

4593a 4593b
4593c (W.D.)

4593a 4593b 4593c (W.D.)

Form 504

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

....., Director

State: California

DESCRIPTIVE REPORT

Topographic Hydrographic + W.D.	Sheet No. 4593a 4593b 4593c W.D.
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LOCALITY

Carquinez Strait

Benicia Waterfront

.....

1926

CHIEF OF PARTY

P.C. Whitney

GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO. 45932

HYDROGRAPHIC TITLE SHEET

SHEET "A".

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. A 3

REGISTER NO. 45932

State CALIFORNIA

General locality ~~CENTRA COSTA COUNTY~~ Carquinez Strait

Locality ~~CARQUINEZ STRAITS~~ Benicia Waterfront

Scale 1:10,000 Date of survey December 10-20, 1926

Vessel SHORE PARTY

Chief of Party Paul C. Whitney

Surveyed by Chas. K. Green

Protracted by I. Rittenberg

Soundings penciled by I. Rittenberg

Soundings in ~~XXXXXX~~ feet

Plane of reference Mean Lower Low Water

Subdivision of wire dragged areas by _____

Inked by J. D. Torrey

Verified by J. D. Torrey

Instructions dated July 2, 1926

Remarks: _____

GPO

Attached:
Descriptive report,
Statistics.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO.
4593b

HYDROGRAPHIC TITLE SHEET

SHEET "B".

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. B

REGISTER NO. 4593b

State.....CALIFORNIA.....

General locality.....~~CONTRA COSTA COUNTY~~ Carquinez Strait

Locality.....~~CARQUINEZ STRAITS~~ Benicia Waterfront

Scale 1:10,000 Date of survey December 10-20, 1926

Vessel.....SHORE PARTY.....

Chief of Party.....Paul C. Whitney.....

Surveyed by.....Chas. K. Green.....

Protracted by.....L. Rattensberg.....

Soundings penciled by.....C. K. Green.....

Soundings in ~~XXXXXX~~ feet

Plane of reference.....Mean Lower Low Water.....

Subdivision of wire dragged areas by.....

Inked by.....J. D. Torrey.....

Verified by.....J. D. Torrey.....

Instructions dated.....July 2, 1926

Remarks:.....

GPO

Attached:

- Descriptive Report,
- Statistics,
- Descriptive Tracing.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

REG. NO. 45930 W.D.

HYDROGRAPHIC TITLE SHEET

WIRE DRAG SHEET.

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. _____

REGISTER NO. 45930 WIRE DRAG

State _____ CALIFORNIA _____

General locality ~~SANTA COSTA COUNTY~~ Carquinez Strait

Locality ~~CARQUINEZ STRAITS~~ Shoal off Benicia

Scale 1:10,000 Date of survey December 20, 1926

Vessel _____ SHORE PARTY _____

Chief of Party Paul C. Whitney

Surveyed by Chas K. Green

Protracted by Chas. K. Green

Soundings penciled by _____

Soundings in ~~FATHOMS~~ feet

Plane of reference Mean Lower Low Water

Subdivision of wire dragged areas by Chas. K. Green

Inked by Chas. K. Green

Verified by _____

Instructions dated July 2, 1926

Remarks: _____

DESCRIPTIVE REPORT

To Accompany Sheets "A" and "B"

Hydrographic Sheets of Carquinez Straits, Benicia, Calif.

In accordance with instructions of July 2, 1926, sounding lines were run with and against the current on sheet (A) and normal to the current on sheet (B).

Thirteen consecutive hours of current observation were made on Dec. 13, about the middle of the work, when the range of tide at Benicia was 5.3 feet. Currents were observed on the 14th, 15th, and 20th, by launch drifts in calm weather, the results of which were also recorded in the Record of Current Observations, forwarded to the Office January 27, 1927. The observed maximum strength of ebb occurred about $1\frac{1}{2}$ hours before low water at Army Point, Benicia, and continues to ebb for about 2 hours after low water. The maximum current observed was 3.8 knots. This was four days before the maximum tide range for the month.

