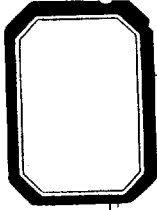


4225

Diag. Cht. No. 5502-1



Form 504

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

State: CALIFORNIA & NEVADA

11-5613

DESCRIPTIVE REPORT.

HYDRO. Sheet No. 4225

LOCALITY:

LAKE TAHOE

Calif - Nevada

19²²
~~19¹⁸~~

CHIEF OF PARTY:

Fred. L. Peacock - H.&G.E.

4225

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON

DESCRIPTIVE REPORT

to accompany

HYDROGRAPHIC SHEET #4225.

LOCALITY -- A systematic survey was made of the entire area of Lake Tahoe. This lake is situated on the California-Nevada Boundary and is included between the $38^{\circ} 56'$ N and $39^{\circ} 15'$ N parallels and the $119^{\circ} 55'$ W and $120^{\circ} 10'$ W meridians. The extreme length lies nearly north and south and is 21.5 statute miles. The greatest breadth is approximately 12 statute miles. The greater part of the lake is within the California boundary.

CONTROL -- Four supplementary triangulation stations of the 39 parallel-triangulation of 1893 were recovered. From three of these stations used as a base triangle, an 11 station scheme of tertiary triangulation was observed which thoroughly covered the entire area of the survey. From the stations of this triangulation approximately 90 hydrographic signals were located by theodolite cuts. In addition, 18 hydrographic signals were located by planabla and about 30 by sextant cuts from the launch. These signals furnished strong three-point fixes for practically the entire area, the only exceptions being a few instances close in on abrupt irregular shorelines when such fixes as were available and the experience of the officer in charge in judging distance give a good location of the soundings.

EQUIPMENT AND METHODS -- The U. S. Reclamation Service Launch MT. ROSE was found to be best adapted of any local boat available for the purposes of the survey. She being laid up, permission was readily obtained to put her into commission for the season. This was done and the MT. ROSE was used for all launch purposes of the party throughout the field season. This launch was 32 feet long, cruiser type, forward, and permanent canopy with curtains aft. She was powered by a 28 H.P. Campbell marine engine and made about 7 to $7\frac{1}{2}$ knots per hour at full speed. Draft was about 30 inches and owing to practically all of her being out of water, she was very susceptible to wind pressure.

Owing to the depths of the lake, nearly all of the soundings were necessarily with wire. Hand sounding machine #16, a small machine of about 400 fathoms maximum capacity, was installed on the stern of the launch and driven by power from the flywheel of the launch engine.

Registering sheaves Nos. 116 and 99 were used for recording the amount of wire out, No. 116 being used the earlier half of the work and No. 99 the last half of the work. Stranded, double galv. sounding wire as furnished by the Roebing Wire Company was used and all wire sounding were up and down with all way off the launch. Owing to the favorable conditions under which the work was executed and to the close attention paid to the condition of the registering sheave and to the reading of the depths, by the Chief of Party, the wire soundings are believed to be very accurate even in shoal depths where the bottom might have been reached with a hand lead. The weight of lead used with wire was varied from 15 to 35 lbs., somewhat governed by the depths in which used. It was found that the equipment would not handle the 35 lb. lead with facility. The greater part of the deep water was sounded with a 20 lb. lead as that weight handled easily and gave sure indication of reaching bottom. In general it was found to be impracticable to be under way when reeling in for the reasons that, so small a machine was not powerful enough to handle the lead when underway, that the bottom samples were frequently washed off by so doing and that the limited capacity of the hands who would accept employment made it extremely dangerous to them in operating the reeling in equipment when under way.

Several days of hand lead sounding were done during the season while sounding the shoal shelf off Tahoe City, the narrow shelf extending along the southern shore of the lake and in developing the reefs, dangers, etc. For the hand lead work, leadlines of Sampson Spot cord or Silver Lake #8 graduated to feet, were used with either eight or ten pound leads. Leadlines were checked daily when used.

