

2304

Diag Cht. No. 5530-1

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey *Hydrographic*

Field No. Office No. *2304*

LOCALITY

State *California*

General locality *San Francisco*

Locality *Bay*

*1897*

~~194~~

CHIEF OF PARTY

*J. M. Helm*

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U. S. COAST AND GEODETIC SURVEY.

Gen. W. W. Duffield, Superintendent.

State: California.

DESCRIPTIVE REPORT.

Hydrographic Sheet No. 2304

LOCALITY:

San Francisco Bay

1897

CHIEF OF PARTY:

Lieut. J. M. Helms, U. S. N.

2304

## Descriptive Report.

In compliance with Art. 204 - 209, Instructions for Hydrographic Parties, I have the honor to submit the following descriptive report of the work along the Eastern shore of San Francisco Bay, from Robert's Landing to Newark Slough.

The most of the work was done before receipt of letter of instructions from Hydrographic Inspector dated May 26, under instructions dated April 22, 1897, as follows: \* \*

"Please pay particular attention to development of bottom in vicinity of wharves and landings and in the creeks and sloughs."

The limit of the work was prescribed by a colored tracing forwarded with above instructions.

There is no commerce carried on in these creeks and sloughs in vessels drawing 8 ft. Navigation is confined to flat bottomed scows.

drawing) loaded about 4 to 5 ft., which  
works up the channels leisurely with the  
tides, going as far inland as possible to  
get at top of high water.

1. Title of sheet, Form 11, attached.
2. General remarks &c.

See accompanying report of Lieut. N. A. McCully, U.S.N.

3. See accompanying report of Lieut. N. A. McCully, U.S.N.  
A private white light is maintained on nights  
when there is no moon, hoisted on a signal  
mast on Coyote Oyster House.

4. See accompanying report of Lieut. N. A. McCully, U.S.N.  
No Pilots employed by Class of vessels nav-  
igating these waters. Tow boats can be found in  
San Francisco but are not used in Sloughs.

5. See accompanying report of Lieut. N. A. McCully, U.S.N.  
No special anchorages: scows lay on the mud  
high and dry between tides or tie up to the  
banks in the Sloughs: No harbor improvements in

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Progress.

6. See accompanying report of Lieut. R. A. McCully U.S.N.

The tidal currents of the bay set across the mouths of the sloughs.

7. A number of shell banks were found which do not show on the old chart. The shore line seems to be growing out into the bay.

8. No ice: much less fog is found on this shore than on the west side of the bay.

Freshets prevail in the neighborhood of Alvarado during the wet season.

9. Prevailing winds N<sup>d</sup> and W<sup>d</sup>: fresh in the afternoon during the summer. Heaviest gales probably come from S<sup>d</sup> and E<sup>d</sup>, and S<sup>d</sup> and W<sup>d</sup> during the winter time. None experienced during the progress of our work.

10. Wrecks: inland waters, not dangerous.

No life saving stations. No hospitals for seamen.

11. Quarantine regulations. Those of San Francisco Bay.

12. Fresh water obtained from artesian wells: not very good for drinking purposes and bad for boilers: facilities for watering ships limited to ships own boats. Coal, repairs &c obtained in San Francisco.

13. Wharves; see accompanying report of Lieut. N. A. McCully, U.S.N. At mean low water it is practically dry along the wharves and landings; at the wharf of salt works near mouth of Coyote Slough there is possibly 4 ft at mean low water.

14. No weather service signals nor time ball.

15. No branch Hydrographic Office, stations for reporting vessels, or special signals.

16. No docks nor marine railways.

17. No regular passenger steamers; passengers might go by stern wheel steamers and scows.

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if they desired. The Southern Pacific Railroad skirts along the east shore of bay.

Post offices and Telegraph stations at Newark and Alvarado and possibly other places.

