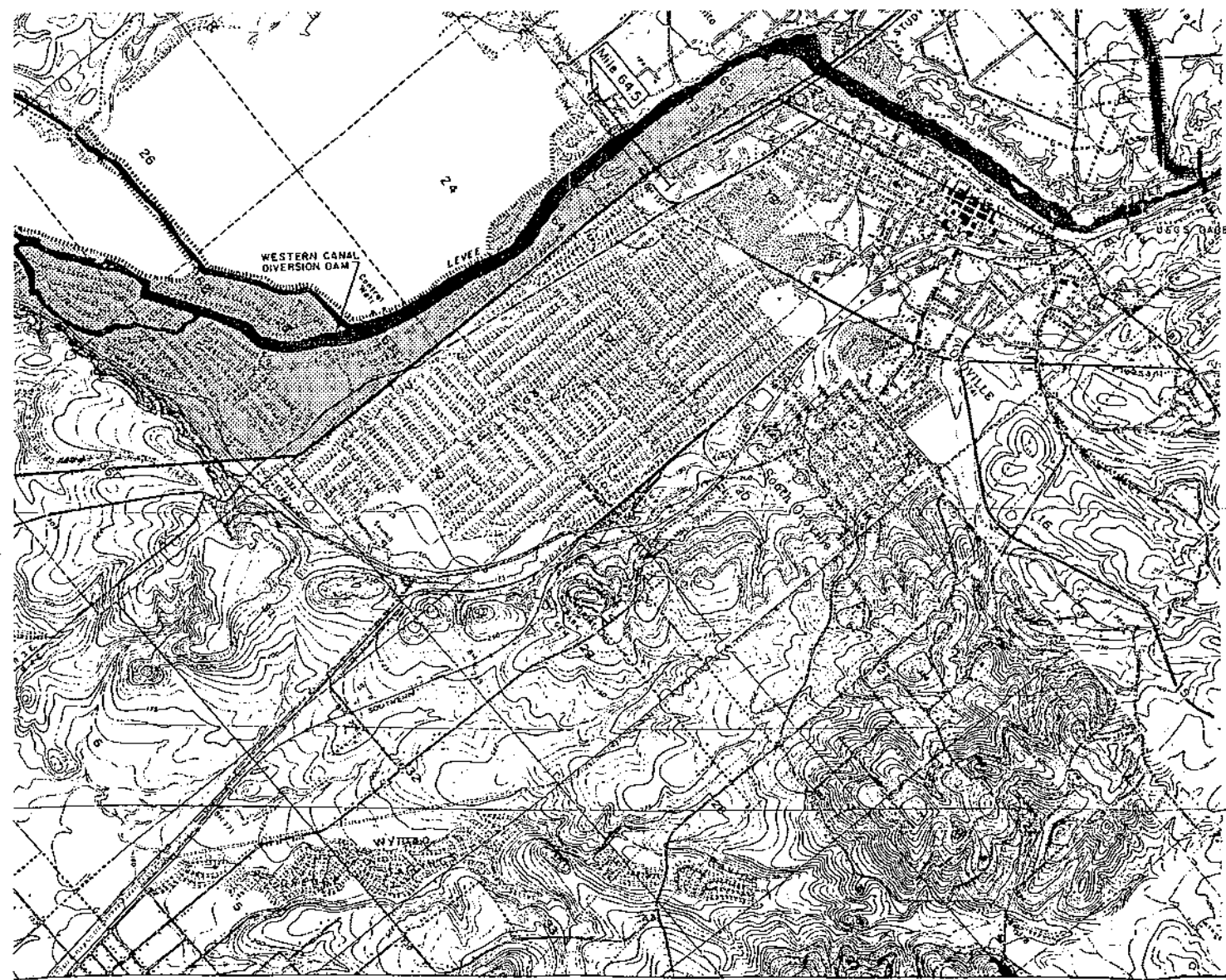


Sheet No. 1 of 2
Scale 1:50,000
Date 1/1/50

LEGEND
● METEOROLOGICAL STATION
▲ TELEPHONE CENTRE
▲ TELEGRAPH CENTRE
▲ RAILWAY CROSSING

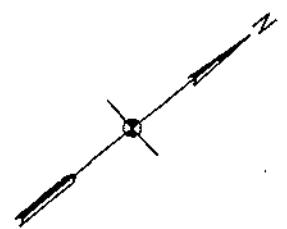
APPROXIMATELY
FOR THE PURPOSES OF
THE SURVEY
1:50,000





Mile 64.5 |—| Cross section

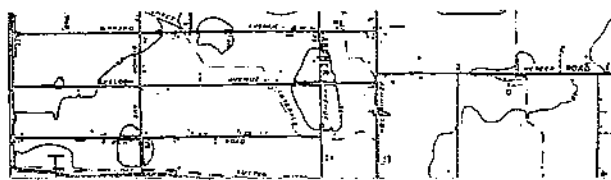
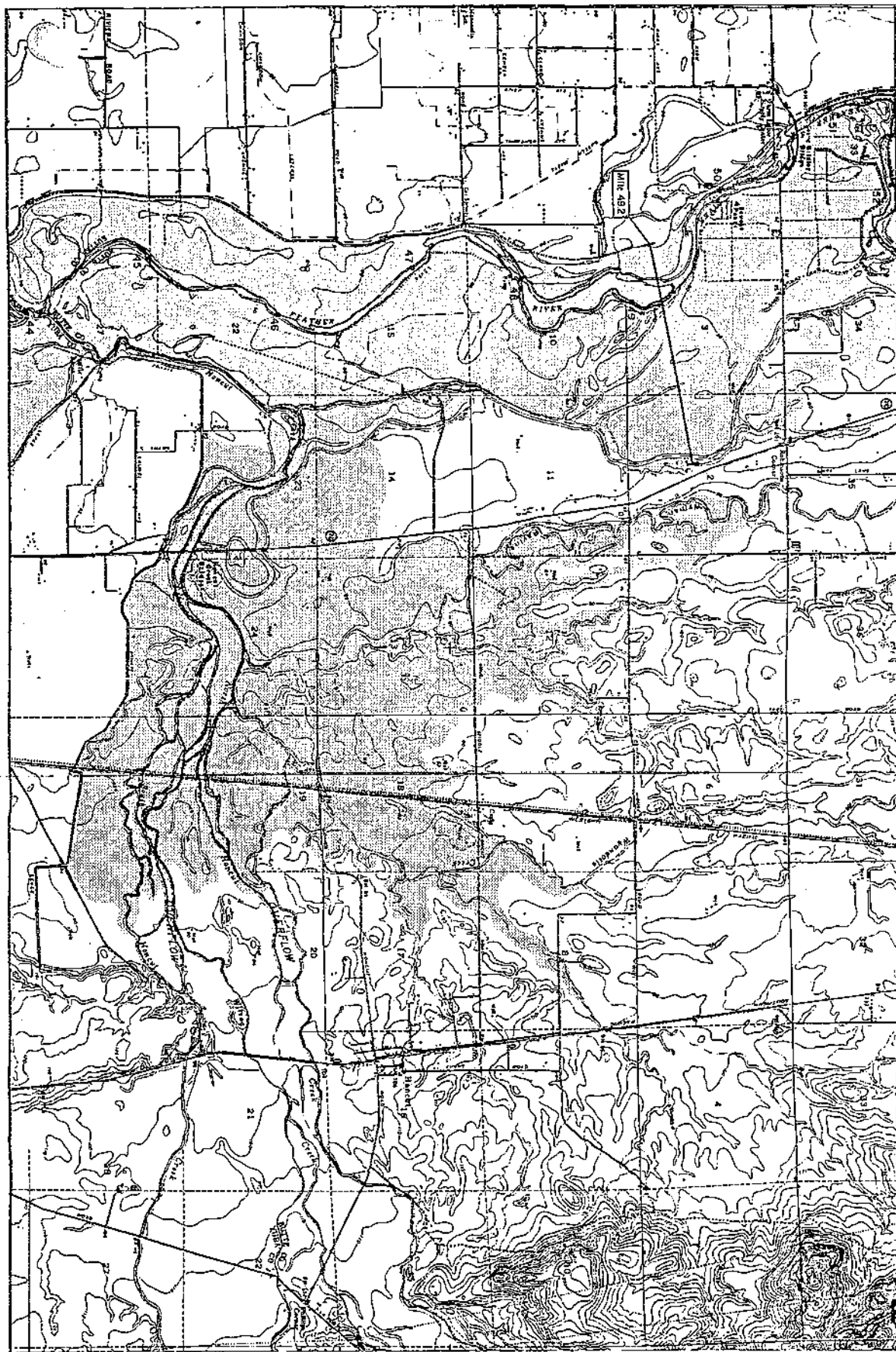
Note: In the reach above the Honcut Creek junction, the depth of flow for 170,000 cfs would average about 2 feet more than that sum for 150,000 cfs. The flooded areas would be virtually equal.

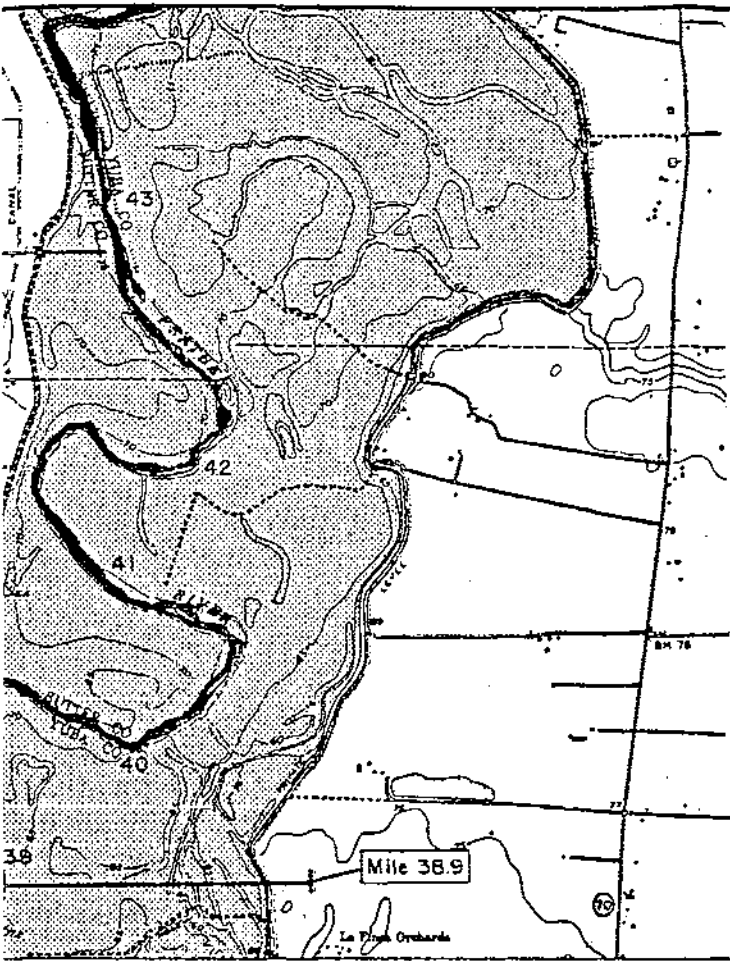


SCALE IN FEET
 1000 0 1000 2000 3000 4000 5000
 CONTOUR INTERVAL - 5 AND 25 FEET




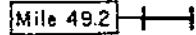
CORPS OF ENGINEERS, U.S. ARMY
 SACRAMENTO DISTRICT
 FLOOD PLAIN INFORMATION
 FEATHER AND YUBA RIVERS
 MARYSVILLE-YUBA CITY, CALIFORNIA

FLOODED AREAS
 FEATHER RIVER
 JUNE 1968





LEGEND

-  Low water channel
-  Objective Flows
-  Miles above mouth
-  Cross section

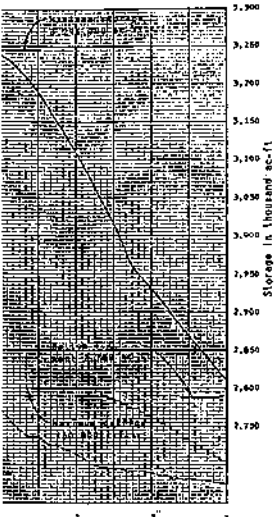
Note: In the reach above the Honcut Creek junction, the depth of flow for 170,000 cfs would average about 2 feet more than that shown for 150,000 cfs. The flooded areas would be virtually equal.



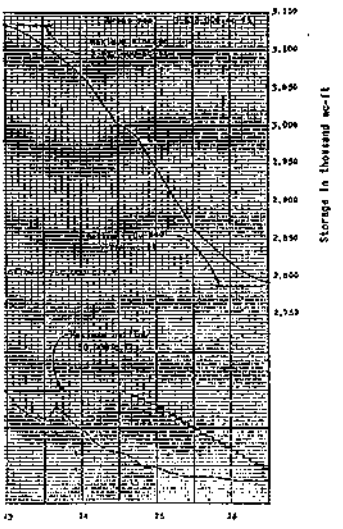
CORPS OF ENGINEERS, U.S. ARMY
 SACRAMENTO DISTRICT
 FLOOD PLAIN INFORMATION
 FEATHER AND YUBA RIVERS
 MARYSVILLE-YUBA CITY, CALIFORNIA

**FLOODED AREAS
 FEATHER RIVER
 JUNE 1968**

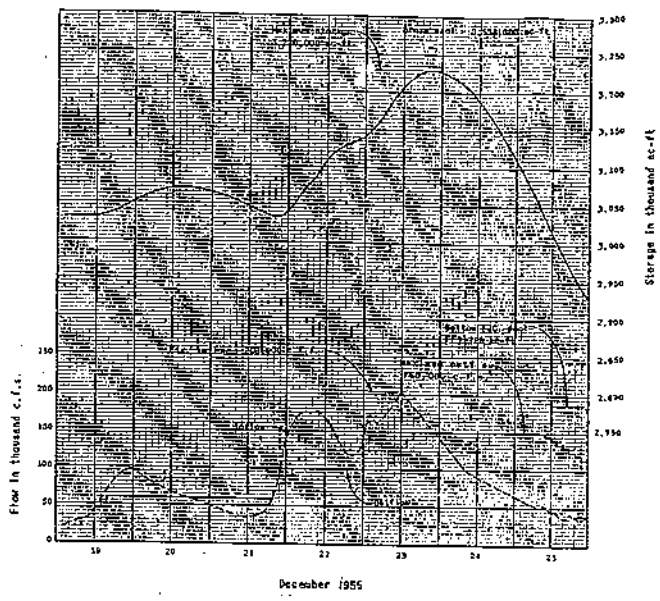
(Deleted August 1970)



Feb. 1963



December 1964

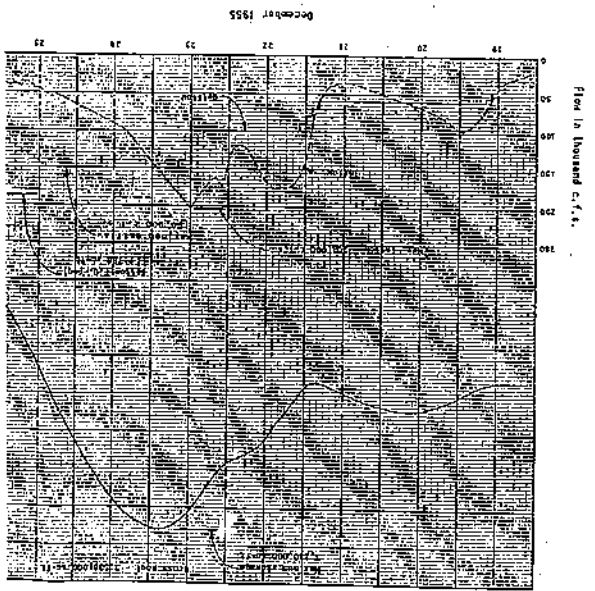
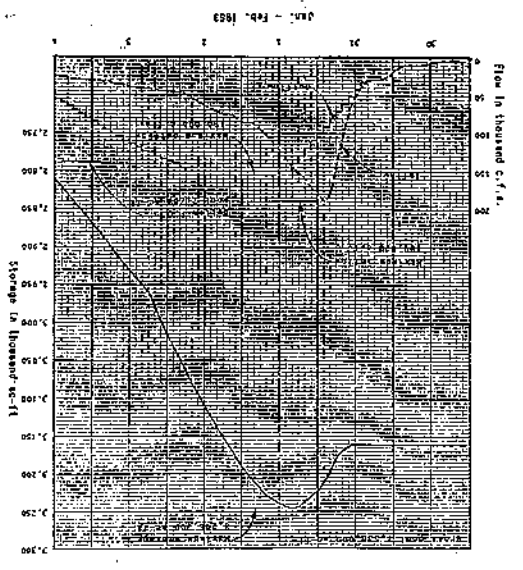
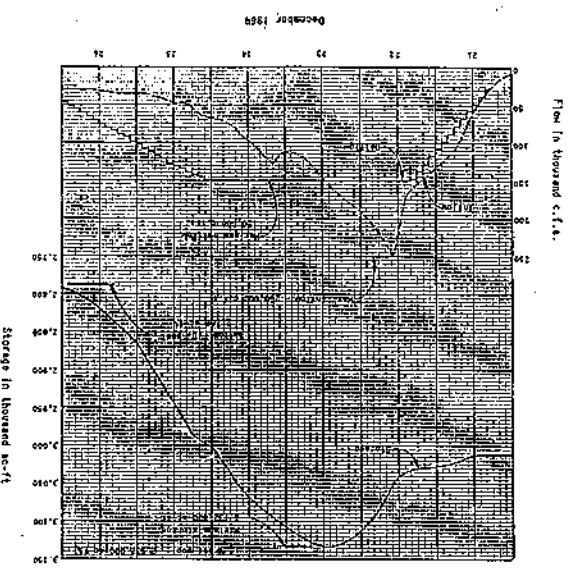


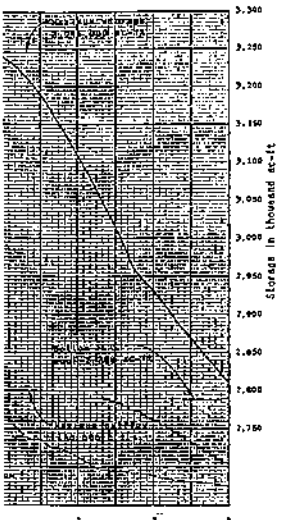
December 1955

ORVILLE DAM AND RESERVOIR
FEARNS AVENUE, CALIFORNIA

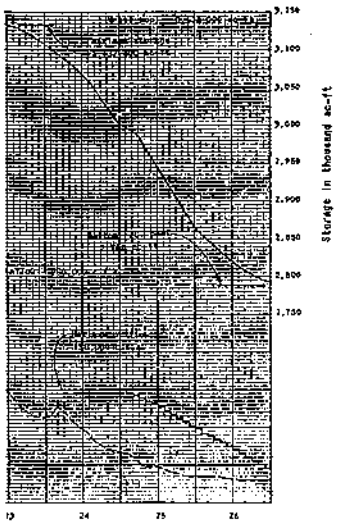
HISTORICAL FLOOD ROUTINGS

CORPS OF ENGINEERS,	SACRAMENTO, CALIFORNIA
Prepared: J.A.R.	Date: May 1970
Drawn: R.E.Y. & S.E.W.	