For deep water soundings, a fix was taken and plotted at each sounding. In shoal water and when sounding with handlead, fixes were taken at frequent intervals and at all changes of course and speed as nearly as possible in order to insure accurate plotting of soundings. Lines were steered by compass only there being little current.

SYSTEM OF LINES -- A system of East and West parallel lines was used in general, although the close inshore development is frequently different in direction and normal to the shoreline. Outside depths of 175 fathoms, lines are spaced about three to each two statute miles with soundings spaced about 600 meters apart along the line. From 175 fathoms to fifty fathoms, the spacing is 3 lines per statute mile with a corresponding shortening of the sounding interval. The inshore development is intended to be sufficiently close that depth curves may be drawn smoothly and readily and that no dangers or shoalings are undetermined.

BOTTOM CHARACTERISTICS -- The lead was kept armed at all times and a continuous record of bottom characteristics was entered in the sounding volumes. Just outside the 200 fathom curve the bottom was found to be soft mud but in the central part few samples of the bottom were brought to the surface. From the feel of the bottom there, from the fact that practically all indications of the bottom were washed off before the lead reached the

surface, from the slight indications which infrequently adhered to the arming and from the fact that the lake is really a huge settling basin, it is believed that the bottom in this deep central part of the lake is covered by a considerable depth of a light fluffy silt deposit. On the small mounds in the Eastern central part of the lake, the bottom is clay. Elsewhere many different kinds of bottom were encountered, including grassy, rocky, boulders, gravel, coarse sand, fine sand, decomposed granite rock and various clays.

BAYS AND INDENTATIONS AND SHORELINE --

Emerald Bay: A small landlocked bay at the Southwestern end of the lake, about $\frac{1}{2}$ mile wide and $1\frac{1}{2}$ miles deep. This Bay has a narrow shoal entrance but is deep inside except close to shore. The greatest depth inside is 35 fathoms. A small high island lies in the Southwestern end of the bay surrounded by deep water on all but the western end. From $\frac{1}{2}$ mile North of the entrance to Emerald Bay, to Rubicon Point, the shoreline is very abrupt. At one point here the 200 fathom curve being but $\frac{1}{3}$ statute miles offshore.

Rubicon Bay: Rubicon Bay lying between Rubicon Point and Meigs Bay has an irregular bottom and is shoal and foul inshore both North and South of Newhall's Wharf.

Meigs Bay: A small bay lying immediately South of the Southern extremity of Sugar Pine Point has deep water of irregular outline except close inshore.

Sugar Pine Point is surrounded by a narrow belt of shoal water. A considerable part of the shoreline is fringed with detached rocks and boulders some of which are bare, some sunken.

McKinney or Upson Bay is a large open bay lying between Sugar Pine Point and the shoal shelf off Tahoe City. The inshore area is somewhat irregular and there is one mound rising about 200 feet from depths of over 160 fathoms situated about $2\frac{1}{2}$ statute miles North by West of Sugar Pine Point Light.

Observatory Point is fairly steep on the East but shoal on the South side.

The water is shoal all along the Tahoe City water front with scattered boulders (small) along the northern portion.

Carnelian Bay, lying between Observatory Point and Flick Point, while shoaler than many parts of the lake has good water.

Agate Bay lying between Flick Point and State Line Point is comparatively shoal. A considerable portion of the bottom is clay. There are some boulders inshore.

State Line Point has deep water close to on the Southeast but is shoal, rocky and dangerous on the Southwest.

Crystal Bay, the Northeastern end of the Lake is very deep except close inshore. The shore line of the Eastern side of the Lake from Crystal Bay to Deadman point is in general extremely irregular with many detached rocky masses close to shore.

Deadman Point is steep to with deep water close to shore.

Glenbrook Bay, lying immediately South of Deadman Point, is shoal close inshore. The inshore area is sandy along the West shore and rocky along the North and South shores.

