INVESTIGATION OF METHODS FOR DETERMINING COASTAL BLUFF EROSION

- HISTORICAL SECTION -

(Carver; R/CZ-53)

INVESTIGATION OF METHODS FOR DETERMINING COASTAL BLUFF EROSION

H I S T O R I C A L S E C T I O N

Sea Grant No. _____

Prepared By

Donald C. Tuttle

March 1981

PREFACE

In November 1972 the people of California passed an initiative which became the Coastal Act. They decided the coastline should be treated as a special, sensitive resource of the State.

In making land use decisions, Coastal Commissions discovered there was a lack of critical information on hazards to development along the coast.

This portion of the report presents historical information on bluff erosion along a portion of coastline in Humboldt County, from Little River, north to the Gold Bluffs area.

In assembling the information, I have attempted to present several accounts and measurements at the same point. This should decrease the possibility of error and myth-making, an inherent characteristic of historical research and reporting.

The enlarged (38" x 38") aerial photographs and historic maps were too large to include in the report. They will be placed in the Environmental Data Bank of the Humboldt County Natural Resources Division and remain available to researchers, planners, engineers, property owners, and other interested parties.

It is my sincere hope that this report will aid land use decisions along the coastline of the northcoast of California.

Arcata, California
March 1981

Donald C. Tuttle

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COASTAL RETREAT STUDY

HISTORICAL SECTION

Introduction

The purpose of the historic section of the report is to provide information on erosion and retreat of coastal bluffs and landslide areas from Redwood Creek to Little River in Humboldt County. This information should provide the data needed to test the predictive model developed in the other sections of this study.

Another purpose was to provide actual documentable measurements of coastal erosion along the study section. This information is needed by coastal property owners, prospective buyers of coastal property, loaning institutions, realtors, engineers, developers, building contractors, Coastal Commission, Humboldt County Planning Department, Humboldt County Public Works Department, Caltrans, Corps of Engineers, Redwood National Park, and the Northern District Office of the California Department of Parks and Recreation.

Findings

It was found that several portions of the coastline from Redwood Creek to Little River have retreated significantly.

The point of land on the north side of Redwood Creek has retreated about two hundred feet since 1851.

The point of land at the north end of Freshwater Lagoon was removed in 1948 during construction of Highway 101 across the sand spit, separating Freshwater Lagoon from the ocean. The coastline from the south end of Freshwater Lagoon to the north end of Stone Lagoon

has not retreated significantly. The rock point has apparently been in the surf zone for at least the past one hundred and thirty years.

Sharp Point or Goat Rock has existed in the surf zone for the past one hundred and thirty years.

Portions of the shoreline from the south end of Dry Lagoon to the north end of Big Lagoon have retreated thirty to one hundred and twenty-five feet in the last fifty years. The large landslide continually pushes material out into the surf zone and the surf removes the clay and unconsolidated materials leaving large blocks of rock on the beach.

Big Lagoon has broken out at its north end at least since 1870 and its south end from before 1850 to about 1900. It breaks out at the north end usually three to five times a year during the rainy season.

The shoreline at the south end of Big Lagoon has a record of eroding ten to forty feet in periods of two weeks to four months. A special set of conditions occurs infrequently whereby large storm swells hit the beach continuously for three to six days removing the sand and attacking the base of the bluff along a one mile stretch from the Big Lagoon County Park south to a point near the mouth of an unnamed creek near the south end of the Big Lagoon subdivision. The bluffs along this stretch have retreated from forty to one hundred feet in the last fifty years.

At least nine cabins along the bluffs of the Big Lagoon Park Corporation had to be moved inland in 1940 and 1941, only eleven years after they were constructed, in order to be saved.

The base of the bluffs from the south end of Big Lagoon to

Patricks Point State Park were under direct wave attack from 1850 to about 1950. During the last twenty years a bench of sand has developed along the base of the bluffs from Patricks Point State Park north to the south end of the Big Lagoon subdivision.

Several portions of the shoreline from Patricks Point State Park south to Trinidad have experienced local erosion and retreat up to a maximum of about ninety-three feet in the last forty years. Some landslides have caused momentary aggradation of the shoreline seaward.

From Trinidad to Little River retreats over the past forty years varied from two to seventy feet while aggradations measured from five to nineteen feet. Many sections of this stretch have a history of landsliding over the past eighty years.

Methods

The materials used to research and document coastal retreat included the use of maps, survey notes, highway right-of-way and design plans, aerial photographs, still pictures taken on the ground, historical letters, historical journals, historical sketches, archaeological reports, and notes taken from personal interviews.

The location of early Indian trails, village sites, burial sites, ceremonial sites and fishing sites were obtained from archaeological reports. These reports date the time of first settlement of sites which gave an idea of slope stability and distance to edge of bluff at time of settlement.

Letters, articles, diaries, newspapers, and journals written by early explorers and miners provided descriptions of beaches, trails, bluffs, original vegetation, surf run-up and bluff erosion

during the period 1850 to 1870.

Maps, survey notes, highway plans, construction reports, private property surveys, and personal interviews provided information on the location of the edge of bluff, base of hill, beach profile and width, road location, landslides, old structures, fence lines, and configuration of the mouth of Redwood Creek and south end of Big Lagoon.

Aerial photographs, still pictures taken on the ground, and personal interviews provided additional information to substantiate and document landslides and shoreline erosion described in the aforementioned documents.

To find the research materials mentioned above the first task involved going through the Humboldt County Department of Public Works Natural Resources Division Environmental Data Bank. This data bank contained material on Humboldt County gathered during the last eight years from several local, state and federal agencies, university libraries and private photo collections.

The next task was to meet with Jerry Kuhn, researcher at Scripps Institute at La Jolla to review his methods and sources of data he developed while working on a similar type of coastal retreat study.

As a part of this study a ten-day trip was made to Washington, D.C., to the National Archives, Library of Congress, and Smithsonian Institution to search for historic maps, aerial photos and still pictures of the study section of coastline.

The files and library were searched in the District One office of Caltrans reviewing old survey books and highway plans.

Portions of old aerial photographs dated 1931, 1941, and 1942 were enlarged to a scale of 1"=1000' and 1"=200'. 1974 aerial photos were enlarged to 1"=500'. Aerial photos dated 1963 at a scale of 1"=1000' were borrowed from Humboldt County.

In using the aerial photos distortion was always taken into account. To determine scale, a feature with known dimensions at roughly the same elevation as the location of the bluff measurement was used.

Archaeological reports were read and information pertinent to the study section was noted. The accounts of early explorers and miners were searched for descriptions of the study area. The location of shoreline features and landslides were extracted from early property surveys, road surveys, and highway plans.

Historical still pictures taken on the ground provided detailed descriptions of certain sections of shoreline. New pictures taken from the same points as the historic photographs were compared to the old pictures.

Sketches of portions of the study section of shoreline made in 1851 were compared to new pictures taken from the same point.

Personal interviews with people who had lived along the study section for many years were conducted both by phone and in person. They were shown historical still pictures to assist their memory. The usual method consisted of phoning for an appointment, describing the study and its purpose, setting a date, meeting them at their home, and spending about two hours discussing historical erosion. In some cases they were taken on a personal tour of the sites, which, along with the old photographs, greatly aided their memory.

Results

The results of the study consists of information obtained from many sources such as historical journals, maps, photographs, personal interviews, sketches, and so on. They are given in this section chronologically. The tables of measurements contain stations which are located on the aerial photographs and delineated on the base map.

Information to date indicates that the study area was settled around A.D. 900 to 1300 (E. L. Sasser, 1978). Radio carbon dates that have been obtained from sites within the study area include two dates from the Patricks Point site (CA-Hum-118) showing initial settlement to be A.D. 1310 and A.D. 1405. The site at Stone Lagoon (CA-Hum-129) gave dates of settlement of A.D. 120, A.D. 490, and A.D. 1765. The date of settlement of the Tsurai village at Trinidad has been estimated at A.D. 1620. These dates are summarized in a recent report done for Six Rivers National Forest (Theodoratus, 1980).

Several place names pertinent to this study are contained in a report on the Yurok Indians who had settled this portion of Humboldt County before 1775 (Waterman, 1920). The first place name is located about one-quarter mile north of Squashan Creek in the Gold Bluffs region in the Redwood National Park. The Yurok Indians called it O-tega and it was translated "Where it thumps." It was described as a place where the earth falls down in large chunks.

The next place was named for an area where the cliff is full of boulders. This point is about one-quarter mile north of the southwest corner of Section 4, T11N, R1E. The next point of interest was called "Earthquake his house -- pit." Waterman noted that these

pits are pointed out in many localities. This particular one is at the south end of Espa Lagoon. It is essentially a depression on the hillside.

The Indians had a name for a large rockslide one-quarter mile northwest of the southeast corner of Section 17, T11N, R1E. A high point of land, now known as Mussel Point, was a place where they collected flooring stones for their sweat houses (Photo No. 1).

About a quarter mile north of the mouth of Redwood Creek is a low pass in the hill with an elevation of about two hundred feet (Photo No. 3). The Yurok Indians indicated that the ocean used to come in here. This pass is located at the south edge of Section 29, T11N, R1E. They had a name for the high point immediately south of this pass. This point was sketched by Goldsborough Bruff and is shown as No. 4 in the photo section of this report (Read and Gaines, 1944). Below the high point they had a name for the edge of the bluff (Photos No. 3, 5-11).

At the mouth of Redwood Creek there were two Yurok Indian villages. Associated with them were place names on the sand spit or sand bar south of the original estuary. Waterman notes one of these places as a recently improvised sweat house. The other place may have been a former place of settlement although it is unclear. In Waterman's sketch of the mouth of Redwood Creek he shows no beach seaward of the point of land between Redwood Creek and Freshwater Lagoon nor in front of the hill immediately north of Redwood Creek. This map apparently was prepared by Waterman during the summer of 1909.

Continuing south along the coast the Yurok Indians had a trail

that went up over the point of land separating Redwood Creek and Freshwater Lagoon (Photo No. 12). On the sand barrier along Freshwater Lagoon (Photo No. 13) they had a name for a point one-half mile south of the north end of the lagoon called "Boat where it goes over." This was a point where the sand barrier was at its narrowest point. Another point of interest along the same sand barrier was located eight-tenths of a mile south of the north end of Freshwater Lagoon. This point is named for the place where the lagoon once broke out according to the Indians. Waterman had good evidence that the lagoon broke out at this point in 1899. (See Photo No. 14 of Freshwater Lagoon breaking out to the ocean on March 24, 1938.)

Between Dry Lagoon and the north end of Big Lagoon they named a rock "Bald eagle where he sits." Waterman describes it as a crag overlooking the sea. Another rock south of the crag but north of Big Lagoon, was desribed as a crag at the cliff edge. Waterman described it as a number of scattered boulders onshore and in the sea (Photo No. 14). At the north end of Big Lagoon the Indians had a name for a place where they said the lagoon sometimes breaks out.