18. No custom House.

19. Settlements: See accompanying report of Lt. D. G. McCully, USA.

20. No kelp.

Respectfully submitted

J. H. Nelson  
Chief of Party

Hydrographic work on Eastern Shore of Southern part of San Francisco Bay

Memorandum for Lieutenant J. M. Helm

On May 4, 1897, I left the ship with a party consisting of Apothecary D. L. Reese, F. O. Lane, Q. M. H. P. Mattson, Mach. C. L. D. Cranton, I. C. F., W. Frost, Seaman, and C. Charles Lawton, Seaman, and Fung Jung, mess attendant, steam launch no 117, and the canoe camp was located near the head of Coyote Hills Creek on northern bank where it cuts range of Coyote Hills, the tide gauge was established, signals built, stations occupied with theodolite, and on May 8, hydrographic work begun in Coyote Hills Creek (chart name)

#### Coyote Hills Creek

This slough opens to S.W. on shore line of Eastern part of Bay about halfway between Coyote Oyster House and Beacon No. 3, an old warehouse and the salt works and white salt heap on northern bank serving to locate the mouth. Any craft intending to enter stands down the channel in Southern part of Bay until the mouth of the creek bears about N. E. by N. magnetic, then heads straight in for the mouth, keeping the creek open as soon as it can be seen. This course avoids all the higher shell-banks, of which there are a number about the mouth. There is one high bank marked by a stake and cross piece about 1.3 miles S.W. by W. from the mouth, on which many craft go aground. Just to the S. of the bank is a shallow channel in which 7.0 feet may be taken at high water. In this channel the bottom is hard mud and broken shells, soft mud on the northern edge, and shell banks on the southern edge. About 0.7 miles from the mouth the channel deepens, and there is no further difficulty in entering, the creek being kept open. The creek or slough itself is wide and deep, and continues past the salt works for about 1.3 miles, curving steadily to the right, and then forks into two branches, one making off to the S.W. and the other to the N.



## Coyote Hills Creek:— continued

Many sailing scows and a few gasoline schooners and stern wheel steamers, drawing not over 50 feet loaded, come in to the creek, fetching stores to the Salt Works, and taking away salt, and navigating the two main branch sloughs.

The skait name "Coyote Hills Creek" is shortened locally into "Coyote Creek," or "Coyote Slough." As there is no fresh or running water entering directly, and no essential difference from the other inlets called sloughs, "Coyote Slough" seems a more appropriate name, and would seem to distinguish it from the "Coyote Creek" further up the Bay.

## Patterson's Slough:—

The branch which makes off to the Sd. from the fork of Coyote Hills Creek is known locally as Patterson's Slough. It first makes to the Sd. about 200 metres, then turns to the Eastward and winds about through the marshes, and Coyote Hills to the limit of navigation about 2.3 miles from where it leaves Coyote Hill Creek. The landing at the point called Johnson's Landing on the skait is now known as Patterson's Landing. There are a few shallow places in the slough one about 1700 metres from the fork with 1.9 feet water and soft muddy bottom; another near the end of the third reach from this place with 2.8 feet water and hard rocky bottom, and another near end of loop just after passing through range of Coyote Hills with 1.7 feet water bottom hard mud and broken shells. The slough then narrows and shallows gradually up to the limit of navigation, and splits into a number of small sloughs. In winter a small amount of fresh water enters this slough, in the dry season none at all.

A large slough makes off Patterson's Slough about 750 metres from the fork of Coyote Hill Creek. It is known as Mallard Slough and is not navigated except by duck hunters.

A few sailing scows and gasoline schooners come up the slough taking stores to Patterson's Landing and loading with hay, straw and farm produce, all the navigation being done at high water when 60 feet may be carried ahead of navigation.

Plummers slough -

The branch slough making off to the northward from Coyote Hill Creek is known locally as Plummers slough, and winds about through the marsh in a general N.E. direction the limit of navigation being reached at Plummers Landing, about 2.2 miles from the fork. In this slough are several shallow places with soft muddy bottom, the shallowest being in the straight reach toward Plummers landing, and gives soundings of -1.6<sup>feet</sup> at low water.

There is a large branch slough making off to the northward, known locally as Teal slough, and is navigated by duck hunters only.

S. along section carries about all the traffic there is in the slough, bringing stores to the Plummers Salt Works and loading with salt. As in Pattersons Slough it is all high water navigation, and 5.0 feet can be taken up to head of navigation.

Alameda Creek -

This is a mountain stream of considerable volume during the wet season, and of very little volume during the dry season. It now passes through Alameda, and finds its way into the Bay through a slough whose mouth is 1 1/4 mile to the N.W. of Coyote Hill Creek. The slough opens to the S.W. its mouth being marked by a large red building on the Southern bank and 1000 metres from the mouth. This building has a cupola, and flagstaff on it, and is the store house at the Salt Works of B. P. Baston.