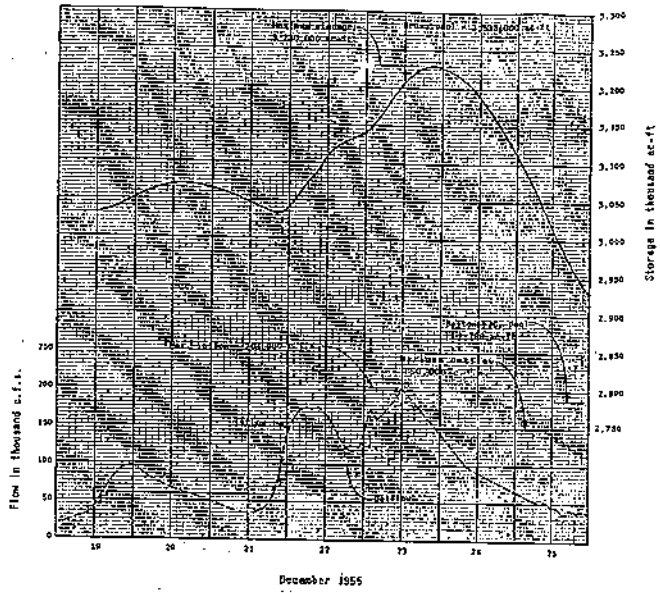




Feb. 1963



December 1958



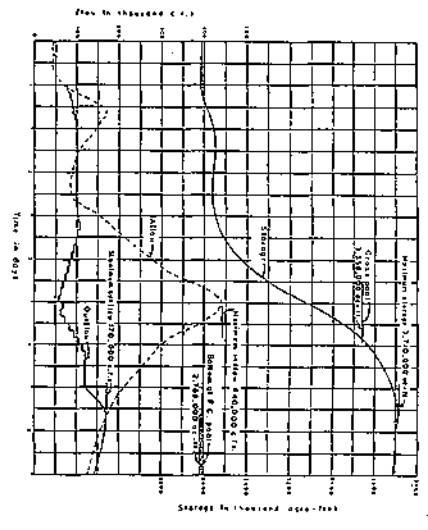
December 1955

OPPOWILLE DAM AND RESERVOIR
 YUBA RIVER, CALIFORNIA

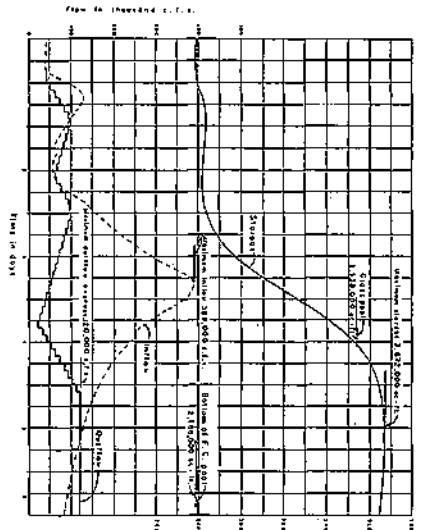
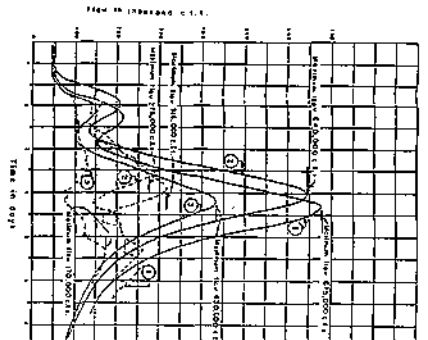
HISTORICAL FLOOD ROUTINGS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA
 Prepared: J.H.M. Date: May 1970
 Drawn: R.E.V. & S.E.M.

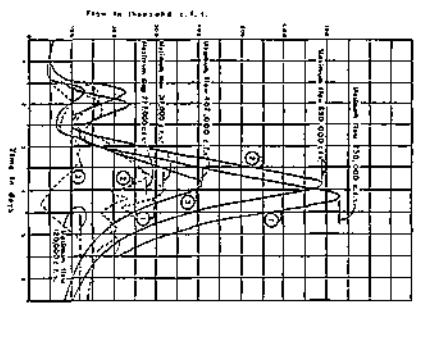
VALUE ENGINEERING PAYS



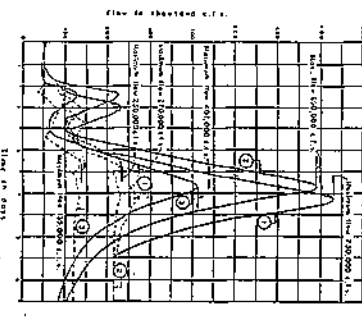
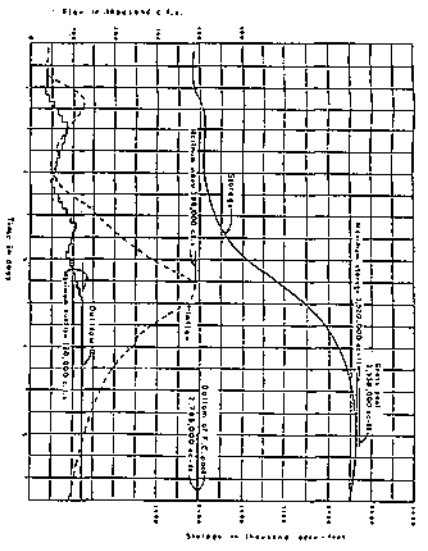
ROUTING NO. 1 (PRESENT CONDITIONS)
 (Primary standard project storm centered on Reaher River above Granite Dam)
 (Repetition by Granite and New Butte's Dam Retention)



ROUTING NO. 2 (PRESENT CONDITIONS)
 (Primary standard project storm centered on Yabo River below New Butte's Dam)
 (Repetition by Granite and New Butte's Dam Retention)



ROUTING NO. 3 (FUTURE CONDITIONS)
 (Primary standard project storm centered on Yabo River below New Butte's Dam)
 (Repetition by Granite and New Butte's Dam Retention)



- NOTES:
1. All routing curves are based on the present conditions.
 2. By National Insurance Co. with 10%.
 3. All routing curves are based on the present conditions.
 4. All routing curves are based on the present conditions.
 5. All routing curves are based on the present conditions.
 6. All routing curves are based on the present conditions.
 7. All routing curves are based on the present conditions.
 8. All routing curves are based on the present conditions.
 9. All routing curves are based on the present conditions.
 10. All routing curves are based on the present conditions.

STANDARD PROJECT FLOOD ROUTINGS

DESIGNED BY: [Name]

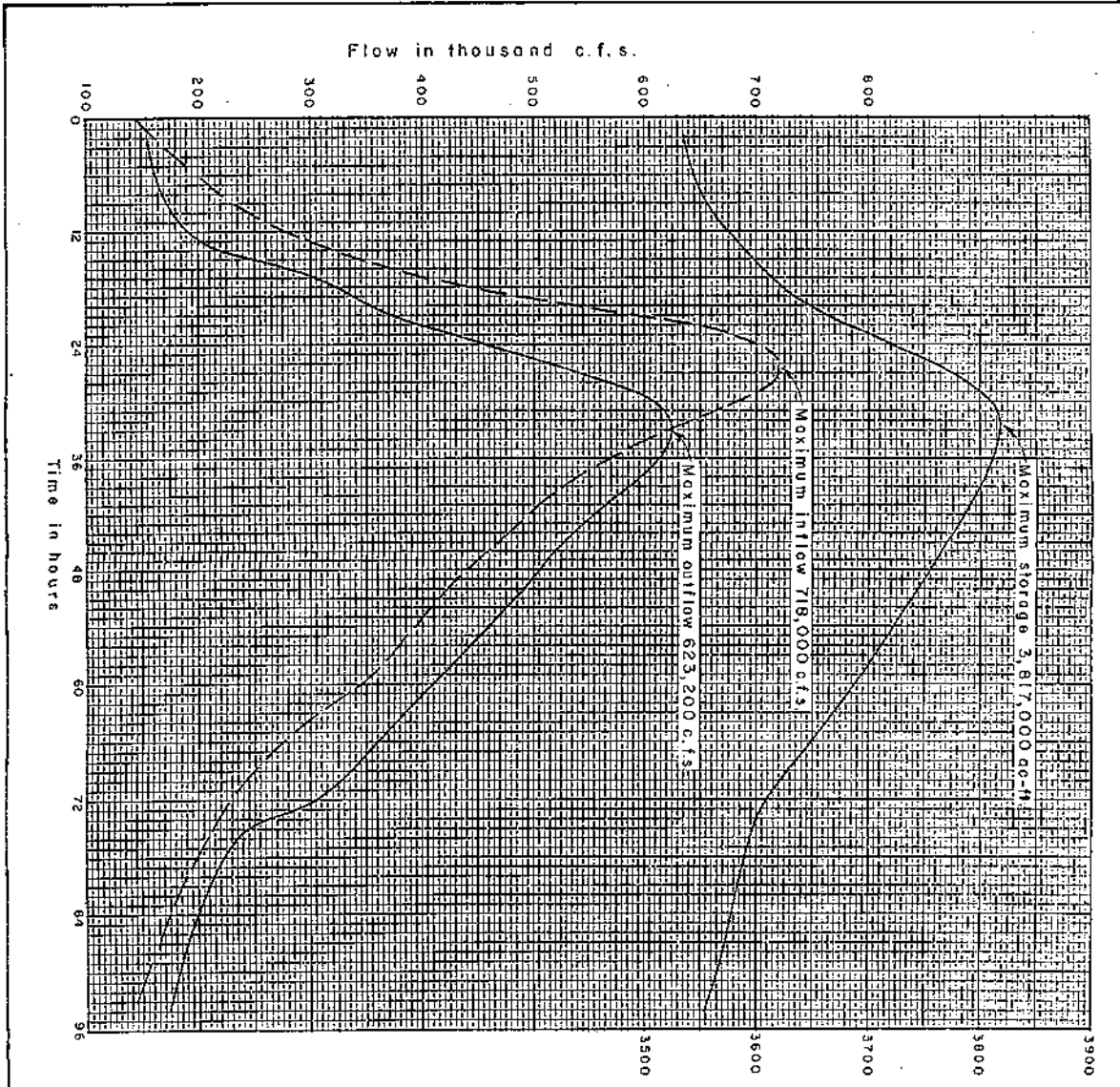
CHECKED BY: [Name]

DATE: [Date]

PROJECT NO. [Number]

SCALE: [Scale]

SAFETY PAYS

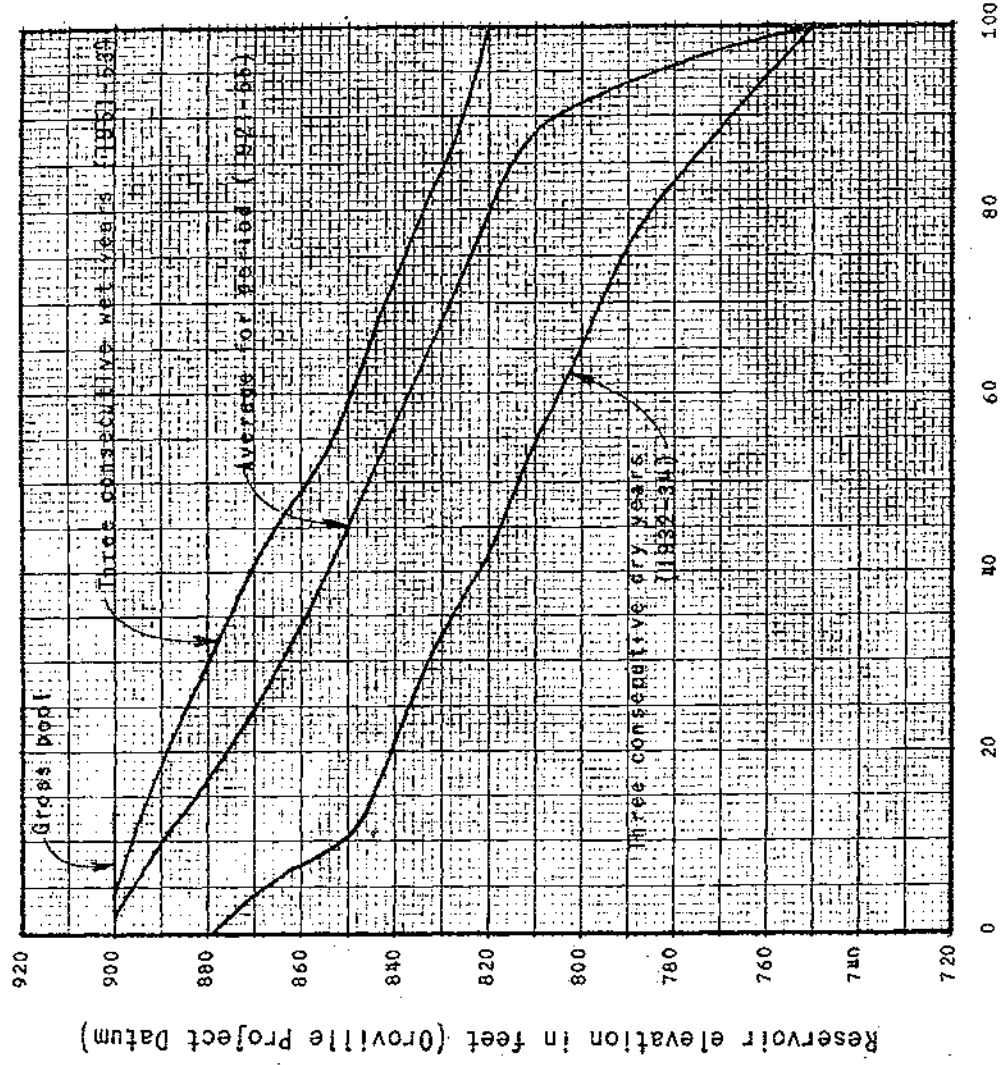


Storage in thousand acre - feet

NOTE: Data furnished by D.W. R.

OROVILLE DAM AND RESERVOIR
 Feather River, California
 SPILLWAY DESIGN
 FLOOD ROUTING

CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA
 Prepared by T.V.H. Date: April 1968
 Drawn: L.R.S.