About one and a quarter miles north of the south end of the Big Lagoon sand spit the Yurok Indians named a place called "Sandbar sticks out." Waterman noted that it is a place where the sand spit bends somewhat oceanward. At the southwest corner of Big Lagoon where the sand spit meets the land they had a name for the clay bank. About eight hundred feet north of this point was a place they called "Long trees lie." Waterman described it as a place on the sand spit. About five hundred feet south of the southwest corner of Big Lagoon, on the beach, they had a name for a place called "As far as it comes."

Waterman described it as a point where the cliffs end and the beach begins. (Photos No. 34 and 67). He indicated there is a small knoll there. Another translation of the Yurok name for this spot is "Rocks where they end." Waterman interpreted this as the exact point where the cliffs end and the sand beach begins. A few hundred feet south of this point is a place translated "Bluff gets low." Waterman describes this as the point where the beach terminates at a line of cliffs which gradually increase in height towards Patricks Point. This may be at the mouth of Roundhouse Creek. (Photos No. 42 and 44).

Moving south another six hundred feet, Waterman's map indicates a creek (Photos No. 59, 60). An additional nine hundred feet south indicates another creek (Photo No. 61). At this creek he stated the coast trail appears to leave the beach and go up the slope towards Patricks Point.

From Patricks Point to Trinidad the original Indian trail lay inland from the coast from one-quarter to one-half mile. Most of the sea stacks offshore along this stretch had specific names. The Indians named the bluffs at College Cove "Yellow where they frequent." Waterman described it as a stretch of beach in front of a yellow bluff (Photo No. 83, upper left).

At the south end of the beach immediately west of the town of Trinidad the Indians named it "On the other side, beyond." Waterman named it a pebbly beach. On a point a thousand feet west of the Tsurai village the Indians described a place called "Where they obtain clay or earth" (Sketch No. 101 and Photo No. 102). Indians came here to obtain blue clay which was used like soap to whiten buckskin dresses.

In 1806 a ship captained by Jonathan Winship came along the coast and stopped at Big Lagoon. On a hand-written manuscript by an unknown author it states, "June 10th they anchored just north of Trinidad Bay, and a party of eighteen was sent on shore to explore. They returned and reported that otter were abundant and the existence of a sound to which no entrance was discovered after following the shore for two miles." This is the first written account of the existence of Big Lagoon. The manuscript goes on to state, "The sound spoken of was a discovery of Captain Winship; it was partially explored and named by him, Washington Inlet. It had two entrances from the sea and the shores were thickly populated with Indians. Otter and seal were numerous." (Manuscript in University of California, Bancroft Library.)

Following the discovery of gold on the Trinity River in 1848 and the resulting land discovery of Trinidad and Humboldt Bay in December, 1849, there occurred a large influx of people from all over the world into and along the coast from Trinidad to the Klamath River and beyond. Following are accounts from some of their journals.

Ernest DeMassey got off a ship at Trinidad in either late March or early April. After setting up his tent he described the beach: "There is no beach at high tide, although at low tide it extends many meters. From it a steep bank arises abruptly" (DeMassey, 1849). He, along with a group of men, left Trinidad and walked to Patricks Point and continued north down to Agate Beach. He states, "Here we found we could travel along a pebbly beach from two or three hundred meters broad, with the sea booming on our left, and the cliffs rising on our right" (Photo No. 72). "All this coast is covered with

gigantic tree trunks half buried in the sand which have been lying here for many decades -- possibly thrown up on the beach by the sea or brought down off the cliffs which are being steadily undermined by the heaving seas." Continuing on, he states, "Having traveled some six kilometers with the sun beating down on our heads and the pebbles making walking difficult we stopped and camped an hour before sunset on the northernmost extremity of this deserted beach close to a little salt lagoon and within reach of a spring of pure water." The little salt lagoon he refers to is Big Lagoon and they must have camped at the north end of the lagoon. It should be noted that he used the word pebbly to describe the beach and the word sand to describe the spot where he slept on the beach. After having visited some of the mines he was on his return trip back to Trinidad. He states, "On the 26th (April 26, 1850), at nine in the morning after having breakfasted we were off. We lunched at the northern end of the lagoon I have already mentioned. While this lap was not long, yet a march of two hours over pebbles or gravel with the bright sun beating down, and loaded with a heavy pack, it's quite enough for a tenderfoot as yet not seasoned, and unaccustomed to this kind of exercise."

Another Frenchman by the name of Alexander André landed at Trinidad and took off on the trail north of Trinidad. When they reached the lagoon he states as follows: "This part of the trip, until dinner, ran along the sea through shifting sands, which, yielding under the feet, tires the traveler very much...we walked in the sand, each according to the strength of his legs." After visiting the mines they were again on their way back to Trinidad. He states, "We had to pass again these moving sands which we feared so much; at

high tide, the sea covers all those sands..." Further on in the journal they indicate they feared they would drown if they remained on the beach in the Patricks Point/Agate Beach area.

Another report of a group headed north out of Trinidad in 1850 indicates the beach or sandspit at Big Lagoon was difficult to traverse (Carr, 1891). This report states as follows: "Our first day out of Trinidad was along the beach and sometimes on the bluffs...before leaving Trinidad we were cautioned about crossing the beach in front of the Big Lagoon as there were between four and five miles of sand that was knee deep and very hard traveling for both man and beast...next morning we started on the beach, or across the lagoon, and had a hard time of it...we got across towards evening as tired and worn out set of men and mules as you could find in the state."

In a magazine article in 1891 Thomas Gihon reported that on April 5th, 1850, a group of miners left Trinidad and followed an Indian trail through the beautiful forest. He states, "After struggling on all day and making some nine or ten miles we came to a bluff looking down on a beach and out on the ocean" (Photo No. 74). The next day, April 6th, 1850, after waking up in the morning they noted some of their camping equipment was missing. They walked along a narrow trail that led down to the beach and their group fired at several Indians in a village. It is thought that this was the village at the southwest corner of Big Lagoon. He states that one Indian hid "among the rocks," and was shot. He stated, "I went and clammored over the rocks and saw him lying in a heap..." They returned to their campsite, had breakfast, descended to the beach and continued their

journey mostly through the sand. He states, "This was very fatiguing..." They reached the north end of Big Lagoon at the end of the day.

The trail used by the pack trains carrying equipment and materials from Trinidad to the Trinity River gold mines followed the Big Lagoon sand spit to the north end then turned inland and went to Redwood Camp, Redwood Creek, Elk Camp, and Three Creeks (Simmons, 1972). The trail to Klamath City went along the beaches and spits of the lagoons and in front of the Gold Bluffs (Photo No. 1).

Trinidad was settled from April through July of 1850 (Coy, 1929). On April 13th, 1850, the population was one hundred and forty, on July 1st, 1850, it measured three hundred. That summer miners traveling to the Klamath River discovered gold in the sands along Gold Bluffs. In the fall some operations began. The San Francisco newspapers reported it in January of 1851. By the end of February 1851, the population of Trinidad increased to nearly two thousand (Sketch No. 101, Trinidad). After the miners discovered the gold was too hard to obtain from the sands and bluffs they left the area. Crescent City was founded three years later in 1853 (Coy, 1929).

J. Goldsborough Bruff read about the discovery of gold at Gold Bluffs in the San Francisco papers and left San Francisco for Trinidad on January 17th, 1851. He and arrived at sunrise on January 21st, 1851. After they landed on the beach he states that they ascended the small cliffs to the town of Trinidad (Read and Gaines, 1944). On the morning of January 22nd, Mr. Bruff left with eleven other people for Gold Bluffs. He notes they traveled two miles north along the table land and that close on his left was the edge of the cliffs (Photos No.

82 and 102). Then they entered a very irregular country broken by numerous deep soft gulches with streams draining to the ocean (Photo No. 80). The trail was muddy and they crossed several rapidly flowing streams in brushy hollows. Following this they reached Patricks Point and descended a long steep and muddy inclined plane whereon they reached the beach. He stated, "Now our travel was upon the beach, -- soft, yielding and irksome. A heavy surf roared on our left and perpendicular clay cliffs towered high on our right. Alternate stretches of such beach travel, from three to nine miles, each; over tall, steep, rugged and slippery promontories and points, and at length reached at dusk a cove at the base of very tall and rugged promontory" (Photos No. 1, 15, and 16). This was on the south side of Goat Rock or Sharp Point.

He noted they passed on the beach many bones of whales, numerous skate fish, star fish and Indians and squaws were going down. They passed several long and narrow lagoons two of them being freshwater. The next morning they went back south a short distance to the north end of Dry Lagoon and ascended a trail which ran north on a gradual slope up behind Sharp Point through close long dry grass, weeds, and brush, at which point when they reached the promontory they descended back down to the beach by a long crooked and wet path of black mud and slakey fragments. Upon reaching the beach they went three more miles through soft sand (along sand spit of Stone Lagoon) to a low marshy place containing a stream, about four hundred yards back (inland) from the edge of the beach. They rested there a few minutes; drank from an excellent spring under evergreen trees, then proceeded up the beach.

In a few miles they reached the mouth of Redwood Creek. He states the beach is thickly strewn with heavy pine drift timber, some of it immense trees. He indicates the estuary is quite deep and the current is rapid in the middle of the channel. He states the estuary is about three hundred yards across. A raft was pushed off from the opposite shore with five men on it, two of whom propelled it with long poles. (See the sketch of this area by Bruff in 1851 in No. 4.)

On the morning of January 24th, 1851, they left for the bluffs. He states, "The path led through a deep marshy tangle and hollow for about four hundred yards, -- very crooked, then by slight ascent for a fourth of a mile more we reached the brow of a tall cliff overlooking the sea beach. The descent was over wet blue mud and slatey fragments. On reaching the beach it was apparently fifty yards broad but increased in breadth as we ascended it. While the cliffs grew higher and more abrupt; rising from one hundred to five hundred feet."

"The floodtide was setting in and as we proceeded the periodical return of the roaring breakers often reached our feet."

The next morning on January 25th, 1851, he describes the bluffs as follows: "After breakfast we walked up the beach to the 'Upper Station', about one and a half miles. At half the distance the cliffs are very tall: the base appears to be a recently formed blue sandstone on which lies blue clay and upper portions are of yellow and white clay. Large pines and firs crown their summits. Much pebble and gravel are on the beach -- the Upper Station, like that we left, -- is located on a plateau above a dell and stream and surrounded by hills, forests and thickets -- but the situation is more agreeable and

healthy -- for a larger space is cleared off and the surface is more elevated. They are making a garden spot."

Later on in the day he states, "At sunset we started for the other station. The tide was up, and between the tall crumbling cliffs -- on the one hand, and the heavy bursting surf -- on the other, we managed to get down, with wet feet only."

"In the incipient sandstone at the base of the cliffs I noticed horizontal strata of large trunks of trees slightly silicified. -- The sandstone exhibits in its formation, curves of water subsidence charged with silicious matter."

The next morning on January 26th, some of the men left for Trinidad. Bruff states, "The surf runs too high to venture up the beach. Those who started to go down returned to await the ebb tide. After waiting an hour the tide subsided sufficiently and we ran the gauntlet up the beach. Remained there several hours and returned."

On January 29th it was raining and there was high surf. He stated that no one could traverse the beach until the afternoon. The next day on January 30th he states, "High surf this morning. The cliffs above, crumble, and fall occasionally, to the great peril of persons below."