* The accompanying tracing shows soundings in red taken against an observed $3\frac{1}{2}$ knot current; soundings in black (pos. 22c to 28c) with an observed $3\frac{1}{2}$ knot current; soundings in black (pos. 1a to 8a) with an estimated $2\frac{1}{2}$ knot current; soundings in green (from sheet "B") are all taken normal to the current, and most of them in currents of less than $1\frac{1}{2}$ knots. The currents shown are correct, as the drifts were taken in calm weather; the first immediately before the line (1c to 21c, against the current) and the second immediately before the line (22c to 28c, with the current). The soundings in red and black are taken on the same range on signal Cos. The speed of the launch over the ground was .6 knots against and 7.3 knots with the current, making a speed through the water of 4.1 knots against and 3.7 knots with. This was the minimum speed possible under the conditions. Soundings were carefully checked for up and down casts and correct readings. 10 and 12 pound leads were used with copper center sounding cord.

The soundings normal to the current (in green) are correct, as most of them were taken when the current was not excessive, and even when the current approached 3 knots, the "feel" of the leadline indicated much better soundings than when operating against the current. When sounding with the current (in black) it was necessary to heave the lead well forward on account of the speed of the launch over the ground to allow time for the leadsman to take all the slack out of the line as the boat rapidly passed over the lead on the bottom. Soundings in black agree with those in green. When sounding against the current (in red) a bight aft formed in the line as evidenced by the distinct "tugging" on the line. It was impossible to pull the bight out without lifting the lead from the bottom, this of course, forced the lead down with the current, making a still greater error. Such a bight may be caused by the differences in currents at different depths, or by the fact that the sweep of the water has a greater effect on the bight of the line than on the lead, the momentum of which tends to carry it through the current due to the angle it enters the water. The soundings in red are 4 feet deeper in 5 to 6 fathoms than those in green and black. Positions 1c to 28c, sheet A, were not plotted, as these lines were run over the same range as test lines.

*Tracing attached to ~~sheet "A"~~ Desc. Report

The line (9a to 28a, sheet "A"), not shown on the tracing, was also run against a 2 or 3 knot current, and is too deep by 3 or 4 feet. Lines run against the current, inshore of adjacent lines run with the current, show deeper soundings, when the reverse is correct. Therefore correct depth curves can not be drawn on sheet "A".

As the lines normal to the current gave better results, the area was developed in this manner (sheet "B"). On this sheet 3 soundings of 12 feet (pos. 13e, 14e, 15e) were found about 150 meters W. by S. from the 10 foot sounding shown on the U. S. Army Engineer's blueprint. The shoalest sounding in the immediate vicinity of the Army Engineer's 10 foot sounding is 14 feet. A marker buoy was placed on the shoal and the area carefully investigated at and near slack water, in addition to the development shown on the smooth sheet. The shoal is sand, and the bottom is "corrugated" with sand waves 1 to 2 feet high. The rest of the area covered has, for the most part, soft sticky bottom. On account of these bottoms, it is difficult to get soundings of equal depth on the same position. The least depth is undoubtedly subjected to change due to strong currents shifting the position and character of the bottom.

The shoal was also dragged at slack water with an effective depth of 11 feet (see wire drag sheet).

In conclusion it appears that, first: Soundings taken with the ordinary leadline (10 to 12 pounds) in over 3 fathoms will be too deep if the work is done against the current, and if the current is 2 knots or over the error is excessive. Second: With proper care, correct soundings can be taken from an ordinary sounding launch in depths up to 6 fathoms when running with a current of 4 knots, the spacing of the soundings, however, may be too great. Third: Lines normal to the current offer the best results in depths up to 6 fathoms in currents up to 3 knots.

Submitted by
Chas. H. Green

Approved:
Paul F. Whitney
Chief of Party, C. H. G.

STATISTICS, SOUNDINGS, CARQUINEZ STRAITS, CALIFORNIA.
SHEET, "A".

<u>Date, 1926</u>	<u>Letter</u>	<u>Volume</u>	<u>Positions</u>	<u>Soundings</u>	<u>Miles Statute.</u>
Dec. 10	a	1	135	535	17.0
Dec. 11	b	1	27 ³	68	2.4
Dec. 14	c	1	28	98	3.0 <i>not plotted</i>
Dec. 16	d	1	11	32	1.7
<u>Total.</u>			201	733	24.1

Soundings are plotted in feet,

Plane of reference, Mean Lower Low Water.

Mean Lower Low Water on tide staff is -0.972. (below zero of staff.)

Lowest tide observed by this party, reading on tide staff: -1.4 ft.

at 5:00 P.M. on December 15, 1926.