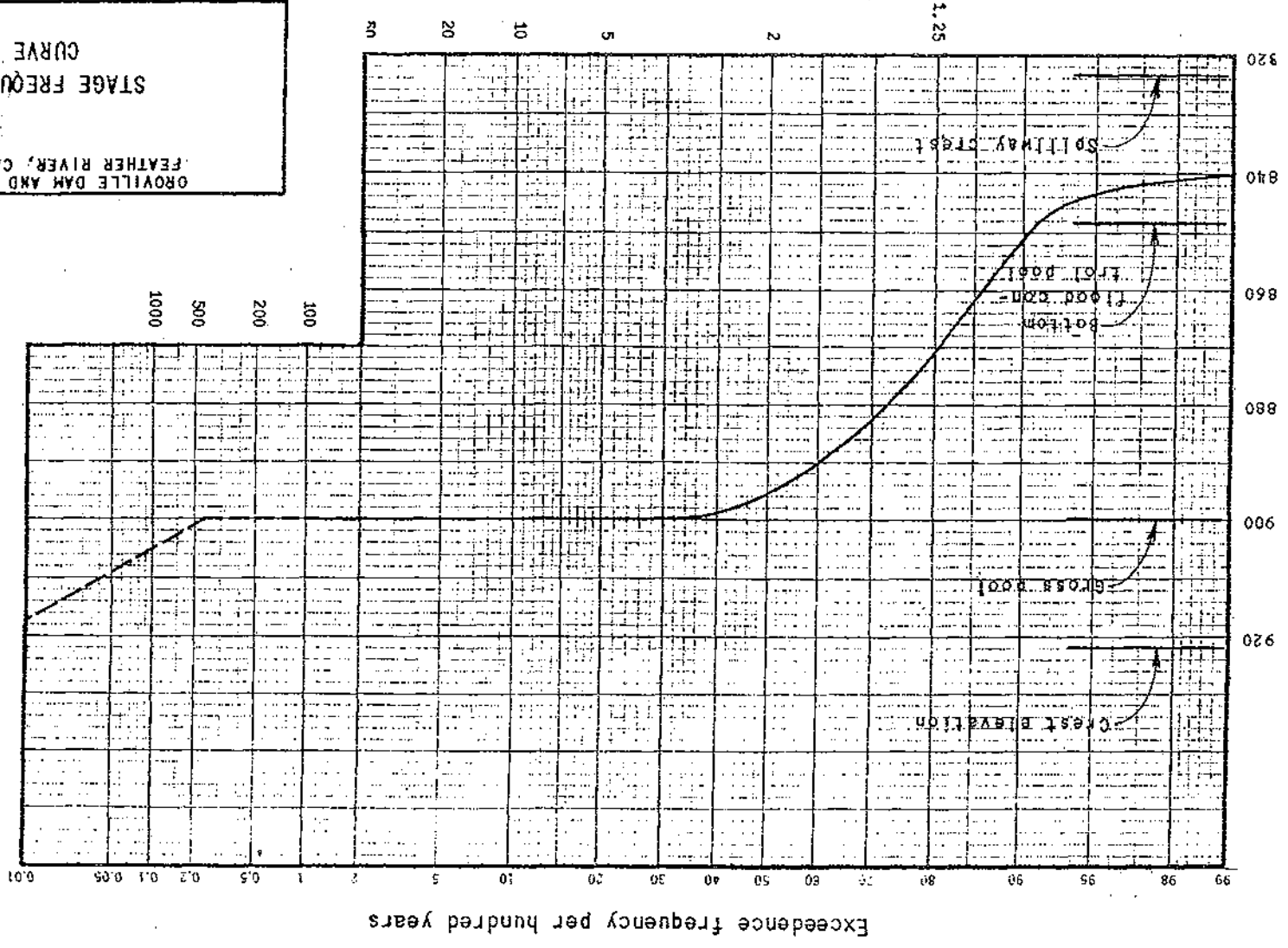
OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

STAGE-DURATION CURVES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R. F. C. Date: July 1970
Drawn: R. E. Y. & S. K. N.

Reservoir elevation in feet (Orville Reservoir Datum)

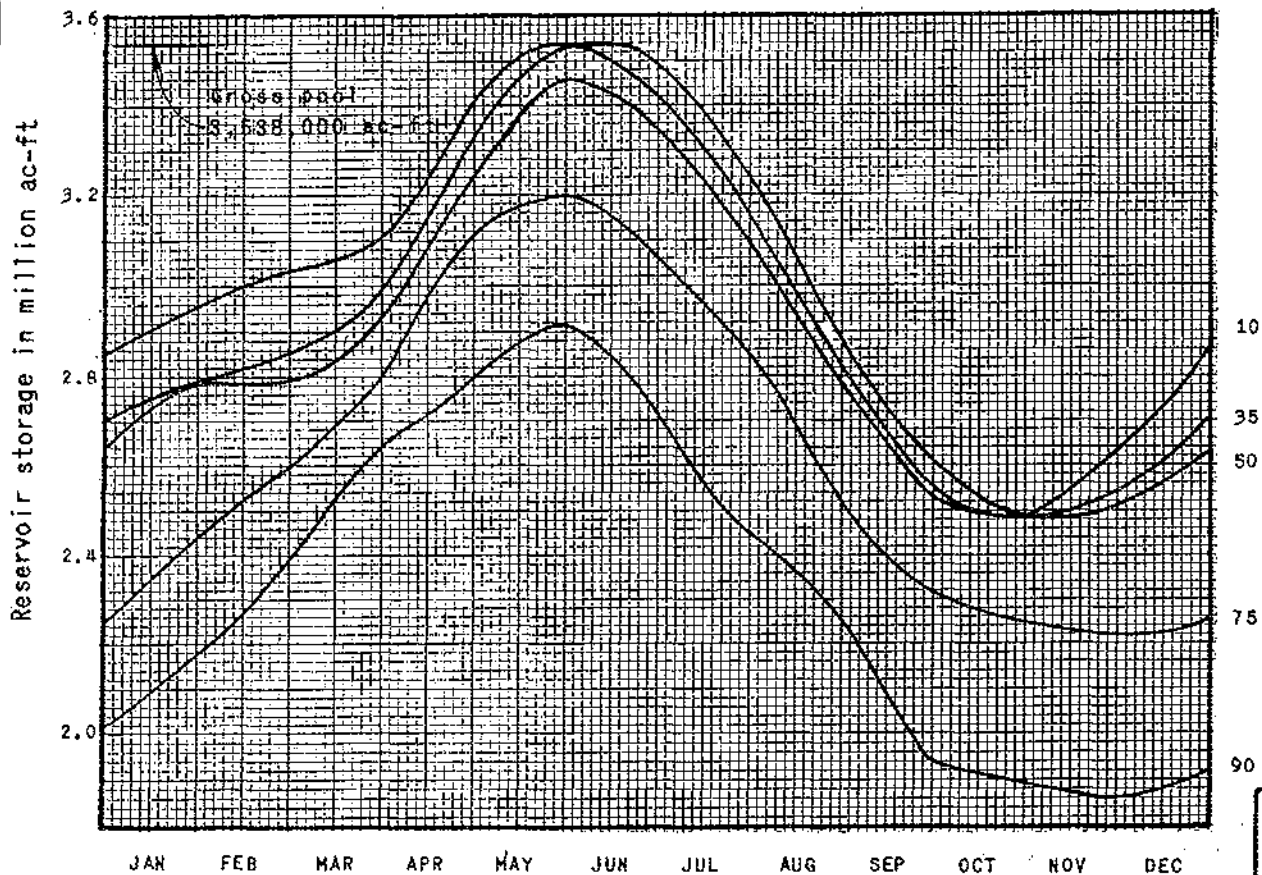


Exceedence interval in years

ORVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA
CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA
Prepared: R.F.C.
Drawn: R.E.Y., S.K.H.
Date: July 1970

STAGE FREQUENCY
CURVE

ORVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA



NOTES:

1. Indicated parameter value is percent of years that storage is equalled or exceeded on given date. (Based on total storage at end of month)
2. Curves computed from data furnished by DWR.

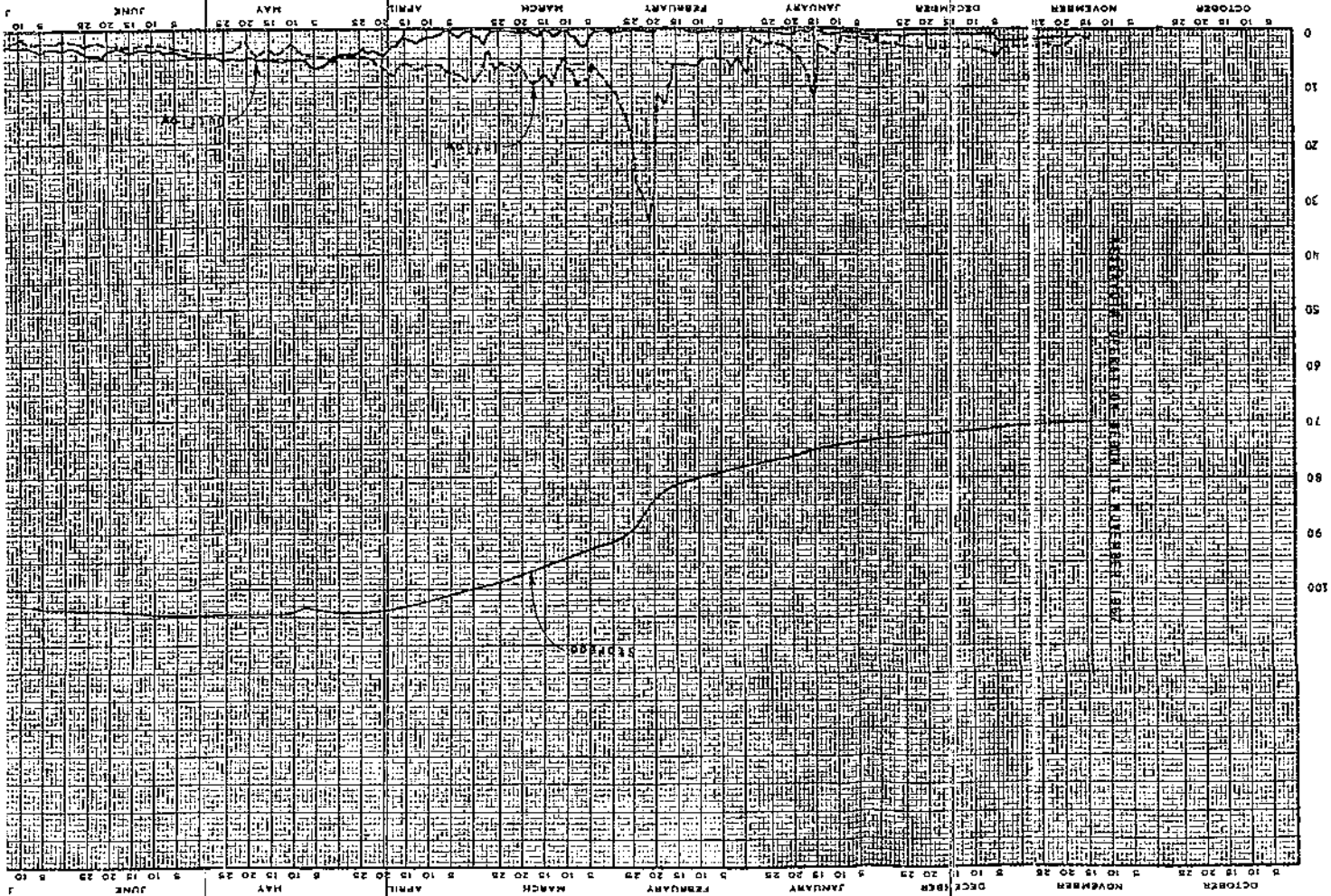
ORVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

SEASONAL VARIATION
OF
RESERVOIR STORAGE
FREQUENCY

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

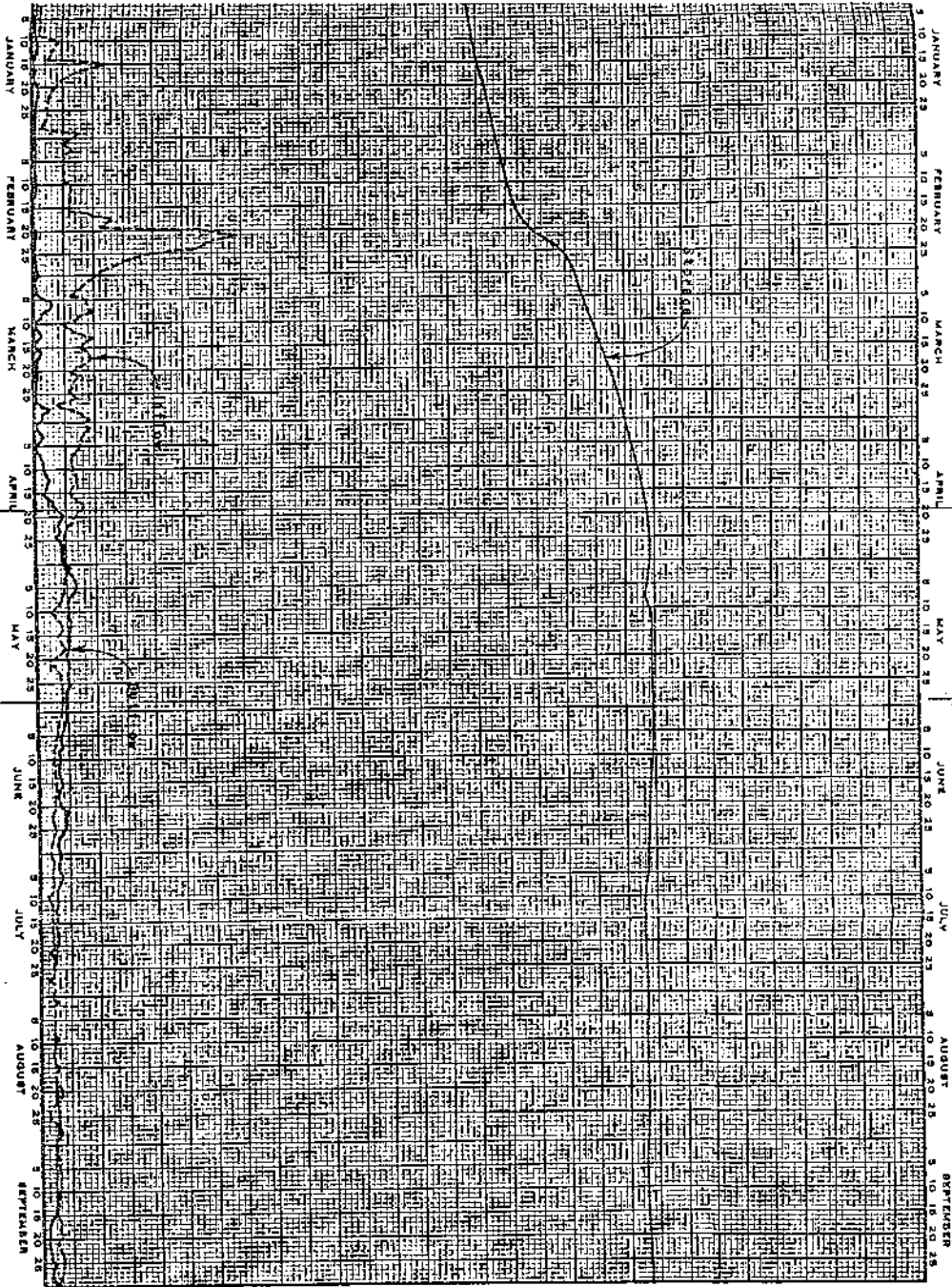
Prepared: R.F.C. Date: July 1970
Drawn: R.E.Y. & S.K.N.

1967 - 1968



Mean daily flow in thousand c.f.s.