On February 10th a group of men returned to camp and noted that at a place a short distance below the Upper Station an immense slide of the tallest portion of the cliffs occurred just before they reached that spot. Two men were within twenty yards of the avalanche. Earth, rocks and trees rolled down in a great volume into the sea leaving a great loose ridge. The men hurried across this area and had just cleared it when a second slide occurred. Bruff noted, "Once

while going up the beach at time of high tide a dash of breakers drove me close to the bluff. When some small pebbles and bits of clay struck my head and shoulders from the top of the perpendicular cliff causing me to hurry from such a dangerous position. Several pebbles as large as my fist fell not far in my rear and bounded into the surf. Had I been hit on the head with a large pebble, the next swell of surf would have swept me into the sea."

On February 12th when they were returning south to Trinidad they had to cross the beaches of Freshwater, Stone, Dry and Big Lagoon. Of interest, Mr. Bruff states, "On the nine mile beach we met several small parties of Indians. At one time while I was engaged picking up agates the company got considerably ahead of me, when I met a party of some twenty male Indians mostly young men nearly naked and each one armed with bow and arrows and very long knives hanging down the back." Essentially Mr. Bruff almost lost his life in the following five minutes. He was rescued by an old miner in the group that had gone on ahead. Of interest is the fact that he was picking up agates, an activity still practiced today.

In the Humboldt Times newspaper on October 30th, 1856, there appeared the following article: "On Tuesday, October 26th, 1856, Lieutenant Collins, his lady and his packer, Mr. Whitman, tried to cross the mouth of Big Lagoon. Lieutenant Collins drowned. He was stationed with the Klamath Reservation."

In another report filed in 1862, a commander of the Humboldt Military District reported that a group of soldiers crossed the Big Lagoon spit on August 15th, 1862. There were no complaints of deep sand or of anybody getting tired. (War of the Rebellion, 1861 to

1865).

The following statements were written in a diary by Greenleaf Curtis covering the period from October 1st, 1861 to June 15th 1863 (Caughell, 1953).

On May 13th, 1862 Mr. Curtis wrote, "Waited until 11:00 a.m. for the tide to ebb, so (we) could get around the (Gold) bluffs...sixteen of us and the Lieutenant got to the creek and crossed a little before sundown having made twelve miles soft sand."

On May 14th, 1862 Mr. Curtis wrote, "...the Lieutenant and nine more of us took onto a long beach in lie (?) of taking a trail up a hill. The beach between a large lagoon and the ocean is about four miles long and is very soft sand. Part of the way (we) would sink over (our) shoes in the sand."

On January 11th, 1863, Mr. Curtis wrote that they could not get across the outlet of Big Lagoon. He writes, "...back four miles and stayed all night in an empty house without supper or..." On January 12th, 1863, the next day he notes that they arrived at Trinidad and started for Arcata.

In a report filed by Walter Van Dyke in 1878, he wrote, "...a few of us went down to Gold Bluffs. The ocean surf beats against it and the bluffs average in height from three to five hundred feet" (McBeth, 1950).

In 1881 Wallace W. Elliott described the mechanics of erosion of the bluffs at Gold Bluff as follows: "Every winter, after the parching heat of summer has cracked the earth, the soaking rains of winter cause huge slabs of earth and gravel to cave and split off the perpendicular face of the bluff, millions of tons, falling upon the

beach. At high tide the surf washes to the base of the cliff, which is subject to incalculable washing and swashing during the heavy storms. The cakes of gravel become dissolved and are ground to pieces and carried about by the action of the water." (Elliott, 1881)

On November 9th, 1881, the Daily Humboldt Times reported that nine hundred feet of the north spit (on Humboldt Bay) washed away. Six hundred and twenty feet in one week. The entrance is very wide and unusual. The south spit remained stable.

The Times Daily Telephone newspaper reported on September 25th,1884, that a piece of wagon road was constructed around the points of the Sand and Gastman Hills on the road from Little River to Trinidad.

In the annual report by the state mineralogist in 1890 to 1892, it was reported that at Big Lagoon a large amount of peat was exposed when the lagoon broke out. Gold was discovered in the sands of Big Lagoon in the 1850's and was worked crudely by rock, tom, and sluice yielding about ninety cents per day per man. The sand on top of the spit produced about twelve and a half to twenty cents a ton. Sixteen feet deep it produced seventy-five cents a ton. The annual report goes on to say that the bar appears to be increasing on its seaward side having gained fifty to a hundred feet in width in the last four years. The sand has little black sand content. At fourteen to sixteen feet down on the bar mud is struck. (State mineralogist, 1890-92.)

Ruth Talufson was born at Big Lagoon in 1894. She saw the lagoon break at the south end and she recalled that a man named James Sangster drowned at the mouth of the lagoon while attempting to cross.

Her father owned one hundred and sixty acres at the southwest corner of Big Lagoon. Her grandmother was a Sangster and came to Trinidad in 1863. (Personal Interview, 1973.)

In the annual report of the state mineralogist in 1896 there is a discussion of the Gold Bluffs wherein it is stated, "As the breakers undermine the bluffs, large masses break down and are disintegrated by the surf. Sometimes after a storm the beach is narrow and steep and at other times it is piled up with sand several hundred feet wide. Years ago the beach along the whole of the Gold Bluffs was narrow and steep and the waves washed their base at every high tide. At present this is only the case at the south end. On the northern part, for a distance of three miles, sand has accumulated to a width of two hundred to eight hundred feet and besides a broad sandbar is forming about a mile from shore. This deposit of sand has been noticed to grow for the last ten years. The material is no doubt brought down the Klamath River and carried south by the strong ocean currents."

In this same report there's a short discussion of Big Lagoon wherein it states, "Generally in winter an outlet near the south end is open." The report went on to mention that the bar is three hundred to six hundred feet in width.

In 1902 the local newspaper reported that the lower Gold Bluffs company is packing rich sand from the beach and have fifty men employed (Times Standard, 1978).

During the years 1903 to 1904 a young school teacher at Stone Lagoon named Eleanor Ethel Tracey wrote many letters home to her parents and other friends (DeLong, 1978). In her letters Miss Tracey

stated on October 19th, 1903, the beach at Dry Lagoon is covered with coarse sand and pebbles. She goes on to state, "The beach next to the ocean is steep and the waves break right at the shore." While on a trip to the Klamath River she noted they went through Prairie Creek State Park then came out along the coast up high. On August 31, 1903, she looked out to sea and noted, "There was a circle of different color where the Klamath emptied into the sea." In a letter written April 11th, 1903, in referring to Big Lagoon she stated, "The lagoon was running out and had cut away much of the hill." She took a picture (Photo No. 29) of this phenomenon at the north end of Big Lagoon. In Photo No. 16, taken by Ms. Tracey, of the beach at Dry Lagoon south of Goat Rock, the beach appears very steep and indicates the surf reached the base of the bluff.

In discussing the study section with Frank Brown he recalls that Westhaven Road was constructed in 1908 and Scenic Drive was abandoned at that time. This was confirmed by a Humboldt County Board of Supervisor's Order on January 25th, 1908, whereby they ordered Scenic Drive, which is the road from Moonstone Beach to Trinidad, closed and abandoned. Mr. Brown recalled that in 1918 Scenic Drive was opened up again. This is confirmed in that new construction plans for upgrading the old county road along that stretch were developed by the California Department of Transportation and were dated 1918. Mr. Brown also recalls that Freshwater Lagoon broke out twice (Brown, 1979).

There was an area at the north end of Big Lagoon locally known as the Truttman Sink. It is a large landslide that has continued to flow into the ocean since 1923. In discussing the area with Richard

Truttman, who is presently ninety years old, Richard Gustufson obtained the following answers to his questions: Mr. Truttman recalls the lagoon always broke at the north end but remembered it broke at the south end prior to 1900. He recalled the buggy road went on the Big Lagoon spit to the north end, then went up the hill via three or four switchbacks to a high point and then down to Dry Lagoon. He further recalled there was always two hundred feet of beach available for travel around the headland area of Truttman Sink and Goat Rock. He and his brother used to sit on some rocks that are presently one hundred and fifty feet offshore near the northerly end of the Truttman landslide. His father owned three hundred and twenty acres which included some of the headwaters of McDonald Creek. They used to burn the area every year in order to maintain grazing area for their cattle. He recalled the Truttman slide did not move the first five years after construction of a new alignment of Highway 101 across the slide area in 1926 through 1928. (Gustufson, 1979)

In a letter sent to Thelma Hufford (published in the Union in 1974), Richard Truttman gave the following information. Highway 101 from Trinidad to Freshwater Lagoon was built from 1921 through 1923. The slipout at the north end of Truttman Sink caused the road to be closed in the winter of 1923 and 1924. About 1938 to 1939, Highway 101 across Truttman Sink was realigned. A crusher was installed at the rocks on the beach below Truttman Sink for repaving material. (See Photo No. 17.) The Big Lagoon bridge was built in 1927. Because the deck was wooden and built too low, the north end of the lagoon had to be artificially broken in order to lower the water to protect the bridge. (The Union, 1974)

The following notes are contained in the survey book of 1918 for the road now known as Scenic Drive between Moonstone Beach and Trinidad:

Station	Remarks
673+20 and 673+75	"Small slides."
673+80 to 676+70	"Road slid out."
677+00 and 677+45	"Small slides."
673 to 678	"Small alders and heavy growth of small brush along left bank or bluff face."
685+00 to 685+50	The field notes and sketches imply the road was gone.
685+60 to 686+00	"Road slid out."
686+00 to 687+00	"Road slid out."
689+90 to 690+70	"Road slid out."
687+00	Distance to shoreline: 250'
688+50	Distance to shoreline: 135'
674+80	Distance to shoreline: 295'
681+60	Distance to shoreline: 200'

An undated survey book covering the Egg Point area was reviewed and the notes indicated no slides in that area. It is estimated the survey notes were made in the early 1920's. (Caltrans, ca. 1922)

Several survey books in the 1920, 1921, and 1922 years were generated during alignment studies for Highway 101 through the area now known as the Big Lagoon Subdivision. Book Number 24 has a station

equation to relate stationing and alignments contained in Book 12. Book 12 contains lines J-32 and J-54. The bearing of the centerline of the highway in book 24 is missing. Also the original cross-sections of the centerline of alignment of J-32 and J-54 are missing. The equation between the two lines is J-32, 414+35.Ø PT = J-54, 414+37.9 PT.

In survey books number one and number two information is contained on J-54 line from station 394+56.5 to 414+37.9.

In survey book number 24 the following distances were noted from the county road to "ocean".

Station	Distance to Ocean
439	1,23Ø feet
445	96Ø feet
452	1,15Ø feet

In a report on the construction of the wooden trestle across Big Lagoon in 1925 it was stated that the elevation of the sand spit at the south end of Big Lagoon was at twenty-three feet, mean sea level (MSL) and twenty feet MSL at the north end. It further noted that the spit was artificially opened at the north end in February of 1923. A trench three feet deep and one hundred and fifty feet long was dug. (Photos No. 3Ø, 31, 32, 33.) When the lagoon finally started to flow through the trench the mouth widened to one thousand feet and the water level in the lagoon dropped from 16.5 feet to 2.5 feet elevation in twenty-four hours. Borings done on the spit showed blue mud mixed with fine sand and gravel at elevation fifteen to

twenty feet down. The report further indicated that the Lagoon Lumber Company had controlled the water level in the lagoon for several years (Caltrans, 1925).