Highest tide observed by this party, reading on tide staff: 6.5 Ft.

at 11:45 A. M. on December 17, 1926.

Plain staff on Army Dock. Benicia Arsenal, Army Point, Benicia, Calif.

Only one tide staff used.

STATISTICS, SOUNDINGS, CARQUINEZ STRAITS, CALIFORNIA.
SHEET "B".

<u>Date.</u> 1926	<u>Letter</u>	<u>Volume</u>	<u>Positions</u>	<u>Soundings</u>	<u>Miles Statute.</u>
Dec. 11	a	1	64	205	6.0
Dec. 14	b	1	94	280	5.7
Dec. 15	c	1	135	472	10.3
Dec. 16	d	1 & 2	99	290	6.0
Dec. 17	e	2	20	27	1.0
<u>Total</u>			<u>412</u>	<u>1274</u>	<u>29.0</u>

Soundings are plotted in feet.

Plane of reference, Mean Lower Low Water.

Mean Lower Low Water on tide staff is -0.972 ft. (below zero of staff).

Lowest tide observed by this party, reading on tide staff: -1.4 ft.

at 5:00 P. M. on December 15, 1926.

Highest tide observed by this party, reading on tide staff: 6.5 ft.

at 11:45 A. M. on December 17, 1926.

Plain staff on Army Dock. Benicia Arsenal, Army Point, Benicia, Calif

Only one tide staff used.

DESCRIPTIVE REPORT

To accompany Wire Drag Sheet, Carquinez Straits, Benicia, Cal.

1926.

Soundings of 12 feet were obtained on the sand shoal off Benicia (shown in pencil on this drag sheet) and plotted on sheet "B", hydrography. The shoal was dragged to an effective depth of 11 feet with the standard light wire drag. The drag was 1200 feet long, and was carried over the shoal, first in a southwesterly direction (pos. 1a to 17a), then in a northeasterly direction (pos. 18a to 28a). Slack water occurred while the area was being dragged. The drag was operated at slow speed, the average pull being about 100 pounds on the towing scales.

Submitted by
Chas. H. Green

Approved:
Paul T. Whitney
Chief of Party, Ensign.

STATISTICS, WIRE DRAG, CARQUINEZ STRAITS, CALIFORNIA.

<u>Date. 1926</u>	<u>Letter</u>	<u>Volume</u>	<u>Length of Drag</u>	<u>Positions</u>	<u>Miles Statute</u>	<u>Soundings.</u>
Dec. 20	A	1	1200 ft.	28	1.4	0

Drag depths are in feet.

Plane of reference, Mean Lower Low Water.

Mean Lower Low Water on tide staff is -0.972 (below zero of staff)

Lowest tide observed by this party, reading on tide staff: -1.4 ft.

at 5:00 P.M. on December 15, 1926.

Highest tide observed by this party, reading on tide staff: 6.5 ft.

at 11:45 A. M. on December 17, 1926.

Plain staff on Army Dock. Benicia Arsenal, Army Point, Benicia, Calif.

Only one tide staff used.

2 (14) 3

February 16, 1927.

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
 1 volumes of sounding records for

HYDROGRAPHIC SHEET 4593A

Locality: CALIFORNIA.

Chief of Party: P. C. Whitney
 Plane of reference is M L L W
 -1.0 ft. on tide staff at Army Point (Benicia)

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.



Chief, Division of Tides and Currents.

February 17, 1927.

(11)

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
2 volumes of sounding records for

HYDROGRAPHIC SHEET 4593B

Locality: CALIFORNIA.

Chief of Party: P. C. Whitney
Plane of reference is M L L W
-1.0 ft. on tide staff at Army Point (Benicia)

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.



Chief, Division of Tides and Currents.

February 17, 1926.

(11)

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in

1 volumes of sounding records for

HYDROGRAPHIC SHEET 4593C

Locality: CALIFORNIA

Chief of Party: P. C. Whitney

Plane of reference is M L L W

-1.0 ft. on tide staff at Army Point, (Benicia)

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.



Chief, Division of Tides and Currents.

Hydrographic Sheet No 4593 a+b

Benicia Waterfront, California.