1967 - 1968



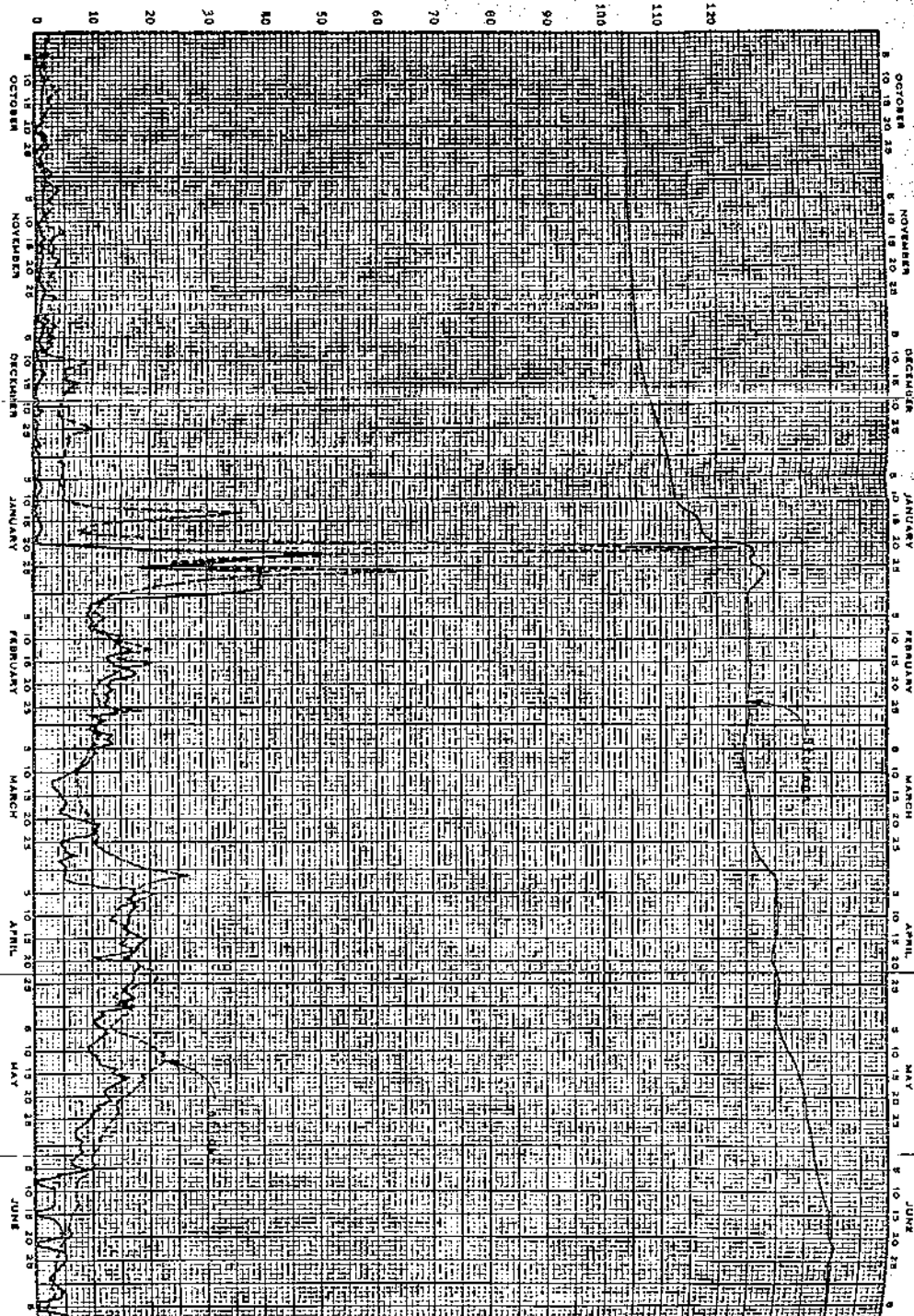
Storage in thousand acre-feet

DEWITTE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

HISTORICAL OPERATION

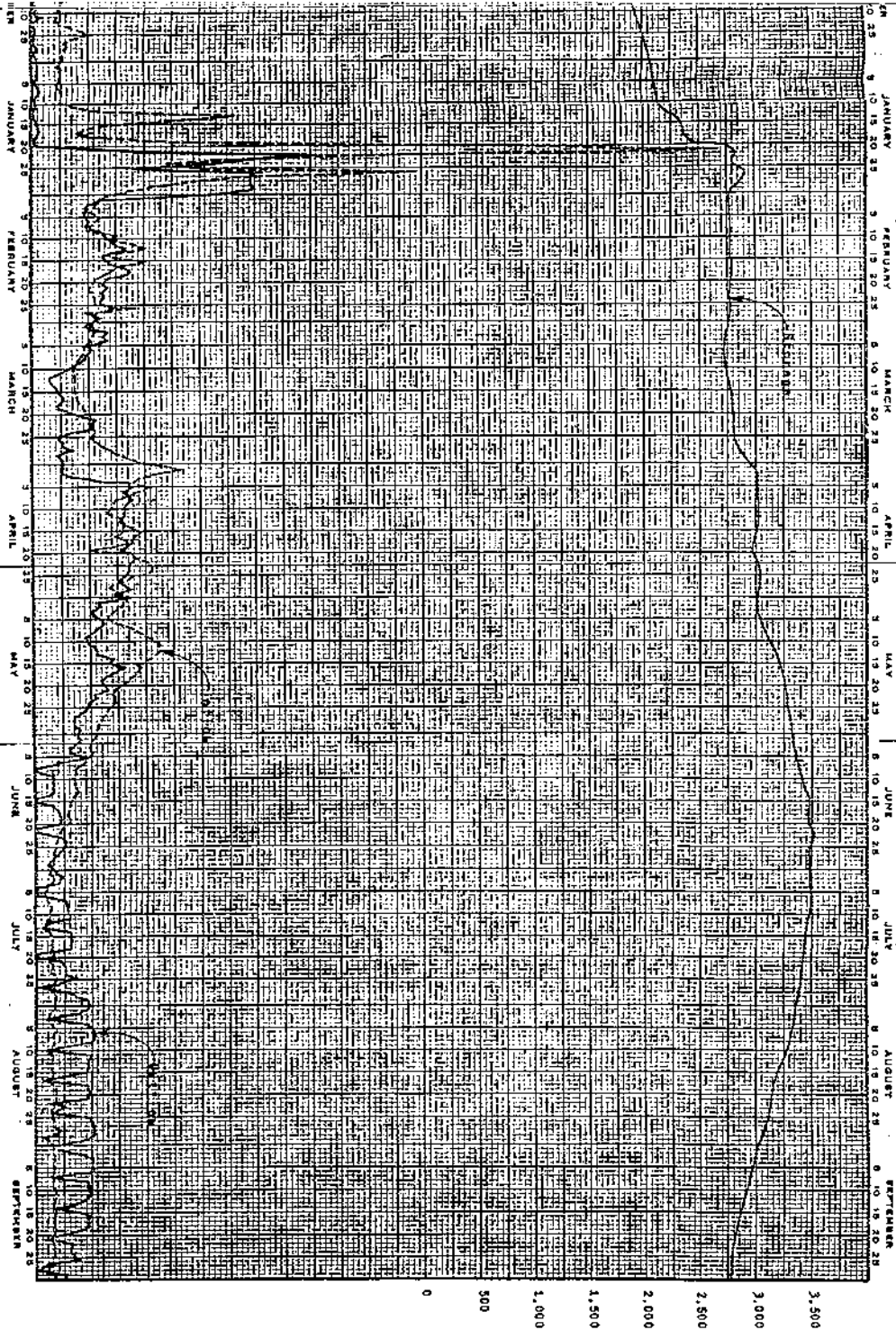
CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA
Prepared: R.F.C.
Drawn: R.E.T. & S.M.M. Date: June 1970

Mean daily flow in thousand c.f.s.



1968 - 1969

1968 - 1969



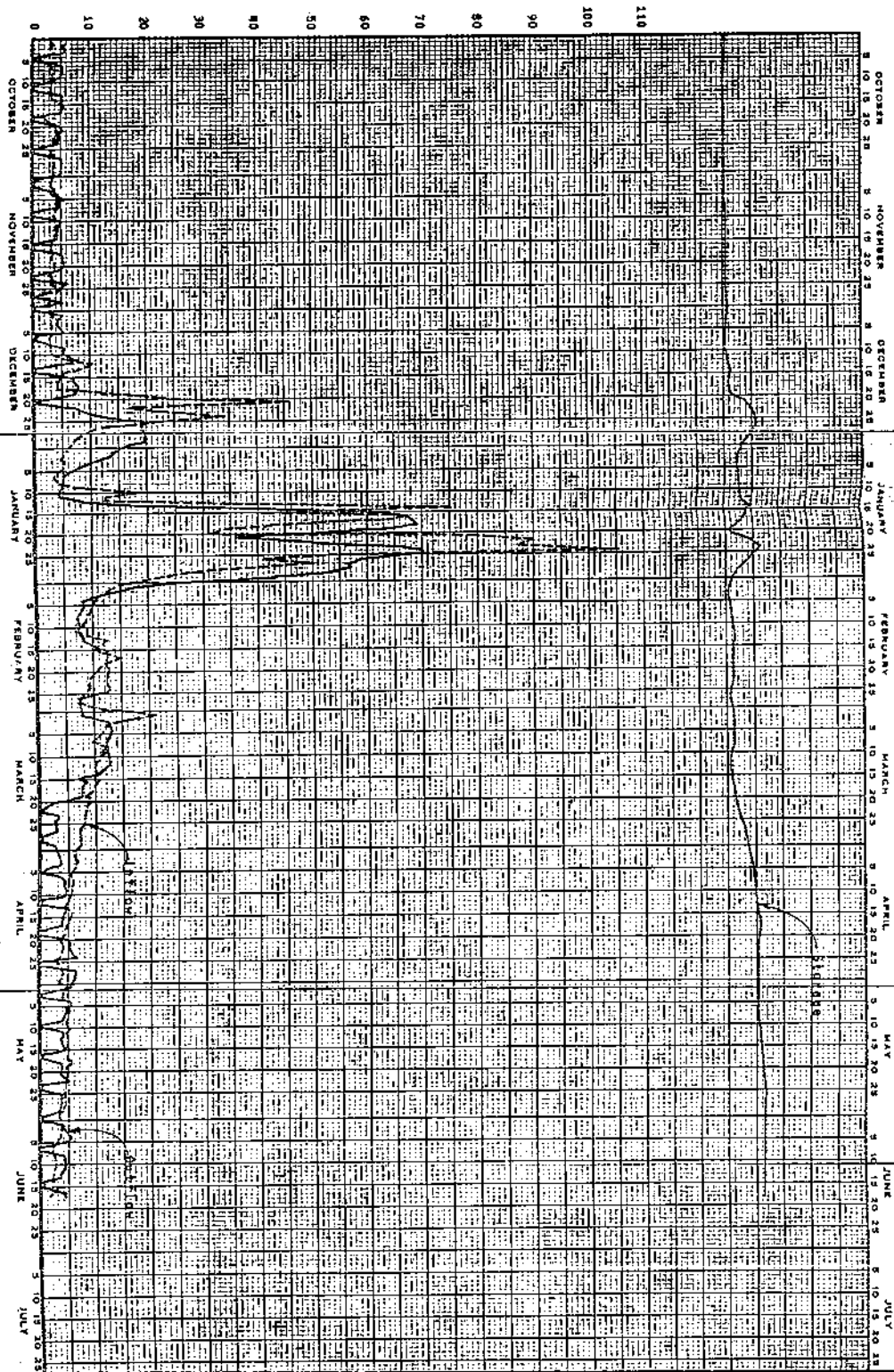
Storage in thousand acre-feet.

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA
HISTORICAL OPERATIONS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA
Prepared: R.F.G.
Drawn: R.E.V. & S.K.M. Date: June 1970

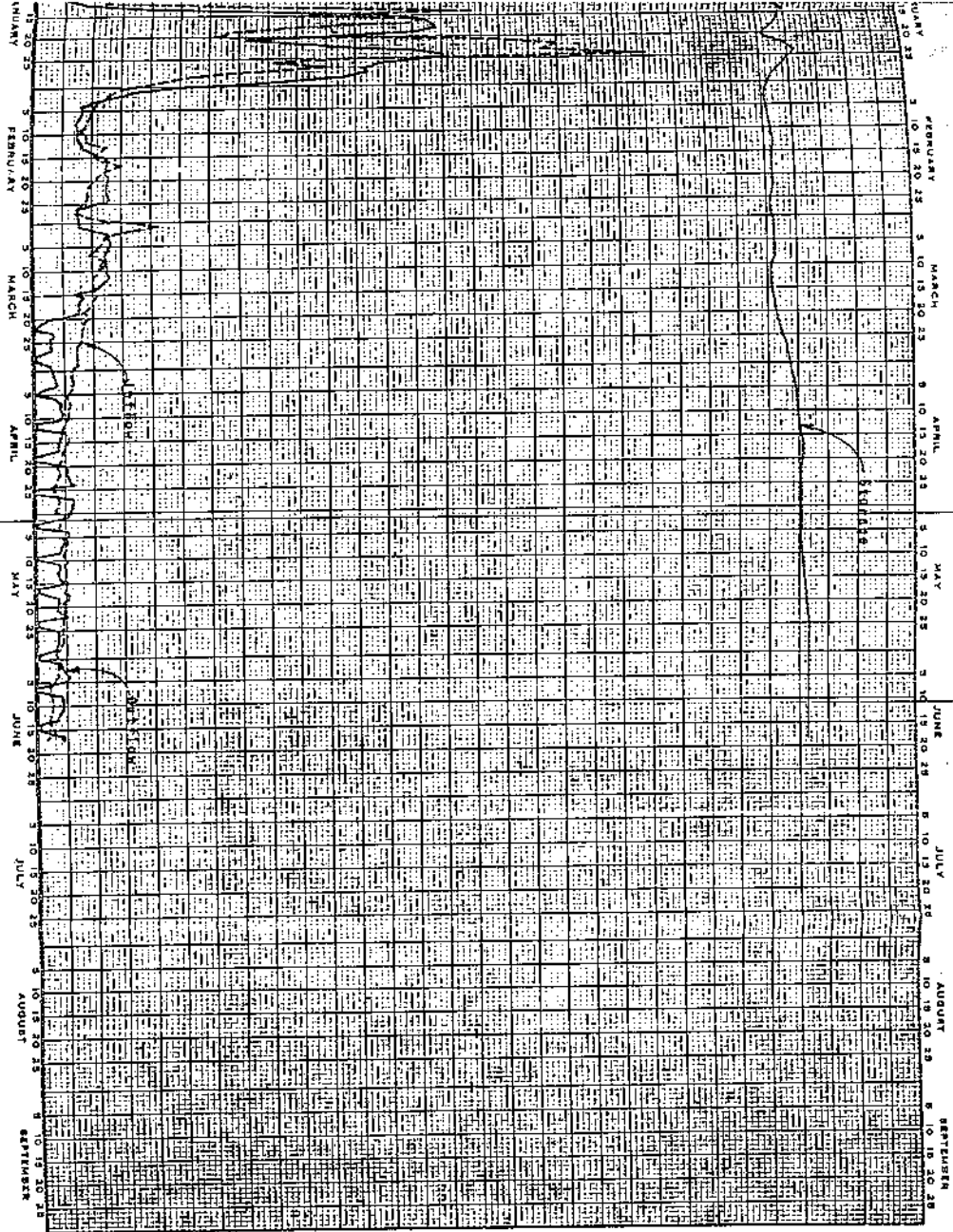
SHEET 2 CHART 37

Mean daily flow in thousand c.f.s.



1969 - 1970

1969 - 1970



Storage in thousand acre-feet

HISTORICAL OPERATIONS
 OSVILLE DAM AND RESERVOIR
 FEATHER RIVER, CALIFORNIA

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA
 Prepared: R.F.C. Date: June 1970
 Drawn: R.E.V. & S.R.W.

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

August 1970

APPENDIX A
FLOOD CONTROL REGULATIONS

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

RULES AND REGULATIONS

certified in writing, is required to meet such obligations or requirements.

(c) Asphalt imports under an allocation made pursuant to paragraph (b) shall not be further processed except by blending by mechanical means or by air blowing and shall not be burned for lighting or for the generation of heat or power.

(d) Applications for allocations under this section may be filed with the Director at any time during the period. An application must be filed in such form as the Director may prescribe. All licenses issued under allocations made pursuant to this section shall be valid only during the period January 1, 1977, through December 31, 1978.

(e) No allocation made pursuant to this section may be sold, assigned, or otherwise transferred.

[FR Doc. 71-16643 Filed 12-20-71; 8:50 am]

Title 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers,
Department of the Army

PART 208—FLOOD CONTROL REGULATIONS

Oroville Dam and Reservoir, Feather River, Butte County, Calif.

Pursuant to the provisions of section 7 of the Act of Congress approved December 22, 1944 (58 Stat. 890; 33 U.S.C. 709), § 208.88 is hereby prescribed to govern the use and operation of Oroville Dam and Reservoir on Feather River, Calif., for flood control purposes.

§ 208.88 Oroville Dam and Reservoir Feather River, Calif.

The Department of Water Resources, State of California, Sacramento, Calif., shall operate or otherwise effect the operation of Oroville Dam and Reservoir in the interest of flood control as follows:

(a) Storage space in Oroville Reservoir of 750,000 acre-feet, below elevation 900 feet, shall be kept available for flood control purposes on a seasonal basis in accordance with the Flood Control Diagram currently in force for that reservoir. The Flood Control Diagram in force as of the promulgation of this section is that dated September 13, 1971, File No. 4-13-585.

(b) Except when greater releases are required as prescribed in paragraph (c) of this section, releases from Oroville Reservoir shall be restricted insofar as possible to quantities which will not cause flows in Feather River below Oroville Dam or in Feather River above Yuba River to exceed the controlling flow rates as specified on the Flood Control Diagram. Any water temporarily stored in the flood control space shall be released as rapidly as can be safely accomplished without causing downstream flows to exceed those criteria.

(c) Whenever water is stored in the flood control space and the reservoir level is rising rapidly because of flood inflow, operation of the reservoir shall be, insofar as possible, in accordance with the Emergency Spillway Release Diagram currently in force, or the Flood Control Diagram currently in force, whichever requires the greater release. The Emergency Spillway Release Diagram in force as of the promulgation of this section is that dated September 13, 1971, File No. 4-13-586.

(d) Except as necessary in order to comply with provisions of the Emergency Spillway Release Diagram under paragraph (c) of this section, the regulations of this section shall not be construed to require dangerously rapid changes in magnitudes of release. The regulations of this section shall not be construed to require that releases be made in a manner that would be inconsistent with requirements for protecting the dam and reservoir from major damage.

(e) The State of California shall maintain a continuous record of reservoir stage, inflow, and releases; make current determinations of required flood control space and required releases and; obtain basic hydrologic data required to accomplish the flood control objectives prescribed in this section.

(f) The State of California shall keep the District Engineer, Corps of Engineers, Department of the Army in charge of the locality, currently advised for reservoir release, reservoir storage, and such other operating data as the District Engineer may request and also of those operating data at upstream reservoirs and other basic operating criteria which affect the schedule of operation.

(g) The flood control regulations of this section are subject to temporary modification by the District Engineer, Corps of Engineers, if found necessary in time of flood emergency. Requests for and action on such modification may be made by any available means of communication, and the action taken by the District Engineer shall be confirmed in writing under date of same day to the Office of the Director, Department of Water Resources, State of California.

(h) Revision of the diagrams require approval of the Chief of Engineers, or his duly authorized representative, and the State of California. Each such revision shall be effective upon the date specified in the approval, and from that date until replaced such revised diagrams shall be in force for purposes of this section. The Flood Control and Emergency Spillway Release Diagrams are on file in the Office, Chief of Engineers, Department of the Army, Washington, D.C. Copies of the diagrams currently in force shall be kept on file in and may be obtained from the District Engineer, Corps of Engineers, in charge of the locality, and the Director, Department of Water Resources, State of California, Sacramento, Calif.

[Regs., Nov. 3, 1971, DAEN-CWE-Y] (Sec. 7, 58 Stat. 890; 33 U.S.C. 709)

For the Adjutant General.