In the final report on the contract for repaving Highway 101 between Big Lagoon and Freshwater Lagoon it stated that gravel and sand were obtained from the Dry Lagoon beach opposite station 877. A plant was set up on the beach and the contractor constructed roads north and south to pits. The road ran south along the bluffs and north along the beach. Two drag lines were used (Photo No. 17). The entire plant was removed on September 25th, 1931 (Caltrans, 1931).

In another report prepared in preparation of modifying the Big Lagoon trestle it was stated that measurements had been taken of the water levels in Big Lagoon during a blowout. In 1924 the level dropped from twenty feet down to 2.5 feet. On February 5, 1943, the level dropped from 17.4 feet down to 7.45 feet. It also stated that highway maintenance workers were used to induce a blowout before the concrete deck was added to the wooden trestle. (See Photos 30-33.)

Of importance in this report, under a discussion of Stone Lagoon, they stated that the farmers found a rock ledge or reef under the north end of the spit when they were trying to dig a permanent cut years ago (Caltrans, 1943).

About sixty small recreational cabins were constructed at the south end of Big Lagoon in the summer of 1929 (Arcata Union, 1929). By June 6th, 1929, twenty-one cabins were under construction. By July 25th, 1929, forty cabins were under construction and roads were being graded. By August 1st, 1929, fifty cabins had been completed and ten more were under construction. About fifteen cabins were placed within

30 to 40 feet of the edge of the bluff.

In one of the cabins several calendars for the years 1935 through 1941 were found rolled up. Notes were marked on the individual dates of various events. The following information was obtained from these calendars. (Dickenson, 1935-41).

On December 29, 1935 it was noted the ocean was very rough and came all the way up to the bank. Other notes in January and February, 1936, stated that they got from 100 to 350 agates in two to six hours on the beach. On September 26th, 1936, the notes indicated a very bad fire occurred near the lagoon. This was the great fire that burned from Little River all the way to the Klamath River.

In January of 1940 the following notes occurred: January 15 through 21, "good days;" January 23rd, "ocean very rough, rain, 54 degrees;" January 24, "ocean rough, 54 degrees, surf up to bank, full moon at 5:22 p.m.;" January 25, "rain off and on;" January 26, "rain off and on, ocean very, very, rough, roughest yet that I have seen, up to bank, just pounded."

The first week of February 1940, contained the following notes: February 2nd and 3rd, "when bank went;" February 6th, "people came to see how ocean cut up beach."

On July 8th through the 13th, 1940, she noted that their house was moved by the Barnes brothers of Arcata. It is possible that many other cabins were moved back from the bluff at that time. It has been stated by other old timers that several cabins were moved on December 7th, 1941. An aerial photo dated November 6th, 1941, shows all of the cabins already moved back from the bluff.

Notes on the dates of October 26 through 29 of 1941, state

that the ocean was very rough and the bluff was eroded or bank was cut.

In discussing the condition of the watershed of Big Lagoon with Ed Murvich, forester for Louisiana-Pacific, it was learned that from 1958 to 1959, eighteen million board feet of Sitka Spruce were removed from the watershed around Big Lagoon and that in 1945 a big forest fire occurred between the two forks of Maple Creek. He also recalled the 1936 fire which burned from Little River to the Klamath River (Murvich, 1972).

Several historic maps were used in this study. The first map under discussion is U.S.C.&G.S. map number 1378, surveyed in 1873. It clearly shows the Gold Bluffs region and indicates very little beach in front of the bluffs. The Upper Bluffs and dwelling houses of the mining claim are clearly shown, as are those down near Espa Lagoon. Some Indian village sites are shown. From the mouth of the Klamath River, the beach existed south to Flint Rock.

At the mouth of Redwood Creek the estuary is drawn similar to that show by Waterman. There is little or no beach indicated around the point of land that used to exist between Redwood Creek and Freshwater Lagoon. The sand spit of Freshwater Lagoon is narrowest at the south end.

The beach in front of the Truttman slide area appears very narrow and there is an implied opening at the north end of Big Lagoon and a very narrow opening at the south end. A beach is indicated in front of the present day Big Lagoon Park Company cabins and Big Lagoon subdivision and appears to end near the end of the foot trail from Patricks Point State Park to Agate Beach.

From the north end of the Dry Lagoon sand spit to Sharp Point, no beach is indicated. From the mouth of Redwood Creek to Espa Lagoon very little beach is indicated.

A larger scale map was prepared in 1870 by the U. S. Coast Survey under register number 1179. It covers the coast from the southwest corner of Big Lagoon to Trinidad. There is no clear evidence on this map that the lagoon was breaking at the south end. The swale from the beach back towards the old Big Lagoon store is indicated as is the mouth of Roundhouse Creek. The bluffs all along this area are very, very straight and the map indicates a beach two hundred feet in width in front of the bluffs all the way to Patricks Point State Park area. The top of the bluffs were covered with Sitka Spruce down to the mouth of Roundhouse Creek. The map shows the two plateaus of the Big Lagoon Park Company cabin area covered with brush and the small knoll mentioned by Waterman.

South of Patricks Point the map shows all of the land covered with spruce and brush and the bluffs are fronted with very small narrow beaches. All of the offshore rocks and features along the bluffs shown on the map are identifiable on present day aerial photographs. There is about a two to three hundred foot wide beach immediately west of the town of Trinidad indicated.

Another map surveyed in 1870 and referenced as register number 1178 covers the area from Trinidad to a point south of Airport Road in McKinleyville. This map indicates small beaches in the coves along Scenic Drive. The vegetation on top of bluffs consisted of spruce trees intermixed with brush. A trail is indicated across the first point of land south of Trinidad. No landslides are indicated.

25th, 1872. The purpose of the map was to show plan and sections for a breakwater. This map did contain a sketch of the area along Scenic Drive and is shown in Photo No. 109.

A new map of Trinidad to Moonstone was prepared in 1873 by the U. S. Coast Survey. It is somewhat less detailed than the 1851 map and indicates the same size beach from Trinidad to Moonstone Beach. Some of the streets and buildings in the town of Trinidad are indicated. A larger scale and more detailed map appeared in 1874 prepared by the U. S. Coast Survey. This map contains almost the same detail as the 1873 map, but appears to be drawn much more carefully at a larger scale. There is a promontory at the northwest corner of town along the beach. It may be one of the stacks sketched by Bruff in 1851. The bluffs along that stretch are clearly indicated but no landslides are indicated.

Another map prepared by U.S.C.&G.S. with chart number 5846, and plate number 3879, is dated March 1928. This map contains topography surveyed up to 1875 and offshore soundings updated to 1921. Comparing this map with the 1874 map indicated no major changes. A new map was surveyed and prepared of Trinidad Bay in 1929. It has the same chart number 5846 of the 1874 map, but has a plate number 4128 and is dated June 1931. This shows an enlarged beach immediately west of town and a new bluff edge immediately north of Trinidad Head. Scenic Drive is indicated on the map since it was constructed around 1923. No slipouts are indicated on the 1931 map. General bottom features and the beaches along this stretch appear to be similar to those in 1875. When laying this 1929 map on a light table with the 1875, some eroded areas were noted.

A map by the U.S.C.&G.S. made in 1889 at a scale of 1:20,000 is referenced under register number 1934. It has the Upper Bluff on it, related to the Gold Bluffs gold mining activity, and the lower Gold Bluff mining claim. As it is mostly a hydrographical map of offshore depths, the land features appear to be traced directly from the 1873 map under register number 1378 discussed above.

A map by U.S.G.S. prepared during the summer of 1929 is register number 4490. This map covers the coastline from Mussel Point to Patricks Point State Park. It shows no estuary or lagoon at the mouth of Redwood Creek. At the north end of Big Lagoon it does not show the lagoon breaking out, but indicates a very narrow sand bar at that point. The bluff from the south end of Big Lagoon to Patricks Point is indicated as protected by a beach measuring about two hundred to three hundred feet in width. The top of the bluff is vegetated with Sitka Spruce trees.

Several early maps were used to study the Trinidad Bay area. The first map is dated 1851 and is known as chart number 633. It was prepared by the U. S. Coast Survey at a scale of 1:20,000. It distinctly indicates a bluff along the coastline from Trinidad to Moonstone. A sandy beach is indicated south of town and in the first three coves south towards Moonstone Beach. The map also contains a sketch made from aboard ship lying about two miles south of town. This sketch indicates the slopes from the top of the bluff to the sea were covered with grasses and brush and that tall timber existed back from the edge of the bluff about a half-mile.

Another map of Trinidad Bay was forwarded to the Chief of Engineers, U.S. Army, Washington, D.C., with a letter dated September

25th, 1872. The purpose of the map was to show plan and sections for a breakwater. This map did contain a sketch of the area along Scenic Drive and is shown in Photo No. 109.

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A map of Trinidad Head was prepared in 1894 and was related to the placement of the new lighthouse on the head. It was prepared at a scale of 1"=200' even though it says 1"=2000' in the legend. It indicates the precise location of the top of the bluff next to the tramway railroad grade that ran out along the east side of the head.

An undated sketch map, found in the National Archives, prepared from private notes of Herman Ehrenberg clearly shows the trail from Trinidad north to the mining region of the Trinity River. This trail traverses the Big Lagoon spit and turns inland at th north end of the lagoon. Of interest, the estuary at the mouth of Redwood Creek is indicated larger than Big Lagoon. The map is undated, but the town of Arcata is labeled as Uniontown which puts the date before March 1860. Mr. Ehrenberg was among the group who discovered gold at Gold Bluff in April 1850.

A map of lower Oregon and Upper California prepared by Thomas Tennet and dated 1853 shows the trail to the mines going north from Trinidad up towards Big Lagoon and then inland to points on the Klamath River. Gold Bluff is clearly labeled in very large letters.

A map dated 1879 and prepared in the Office of the Chief of Engineers shows Big Lagoon broken at the north end. A map dated 1851 of the State of California, prepared by J. B. Tassin shows a trail north out of Trinidad, but it is called Trinity. The trail runs north to Gold Bluff and Klamath and east to the Trinity and Klamath River country. Another map prepared in 1851 by Charles Gibbes showing the gold region of California shows a Port Trinidad and Gold Bluff, but no lagoons. It does show a trail from Port Trinidad over to the Trinity River. Another map at a larger scale done by Gibbes of northwestern

California in 1851 shows the trail from Trinidad north along the spit and around the north end of Big Lagoon and eastward towards the Trinity River.

There were a series of maps prepared over a period of several years by J. N. Lentell. The first map dated 1898 shows a road going north from Trinidad around the back or east side of Big Lagoon, Freshwater Lagoon, Stone Lagoon and on to Orick. This map also shows a dotted line on the sand spits of Big Lagon, Dry Lagoon, Stone Lagoon and Freshwater Lagoon. The same thing appears on the 1901 map. By 1914 there are no longer indications of trails along the sand spit.