These two sheets cover the same area
and when combined appears to develop
the area thoroughly and satisfactorily.
Crossings do not always coincide
Field observations and plotting quite
accurate and records satisfactory

John D. Torrey.
6/15/27

Memoranda for Capt. Giacomini.
6/15/27

Sheet 4593^a. A good sheet and easily
verified + inked.
Positions 169 of which 74 were checked due
to crooked lines. Soundings 635 of which
nearly all were in. Time 8½ hrs.

Sheet 4593^b Not a hard sheet but close
development of shoal area took time.
Positions 412 of which 190 were checked
1274 soundings. Nearly all in.
Time 3½ hrs.

J. D. Torrey.

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO NO. 11-DEM

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

WASHINGTON

July 25, 1927.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheets No. 4593a, b, and c.

Carquinez Strait, California

Surveyed in 1926

Instructions dated July 2, 1926 (Inspector, San Francisco)

Chief of Party, P. C. Whitney.

Surveyed by C. K. Green.

Protracted by I. Rittenberg.

Soundings plotted by I. R. (4593b), C. K. G. (4593a).

Verified and inked by J. D. Torrey.

Wire drag plotted and inked by C. K. G.

Wire drag verified by A. L. Shalowitz.

1. In view of the conclusions arrived at by the surveyor relative to the accuracy of soundings run with and against a current, it is recommended that the "a" sheet should be used only for study purposes and not for charting, since this sheet contains lines that were run both with and against the current. An inspection of the sheet shows that the lines run against the current are deeper by several feet, hence any curves that are drawn on this sheet must necessarily be erratic. OK

The area having been closely developed by a system of lines run across the strait (plotted on the "b" sheet) and since the current during this survey was generally not over 1 1/2 knots per hour, it may be assumed that it fairly represents actual conditions and can therefore be used for correcting the charts. OK

All the remarks which follow relate to the "b" and the "c" (wire drag) sheets and not to the "a" sheet.

2. The plan and extent of development satisfy the specific instructions.

3. The usual depth curves could be drawn.
4. A comparison of closely spaced adjacent lines shows a generally good agreement. The differences which exist may be due to the soft sticky bottom (see paragraph 2, page 2, descriptive report.)
5. The usual field plotting was done by the field party and was excellent.
6. A comparison of this sheet with H. 4581 (surveyed in 1922) shows that westward of longitude $122^{\circ} 09'$ and south of the 18 foot curve the old survey appears to be deeper by several feet. To the eastward of this meridian the agreement is fairly good. Whether the differences in the western portion of the sheet are due to an actual shoaling having taken place or whether the lines on the old survey were run in a strong current (the system used was across the channel) giving a generally greater depth than actually existed, is difficult to say without making a thorough study of the strength of the current at the time of the survey. One thing, however, is certain; that a distinct shoaling has taken place since the 1922 survey. This is also borne out by the Engineers' survey of 1924. The 17 foot shoal found on the 1922 survey agrees fairly well with soundings obtained in the 1926 survey and since the area around the 12 foot shoal on the late survey was only sparsely covered on the 1922 survey, it is not certain whether the shoal has actually shifted to the south or whether it was just missed on the 1922 survey. It is more probable that the shoal has shifted to the south and a general shoaling has taken place inshore of the shoal as is evidenced by the marked change in the 18 and 30 foot curves.

A comparison of the 1926 survey with the Engineers' survey of 1924 (blueprint 19301) shows a slight shoaling to the westward of the 18 foot curve and between the 10 foot shoal on the Engineers' survey and the 12 foot shoal on the late survey. Otherwise there is a good agreement between the two surveys. The shoalest depth obtained in the immediate vicinity of the 10 foot spot was 14 feet whereas 20 feet was the least depth obtained by the Engineers in the immediate vicinity of the 12 foot shoal found on the 1926 survey. Of course there is a possibility of two shoals existing here and that the Engineers missed the 12 just as our party missed the 10, but the greater probability would seem to be that the shoal has moved to the westward causing a change in the bottom between the Engineers' 10 and our 12. The 11 foot drag that cleared the 10 foot spot does not add very much towards disproving the 10 since it could very easily pass over the 10 without actually hanging up. It would have been well to have passed over a 12 or 13 foot drag over the vicinity of the 10.

Tracings have been prepared of the 1922 survey (H. 4281), the Engineers' survey of 1924 (blueprint 19301) and the "a" sheet of the present survey. They are all on the same scale and will be found filed with the smooth sheet (H. 4593) should it be desired to make a further comparison of the various surveys in this vicinity.