There is no regular channel leading into the slough, craft wishing to enter standing down off the mouth from the N.W., the course avoiding the higher shellbanks about Coyote Creek Oyster House, and to N.W. of the mouth. On this course when the bottom changes from hard mud and broken shells to soft mud, head straight in for the mouth, and at high water 5.0 feet can be taken into the slough without difficulty. About 0.2 mile from the mouth

## Alameda Creek -

is a small shallow channel running about East and West; and after entering this the navigation of the slough becomes easy as in the other sloughs.

This slough runs past a salt works and to the N. For 0.8 mile then makes an abrupt turn to the right and continues in a generally E. direction, following the course of old Union City Creek, but with no traces of that part to the N. towards the mouth, nor of the large branch to the S. both being dammed off and filled in to form new salt ponds and reservoirs. About 2.1 miles from the mouth the slough forks into two branches, one making to S. E. to Union City, and following the course of old Union City Creek, the other branch making to the N., and through which now flow the waters of Alameda Creek.

Alameda Creek or North Slough as the branch to the N. is called is narrow, of regular depth, bottom of stiff mud or clay, and considerably deeper than main slough. There is a small salt works 1.9 miles from the fork, past which there is little or no navigation, though the steam launch drawing 30 feet was <sup>able</sup> to get up 3.6 miles from the fork, where the creek narrowed to 12 feet in width, and  $4\frac{1}{2}$  feet deep at high water, though here the launch could make no progress under her own steam, the keel dragging on the bottom as soon as the engines began turning over. At this point the current is quite strong, at all stages of the tide, the water is almost perfectly fresh, and salmon and trout are found. Tide water reaches to this point but the range is considerably reduced.

This creek has no bar or shallow places, and no branches of any importance.

The branch to the S. takes the same course as Union City Creek, and continues in a general E. direction to the limit of navigation which is reached about 2.4 miles from the junction with Alameda Creek or North Slough. Craft drawing 5.0 feet of water can get up to this point.

At the limit of navigation the slough is about 20 feet wide, and a short distance further on narrow still more, and <sup>becomes</sup> unpassable even for small boats on account of overlapping rushes and tule grass. A very small amount of fresh water reaches the head of this slough instead of the large volume that came down formerly from Alameda Creek, which during a very wet season a few years ago overflowed the marshes and broke a new channel through to head of Union City Creek, leaving the former channel of the creek where it passes through Union City and Alvarado, almost dry. Sailing craft of the usual type drawing about 5 or 6 feet loaded fetches stows up the slough head take away salt. There are no shallow places likely to interfere with any craft that can enter the slough.

The names of these sloughs have changed with the physical conditions. The main slough from the mouth to the limit of navigation of the Southern Branch is known as Union City Creek, Union City Slough, and Alvarado Slough. The Northern Branch is known as North Slough and as Alameda Creek. The name "Alameda Creek" is applicable only as far as the junction with the old course of Union City Creek. Besides the natural causes tending to make the stream change its course various other causes as damming or ditching either openly or covertly by people some of whom wish the stream to overflow the marshes, freshening them and depositing sediment on which farm produce is raised, while others seek to obtain the seaming influence of the stream into the channels past their landings. The creek now shows an inclination to break through into the next slough to the northward. "Union City Slough" is the name most commonly used for the slough considered separate from Alameda Creek, and "Union City" itself is at the head of navigation of this slough. But Union City exists as little more than a name the post office and railway station both being named Alvarado and Alvarado forms by a considerable margin the larger part

of the small town formed by combining the two. The slough continues through Alvarado, and "Alvarado Slough" seems the name most likely to endure.

#### Mt Eden Slough.

About  $1\frac{1}{4}$  miles to the northward from the slough just described is the mouth of another slough, called on the chart "Union City Creek" but known now exclusively as "Mt. Eden Slough". It opens to the S.W., and may be identified by the group of buildings and salt-heaps, amongst which are five windmills, belonging to the Union Pacific Salt Works on the southern bank near the mouth. Craft entering the slough stand in toward the mouth from the N.W. and about 0.6 miles from the mouth find a narrow shallow channel marked by remnants of a former beacon, and by stakes as it leads toward the shore, in which 5 feet can be taken at the usual high water. About 0.3 miles from the mouth the channel deepens and follows southern bank up to the Salt works. The slough continues past the Salt works in a general N.E. by direction, the branch to the Southward having been dammed off to form new salt ponds and reservoirs.