A map dated February 1879, at a scale of four miles to the inch was prepared from field notes made on a scout of the trail from Fort Gaston to Stone Lagoon. This map shows a trail very clearly from the north end of Big Lagoon eastward to Elk Camp and along Bald Hills Road past Schoolhouse Peak and French Camp all the way down to Fort Gaston near the mouth of Supply Creek on the Trinity River. The map does not indicate which end of Big Lagoon was the outlet.

The next section will describe historical sketches and photographs of portions of the study area. As mentioned previously, J. Goldsborough Bruff visited the area between Moonstone Beach and Gold Bluffs in mid-February of 1851. His sketches along with his diary and critical notes were gathered together in a book (Read and Gaines, 1944).

Sketch No. 4 (in photo section of this report) is a view north of the mouth of Redwood Creek. It shows two men poling a raft across the estuary. On January 23, 1851, Bruff said the channel had a rapid current and the estuary was 300 yards across. A photograph was taken

in 1980 from the same point the sketch was made in order to gain a qualitative measurement of retreat of this point by comparing the sketch and the photograph (Photo No. 5).

The sketch shown as No. 84 is of a sea cave north of Trinidad on the beach. Photo No. 85 was taken at the same spot.

Sketches shown in No. 86 and 90, made in February, 1851, are of sea stacks on or near the beach west and a little north of the town of Trinidad. Photos No. 87 and 93 were taken in 1980 from the same points that Bruff made the sketches.

Sketch No. 101 is a wide view of Trinidad Head and most of the town of Trinidad, viewed from a point south of town such that the view is roughly west-northwest. The village of Tsurai shows, and the slope from the flat plain of Trinidad down to the beach appears to be gradual with little or no vertical bluff. Some alders and tall Sitka Spruce are growing on the slope. There is a vertical bluff indicated between little head and the main head where the small beach exists today immediately west of the wharf. A sandy beach is shown in front of the Tsurai village and on back to little Trinidad Head.

Sketch No. 107 is a view southeast of the harbor at Trinidad showing two large ships and four or five small rowboats. The significance of this sketch is that it shows vertical bluffs in the background along Scenic Drive and tall trees on top of the bluff.

Sketch No. 108 is a view southeast along Scenic Drive and Clam Beach all the way to Cape Mendocino. Several bluffs are indicated in this sketch along Scenic Drive and Clam Beach. The top of the bluffs are all shown with timber. He also noted on this sketch that the distant mountains had patches of snow.

The report contains 145 illustrations, most of which are photographs. They are arranged in order from north to south. The first 11 illustrations cover the Gold Bluffs area south to the mouth of Redwood Creek. Illustration 4 is a sketch of a view north of the estuary of Redwood Creek in February 1851. The following seven illustrations show the same area over progressive years to 1980.

Photos 12 through 15 cover Freshwater Lagoon and include a rare view of Freshwater Lagoon broken open near the south end to the ocean.

Photos 16 and 17 are views of the beach of Dry Lagoon in 1903 and 1931.

Photos 18 through 25 cover the Truttman Sink area at the north end of Big Lagoon and include aerial photographs from 1931 through 1980.

Photos 26 through 74 cover the Big Lagoon area from the County Park south to Patricks Point.

Photos 26 through 33 are historic photographs showing the north and south end of Big Lagoon around the turn of the century.

Photos 35 through 41 are aerial photographs of the south end of Big Lagoon from 1931 through 1966.

Photos 46 through 50 show recent failures of the bluff at the south end of Big Lagoon due to storm runup.

Photos 51 through 54 show storm runup during the years 1978 through 1980.

Photos 59 through 71 show various portions of the Big Lagoon Subdivision.

Photos 72-74 show views of the bluffs viewed from Patricks

Point in 1910, 1978, and 1980.

The large retreat of the bluffs in the Big Lagoon County Park and Big Lagoon Park Corporation land are well illustrated in photographs 35 through 43.

The construction of homes west of Ocean View Drive in the Big Lagoon Subdivision is well illustrated in photos 65, 66, and 68.

Photos 75 through 93 cover the area from Patricks Point State Park to Trinidad. Of particular interest in this set are photos 79 through 82 showing portions of the coastline in 1942 and also showing the location of the measurement stations.

Illustration number 84 was done by Bruff in 1851 and is of the rock cave on the beach in Trinidad Beach State Park. Photo 85 was taken at the exact same point 129 years later at roughly the same scale. The same applies to illustration number 86 and photo 87, and illustration number 90 and photo 91.

Photos 88 and 92 were taken on the beach west of Trinidad by A. W. Erickson around 1910. Present day photographs were taken from the same point and are illustrated in photos 89 and 93.

Photos 94 through 104 cover the bluffs around the town of Trinidad. Of particular interest are photos 95 and 96. Ninety-five is a painting of the town in 1875 and can be compared to photo 96 which was taken November 27, 1980 from roughly the same point the artist painted the town in 1875.

Another sketch of the town in 1880 is illustrated in number 97.

J. Goldsborough Bruff sketched the town in February 1851 and this is illustrated in sketch 101.

Photo 102 is a view over the town of Trinidad in about 1928.

Photos 105 through 145 cover the area from Trinidad to Moonstone Beach.

Illustrations number 107, 108, and 109 show the Trinidad area in 1851 and 1873 as sketched by two different artists.

Photo 110 shows a portion of the Trinidad area in 1910.

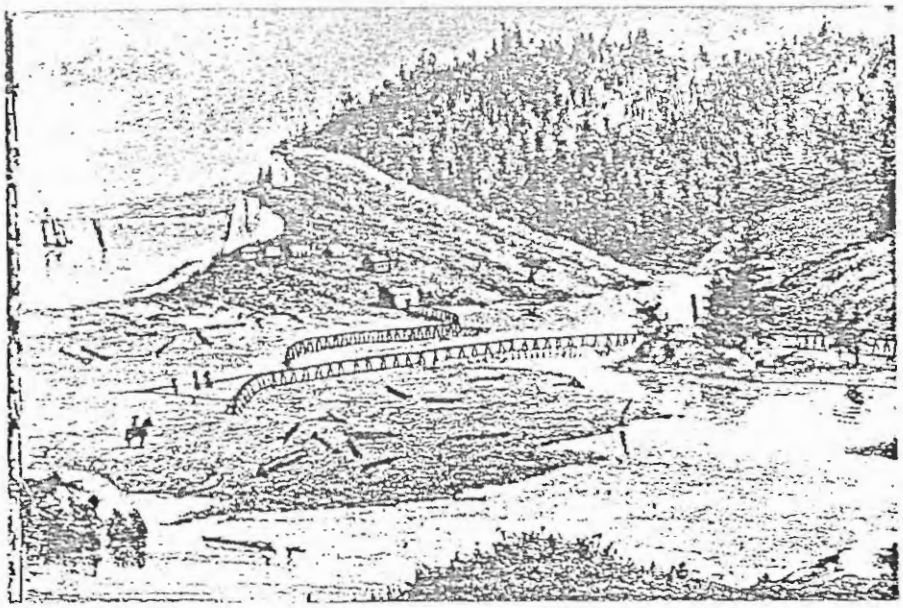
Photos 112, 114, 116, 120, 121, and 125 consist of aerial photos taken February 16, 1942.

Photos 128 through 135 consist of still pictures taken on the ground of portions of Scenic Drive from about 1900 through 1954.

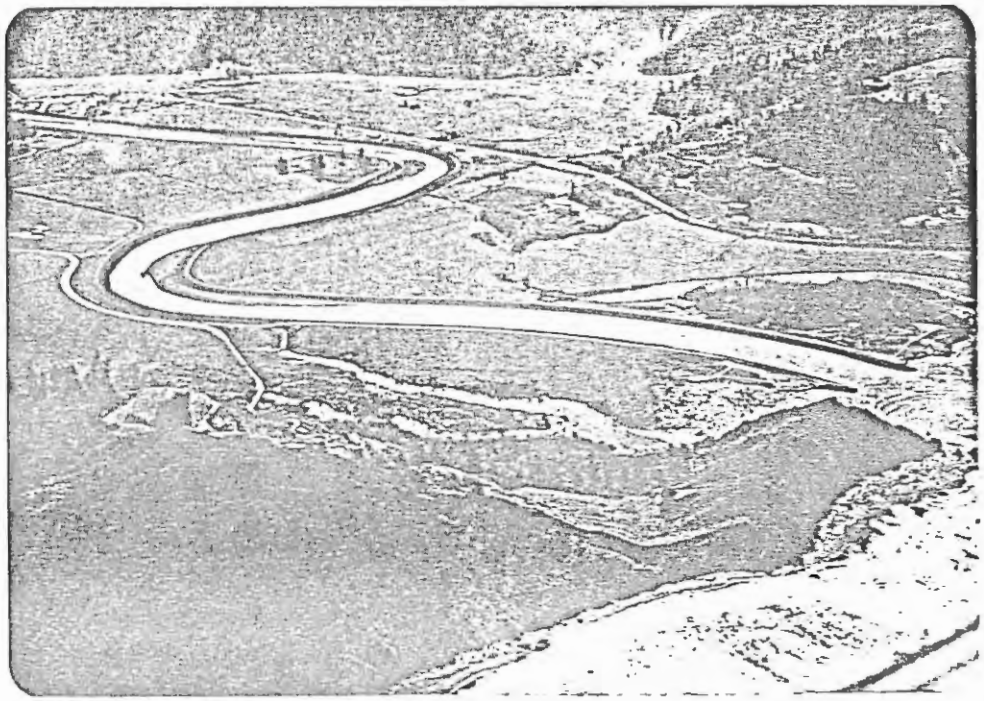
The last two photographs are high altitude color infrared aerial photos of the Trinidad to Moonstone area and illustrate offshore sediment flow patterns and wave direction.

There are nine tables containing the measurements from offshore rocks and various baselines to onshore land features such as toe of slope or top of bluff. These tables contain the details of all of the measurements made off of the aerial photographs and maps.