The shoreline from Glenbrook Bay to Zepher Point is also very very irregular. Offshore reefs and rocks are more common than in any other part of the Lake. Zepher Point and the next point to the Southward are rocky close inshore the bight between is sandy as is the greater part of the shoal inshore area around the entire Southern end of the Lake, exceptions being the immediate vicinity of Lakeside Pier Wharf and along the East side of Eagle Point, which forms the south side of the entrance to Emerald Bay.

NAVIGATION -- Lake Tahoe never freezes, probably due to its large area and great depth. The great depth undoubtedly producing a considerable vertical circulation.

Two passenger steamers operated by the Lake Tahoe Railway and Transportation Company make a circuit of the Lake daily with mail and passengers from about May 15 to September 15. From about September 15 to October 15 but one of these boats is operated daily and from October 15 through the winter and early spring months one boat makes the circuit of the Lake twice each week. This company also operates a third steamer as occasion requires. The largest of these steamers is about 165 feet in length and has a draft of about 7 feet. In addition, a number of the resorts around the Lake run daily launch excursions around the Lake during the summer months. These launches average forty feet in length and four feet draft. The balance of the navigation is by small pleasure craft which are numerous during the summer months.

DANGERS -- Practically all of the dangers to navigation in Lake Tahoe are close inshore. There is abundant water in nearly all parts of the lake for the maximum draft at present operating there. In a lake of this character, however, much of the craft afloat is unsuited to navigate in the short heavy seas which are possible in as large a fresh water area, many of the boats are capable of a very high speed and there also seems to be a tendency to crowd the shoreline at points. The danger from these sources would seem to be greater than from any existing topographical features. The water of the lake is very clear and consequently the general location of such shoals, rocks and reefs as do exist are fairly well known to those constantly operating upon the lake.

The following are mentioned as the principal dangers.

(a) Scattered small boulders in the shoal water along the Tahoe City water front especially between the wharf of the Tahoe Mercantile Company Wharf and the outlet and along the Northern side of the aforesaid wharf. These could be disposed of at small expense, the smaller should be dragged to deep water and the larger dynamited. It is probable that this will be at least partially done in the near future by interested private parties, namely, the Standard Oil Company and the Lake Tahoe Railway and Transportation Company.

(b) The area immediately Southwest of State Line Point is very foul with rocks, bare, detached sunken rocks and rock clumps just awash at low lake level. The outermost of these are just within the five fathom curve and constitute one of the most serious menaces to navigation of the Lake being close to the steamer route between Glenbrook to Brockway. A lighted buoy suitably placed would be of great advantage at this point.

(c) Sand Point Reef 200 meters south and west of Sand Point, a rocky reef with highest parts just awash at Lake also 6223 surrounded by detached sunken rocks, should have spar buoy.

(d) Rocky reef 1/4 statute miles Southwest of Triangulation Station Ormsby and 150 miles offshore dangerous only at extreme low lake level.

(e) Logan House Reef. A sunken rocky reef about 550 meters from shore 1 1/2 miles south of the center of Glenbrook Bay, is buoyed. The area inshore of this reef is more or less foul with rocks, some of which are bare or become awash at low lake level.

(f) Zephyr Cove Reef. A sunken rocky reef about 460 meters off the nearest shore and about one mile N 1/2 E of Zephyr Point is also buoyed. There is clear entrance to the cove South of the reef but portions of the inner cove are foul.

(g) Immediately West of Al Tahoe Steamer Wharf the shoal sand area makes out a distance of 6 tenths statute miles from shore before the 6 foot curve is reached (Lake level 6223). Steamers must round this in going between the adjacent stops of "The Grove" and "Al Tahoe". The outer end should be buoyed.

(h) Entrance to Emerald Bay. This entrance is very shoal and narrow. A buoy marks the best water and should be passed close to keeping it on the starboard hand going in.