R. B. BELNAP,
Special Advisor to TAG.

[FR Doc. 71-16575 Filed 12-20-71; 8:45 am]

Title 41—PUBLIC CONTRACTS AND PROPERTY MANAGEMENT

Chapter 5A—Federal Supply Service,
General Services Administration

PART 5A-73—FEDERAL SUPPLY SCHEDULE PROGRAM

Subpart 5A-73.1—Production and Maintenance

CONTRACT PERIOD AND USE OF RENEWAL OF CONTRACTS CLAUSE IN FEDERAL SUPPLY SCHEDULE CONTRACTS

1. Section 5A-73.106 is revised as follows:

§ 5A-73.106 Contract period for Federal Supply Schedule contracts.

Federal Supply Schedule contracts shall not be entered into for periods exceeding 1 year. The inclusion of the Renewals of Contracts clause, in accordance with § 5A-73.107, is not an indication that the initial contract period or any one subsequent renewal increment will be in excess of 1 year.

2. Sections 5A-73.107 through 5A-73.107-6 are revised as follows:

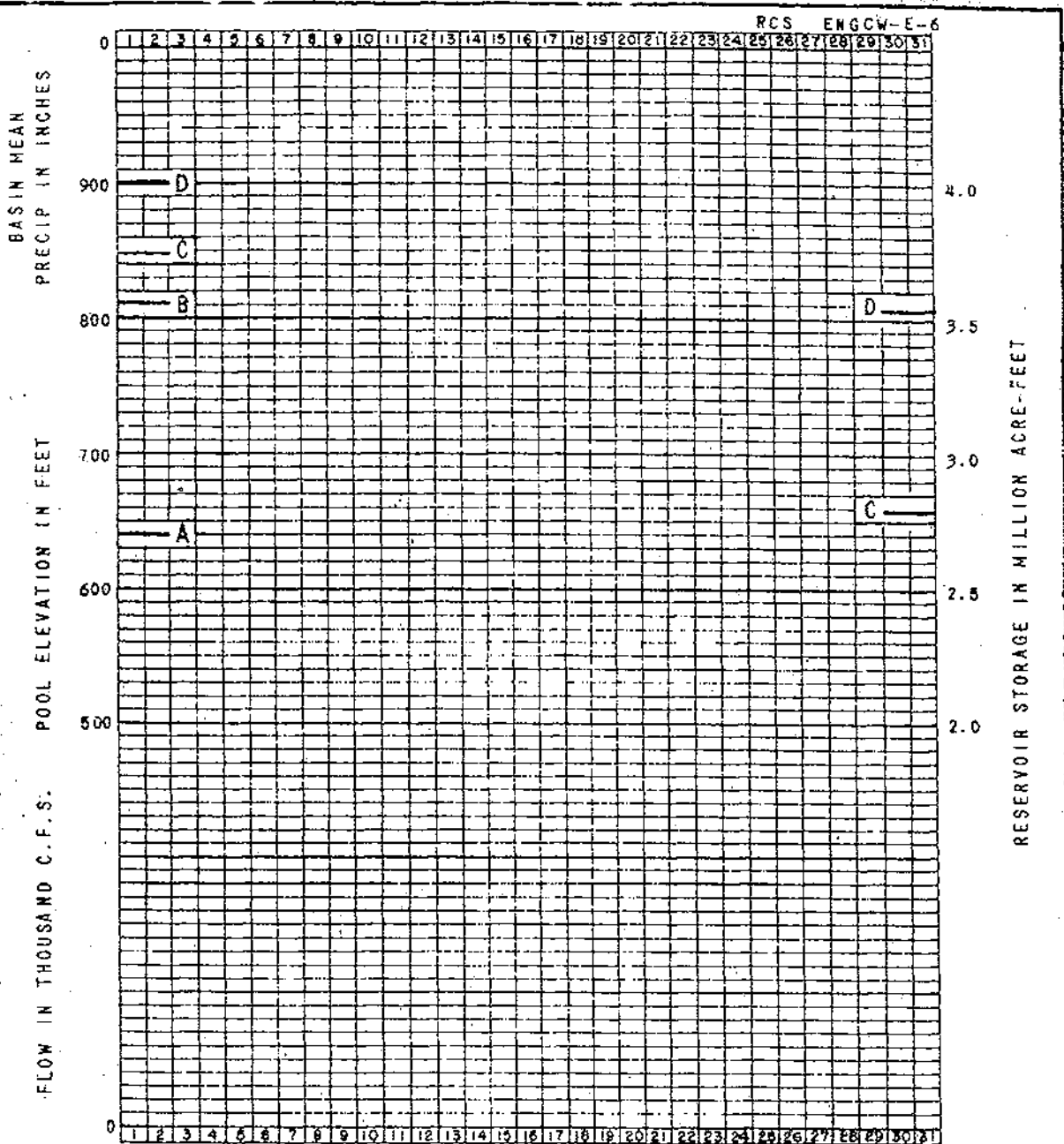
§ 5A-73.107 Contracts with renewal provisions.

§ 5A-73.107-1 Contracts to which applicable.

(a) Negotiated multiple award Federal Supply Schedule contracts shall contain the Renewal of Contracts clause set forth in § 5A-73.107-5 unless the inclusion of this clause is clearly unfeasible or inappropriate. Examples of situations where the clause should be omitted are (1) known phase-outs of the type of commodities or services, (2) anticipated downward penetrations in price trends, (3) expected shifts in the supply/demand ratio in favor of supply, hence a possibility for greater competition, and (4) such other factors which would indicate that the items of Schedule could be obtained at more favorable terms at some future date. The contracting officer for the Schedule shall make a written determination when the Renewal of Contracts clause is to be omitted, setting forth the reasons therefor, and obtain approval for his determination from an official at the next higher level of authority.

§ 5A-73.107-2 Nature of a contract with a renewal clause.

(a) Negotiated multiple award Federal Supply Schedule contracts must not be effective for more than 1 year at any one time. A renewal under the Renewal of Contracts clause constitutes a new contract in which the contract terms and



MONTHLY RESERVOIR OPERATION

OROVILLE RESERVOIR

(OPERATED BY STATE
OF CALIFORNIA)

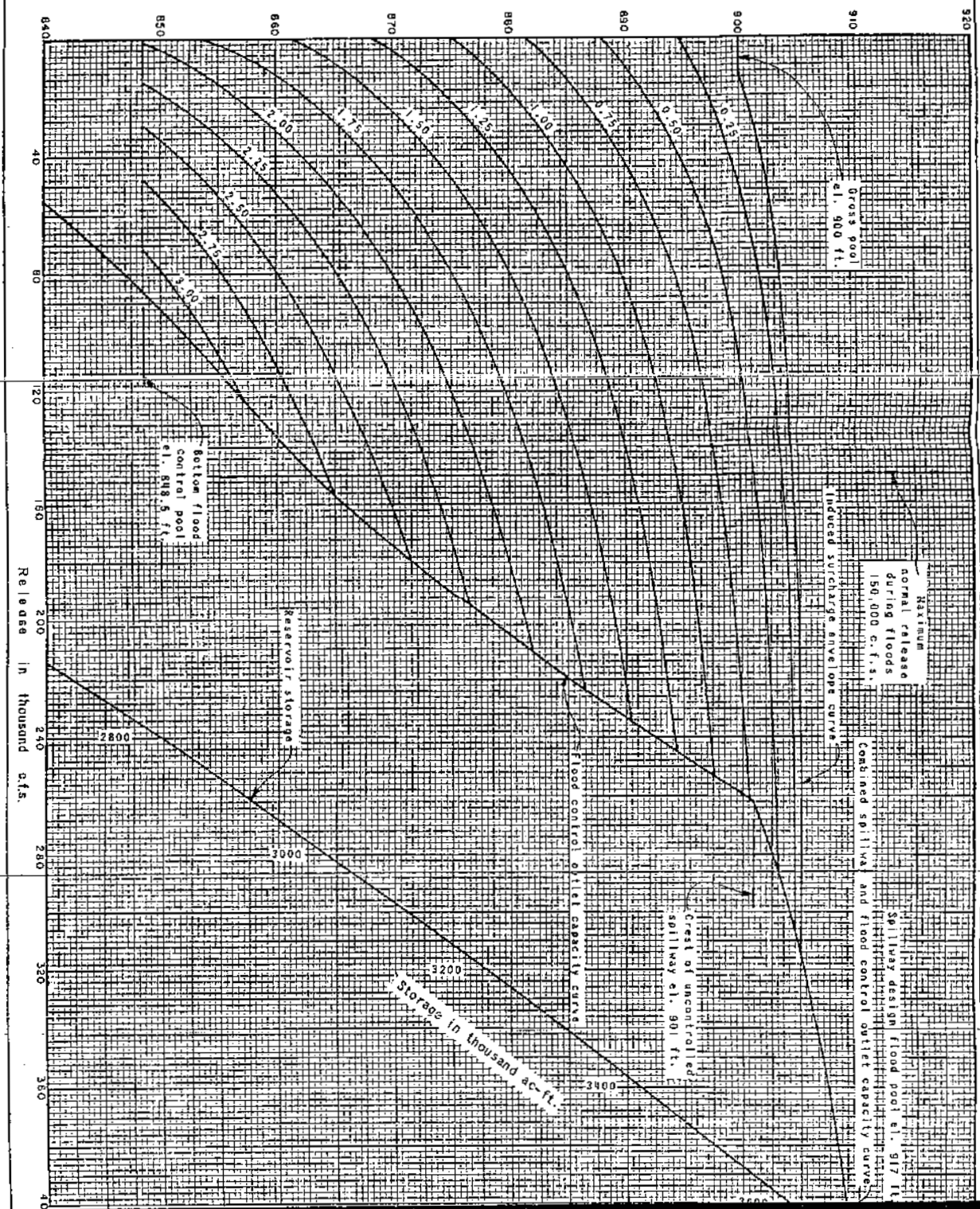
FEATHER RIVER, CALIFORNIA

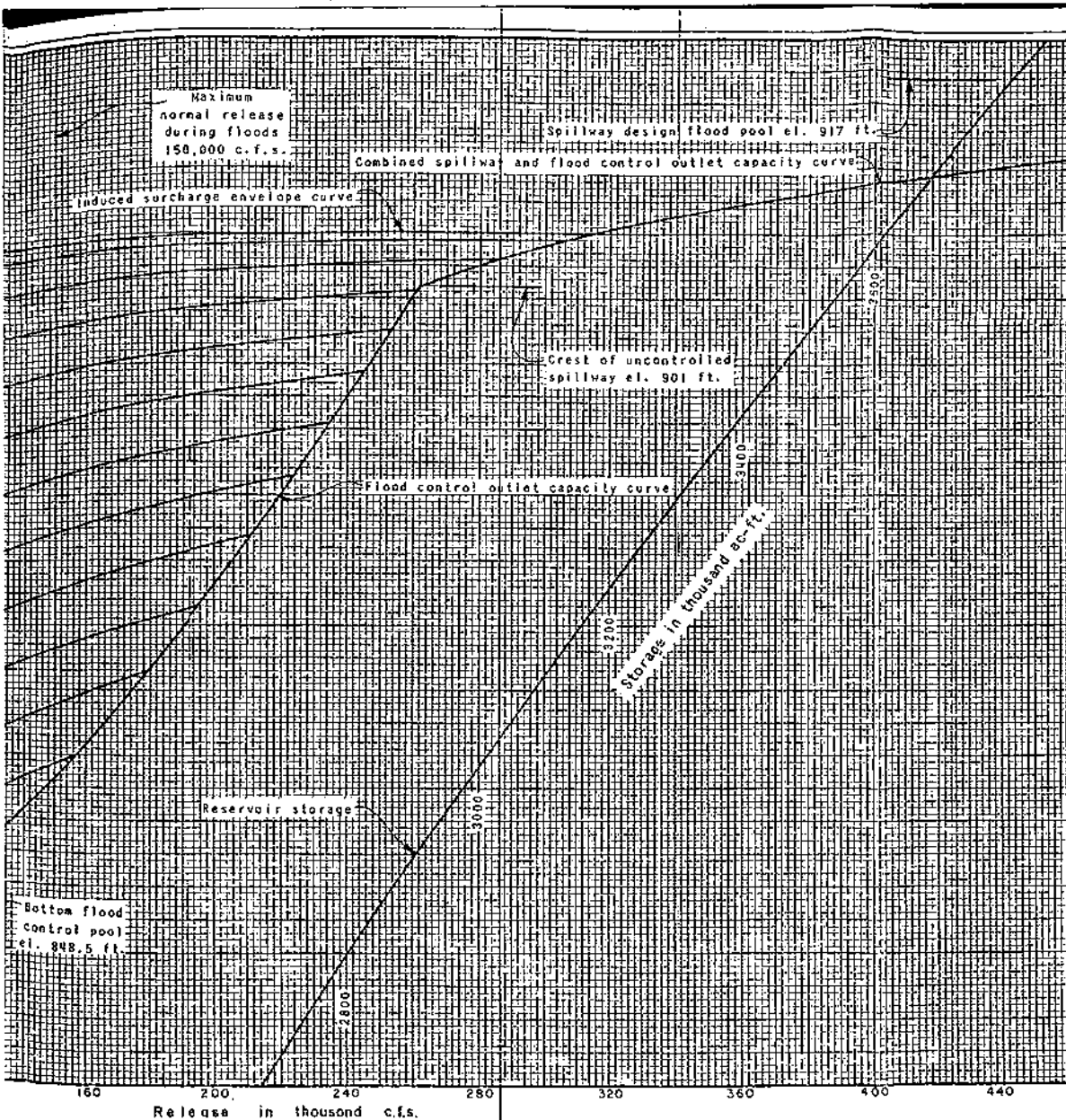
DRAINAGE AREA: 3,611 SQ. MILES

- A. Min. power pool elev: 640.0 ft.
storage: 852,000 ac-ft
 - B. Flood control outlet sill elev:
813.6 ft.
 - C. Bottom flood-control reservation:
elev: 848.5 ft.
storage: 2,788,000 ac-ft
 - D. Gross pool elev: 900.0 ft.
storage: 9,598,000 ac-ft
- Invert elev: 2-54" dia. River Outlets: 228.0 ft.
- Release capacity:
- | | |
|------------|------------|
| Pool elev. | Discharge* |
| 900.0 | 264,000 |
- *exclusive of power releases

SOUTH PACIFIC DIVISION
SACRAMENTO DISTRICT
SACRAMENTO, CALIFORNIA

Elevation in feet (Oroville Project Datum)





OPERATING INSTRUCTIONS

1. Follow regular flood control regulation schedule until larger releases are required by this schedule.
2. Adjust the spillway outflow each hour on the basis of the rate of rise of reservoir elevation in feet for the preceding hour and the current reservoir elevation as indicated by the curves.
3. After the reservoir elevation starts to fall, maintain current gate openings until the flow has been reduced to 150,000 c.f.s.
4. Once operation in accordance with the emergency spillway release diagram is initiated, gate changes shall be made only in accordance with the above criteria.

NOTES:

1. Parameter values are the rate of rise in reservoir elevation in feet during preceding hour.
2. Sill of the flood control outlet is at elevation 813.6 feet. Ungated spillway crest is at elevation 901 feet.
3. Discharge through the flood control outlet is controlled by eight 17.6' x 33.0' gates with an additional 1730 feet of uncontrolled spillway above elevation 901 feet.