7. No additional work is necessary at present, but if the shoal is moving to the southwestward then it might be well to make another survey in a year or so to determine whether the channel is being further encroached upon.
8. It may be of interest to note that Captain Swainson who made the 1922 survey, says that he had a report that two oil tanks were sunk in this vicinity, only one of which he found. Hence this shoal may be the spot where the other tank sunk.
9. Attention is called to the statement by the surveyor that "Lines run normal to the current offer the best results in depths up to 6 fathoms in current up to 3 knots." This statement should not be considered as conflicting with the conclusion heretofore reached by the Section of Field Records that sounding lines should not be run across a channel where strong currents exist. This conclusion was based upon a careful study of the survey in Carquinez Strait (H. 4280) where the depths were mostly well over 6 fathoms. In that study it was definitely proved that as the current increased the differences between the cross lines and the other lines became greater and as the current approached slack the differences became less and around slack water the agreement with the adjacent soundings was satisfactory. It was also demonstrated in that study that as the depths on the cross lines became less or passed out of the full sweep of the current, the discrepancies became less.


It is therefore suggested that before any definite statement is made regarding the value of cross lines in a channel where strong currents prevail, consideration should be given not only the conclusion arrived at by the surveyor on this sheet (H. 4593) but also a study should be made of the results found on H. 4280 (tracing of portion of sheet affected attached to descriptive report of H. 4280) and possibly additional tests may be desirable.

10. Character and scope of surveying - excellent.
Field drafting - excellent.

11. Reviewed by A. L. Shalowitz, July, 1927.

Approved:

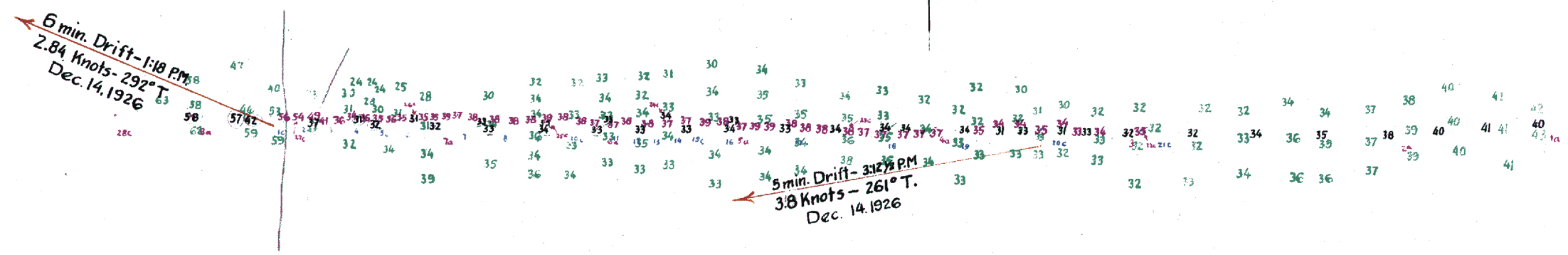
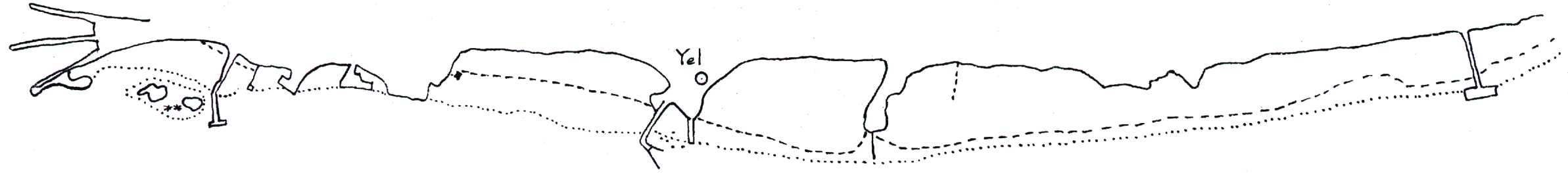
Chief, Section of Field Records (Charts)


Chief, Section of Field Work (H. & T.)

CARQUINEZ STRAITS
 Soundings in red taken against 3 knot current.
 In black with 3 knot current.
 In green normal to current.
 1926 Scale 1:10,000

○ Tan

○ Red



○ Cos