(i) Attention is again directed to the foul inshore areas just North and South of Newhall's Steamer Wharf in Rubicon Bay.

(j) A rocky reef makes out a distance of about 190 meters from the South Shore of Sugar Pine Point into Meigs Bay.

(k) Sugar Pine Point is largely foul close to and should not be crowded.

AIDS TO NAVIGATION -- There are at present four aids to navigation on the Lake, namely, An acetylene light, structure about 12 feet high, on the shoreline of the Northern part of the two Eastern extremities of Sugar Pine Point; a red spar buoy off Logan House Reef; a red spar buoy off Zephyr Cove Reef; and a red nun buoy marked E. B. 2 in the entrance to Emerald Bay. All these aids were accurately located by this party. A small light structure on the cliff at Rubicon Point has been discontinued. The structure still remains and its position is that of A Hi.

FLUCTUATIONS OF LAKE LEVEL -- The tide staff of the U. S. Reclamation Service at Tahoe City was read daily during the period of sounding. A staff installed off the mouth of the Upper Truckee River at the South end of the lake was also read daily during shoal sounding in that portion of the lake. This staff was compared with the Tahoe City Staff by means of a series of simultaneous readings.

The fluctuations of lake level are in general fairly uniform and seldom exceed 4 1/2 feet annually.

CURRENTS -- There is little current in the Lake. However, it was noted that after a wind from one direction had blown constantly for sometime tending to pile up the water in one end of the Lake, there would be a perceptible current in the reverse direction particularly noticeable of points of land such as Rubicon Point, Sugar Pine Point and Deadman Point.

SHORE LINE, ETC.-- It is suggested that the set of blueprints of the original shore-line survey (U. S. Reclamation Service) may be of assistance should any question arise with respect to shoreline details.

Washington, D. C.
Jan. 6, 1923

Respectfully Submitted,
Fred. L. Peacock, H. T. G. E.,
Chief of Party C. & G. S.

C O P Y

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to accompany

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EQUIPMENT AND METHODS -- The U. S. Reclamation Service Launch MT. ROSE was found to be best adapted of any local boat available for the purposes of the survey. She being laid up, permission was readily obtained to put her into commission for the season. This was done and the MT. ROSE was used for all launch purposes of the party throughout the field season. This launch was 32 feet long cruiser type, forward, and permanent canopy with curtains aft. She was powered by a 28 H.P. Campbell marine engine and made about 7 to 7½ knots per hour at full speed. Draft was about 30 inches and owing to practically all of her being out of water, she was very susceptible to wind pressure.

Owing to the depths of the lake, nearly all of the soundings were necessarily with wire. Hand sounding machine #16, a small machine of about 400 fathoms maximum capacity, was installed on the stern of the launch and driven by power from the flywheel of the launch engine.

Registering sheaves Nos. 116 and 99 were used for recording the amount of wire out, No. 116 being used the earlier half of the work and No. 99 the last half of the work. Stranded, double galv. sounding wire as furnished by the Roebling Wire Company was used and all wire soundings were up and down with all way off the launch. Owing to the favorable conditions under which the work was executed and to the close attention paid to the condition of the registering sheave and to the reading of the depths, by the Chief of Party, the wire soundings are believed to be very accurate even in shoal depths where the bottom might have been reached with a hand lead. The weight of lead used with wire was varied from 16 to 35 lbs., somewhat governed by the depths in which used. It was found that the equipment would not handle the 35 lb. lead with facility. The greater part of the deep water was sounded with a 20 lb. lead as that weight handled easily and gave sure indication of reaching bottom. In general it was found to be impracticable to be under way when reeling in for the reasons that, so small a machine was not powerful enough to handle the lead when underway, that the bottom samples were frequently washed off by so doing and that the limited capacity of the hands who would accept employment made it extremely dangerous to them in operating the reeling in equipment when under way.

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SHORE LINE, ETC.-- It is suggested that the set of blueprints of the original shoreline survey (U. S. Reclamation Service) may be of assistance should any question arise with respect to shoreline details.

