

EXAMINATION OF STEAMBOAT SLOUGH, CALIFORNIA.

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LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

*With a letter from the Chief of Engineers, report of examination of Steamboat Slough, and from junction thereof with Sacramento River to mouth of said river.*

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MARCH 5, 1896.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

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WAR DEPARTMENT,  
Washington, D. C., March 4, 1896.

SIR: I have the honor to inclose herewith a letter from the Chief of Engineers, dated February 29, 1896, together with a copy of a report from Capt. C. E. Gillette, Corps of Engineers, dated February 12, 1896, of a survey made by him in compliance with the provisions of the river and harbor act of August 17, 1894, of "Steamboat Channel, and from junction thereof with Sacramento River to mouth of said river."

Very respectfully,

DANIEL S. LAMONT,  
*Secretary of War.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

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OFFICE OF THE CHIEF OF ENGINEERS,  
UNITED STATES ARMY,  
Washington, D. C., February 29, 1896.

SIR: The river and harbor act of August 17, 1894, provides for a preliminary examination of "Steamboat Channel, and from junction thereof with Sacramento River to mouth of said river, with a view to improvement, enlargement of navigable channel, and to increase capacity for flood discharge," and I have now the honor to submit the accompanying copy of report of Capt. C. E. Gillette, Corps of Engineers, dated the 12th instant, upon the results of the examination required.

Captain Gillette considers that, as far as navigation is concerned, Steamboat Slough is not worthy of improvement by the United States, which opinion is concurred in by the division engineer, Col. C. R. Suter, Corps of Engineers, and by me.

Respecting the increase of capacity for flood discharge, Captain Gillette gives a résumé of the existing conditions and of the complications

connected with the problem which involves the entire drainage of the Sacramento Valley, and states that—

The problem is one that concerns the United States, in that the solution adopted for drainage might be injurious to navigation, or that the works for navigation might be injurious to drainage, or the two questions might be solved separately at a cost greatly in excess of the [amount] required had they been considered together.

He considers, therefore, that further examinations and surveys and accumulation of information will be necessary, and is of opinion that these investigations will cost about \$8,000.

In this connection the division engineer remarks that—

As a factor in the discharge of flood waters, it would be unsafe to consider it, except in connection with the general problem of the drainage of the entire basin. For this purpose much fuller information than now possessed seems to be essential, and the necessary surveys and examinations should be provided for in case Congress desires further information on the subject.

I concur in the views of the division engineer.

Very respectfully, your obedient servant,

W. P. CRAIGHILL,  
*Brig. Gen., Chief of Engineers.*

HON. DANIEL S. LAMONT,  
*Secretary of War.*

PRELIMINARY EXAMINATION OF STEAMBOAT CHANNEL (SLOUGH), CALIFORNIA, AND FROM JUNCTION THEREOF WITH SACRAMENTO RIVER TO THE MOUTH OF SAID RIVER.

UNITED STATES ENGINEER OFFICE,  
*San Francisco, Cal., February 12, 1896.*

**GENERAL:** I have the honor to submit the following report of an examination of "Steamboat Channel [Steamboat Slough] and from junction thereof with Sacramento River to mouth of said river, with a view to improvement, enlargement of navigable channel, and to increase capacity for flood discharge."

This examination was made by Lieutenant Deakyne, and a preliminary report was made by Major Heuer on November 23, 1895. A survey, including Steamboat Slough, was in progress at that time, and has since been completed, and the recommendations made herein are partly based upon the results of this survey.

A description of Steamboat Slough is included in Lieutenant Deakyne's report, forwarded by Major Heuer on November 23, 1895. It forms the west channel of the Sacramento River around Grand Island. The other branch, known as Old River, is 18 miles in length. Steamboat Slough is 12 miles in length. The upper portion of the slough is narrow and deep, with high banks. The lower portion is broad and shallow, with low banks. It was formerly the navigable channel of the river, but was abandoned about twenty years ago on account of shoaling, Old River since that time being the main channel. Just below the junction of Steamboat Slough and Old River is the mouth of Cache Slough, which is the outlet of what is known as the Yolo Basin, the great west side depression of this portion of the Sacramento Valley. This slough discharges at flood stages enormous quantities of water previously poured into Yolo Basin by the overflow from the Sacramento River above Sacramento and by the drainage from the Coast Range on the west.

The survey recently completed shows that a navigable channel commensurate in size with the balance of the river can be created by dredging at a cost of about \$17,000. It involves the removal of about 100,000

cubic yards of material, making a channel nowhere less than 8 feet deep and 150 feet wide. An improvement to a similar depth in Old River under present conditions can be made by spur dikes, similar to others already used in the river, at a cost of about \$45,000. The improvement in Old River, however, would probably be permanent; that in Steamboat Slough might be only temporary. As far as can be seen, the same forces and conditions which caused Steamboat Slough to shoal are still in existence, and the deepening of the channel by dredging could only result in temporary benefit, since present conditions would doubtless soon be restored. Present indications, however, are that the channel is to a certain extent scouring out. This result is probably due to the fact that in the last three or four years the lower end of the slough has been leveed, and it is possible that the improvement may continue until it fills present requirements of navigation. In any event, in a stream carrying so much silt as the Sacramento River, ultimate conditions will depend upon causes modifying the flow of water, and will not be much influenced by the dredging of deposited material.