OROVILLE DAM AND RESERVOIR
Feather River, California

EMERGENCY SPILLWAY RELEASE DIAGRAM

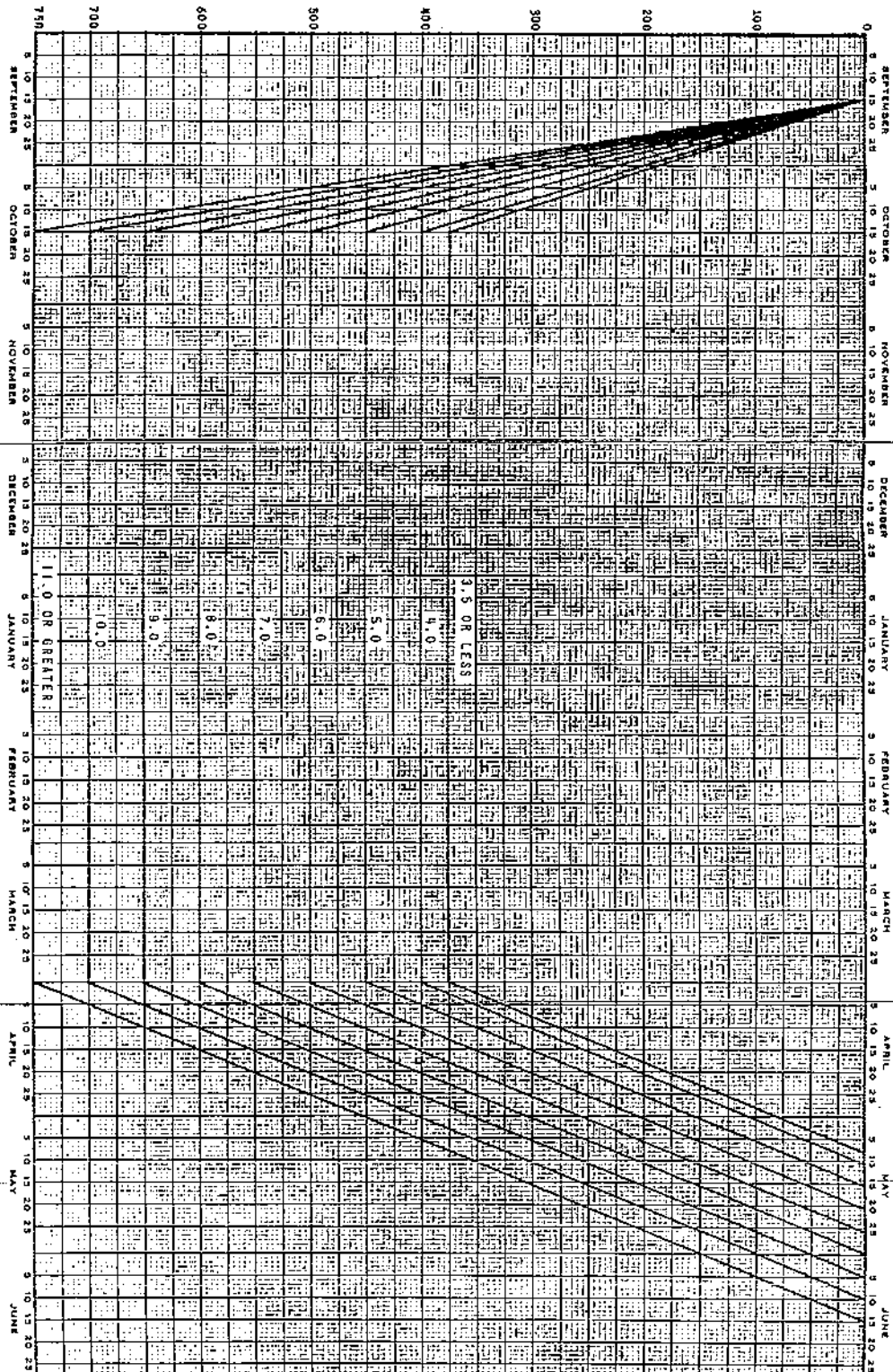
Prepared Pursuant to Flood Control Regulations
for Oroville Dam and Reservoir

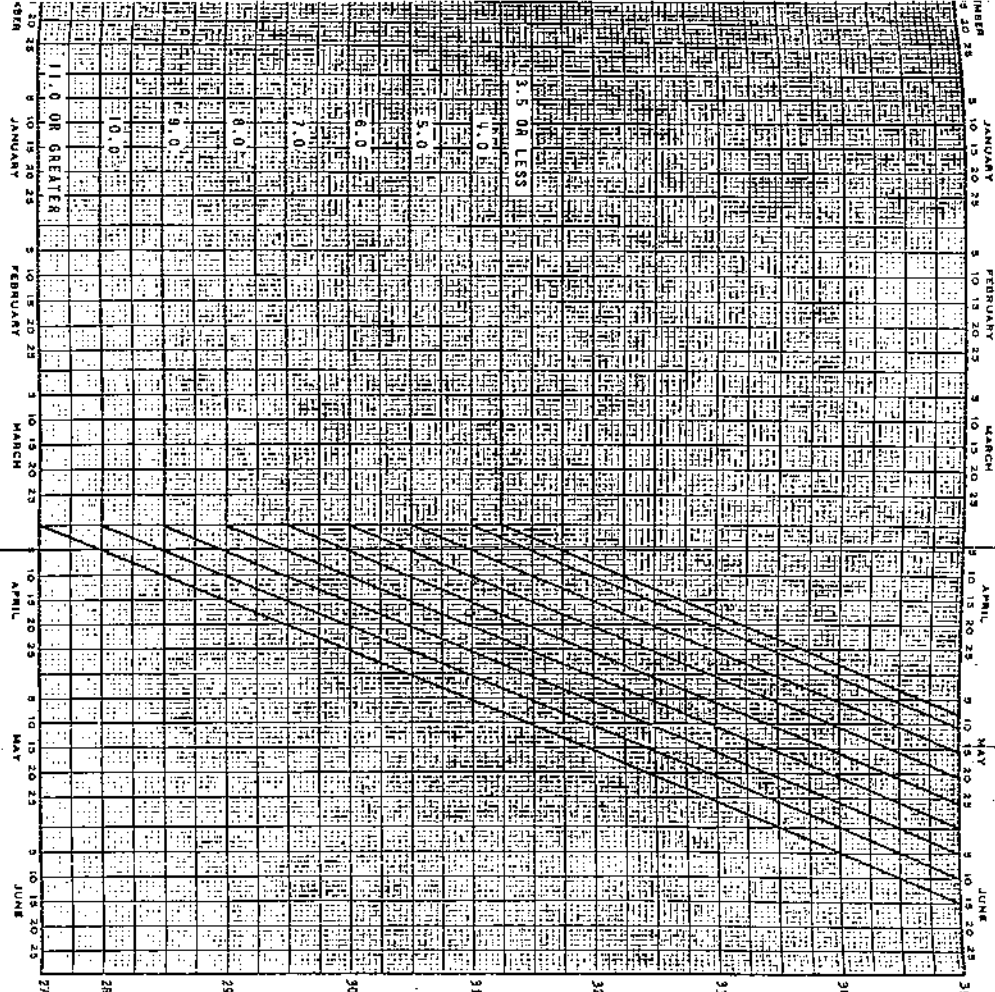
APPROVED: *LP Koisch*
Major General, U.S.A., Director of Civil Works

APPROVED: *W. H. Gravelle*
Director, Department of Water Resources

Effective Date: 13 Sep 71 File No: 4-13-586

Flood control reservation in thousand acre-feet





Reservoir storage in thousand acre-feet

USE OF DIAGRAM

1. Parameters are computed daily from the weighted accumulation of seasonal basin mean precipitation by multiplying the preceding day's parameter by 0.97 and adding the current day's precipitation in inches.
2. Except when releases are governed by the emergency spillway release flood control reservation, defined hereon, shall be released as rapidly as possible, subject to the following conditions:
 - a. That releases are made according to the release schedule hereon.
 - b. That flows in Feather River above Yuba River do not exceed 180,000 c.f.s.
 - c. That flows in Feather River below Yuba River do not exceed 300,000 c.f.s.
 - d. That flows in Feather River below Bear River do not exceed 320,000 c.f.s. insofar as possible.
 - e. That releases are not increased more than 10,000 c.f.s. or decreased more than 5,000 c.f.s. in any 2 hour period.

RELEASE SCHEDULE

ACTUAL OR FORECAST FLOW (WHATEVER IS GREATER)	FLOOD CONTROL SPACE USED	REQUIRED RELEASES
c.f.s.	ac-ft	c.f.s.
0 - 15,000	0 - 5,000	Power Demand
0 - 15,000	Greater 5,000	Inflow
15,000 - 30,000	0 - 30,000	Lesser of 15,000 or maximum inflow
0 - 30,000	Greater 30,000	Maximum inflow for flood
30,000 - 120,000		Lesser of maximum inflow or 60,000 c.f.s.
120,000 - 175,000		Lesser of maximum inflow or 100,000 c.f.s.
Greater Than - 175,000		Lesser of maximum inflow or 150,000 c.f.s.

OROVILLE DAM AND RESERVOIR
FEATHER RIVER, CALIFORNIA

FLOOD CONTROL DIAGRAM

Prepared Pursuant to Flood Control Regulations
For Oroville Dam and Reservoir

APPROVED:

F. P. Smith
Major General, USA, Director of Civil Works

APPROVED:

W. H. Williams
Director, Department of Water Resources

Effective Date: 13 Sep 71

File No.: 4-13-583

EXHIBIT G

Please refer to Disks:

A) Technical Studies

Documentation

December 2002;

B) Interim Report

December 2002

EXHIBIT H

State of California
The Resources Agency
Department of Water Resources



Responding to California's Flood Crisis

FALDROD W. BUNNINGS



Cover illustration: from "The Climate of California on a Rampage" by Charles Nahl, 1878

EXECUTIVE SUMMARY

While flooding has always been an unfortunate fact of life in many parts of California, the need for adequate flood management is more critical now than ever before. California's Central Valley flood control system is deteriorating and, in some places, literally washing away. Furthermore, the Central Valley's growing population is pushing new housing developments and job centers into areas that are particularly vulnerable to flooding. Yet, in recent years, funding to maintain and upgrade the flood protection infrastructure has sharply declined. Compounding these challenges is a recent court ruling, *Paterno v. State of California*, that held the state liable for flood-related damages caused by a levee failure. Together, these factors have created a ticking time-bomb for flood management in California.

This Flood Management White Paper presents an overview of the current condition of flood management in the Central Valley and outlines a plan to reduce flood risks through an integrated approach for better planning, new investments, improved management of our infrastructure and closer collaboration between water agencies and users.

SUMMARY OF RECOMMENDATIONS

Flood management in the Central Valley needs an approach that will achieve both short term and long term solutions. This approach should include a set of strategies that involve policy changes, program reforms and funding proposals to better protect California from the devastating consequences and economic impacts caused by floods. These strategies fall under the following set of broad-based recommendations:

1. Ensure the integrity of existing flood project infrastructure through improved maintenance programs that balance public safety and needed environmental protection.
2. Evaluate the integrity and capability of existing flood control project facilities and prepare an economically viable rehabilitation plan.
3. Improve the effectiveness of emergency response programs.
4. Create a sustainable fund to support flood management programs.

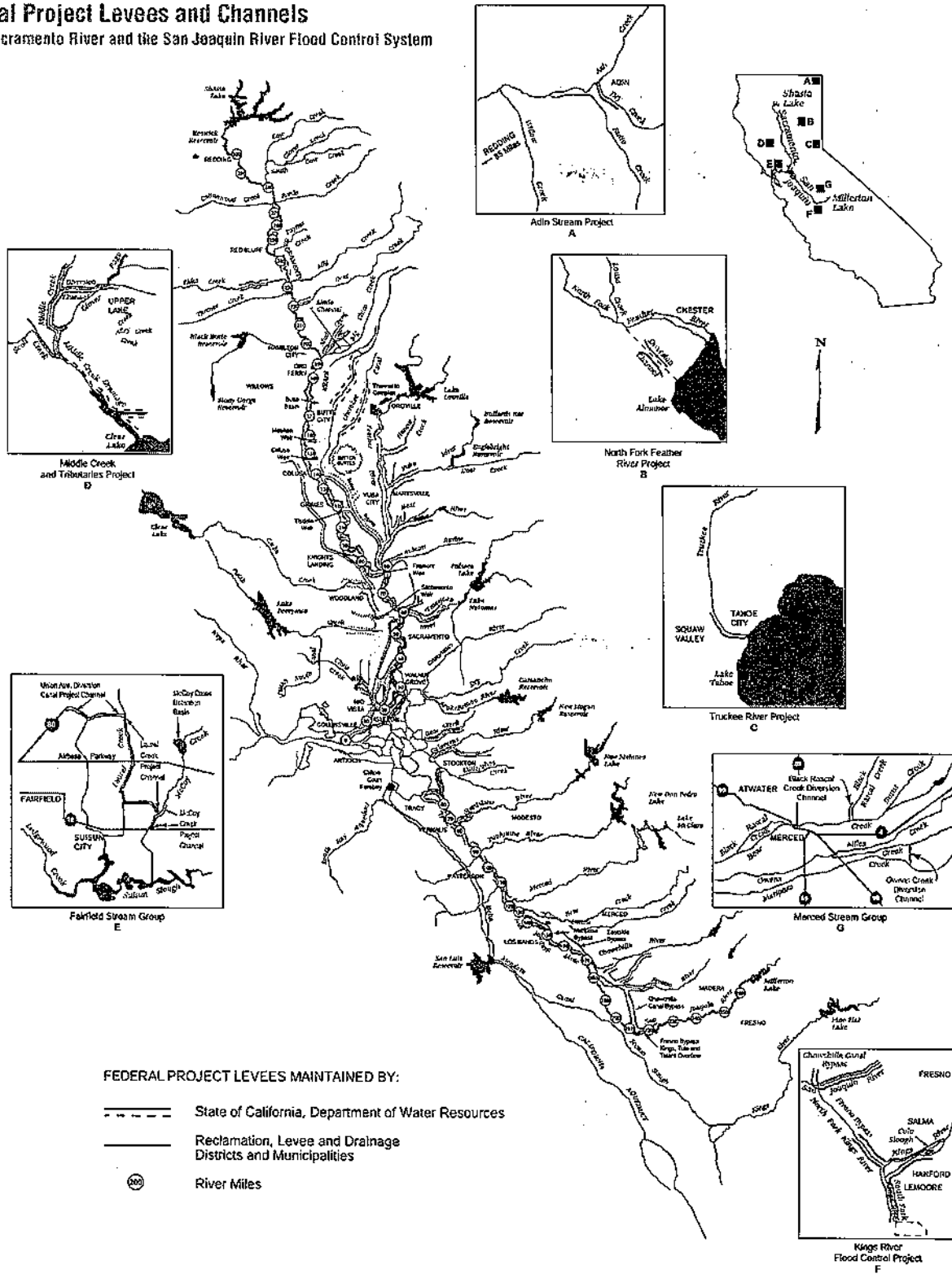
5. Update floodplain maps and provide better education on flood risks to the public and to agencies that authorize development in floodplains.
6. Where feasible, implement a multi-objective management approach for floodplains that would include, but not be limited to, increased flood protection, ecosystem restoration, and farmland protection.
7. Evaluate potential policies and procedures that may determine the State's capacity to fund levee maintenance, infrastructure improvements and emergency response in the Delta.

PROPOSED LEGISLATIVE AND CONSTITUTIONAL ACTIONS NECESSARY TO IMPLEMENT RECOMMENDED STRATEGIES

The following suggested legislative and constitutional actions form the basis for an action plan by State Government that is needed to implement the strategies recommended above.

- A. Examine existing flood insurance requirements and consider the creation of a "California Flood Insurance Fund," a sustainable State insurance fund to compensate property owners for flood damage.
- B. Create a Central Valley Flood Control Assessment District with the authority to assess fees that would provide adequate flood control protection for regional participants.
- C. Enact legislative and constitutional changes that would reduce taxpayer exposure for funding flood disaster claims. Revisions would include constitutional amendments to exempt flood control projects from inverse condemnation liability and exempt local flood control districts from the Proposition 218 two-thirds voting requirement.

Federal Project Levees and Channels
of the Sacramento River and the San Joaquin River Flood Control System



THE STATE'S CENTRAL VALLEY FLOOD CONTROL SYSTEM

The State's flood control system in the Central Valley includes reservoirs with flood detention space, approximately 1,600 miles of project levees, and a series of overflow weirs and bypass channels. These facilities were originally constructed by or incorporated into a federally designated flood control project (see figure on opposite page). The State's system discharges through the Sacramento-San Joaquin Delta, which contains over 1,000 miles of non-project (local) levees which are generally maintained by local reclamation districts. The California Department of Water Resources inspects and evaluates the maintenance of all of the State's federally designated project levees and channels. Most project levees are maintained by local agencies, such as reclamation and levee districts. Where the levees provide broad system benefits and local interests are unable to perform satisfactory maintenance, DWR may perform the levee maintenance. Maintenance performed by DWR on behalf of local interests is funded through assessments of benefitting landowners. DWR also is responsible for channel maintenance of the Sacramento River Flood Control Project. Local agencies are responsible for maintenance of the channels of the San Joaquin River system.

THE CHALLENGES

An aggressive investment in the flood management system and a new flood management philosophy is vitally important to public safety and our economic well-being.

Over the years, major storms and flooding have taken many California lives, caused significant property losses and resulted in extensive damage to public infrastructure. However, a combination of recent factors has put public safety and the State's financial stability at risk for even greater calamity in the future:

- ❑ Escalating development in floodplains increases the potential for flood damage to homes, businesses and communities.
- ❑ California's flood protection system, comprised of aging infrastructure with major design deficiencies, has been further weakened by deferred maintenance.
- ❑ State and local funding for effective flood prevention and management programs has been reduced.
- ❑ Court decisions have resulted in greater State flood damage liability.

Unless California implements a strategic plan, the next major flood could easily overwhelm the state's deteriorating 50-year-old flood protection system and have catastrophic consequences for our people, property and environment. The State will continue to pay out millions, and potentially billions, of dollars every time a levee break occurs in the flood control system. An aggressive investment in the flood management system and a new flood management philosophy is vitally important to public safety and our economic well-being.



Inundated Structures During the 1997 Floods.

RISING RISK OF LEVEE FAILURES

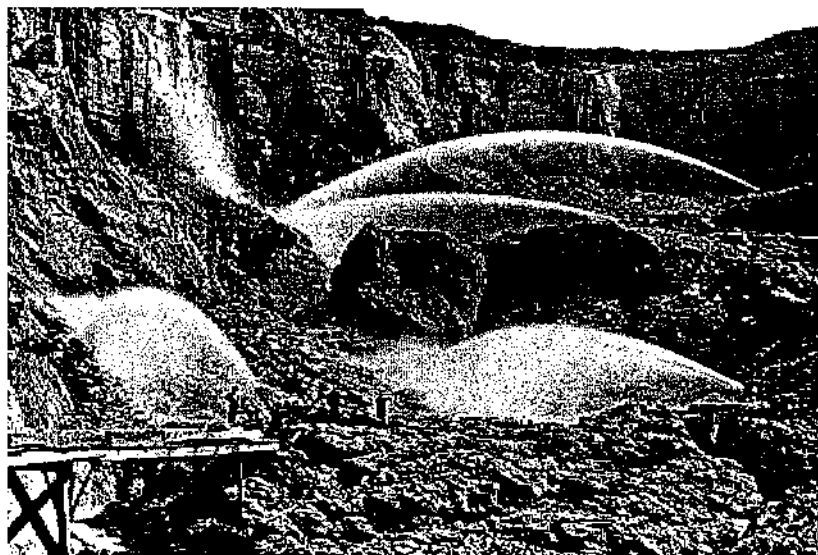
Deteriorating Flood Control System

California's Central Valley flood control system of levees, channels and weirs is old. Many levee reaches were built more than a century ago on foundations that are subject to seepage and movement. Over time, the levee system has significantly deteriorated, partly due to deficiencies in the original design and partly due to deferred maintenance. Observed deterioration includes levee reaches with internal and external erosion, degradation/removal of natural berms, animal burrows, and settlement. In addition, the uncontrolled growth of vegetation and build up of sediment deposits has greatly reduced the amount of water that flows smoothly through critical channels and rivers.