Respectfully submitted,

Fred. L. Peacock, H. & G.E.,
Chief of Party C. & G. S.

Washington, D. C.
Jan. 8, 1923.

Statistics

| <u>Date</u> <u>1922</u> | <u>Letter Day</u> | <u>Statute mi. in</u> <u>Sounding Line</u> | <u>Positions</u> | <u>Angles</u> | <u>Soundings</u> |
|----------------------------|-------------------|---|------------------|---------------|------------------|
| Aug. 2 | a | 1.0 | 13 | 36 | 23 |
| " 3 | b | 23.1 | 117 | 338 | 515 |
| " 4 | c | 8.9 | 36 | 73 | 147 |
| " 5 | d | 11.5 | 35 | 132 | 230 |
| " 7 | e | 9.7 | 42 | 83 | 42 |
| " 8 | f | 15.0 | 61 | 122 | 61 |
| " 9 | g | 15.1 | 45 | 90 | 45 |
| " 10 | h | 3.1 | 13 | 26 | 13 |
| " 11 | i | 15.5 | 45 | 40 | 45 |
| " 12 | k | 10.2 | 29 | 59 | 29 |
| " 15 | l | 11.2 | 42 | 85 | 42 |
| " 16 | m | 21.8 | 77 | 157 | 77 |
| " 17 | n | 20.0 | 64 | 121 | 64 |
| " 18 | o | 17.1 | 57 | 118 | 57 |
| " 19 | p | 17.9 | 55 | 115 | 55 |
| " 21 | q | 10.4 | 45 | 90 | 45 |
| " 22 | r | 25.0 | 78 | 155 | 78 |
| " 23 | s | 7.1 | 25 | 52 | 25 |
| " 24 | t | 18.5 | 94 | 188 | 94 |
| " 25 | u | 21.2 | 103 | 200 | 103 |
| " 26 | v | 21.9 | 141 | 230 | 141 |
| " 28 | w | 12.7 | 55 | 110 | 55 |
| " 29 | x | 13.6 | 108 | 212 | 108 |
| " 30 | y | 16.7 | 91 | 180 | 160 |
| " 31 | z | 14.1 | 89 | 177 | 165 |
| Sept. 1 | aa | 17.7 | 113 | 223 | 249 |
| " 2 | bb | 8.9 | 52 | 103 | 114 |
| " 5 | cc | 10.6 | 91 | 185 | 105 |
| " 7 | dd | 19.1 | 115 | 236 | 484 |
| " 9 | ee | 12.2 | 75 | 116 | 154 |
| " 9 | ff | 13.0 | 88 | 164 | 535 |
| " 11 | gg | 4.2 | 35 | 62 | 179 |
| " 12 | hh | 9.7 | 91 | 161 | 312 |
| " 13 | ii | 11.3 | 59 | 117 | 200 |
| " 14 | kk | 13.4 | 61 | 122 | 77 |
| " 15 | ll | 11.6 | 48 | 92 | 63 |
| " 18 | mm | 9.0 | 99 | 210 | 172 |
| " 19 | nn | 10.1 | 91 | 178 | 189 |
| " 20 | oo | 9.3 | 68 | 129 | 113 |
| " 21 | pp | 8.9 | 68 | 133 | 118 |
| " 22 | qq | 7.0 | 53 | 106 | 75 |
| " 23 | rr | 8.1 | 51 | 100 | 90 |
| " 25 | ss | 9.3 | 60 | 115 | 104 |
| " 28 | tt | 12.5 | 71 | 136 | 132 |
| " 29 | uu | 0.6 | 5 | 10 | 5 |
| " 30 | vv | 16.1 | 91 | 162 | 156 |
| Oct. 4 | vw | 12.5 | 82 | 170 | 145 |
| " 5 | xx | 10.5 | 75 | 146 | 123 |
| " 6 | yy | 7.5 | 68 | 134 | 101 |
| " 7 | zz | 10.1 | 85 | 149 | 140 |
| " 9 | aaa | 10.2 | 83 | 172 | 115 |
| " 10 | bbb | 4.9 | 55 | 105 | 80 |
| " 12 | ccc | 12.5 | 87 | 180 | 145 |
| " 13 | ddd | 9.7 | 77 | 130 | 116 |
| " 14 | eee | 6.2 | 46 | 96 | 102 |
| " 16 | fff | 4.0 | 39 | 74 | 49 |
| TOTALS | 56 days | 681.6 | 3770 | 7582 | 7397 |