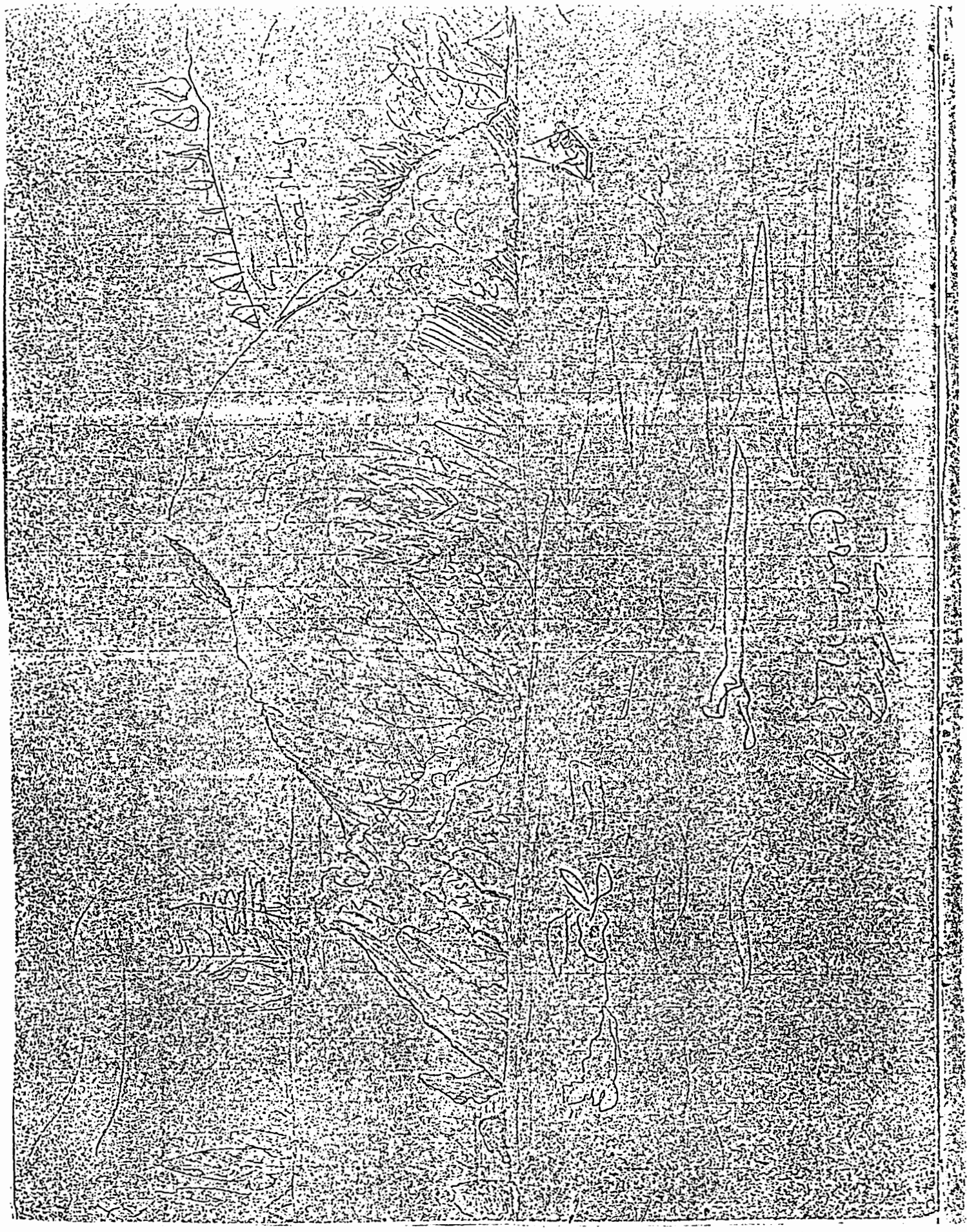
No. 1: View South from Mussel Point to Patricks Point. From north to south the view includes a view of the mouth of Redwood Creek, Freshwater Lagoon, Stone Lagoon, Dry Lagoon and Big Lagoon.



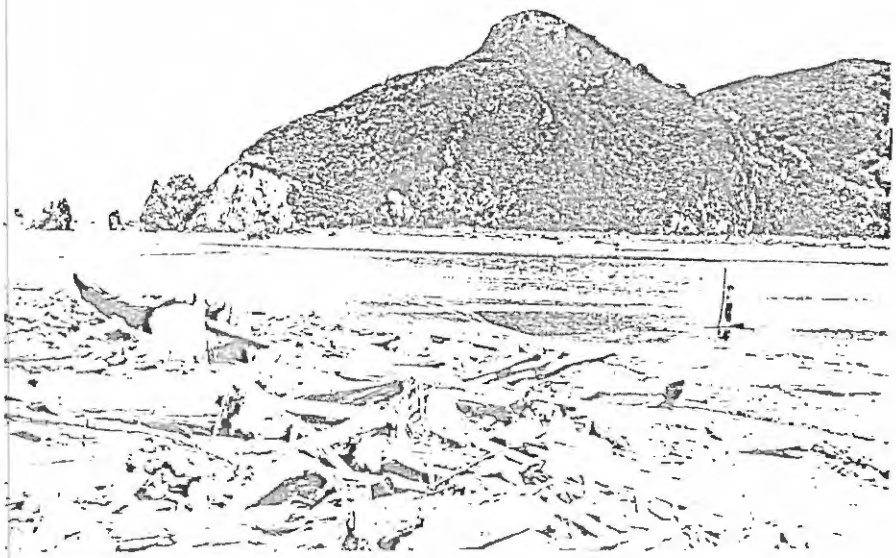
No. 2: Sketch of the village called Lower Gold Bluff. Note vertical eroded bluffs in background. (Elliott, 1881)



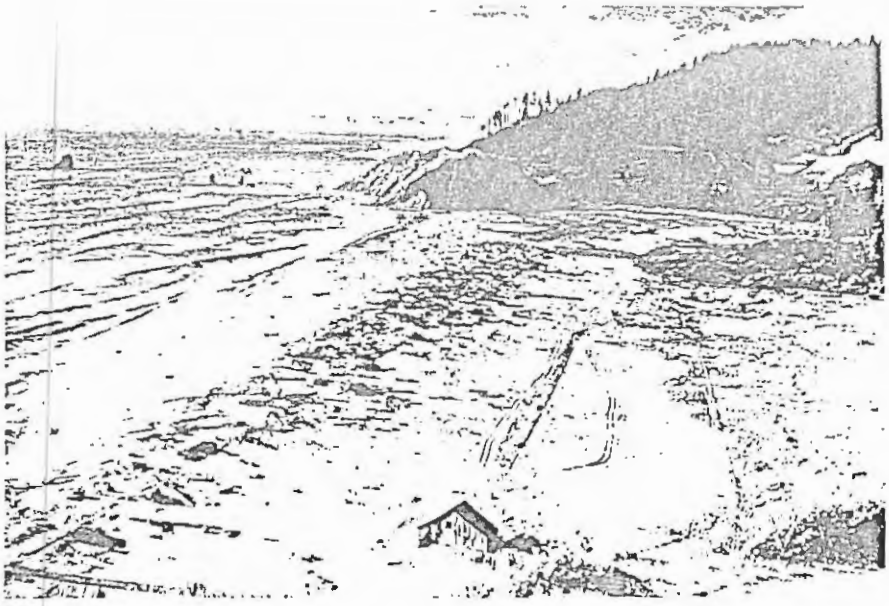
No. 3: View southeast of the mouth of Redwood Creek. Note swale in lower right foreground. (March 27, 1980, Tuttle)



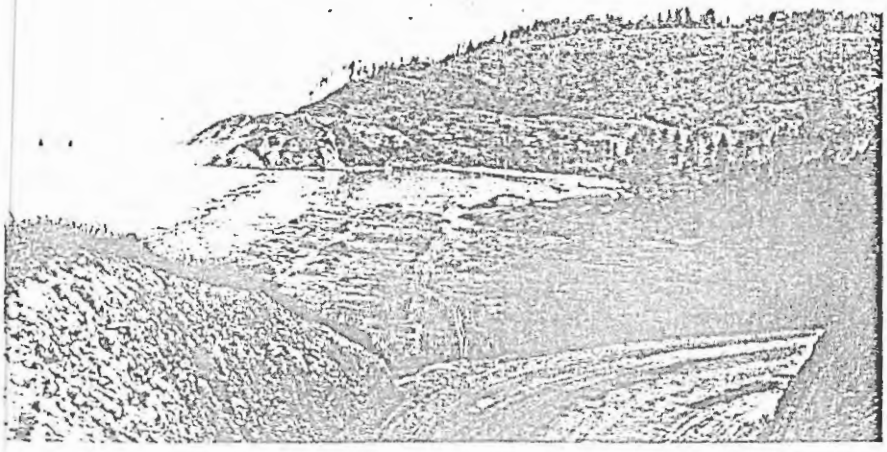
No. 4: Sketch by Goldsborough Bruff in February 1851 looking north at the north side of the mouth of Redwood Creek. (Read and Gaines, 1944)



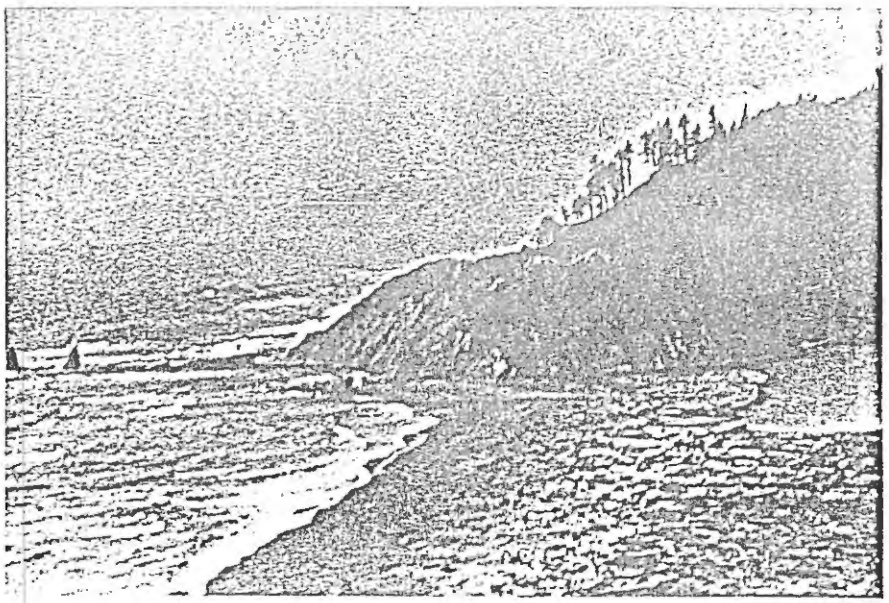
No. 5: View north at mouth of Redwood Creek.
(May 2, 1980, Glatzel, William)



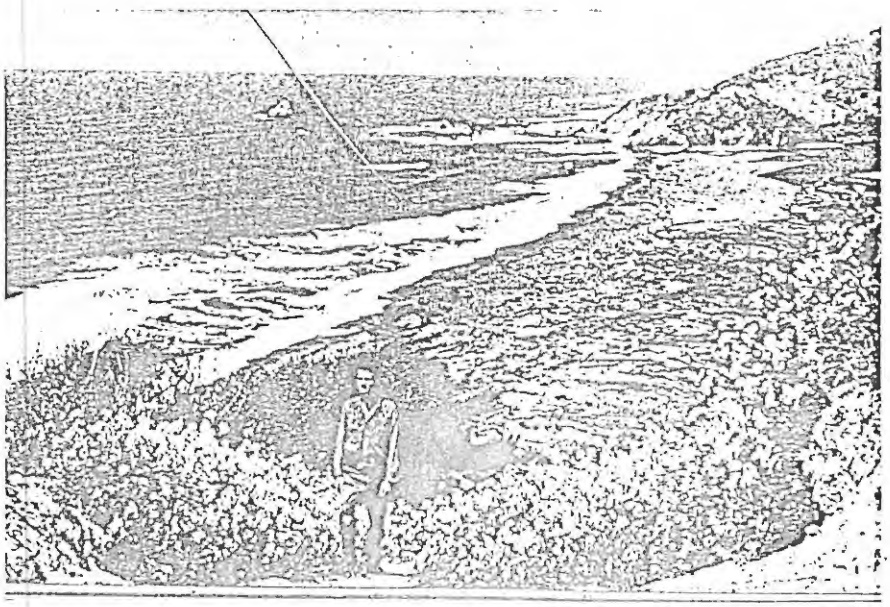
No. 6: View north of mouth of Redwood Creek. (July 1934, Caltrans-Sacramento Archives, File No. 61-4)