Riverbank and levee erosion has been a particularly devastating part of the overall deterioration. In many levee reaches, the flood control channels were designed to flush out sediments that accumulated in the Sacramento River system from hydraulic mining activities in the late 1800's.

These designs were quite successful in flushing out the mining debris. However, with the debris removed, the powerful flows are now eroding the natural channel banks and the flood protection levees placed on them. This ongoing erosion causes more damage than can be repaired by the State or local reclamation districts using normal maintenance programs. A significant strategic plan element must include a proactive short-term maintenance approach and a long-term project solution.

Many places within the levee system have developed problems caused by underseepage and other internal weaknesses. While studies to uncover these weaknesses have been completed and extensive remedial work has been performed on some parts of the system, much work remains. In addition, it is extremely difficult to detect all hidden deficiencies. As a result, failures occur unpredictably and with little warning.



Hydraulic Mining in the 1800s (photography by Carleton E. Watkins, courtesy Bancroft Library, University of California, Berkeley).

Due to funding and environmental issues, both the State and local agencies have found it increasingly difficult to carry out adequate maintenance programs.

To address both the known and the developing deficiencies in the system, the U. S. Army Corps of Engineers (Army Corps) evaluated 1,059 miles of levees in the Sacramento River Flood Control Project between 1986 and 2003. This multi-year evaluation found 89 miles of levee that needed significant repairs at an estimated cost of \$145 million. While most of those repairs have already been completed, the evaluation was performed using criteria that are now outdated, and did not include all potentially deficient levees. The Army Corps has recently developed new seepage design criteria that will require much more stringent field exploration than earlier guidance. These new criteria are likely to result in identifying many more deficient areas that will in turn ultimately lead to a significantly greater repair cost.

Deferred Maintenance

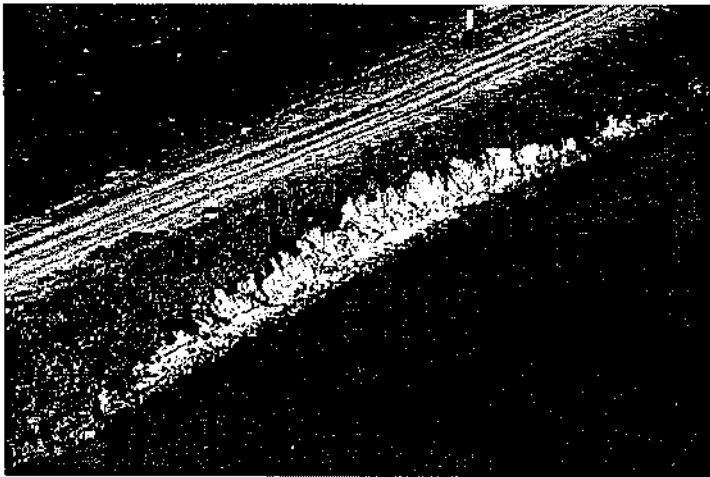
Due to funding and environmental issues, both the State and local agencies have found it increasingly difficult to carry out adequate maintenance programs. For example, the designers of the flood control system assumed that erodible soil slopes would be covered with rock, an approach that is at odds with protecting environmental habitat. Implementing erosion protection measures that reduce

impacts to the environment takes more time, consultation and funding.

Several performance measures demonstrate that the Department of Water Resources (DWR) does not have the assets necessary to maintain key components of the Sacramento River Flood Control Project at the level it has in the past.

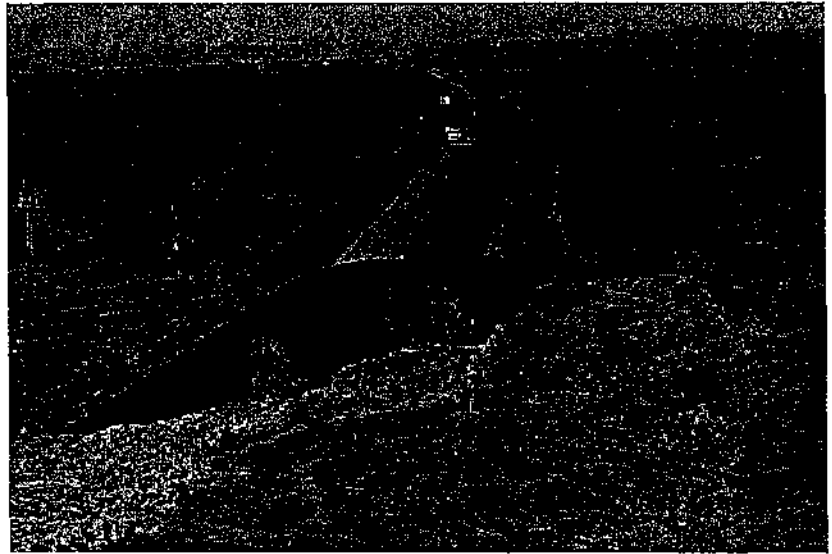
For example, from 1986 to the present, the number of maintenance staff members has dropped from 81 to 53. In the eight years between 1983 and 1991, DWR removed about 10 million cubic yards of sediment

obstructing the proper performance of weirs and other flood control structures. However, in the past 11 years, DWR has removed less than three million cubic yards of sediment, a decrease of approximately 80 percent. In partnership with the Army Corps, the State Reclamation Board repaired levee erosion sites on a regular basis through the early 1980s using the Sacramento River Bank Protection



Channel and Levee Erosion along San Joaquin River in 1997.

Project, at a cost of about \$300 per linear foot with no significant backlog of sites. By contrast, today there is a backlog of nearly 200 erosion sites totaling 120,000 linear feet. With repair costs now as high as \$5,000 per linear foot, the bill to repair these sites could eventually approach \$600 million. Meanwhile, the erosion continues and new erosion sites are anticipated. Finally, while DWR cleared flood channels of vegetation at the rate of 7,000 acres per year in the early 1970s, that rate has fallen to only about 1,000 acres per year.



Unanticipated Failure of Sutter Bypass Levee in the 1997 Floods.

In 1998, a Levee Review Board comprised of State and Army Corps representatives issued a report detailing the “overall deterioration of the levee system over several years.” Similarly, the December 2002 Sacramento and San Joaquin River Basins California Comprehensive Study Interim Report states:

“Flood risk in this region is rising, as are conflicts between maintenance of the existing flood management system, a rapidly-growing population, and ecosystem needs. Levee maintenance has grown more difficult and expensive due to such factors as poor levee foundations, erosion, and conflicts with environmental concerns. The levees will continue to deteriorate, increasing the flood risk, especially in rural areas.”

Following more than 30 breaks on federal project levees during the 1997 flood, new appreciation was gained for the susceptibility of levees to seepage failures. The Army Corps convened a Levee Seepage Task Force in 2003 comprised of experts from the State, Army Corps, and academia that concluded:

“The ongoing deterioration of the levee system needs to be addressed. The [Sacramento] District and its local partners should revitalize their ongoing levee maintenance and monitoring programs to assure that, as portions of the levee system deteriorate, they are identified and corrected before a major flood occurs.”

Delta Concerns

In addition to the challenges of maintaining a viable flood control system in the Central Valley, there are also great challenges in the Sacramento-San Joaquin Delta. The Delta includes nearly 60 islands and tracts lying below sea level that are kept dry by more than 600 miles of marginal levees, many founded on peat soils. Most of these levees have problems associated with long term levee settlement

and island subsidence. During the last century there have been more than 140 levee failures and island inundations, most of which occurred during flood seasons.

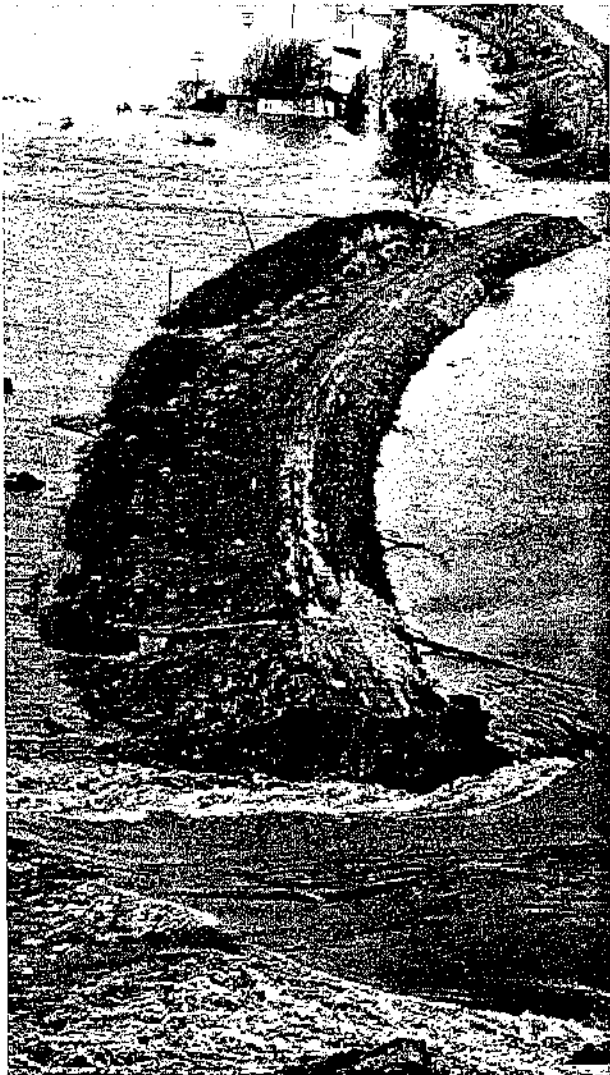
More recently, on June 3, 2004, a huge dry weather levee failure occurred without warning on Upper Jones Tract. The cause remains unknown but the effect was the inundation of 12,000 acres of farmland with approximately 160,000 acre-feet of water.

Higher Flood Flows

Traditionally, levee heights and channel capacities have been designed using historical data related to precipitation and runoff. However, due to either limited historical data or climate change, the general trend is for flood flows to be higher than anticipated. Consequently, flood inundations by 100-year flood events now cover much greater areas than those used for design and floodplain mapping just a few years ago. Thus, many existing floodplain maps are woefully out of date.

COSTS AND CONSEQUENCES

The potential impacts on people and communities of a single failure or multiple failures are catastrophic. These risks tend to be disproportionately higher in rural and economically disadvantaged communities that are often unable to invest in flood control improvements. The 1997 floods forced more



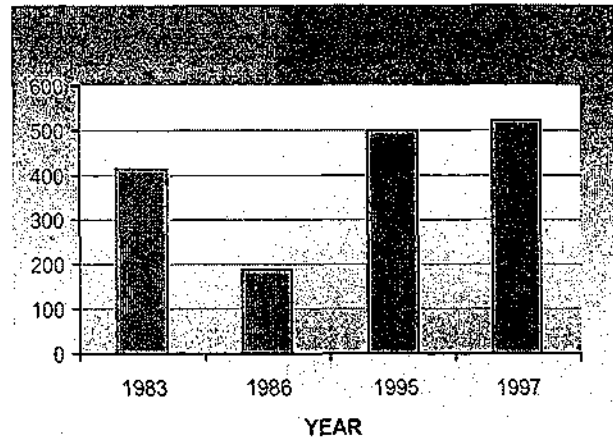
Levee failures in Sacramento-San Joaquin Delta (Tyler Island) During the 1986 Floods.

than 120,000 people from their homes. More than 55,000 were housed in 107 shelters, the largest sheltering operation in California's history. An estimated 30,000 residential and 2,000 business properties were damaged or destroyed.

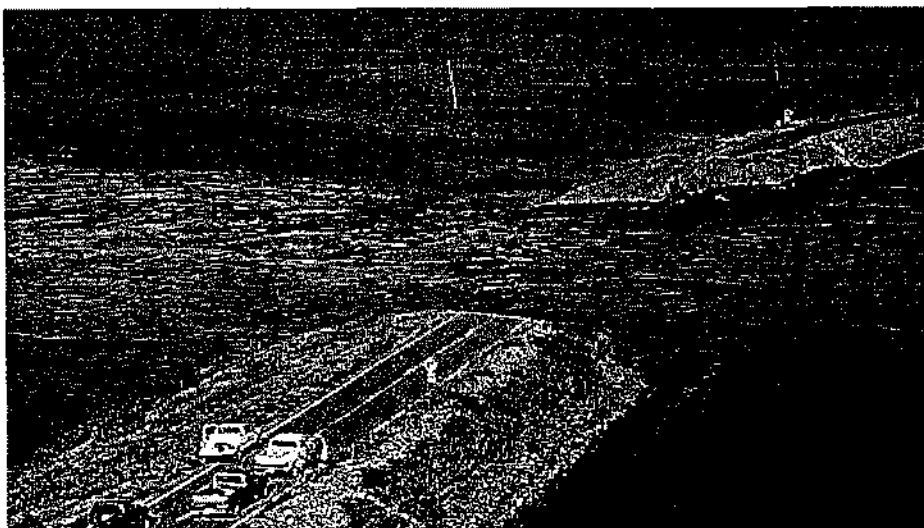
The recent levee break on Upper Jones tract in the South Delta will cost nearly \$100 million for emergency response, damage to private property, lost crops, levee repair, and pumping water from the island. There were also significant costs associated with losses in water supply and conveyance. Following the break, Delta pumping was curtailed for several days to prevent seawater intrusion at the State and Federal pumping plants, and water shipments to Southern California were continued only through unscheduled releases from San Luis Reservoir, a large offstream reservoir where water is held after it is pumped from the Delta. Releases were also increased at Shasta and Oroville reservoirs, sending more fresh water to the Delta for salinity control.

In general, the flood control system does not provide the necessary protection for public safety, property and economic values.

Flood Damages (millions)



Flood Damages Caused by Recent Flood Events in the Sacramento and San Joaquin River Basins (from Sacramento and San Joaquin River Basins, California, Post-Flood Assessment, U. S. Army Corps of Engineers, Sacramento District, March 1999)



Sudden Dry Weather Failure of Middle River Levee on Upper Jones Tract in 2004.

GROWING RISKS FOR FLOOD DAMAGE AND LOSS OF LIFE

California's population growth presents a major challenge to the State's flood management system. In the Central Valley alone, much of the new development is occurring in areas that are susceptible to flooding. In some cases, land use decisions are based on poor or outdated information regarding the seriousness of the flood threat. For example, many flood maps used by public agencies and the general public are decades old and do not reflect the most accurate information regarding potential flooding. Even worse, many maps were made by simply assuming that federal project levees provided protection from 100-year flood events. Unfortunately, recent experience has shown that this assumption is not necessarily valid.

Better coordination is needed between agencies making land use decisions and the parties, often the State, which must bear the burdens and liabilities of those decisions.

Land use decisions at the local level that allow developments in floodplains protected by the State-federal levee system in the Central Valley greatly increase the risk of State liability for loss of life and property damage. Better coordination is needed between agencies making land use decisions and the parties, often the



Aerial Photograph of Sacramento's Pocket Area Showing Urbanization in a Floodplain Protected by Levees.

State, which must bear the burdens and liabilities of those decisions. The State must develop a process that guides regional development with the goal of protecting people and property at risk in floodplains, while connecting the legal liability of ill-advised land use decisions to those making the decisions to approve development in these areas.

Another challenge is that people who live and work behind levees have a false sense of protection. Many believe that the levees will protect them against any level of flooding. Even if a levee was capable of successfully holding back a 100-year flood, a target flood event used by many insurance and public agencies when providing flood protection, it doesn't mean that a larger flood, such as a 110-year or a 150-year flood event, won't flood their property. During a typical 30-year mortgage period, there is a 26 percent chance that a homeowner living behind a levee will experience a flood larger than the 100-year flood. This risk is many times greater than the risk of a major home fire during the same period.

During a typical 30-year mortgage period, there is a 26 percent chance that a homeowner living behind a levee will experience a flood larger than the 100-year flood. This risk is many times greater than the risk of a major home fire during the same period.

GREATER LEGAL LIABILITIES

As the risks of levee failure and corresponding damage increase, California's courts have generally exposed public agencies, and the State specifically, to enormous financial liability for flood damages. The November 2003 *Paterno vs. State of California* decision found that when a public entity operates a flood control system built by someone else, it accepts liability as if it had planned and built the system. The *Paterno* ruling held the State responsible for defects in a Yuba County levee foundation that existed when the levee was constructed by local agricultural interests in the 1930's.

When the levee failed in 1986, hundreds of homes and a shopping center in the city of Linda were flooded. The *Paterno* decision makes it possible the State will ultimately be held responsible for the structural integrity of much of the Central Valley flood control system — 1,600 miles of levees that protect more than half a million people, two million acres of cultivated land and approximately 200,000 structures with an estimated value of \$47 billion.

In the *Arreola v. Monterey County* decision of July 2002, local agencies were held liable for 1995 flood damages to property owners that resulted from a failure to properly maintain the Pajaro River project. The maintaining agencies had not

been able to use standard mechanical clearing methods to remove vegetation in the channel because of environmental requirements to protect riparian habitat. Alternative methods to clear the channel had proved inadequate and costly. This decision exposes the State and local agencies to major liability. There is a need to reconcile a time-consuming environmental permitting process with the need for prompt maintenance of critical public safety infrastructure.