About 1.5 miles from the mouth are the Salt Works of the Oliver Salt Company, and 1.8 miles from the mouth is the landing, called on the chart Allen's Landing, but now known as Mt. Eden Landing. The landing called Mt. Eden Landing on the chart is no longer used. The course of the slough has somewhat changed, two loops having been cut off by ditching across, and another near the head of navigation has been ditched across. But the course of the slough has not been fully diverted into this channel as yet. The head of navigation is reached about 30 miles from the mouth, and the usual type of craft drawing 5 feet loaded can get up to this point.

About 1.5 miles from the mouth is a branch slough to the right up which there is no navigation, being used mainly as a feeder for salt ponds. There is another

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small branch to the right 26 miles from the mouth on which is located a small salt works.

There are a few shallow places with soft muddy bottom over which any craft can pass that can enter the mouth.

Most of the traffic is by means of the usual type of sailing craft that navigate the sloughs. A small stern wheel steamer runs to Mt. Eden Landing.

#### Marsican's Landing.

Northward of Mt. Eden Slough 15 miles, on a small slough opening to N.W., is situated Marsican's Landing. This may be identified by a long low wood colored building on the northern bank, used as a warehouse. Sailing craft bring in lumber and stores and take away salt. A small channel runs out along a row of piles for about 150 metres from the beach.

#### Haywards's Landing.

Haywards's Landing is 0.9 mile to the N.W. of Marsican's Landing and is similarly situated, and can be identified by a large quadruple warehouse. Considerable traffic comes to this landing for the small towns in the vicinity, stores, lumber and flour being brought, and salt, hay and straw and farm produce taken away. A channel runs out close alongside a narrow pier for about 160 metres from the high water mark.

#### Robert's Landing.

Thompson's Landing on the chart is now known as Robert's Landing after the present owner. It is situated on a small slough opening to the S.W., the channel of which has been straightened by digging across the bight that formerly existed. The entrance consists of a narrow, shallow channel making straight out from shore and marked by bush beacons. The cluster of buildings about

8.  
The landing and a large white warehouse are means of identifying the landing. Considerable traffic in the shape of lumber, flour, and tallow comes to this landing, while hay, straw, fruit and farm produce are re-shipped. A small stern wheel steamer the "San Lorenzo" runs regularly between this landing and the city of San Francisco, vessel traffic being carried in the usual type of sailing craft, there being no traffic past the landing. A small fresh water creek, known as San Lorenzo Creek empties through the mouth of this slough.

#### Fennion's Slough -

Fennion's Slough is the slough whose mouth is about one mile to the Sd of Coyote Slough, but up which there is no navigation except by duck hunters.

#### Hill Slough

Hill Slough is the slough whose mouth is 1.2 miles to the Sd of Fennion's Slough, to which it is similar.

#### China Slough -

About .6 mile to the N. of Potrero Point or Dumbarton Point as it is now called, is the mouth of the slough called on the chart "Beards Creek" some small shanties of a Chinese fisherman's camp on the northern bank serving to identify it. This slough makes to the N.E. winding about through the marshes in a general Ely direction, and opens into a larger and deeper slough called now Newark Slough. There is no channel of value leading into the mouth of this slough, and there is very little navigation in it on account of the better and deeper Newark Slough, called "The Gap" on the chart.

#### Newark Slough -

Newark Slough has its mouth to the E. of Potrero or Dumbarton Point, the entrance being deep, and the channel

both wide and deep. The slough winds about in the marsh to the N.W., till it meets China Slough then makes off in a generally Ely direction to the foothill of the Coyote range, passes around the southern end of the range and on to the limit of navigation at Jarvis' Landing, called on the Chart Mayhew's Landing, about 4.25 miles from the mouth, and about 1.5 miles from the town of Newark. As the slough passes the Coyote Hills and in a prolongation of the range, it is crossed by a ledge of rocks, outcroppings of the ledge showing on each bank, least depth being 0.7 feet at low water. There are several other shallow places but with soft bottom, and which do not interfere with navigation. There is considerable traffic up this slough principally between San Francisco and the town of Newark, and carried in the usual type of flat-bottomed sailing scows and stern wheel steamers.

Near the entrance of Newark Slough and making off to the right from it is a good-sized slough, up which there is some traffic to a salt works recently built.