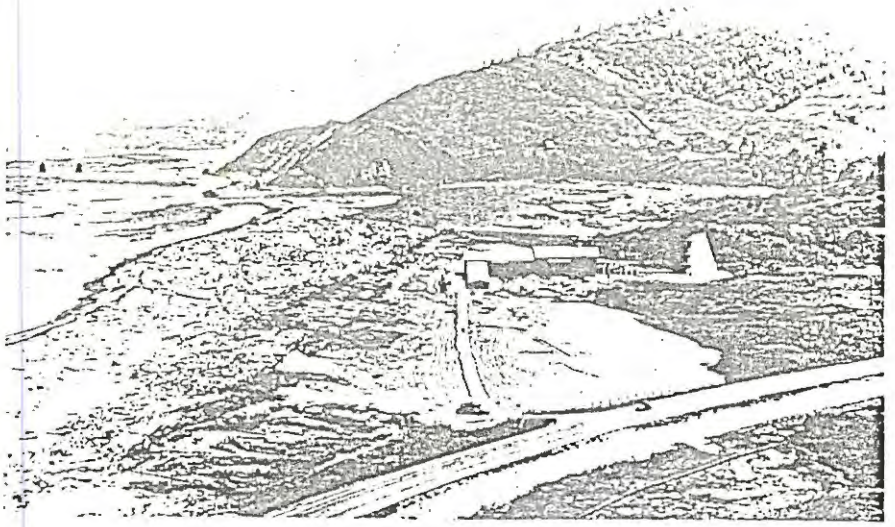
No. 7: View north of the mouth of Redwood Creek. (Ca. 1934, Caltrans-Sacramento Photo Archives, File No. H-318)



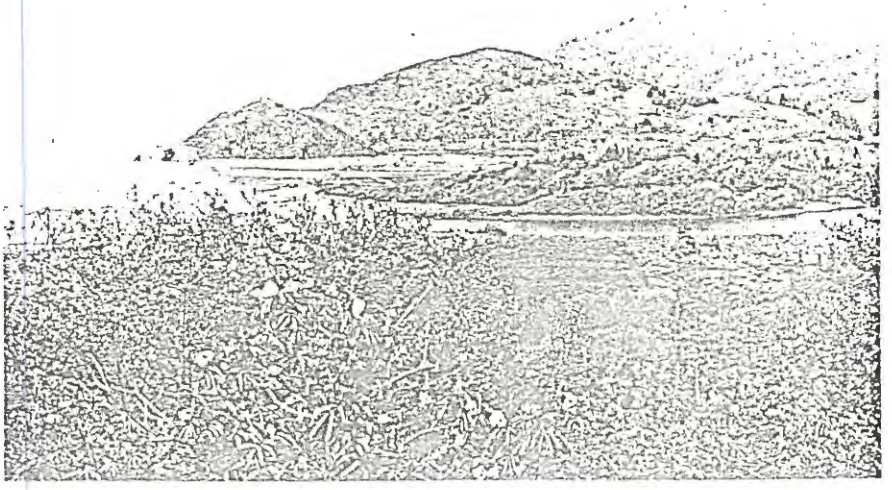
No. 8: View north of the north side of the mouth of Redwood Creek. (October 1, 1946, Photo No. 339, HUM-1-J, Caltrans-Eureka Office)



No. 9: View north of the mouth of Redwood Creek. (June 1949, National Geographic, page 765)

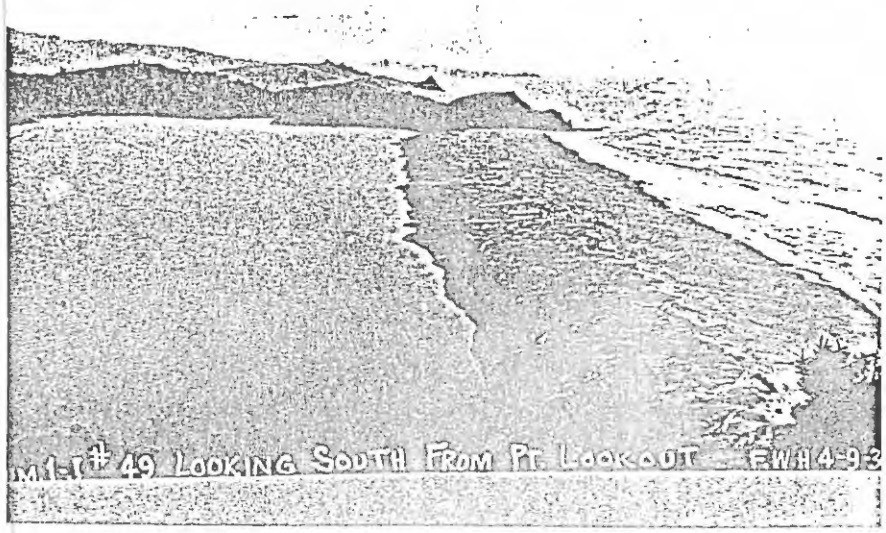


No. 10: View north of mouth of Redwood Creek. (May 29, 1953, Caltrans-Sacramento Photo Archives, File No. 3371-5)

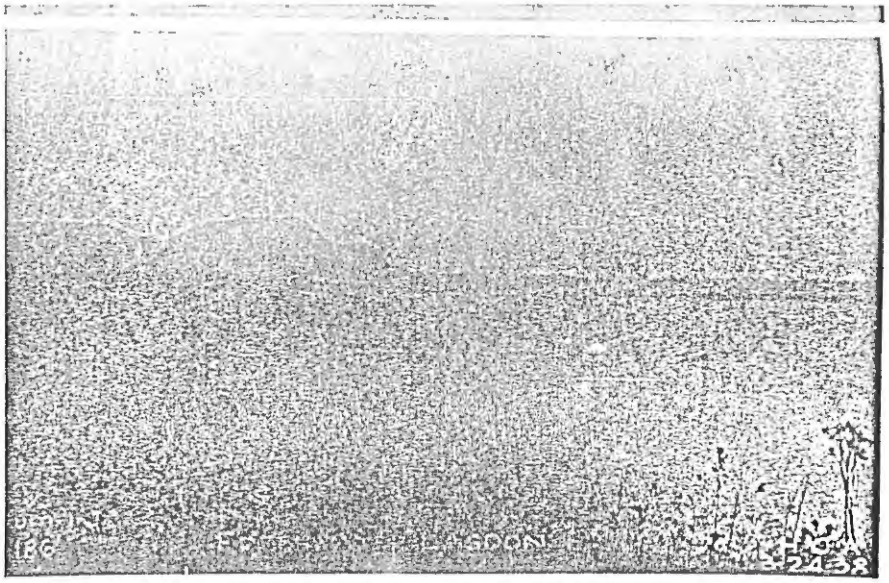


No. 11: View north mouth of Redwood Creek. (April 27, 1980, Tuttle)

No. 12: View northeast of bluffs at Freshwater Lagoon. (Kilburn, K., ca. 1927)

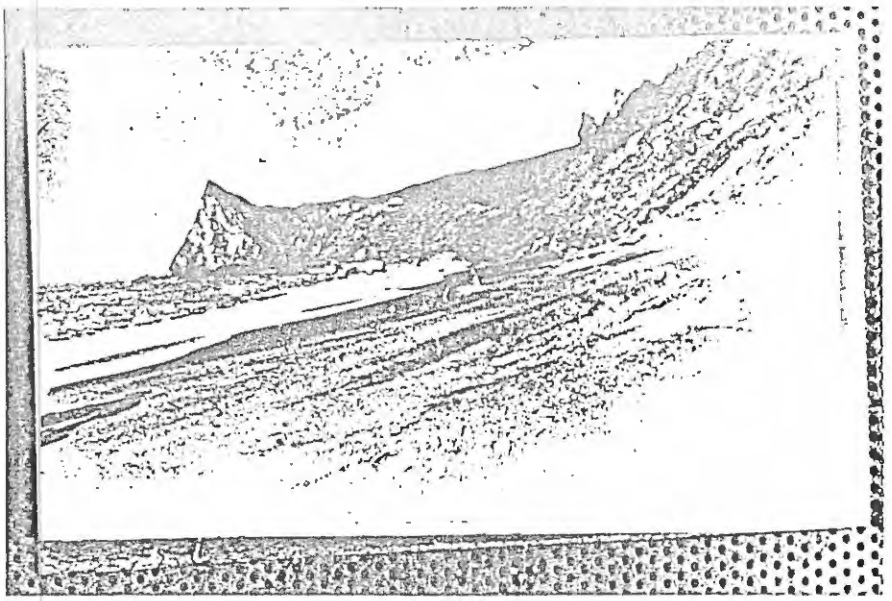


No. 13: View south from north end of Freshwater Lagoon. (April 9, 1930, Photo No. 49, HUM-1-J, Caltrans--Eureka Office)

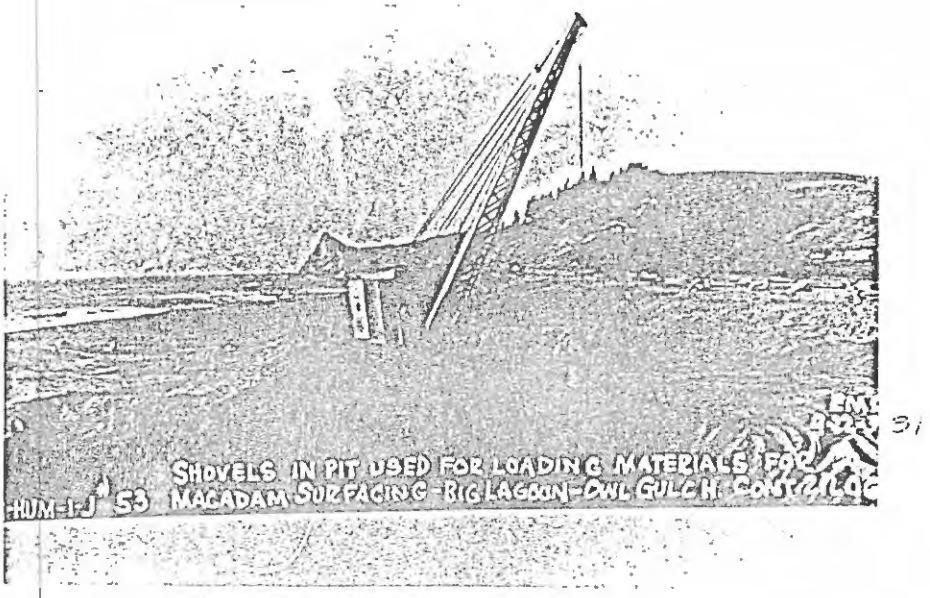


No. 14: Rare view of Freshwater Lagoon open to the sea near the south end. (Photo No. 186, HUM-1-J, March 24, 1938, Caltrans-Eureka Office)