FUNDING

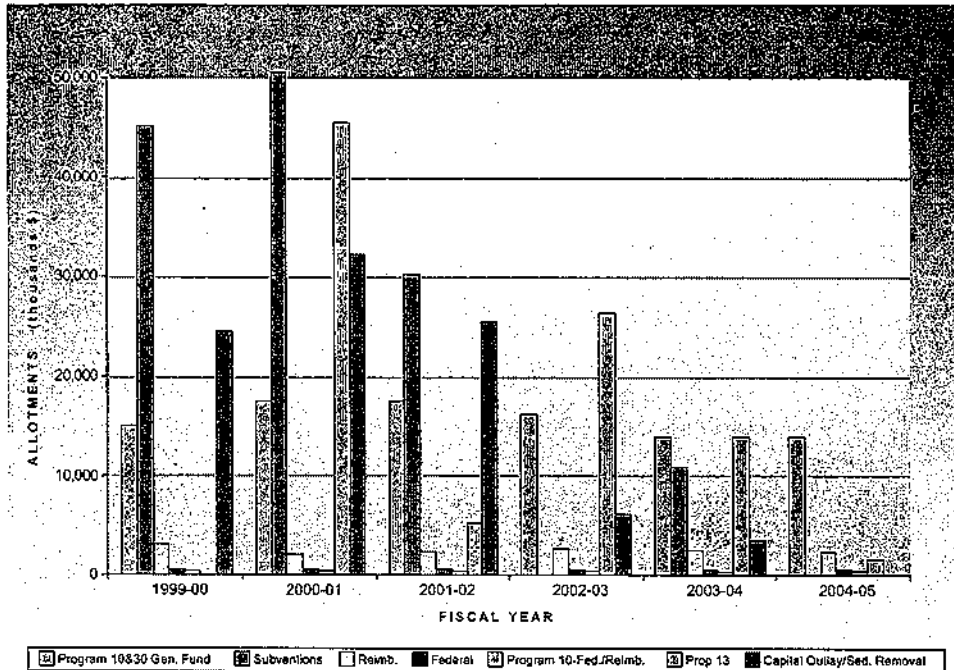
At a time when flood control maintenance and improvement efforts should be increased, the investment in flood management has instead been reduced at all levels of government. Local governments in California have been severely restricted by two constitutional amendments regarding the use of property tax or benefit assessments to generate revenue (Propositions 13 and 218). The federal government in 1996 reduced the maximum that it would pay for the cost of new flood control projects, from 75 percent to 65 percent of the total project cost.

The State's recent fiscal crisis has decreased the general fund's allocations for flood maintenance, improvements, and management activities. Effective emergency response has been hampered by the curtailment or elimination of



Emergency Flood Fight Repairs to a Distressed Levee along the San Joaquin River During the 1997 Floods.

State Flood Management Allotments (excluding Delta Levee Subventions Program)

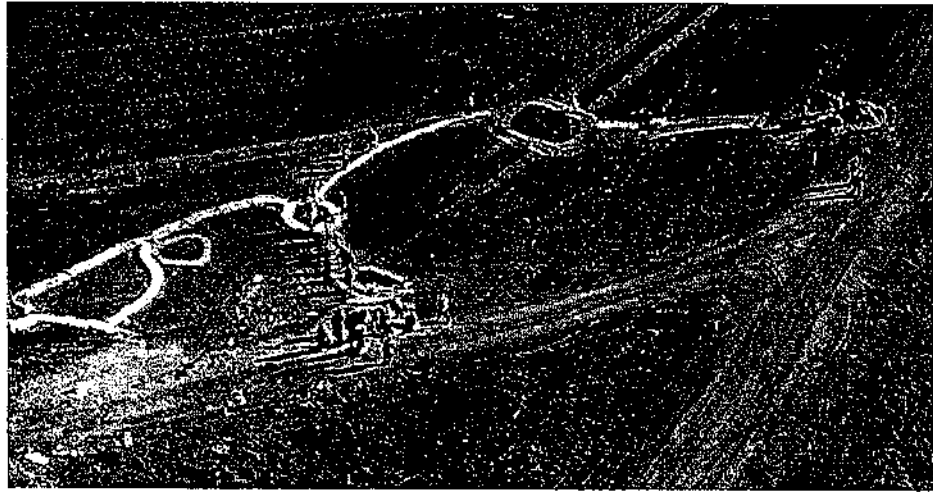


critical electronic information systems and mapping capabilities recommended in the 1997 Flood Emergency Action Team report. DWR will have difficulties providing 24-hour coverage at its Flood Operations Center during a flood emergency. In addition, there have been reductions in funding for flood capital outlay and flood subventions programs, the State programs that fund new flood protection projects.

Emergency flood-fighting efforts by State and local teams have been responsible for saving many leaking levees during major flood events. Without these emergency response actions, countless more levee failures, loss of life, and property damage would have resulted. The lack of funding to prevent levee deterioration will mean that there will be more flood fights during flood events, and fewer resources available to save distressed levees and prevent flooding.

Whether it is associated with a major capital improvement or routine maintenance, there are major costs associated with environmental consultation, permitting, ecosystem protection and the mitigation aspects of any flood management effort. In addition, many non-structural flood management

The lack of funding to prevent levee deterioration will mean that there will be more flood fights during flood events, and fewer resources available to save distressed levees and prevent flooding.



Emergency Crews Placing Sandbag Rings Around Seepage Boils at the Base of a Levee along the San Joaquin River During the 1997 Floods.

methods are now being pursued, such as the establishment of floodplain corridors and the use of setback levees. These endeavors commonly require more resources than those used in more traditional programs years ago. Consequently, the funding needs for the current flood management system are now much greater because of the requirement to incorporate environmental protection and restoration activities more explicitly in these programs.

The need for increased funding at the local level to deal with a deteriorating flood control infrastructure while pursuing nontraditional and environmentally benign approaches is particularly difficult. The passage of Proposition 218 requires that local assessment increases be approved by two-thirds of the voters. Local flood control agencies have found it extremely difficult to educate voters about the risks of flooding and gain enough support to approve the higher assessments necessary to support an adequate flood control infrastructure. In many cases, the local attitude appears to be a reluctance to pay for increased assessments when the State will pay for any flood damage that might result. The *Paterno* decision reinforces this attitude. This greatly contributes to deferred maintenance at the local level and a substandard flood control infrastructure that is a liability for California taxpayers.

RECOMMENDED STRATEGIES TO RESPOND TO CALIFORNIA'S FLOOD MANAGEMENT CRISIS

Effective flood management lies at the heart of a safer, healthier and economically stronger California. Today, we have the opportunity to take stock of the current situation, improve our programs, invest wisely, work with communities and local agencies, and make a difference for the future. The path to sound flood management will mean accepting positive changes and require a significant commitment of human and financial resources. But business as usual is not an option. California's flood management challenges run deep — but determined action by California's leaders can help reduce the toll — both human and financial — of flood disasters.

Several excellent studies have been completed recently that provide guidance for flood management solutions, including:

- ☐ Final Report -Governor's Flood Emergency Action Team, May 10, 1997.
- ☐ Interim Report-Sacramento and San Joaquin River Basins, California, Comprehensive Study, December 20, 2002.
- ☐ Final Recommendations Report, California Floodplain Management Task Force, December 2002.

In addition, the Water Education Foundation, DWR, and the State Reclamation Board recently cosponsored a workshop on flood management options and opportunities. This workshop provided a forum where aspects of the current crisis and many potential solutions were discussed by flood control managers and experts. Collectively, these studies and discussions showed that immediate, short-term remedies were urgently needed in many areas of the Central Valley flood control system. However, there was also consensus that a parallel approach was needed to develop and implement a long term vision and set of solutions to this crisis.

The following recommended strategies are intended to provide a framework for both short-term and long-term future actions:

California's flood management challenges run deep — but determined action by California's leaders can help reduce the toll — both human and financial — of flood disasters.

RECOMMENDED STRATEGY 1:

Ensure the integrity of existing flood project infrastructure through improved maintenance programs.

The State should develop a proactive and collaborative process to properly maintain flood control facilities that balances public safety and environmental protection:

- ☑ Provide adequate funding and staffing to keep pace with current and projected maintenance requirements.
- ☑ Improve levee inspection programs.
- ☑ Perform deferred maintenance (e.g. sediment and vegetation removal at critical weirs, pump replacement, maintenance yard repairs).
- ☑ Increase staffing and support for State Reclamation Board activities.
- ☑ Aggressively form Maintenance Areas to deal with deferred maintenance.

The State should work with environmental groups and agencies to incorporate environmental protection practices in its maintenance programs:

- ☑ Develop a framework agreement with resource protection agencies to allow critical maintenance to implement agreed-upon mitigation measures and to provide a process for developing long-term maintenance solutions.
- ☑ Develop a "Safe Harbors Program" to effectively manage issues associated with threatened and endangered species.
- ☑ Develop a "Mitigation Banking Program" to facilitate the permitting and maintenance of flood control projects.
- ☑ Eliminate Fish and Game code criminal liability exposure for individual employees performing within the scope of maintenance work.
- ☑ Work with the Army Corps to revise project operations and maintenance manuals to accommodate environmental values that are compatible with the flood control function.

RECOMMENDED STRATEGY 2:

Evaluate the integrity and capability of existing flood control project facilities and rehabilitate those that are economically viable.

The State should partner with the Army Corps and local agencies to:

- ☒ Evaluate the system's levees using current Army Corps standards.
- ☒ Rehabilitate levees and other project features found to be deficient.
- ☒ Modify the system, where required, to provide adequate levels of flood protection and to resolve design deficiencies.
- ☒ Authorize the Third Phase of the Sacramento River Bank Protection Project.
- ☒ Amend the Water Code to address the problem that occurs when local agencies and/or the Army Corps prevent necessary rehabilitation by refusing to share the cost.
- ☒ Develop a State program to continuously evaluate system performance and capacity, and to widen the scope of routine inspection.
- ☒ Seek congressional and legislative deauthorization of flood control project facilities that are no longer economically viable (e.g. projects with rehabilitation or O&M costs that exceed the flood damages avoided).
- ☒ Develop a strategic long-term flood control plan that would dictate improvements over time to provide high levels of flood protection for urban areas and to restore ecosystem functionality.

RECOMMENDED STRATEGY 3:

Improve the effectiveness of emergency response programs.

The State should implement proposals from the 2002 Sacramento and San Joaquin River Basins Comprehensive Study for Enhanced Flood Response and Emergency Preparedness:

- ☒ Enhanced detection of flood potential through improved flood forecasting data and procedures.

- ☒ Increased lead-time for notifying emergency response agencies.
- ☒ Improved local agency response capability.

The specific steps for implementing these proposals include partnering with the Army Corps and local agencies to:

- ☒ Increase staffing for flood operations and flood forecasting programs.
- ☒ Restore dual path telemetry to river stage, rainfall, and temperature data.
- ☒ Implement statewide emergency preparedness coordination and training programs.
- ☒ Improve stream gaging and forecasting capabilities.

RECOMMENDED STRATEGY 4:

Create a sustainable fund to support flood management programs.

California's flood management programs desperately need a sustainable set of funding sources to not only finance flood management activities, but also to provide reimbursement for flood damage caused by inevitable failures in the levee system. A combination of the following sources should be utilized:

- ☒ General Fund
- ☒ Bond Funds
- ☒ Reimbursable funding from the federal government
- ☒ Assessment fees from a Central Valley Flood Control Assessment District (see Recommended Strategy 6)
- ☒ Mandatory state flood insurance fees (see Recommended Strategy 5)

To provide for a reliable flood control system in the Central Valley, preliminary estimates indicate that capital improvements on the order of approximately \$2 billion would need to be spent over 10-15 years, and an annual maintenance budget of about \$100 million would be required thereafter.

RECOMMENDED STRATEGY 5:

Examine existing flood insurance requirements and consider the creation of a "California Flood Insurance Fund," a sustainable State insurance fund to compensate property owners for flood damage.

The State should reduce its liability by requiring that all homes and businesses in areas at risk of flooding, regardless of the level of protection, have some form of flood insurance. This will require legislation to enable the State to implement a system of flood insurance similar to the National Flood Insurance Program (NFIP), yet more comprehensive

This approach provides a means of compensation for flood damage that is not dependent on the State's general fund and paid for by those who are at risk of flooding. Within the Central Valley, the area covered by this program would be smaller than the State Reclamation Board's jurisdictional area, but larger than the boundaries of the Sacramento-San Joaquin Drainage District. Other State floodplains would also be included in this program. In general, the higher the level of protection provided by flood control measures, the lower the premiums paid.

The program could be implemented by a statewide insurance fund or by simply requiring those at risk to obtain private insurance. Premiums would be based on parcel size and land use. It would be assumed that a statewide insurance program would be a "no fault" program and would require waiving the right to sue. Any insurance program should be integrated with the federal NFIP and/or local flood assessments to incorporate deductions or credits, along with an alignment of benefits.

This program would be mainly aimed at compensation for flood damage. However, if alternative funding strategies are not implemented (see Recommended Strategy 6), then this insurance fund could be expanded to fund operations and maintenance of flood control facilities and floodplain management activities along with capital outlay projects.

RECOMMENDED STRATEGY 6:

Create a Central Valley Flood Control Assessment District with fee assessment authority to provide adequate flood control protection for the regional benefit of participants.

Amending existing Water Code provisions regarding benefit assessments within the Central Valley for flood control purposes would allow the assessment of parcels that benefit from flood control projects. This financial strategy is intended to distribute the costs of flood control measures among those that benefit from them, thus relieving the general taxpayer in California of the burden. It is also intended to provide a reliable and sustainable funding source for critical flood control efforts.

Funds from these assessments would be used for operating and maintaining flood control facilities, for rehabilitation and replacement of these facilities, maintaining floodplains and upgrading floodplain maps, and for related environmental protection and restoration activities.

In the absence of mandated flood insurance programs (see Recommended Strategy 5), assessments could also be used to compensate people for flood damage. The principal assessment areas would be located in the Central Valley. Alternatives would include:

- One assessment district for the entire valley.
- Two assessment districts, one for the Sacramento Valley and one for the San Joaquin Valley.
- Three assessment districts, one for the Sacramento-San Joaquin Delta, one for the Sacramento Valley upstream of the Delta, and one for the San Joaquin Valley upstream of the Delta.

Assessments could be imposed not only on parcels within floodplains, but also on upland areas in the drainage basins that drain into the floodplain. Manmade activities in the upland areas affect runoff which generally increases the demands on the flood control system in low-lying areas.

RECOMMENDED STRATEGY 7:

Update floodplain maps and provide better flood risk education to the public and agencies that authorize development.

DWR could implement several floodplain management tools to reduce the future public risk due to flooding:

- ☐ Active implementation of FEMA map modernization and DWR “Awareness Mapping” programs
- ☐ Provide notice to owners of parcels located in floodplains
- ☐ Reinvigorate State’s designated floodway program
- ☐ Acquire flood easements
- ☐ Encourage FEMA to establish a mandated flood insurance program for homes behind levees with preferred risk options

RECOMMENDED STRATEGY 8:

Reduce taxpayer exposure for funding flood disaster claims through legislative or constitutional changes.

- ☐ The Legislature should revise the State’s Tort Claims Act (Government Code Section 810 et seq.) to preclude recovery of damages from the State due to flooding, based on any tort theory or cause of action. Add a specific immunity for flood protection activities, similar to those provided for police and correctional activities, Government Code Section 844, and fire protection activities, Section 850.
- ☐ The State Constitution should be amended to exempt flood control projects from inverse condemnation liability. Inverse condemnation was the basis for the *Paterno* decision.
- ☐ The State Constitution should be amended to exempt local flood control agencies from the two-thirds voting requirements of Proposition 218.

RECOMMENDED STRATEGY 9:

Implement a multi-objective management approach for floodplains where feasible.

One way to meet environmental requirements in an era of diminishing funding for flood protection projects is to incorporate flood protection practices into multi-objective floodplain management projects. Multi-objective floodplain management projects will enable flood managers to leverage other sources of funding for flood system maintenance. These projects will result in habitat enhancement rather than simply mitigating for environmental impacts, thereby minimizing environmental concerns. Multi-objective management should be the first choice for flood protection where it is feasible and funding partners can be found.

Depending on the circumstances, multi-objective management of floodplains may yield some or all of these benefits:

- ☑ Increased flood protection
- ☑ Ecosystem restoration
- ☑ Farmland protection
- ☑ Groundwater recharge
- ☑ Recreation
- ☑ Open space preservation

RECOMMENDED STRATEGY 10:

Evaluate potential policies and procedures that may determine the State's capacity to fund levee maintenance, infrastructure improvements and emergency response in the Delta.

DWR and the California Bay-Delta Authority (CALFED) have committed to carrying out a Comprehensive Program Evaluation (CPE) for the CALFED Delta Levees Program. As part of the CPE or concurrently with it:

- ☑ The State should prioritize which islands and levees should be maintained and protected, and to what levels.
- ☑ The State should work with local and federal agencies to establish criteria for funding and participation in any emergency response or flood event.
- ☑ The State should establish a fund for immediate emergency response in the case of a levee failure and island inundation. Such a fund would provide for rapid response to contain the emergency and prevent cascading failures to adjacent islands, and allow time for the coordination of a full, long-term response.

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