General character of the sloughs and entrances

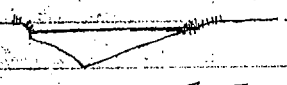
All the sloughs are winding and of irregular depth, bottom generally of soft blue mud covered with a layer of grayish yellow mud. Where the sloughs are scoured to a greater depth than usual, the soft mud is washed away, and the bottom is a stiff blue clayey mud. Boregs for artesian wells near Alameda show first soft blue marsh mud, then stiff blue and yellow clay, and later gravel or sand in which is found water. The layer of marsh mud is about 20 feet thick near bay shore, and 4 to 6 feet thick about the headwaters of the sloughs. Along the bay shore, marsh grass first pushes out into the water, silt and refuse catch in this and forms a bank, and in time the high water mark is advanced into the Bay. With the exception of Alameda creek all the sloughs are navigable.



The entrances to the sloughs are not well defined. Across the mouths of all of them are bars of mud, with sometimes a shallow channel leading across. These bars prevent all the water from leaving the slough, when the water of the Bay falls below the level of the bar, the water in the slough remains at a stand until the water of the Bay again rises above the level of the bar. This point of stand, depending on the height of the bar at the mouth, being reached by nearly all the lower low waters, besides being a point below which the water never falls, was taken as the plane of reference for each slough.

Nearly all the craft navigating these sloughs are flat-bottomed sailing scows, and gasoline schooners, and shallow draft stern wheel steamers, the rule being that the craft should not draw over five feet loaded. The sailing scows either use their sails when navigating the sloughs or warp themselves along by stakes in the banks. All the navigation is done at high water. Very little fresh water enters any of the sloughs, except the one into which Alameda Creek empties. In the winter or wet season a great deal of fresh water comes down this creek, and in a very wet season floods the marshes about Alvarado.

In carrying on the work in these sloughs, the steam launch was used if there was sufficient water, and the canoe otherwise. At low water the channel would be well defined, and at high water it could be approximated to very nearly by observing the shape of the banks. The following may illustrate the idea,



the deepest water being found near the steeper bank, and about halfway between the bank and the middle of the slough. Only one line was run in each slough, the effort being made to keep in the deepest water. By noticing the banks a craft can be kept very nearly always in the deepest water in the slough, even at high water.

Mean high water is 7'3 above the plane of reference of Newark Slough, and extreme high water 9'3 above.

Mean high water is 7'3 above the plane of reference of Coyote Slough, extreme high water 9'3 above, and the mean high water 7'5 feet can be carried in the channel across the bar at mouth, and 9'5 at extreme high water.

Mean high water is 5'7 above the plane of reference of Alameda Creek, extreme high water 7'8 above, and at mean high water 5'6 can be carried through channel into mouth, at extreme high water 7'6.

Mean high water is 5'1 above the plane of reference of Mt. Eden Slough, extreme high water 7'1 above, and at mean high water 5'2 feet can be carried into mouth, at extreme high water 7'2 feet.

At mean high water 4'1 water can be carried into Hayward's Landing, at extreme high water 6'1.

At mean high water 3'6 can be carried into Maricouso Landing, at extreme high water 5'6.

At mean high water 4'4 can be carried into Roberts Landing, at extreme high water 6'4.

The level of the marshes corresponds very closely to the mean of the extreme high water, and the general level of the shell banks to the mean of the lower low water.

Very respectfully

W. A. M. Lucey

Lieutenant (jg) US Navy

Tide Tables for projection along Eastern Shore of the Southern part of San Francisco Bay.

Redwood City Creek

Mean of lower low waters (34 observations)	3.08
Plane of reference deduced from comparisons with Sausalito	3.36
Lowest tide observed	1.03
Highest tide observed	12.75
Mean rise and fall 139 observations	5.48
Names of observers: - P. Henriksen, Q.M. 3rd, C. Hansen Sea. L. Trompler, Sea.	

Newark Slough

Mean of lower low waters (2 observations)	1.0
Plane of reference deduced from simultaneous Comp. Red. City Creek	1.0
Lowest tide observed	1.1
Highest tide observed	6.6
Mean rise and fall	5.6
Names of observers: - P. Mattson, mach. 1st, E.O. Laine, Q.M. 2nd. L. D. Cranston i.c.f., C. Larsen Sea.	

Coyote Slough See report of Lieut. M.A.M. Cully Page 10

Mean of lower low waters <sup>and</sup> plane of reference (3 observations)	0.33
Lowest tide observed	0.4
Highest tide observed	7.8
Mean rise <sup>and</sup> fall	5.4
Names of observers: - C. Larsen, Seaman	

Alameda Creek See report of Lieut. H. A. McCully, page 10

Mean of lower low waters and plane of reference (1 observation)	0.2
Lowest tide observed	0.2
Highest tide observed	3.7
Mean rise and fall	3.1

Names of observers - P. Mattson, Mach. 1st, F. O. Laine, Q.M. 2d.