Total area - 188 sq. stat. mi.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

WASHINGTON

March 13, 1923.

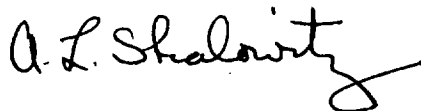
VERIFICATION OF HYDROGRAPHIC SHEET 4225
(Lake Tahoe)

No special difficulty was experienced in verifying this sheet. However, a large amount of time was consumed in verifying many of the positions close to shore where, owing to the closeness of the signals, tracing paper had to be used for plotting. Many of the fixes were also weak and extreme care had to be exercised in the plotting of them. The estimated distance from shore of the end of a line as noted in the records did not always check with the plotted position. In such cases the angles were accepted, but the boat sheet was used as a guide to a great extent.

The plotting of the positions and soundings was found excellent, and in only a few instances were changes made.

No attempt was made to clutter up the sheet with an overabundance of curves on steep slopes. Curves were broken where necessary in order not to obliterate soundings. Rocks were plotted from the records whenever noted. Additional rocks were taken from the boat sheet, but no attempt was made to accurately transfer these rocks to the smooth sheet, as it was believed they were not actually located in the field, but rather given a general representation.

In order to show the amount of water that can be carried into Emerald Bay, an enlarged sketch on a 15000 scale was made of the entrance. It seems to the writer that it would have perhaps been better to have made the survey of the entrance to this Bay on a larger scale and so have been able to make a little closer development as this bay seems to be the only really protected cove. Otherwise the development is adequate.



A. L. Shalowitz,
Cartographer.

COPY

Dec. 18, 1922.

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
12 volumes of ~~sounding~~ records for
wire drag
HYDROGRAPHIC SHEET **4225**

Locality: **Lake Tahoe, California - Nevada**

Chief of Party: **Fred L. Peacock, in 1922**
Plane of reference is **lake level, reading**
3.06 ft. on tide staff at **Tahoe City Placer Co.**

For reduction of soundings, 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.

G. V. Rude

Chief, Division of Tides and Currents.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

WASHINGTON October 29, 1923.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4225.

Lake Tahoe, California - Nevada.

Surveyed in 1922

Instructions dated Apr. 14 and May 31, 1922

Chief of Party, F. L. Peacock.

Surveyed by F. L. Peacock.

Protracted by A. W. Skilling and G. Risehari.

Soundings plotted by A. W. Skilling.

Verified and inked by A. L. Shalowitz.

1. The records conform to the requirements of the General Instructions.
2. The plan and character of development fulfill the requirements of the General Instructions except that additional cross check lines should have been run in shoal areas. Also the development west of Stateline Pt. and west of Observatory Pt. should have been normal to the shoreline.
3. The plan and extent of development satisfy the specific instructions.
4. The sounding line crossings are adequate.
5. The information is sufficient for drawing the usual depth curves.
6. The field plotting was completed to the extent prescribed in the General Instructions. None of it had to be done over by the office draftsman.
7. No further surveying is required within the limits of the sheet. However, if any additional work is done in this locality, then the entrance to Emerald Bay should be developed on a larger scale.
8. The character and scope of both the surveying and field drafting are excellent. The descriptive report is unusually comprehensive.
9. Reviewed by E. P. Ellis, October, 1923.