An improvement of the lower end of the slough might be made with spur dikes, if the requirements of navigation demanded it. A fair estimate of these requirements is shown by the amount of traffic that now seeks the slough at the medium and high stages of water, when the conditions are about as favorable as they would be at low water were this slough improved. At present the through passenger boats carrying the mails never go through Steamboat Slough at all; fruit and produce carrying boats navigate Old River habitually, but occasionally go down the upper half of Steamboat Slough and return; towboats occasionally use the slough on the up trip, and on one occasion have used it on the down trip when without barges. It therefore appears that the present requirements of navigation are slight, and in view of the uncertainty of the permanence of the improvement, I consider that as far as navigation is concerned Steamboat Slough is unworthy of improvement by the United States.

As to the increase of capacity for flood discharge, it may be said that the enlargement of this slough is intimately connected with, and a most important factor of, the entire drainage system of the Sacramento Valley, a subject undoubtedly of great importance, but one which has not heretofore been considered by the Government in connection with river and harbor improvements. The fall at low water from the head of Grand Island to the foot is 2.3 feet, and on account of the shortening of the distance the discharge capacity of the river would doubtless be greatly augmented if Steamboat Slough were the main or only channel of discharge. At present the average cross section of this slough at high water, assuming the slough to be bank full to the top of the levees, is about 11,000 square feet; the increase in cross section caused by the dredging necessary for navigation purposes is less than 200 square feet, so that the increase in discharge capacity incidental to improvement for navigation is trivial and may be neglected.

If Steamboat Slough were widened and deepened and its upper end given a form to facilitate the entrance of the water, it is by no means certain that it would become the main channel of the river. It is a well-authenticated fact that frequently at flood stages the water rushes out of Cache Slough at a higher stage than water in either Steamboat Slough or Old River, practically acting as a dam to the free flow of these waters, and forcing a considerable portion of the discharge of the Sacramento River across low swamp lands toward the San Joaquin. It is probably this directing influence that has caused the improvement of

the upper part of Old River and the shoaling of Steamboat Slough, and with Yolo Basin and Cache Slough in their present condition, the same result would probably occur again. It will thus be seen that the control of the waters flowing into Yolo Basin must be considered in connection with the improvement of Steamboat Slough for drainage purposes, and this brings in the entire problem of drainage of the Sacramento Valley, complicated as it is by the very slight grade of the valley land, the flow of detritus from hydraulic mining, and from natural erosion in the drainage basin of the river.

To cover these questions the survey of Steamboat Slough recently completed is entirely inadequate. There is, however, a great deal of information scattered in various places through the literature concerning the Sacramento Valley and its streams, but probably not enough to permit of reliable estimates being made concerning the proper solution of the drainage problem. The problem is one that concerns the United States in that the solution adopted for the drainage might be injurious to navigation, or that the works for navigation might be injurious to drainage, or the two questions might be solved separately at a cost greatly in excess of that required had they been considered together.

The question is also complicated by the present systemless aggregation of levees and the possibility of reclaiming great tracts of swamp land.

It appears, therefore, that to properly comply with the act of Congress requiring the examination of Steamboat Slough for drainage purposes, further examinations and surveys and accumulation of information will be necessary. The cost of this, it is impracticable now to estimate, but it will probably not exceed \$8,000. \* \* \*

Very respectfully,

CASSIUS E. GILLETTE,  
*Captain, Corps of Engineers.*

Brig. Gen. W. P. CRAIGHILL,  
*Chief of Engineers, U. S. A.*

(Through Col. Charles R. Suter, Corps of Engineers, Division Engineer, Pacific Division.)

[First indorsement.]

UNITED STATES ENGINEER OFFICE,  
PACIFIC DIVISION,  
*San Francisco, Cal., February 17, 1896.*

Respectfully forwarded to the Chief of Engineers, United States Army.

I am not of the opinion that dredging alone would effect more than a very temporary improvement on a stream carrying so much sediment. Contraction works of considerable magnitude would also certainly be required, and the estimated cost of improvement would be correspondingly increased. I therefore agree with the conclusion of the local engineer, that under present conditions Steamboat Slough is not worthy of improvement by the General Government for purposes of navigation only; and that as a factor in the discharge of flood waters it would be unsafe to consider it, except in connection with the general problem of the drainage of the entire basin. For this purpose much fuller information than now possessed seems to be essential, and the necessary surveys and examinations should be provided for in case Congress desires further information on the subject.

CHAS. R. SUTER,  
*Colonel of Engineers, Division Engineer.*