L. D. Cranston, 1st Lt., W. Frost, Seaman

Mk. Eden Slough See report of Lieut. H. A. McCully, page 10

Mean of lower low waters and plane of reference (1 observation)	1.5
Lowest tide observed	1.5
Highest tide observed	7.5
Mean rise and fall	4.5

Names of observers - P. Mattson, Mach. 1st, F. O. Laine, Q.M. 2d.

L. D. Cranston, 1st Lt., W. Frost, Seaman

Robert's Landing See report of Lieut. H. A. McCully, page 10

Mean of lower low waters and plane of reference (1 obs)	2.92
Lowest tide observed	2.92
Highest tide observed	6.74
Mean rise and fall	2.63

Names of observers - P. Mattson, Mach. 1st, F. O. Laine, Q.M. 2d.

L. D. Cranston, 1st Lt., W. Frost, Seaman

Coyote Oyster House

Mean of lower low waters	(3 observations)	1.07
Plane of reference deduced by comparison with Red City Creek		8.9
Lowest tide observed		1.04
Highest tide observed		8.65
Mean rise and fall deduced by comparison with Red City Creek		5.30

Names of observers - C. Johnson, Sec. C. Larson, Sec.

L. D. Cranston, i.c.f.

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To accompany finished sheet, E. shore S.F. Bay.

U. S. Coast and Geodetic Survey. Str. McArthur.

[Form 11.—Statistics of Field Work.]

Statistics of Field Work executed by Lieut. J. M. Helm, U.S.N.

Date of beginning field work..... May 6, 1897.  
Date of closing field work..... June 12, 1897.

RECONNAISSANCE:

Area of, in square statute miles.....  
Lines of intervisibility determined as per sketch submitted.....  
Number of points selected for scheme.....

BASE LINES:

Primary, length of.....  
Secondary, length of.....  
Beach measurements, length of.....  
Number of days employed in measurements of base.....  
Number of days employed in re-measurements.....

TRIANGULATION:

Area of, in square statute miles.....  
Signal poles erected, number of.....  
Observing tripods and scaffolds built, number of.....  
Observing tripods and scaffolds built, heights of.....  
Days occupied in opening and verifying lines of sight, number of.....  
Stations occupied for horizontal measures, number of.....  
Stations occupied for vertical measures, number of.....  
Geographical positions determined, number of.....  
Elevations determined trigonometrically, number of.....

GEODESIC LEVELING:

Elevations determined by spirit-leveling of precision, number of.....  
Lines of geodesic leveling, length of.....

LATITUDE, LONGITUDE, AND AZIMUTH WORK:

Latitude stations occupied, number of.....  
Pairs of stars observed for latitude, number of.....  
Average number of observations on a pair.....  
Longitude stations, telegraphic, number of.....  
Longitude stations, telegraphic, number of nights on which signals were exchanged.....  
Longitude stations, chronometric, etc., number of.....  
Azimuth stations, number of.....  
Number of nights of observations for azimuth.....  
Number of stars observed for azimuth.....

GRAVITY DETERMINATIONS:

Number of pendulum stations occupied.....

MAGNETIC WORK:

Stations occupied for observations of the magnetic declination, number of.....

Stations occupied for observations of the magnetic dip, number of.....

Stations occupied for observations of the magnetic intensity, number of.....

TOPOGRAPHY:

Area surveyed in square statute miles.....

Length of general coast-line in statute miles.....

Length of shore-line of rivers in statute miles.....

Length of shore-line of creeks in statute miles.....

Length of shore-line of ponds in statute miles.....

Length of roads in statute miles.....

Topographic sheets finished, number of.....

Topographic sheets, scales of.....

Topographic sheets, limits and localities of:

HYDROGRAPHY:

Area sounded in square geographical miles *sloughs, creeks, etc included*.....

26.3

Number of miles (geographical) run while sounding.....

349.5

Number of angles measured.....

6192

Number of soundings.....

25657

Number of tidal stations established.....

7

Number of specimens of bottom preserved.....

Current stations, number of.....

Hydrographic sheets finished, number of.....

1 (20.000)

Hydrographic sheets, scales of.....

Hydrographic sheets, limits and localities of:

*East of Long 122° 10'*

*and between Latitudes 37° 30' 54" and 37° 40' 45"*