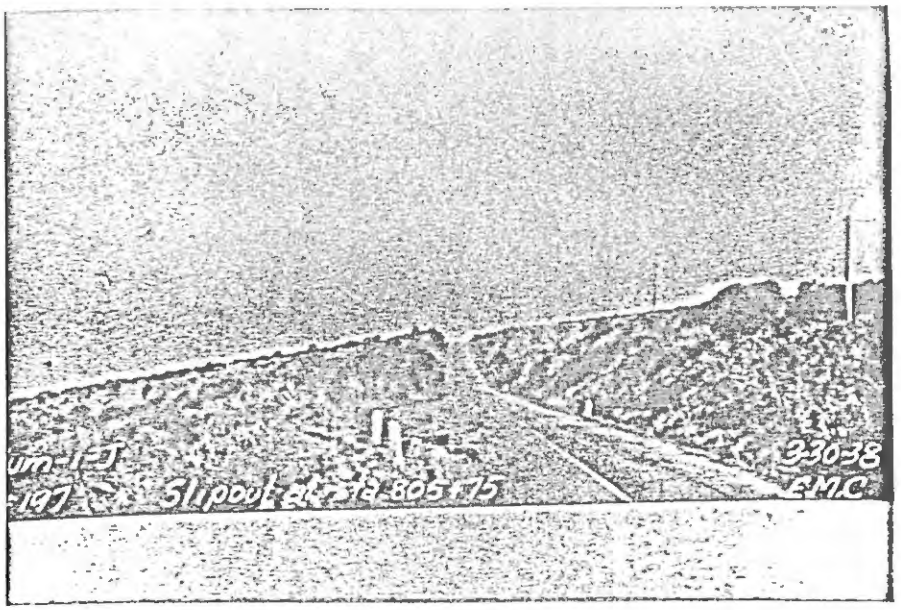
No. 15: View north of Dry Lagoon, Stone Lagoon and Freshwater Lagoon. (March 8, 1974, VanDeMark)



No. 16: View north of beach at north end of Dry Lagoon showing Goat Rock, ca. 1903-04, photo taken by Eleanor Ethel Tracy. (DeLong, 1978)



No. 17: View north of Dry Lagoon beach showing crane removing sand for road construction. September 22, 1931. (Photo 53, HUM-1-J, Caltrans-Eureka Office)

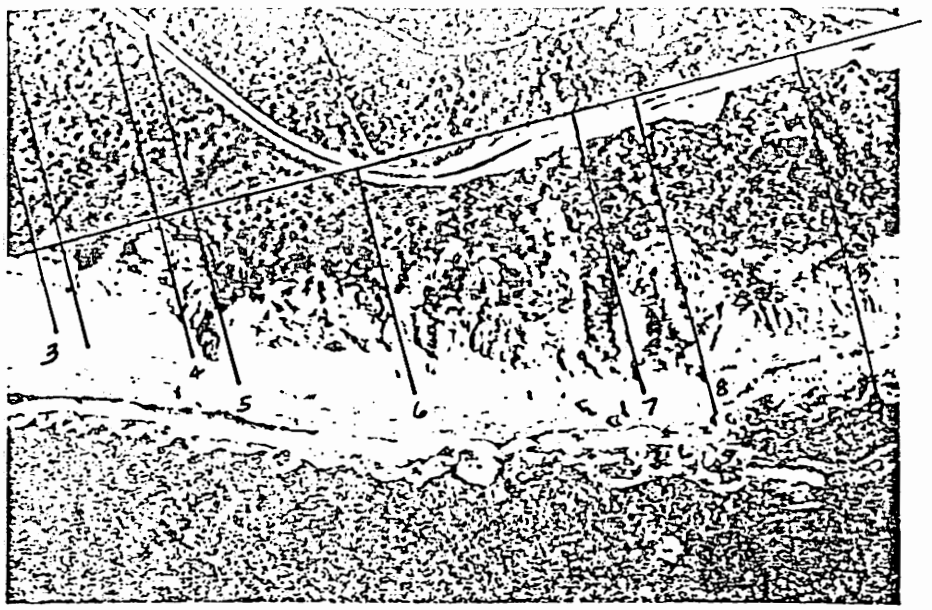


No. 18: View north of Highway 101 across Trutman Sink showing slip out at Station 805+75. (Photo No. 197, HUM-1-J, March 30, 1938, Caltrans-Eureka Office)

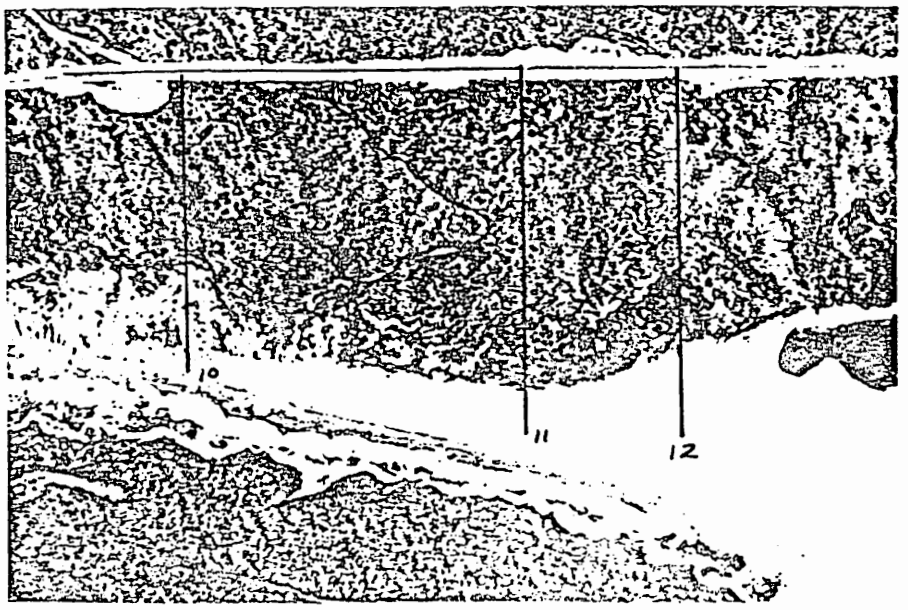
No. 19: View northeast of Trutman Sink area. (March 27, 1980, 9:45 a.m., Tuttle)

No. 20: View east of northerly end of Trutman Sink area. (March 27, 1980, 9:45 a.m., Tuttle)

No. 21: View east of southerly area of Trutman Sink. (March 27, 1980, 9:45 a.m., Tuttle)

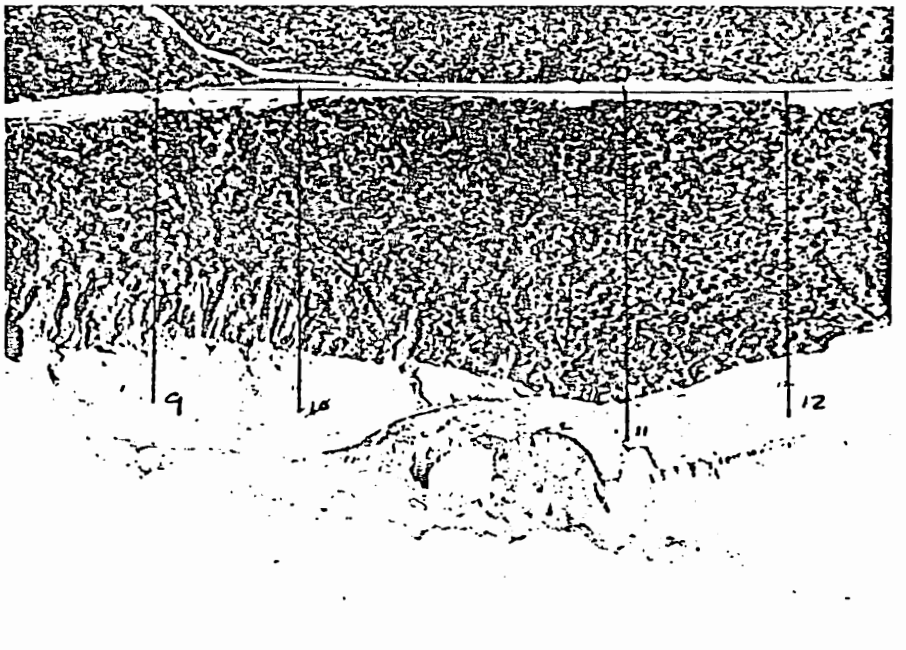


No. 22: Aerial photo of Trutman Sink dated September 1931 showing measuring stations three through nine. (Photo No. C1680-C10, Teledyne Geotronics)



No. 23: Aerial photo of Trutman Sink showing measuring stations nine through twelve dated September 1931. (Photo No. C1680-C10, Teledyne Geotronics)

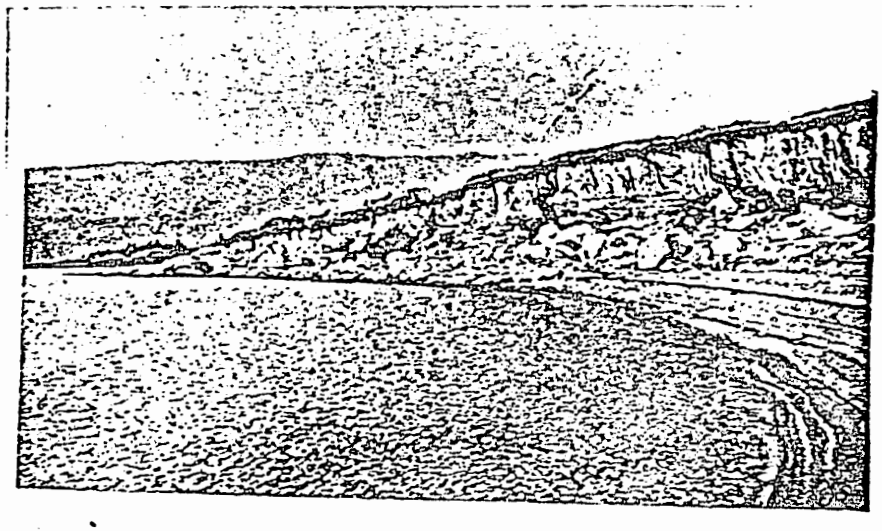
No. 24: Aerial photo of Trutman Sink showing stations four through nine dated February 16, 1942. (Photo No. CVL9B-109B(SE1/4) Source USDA Salt Lake City, Utah)



No. 25: Aerial photo of Trutman Sink showing stations nine through twelve. (Photo No. CVL-9B-109B (SE1/4) dated February 16, 1942, Source USDA Salt Lake City, Utah)

No. 26: View southeast over Big Lagoon, ca. 1906-12.
(Photo taken by Meiser, source Peter Palmquist)

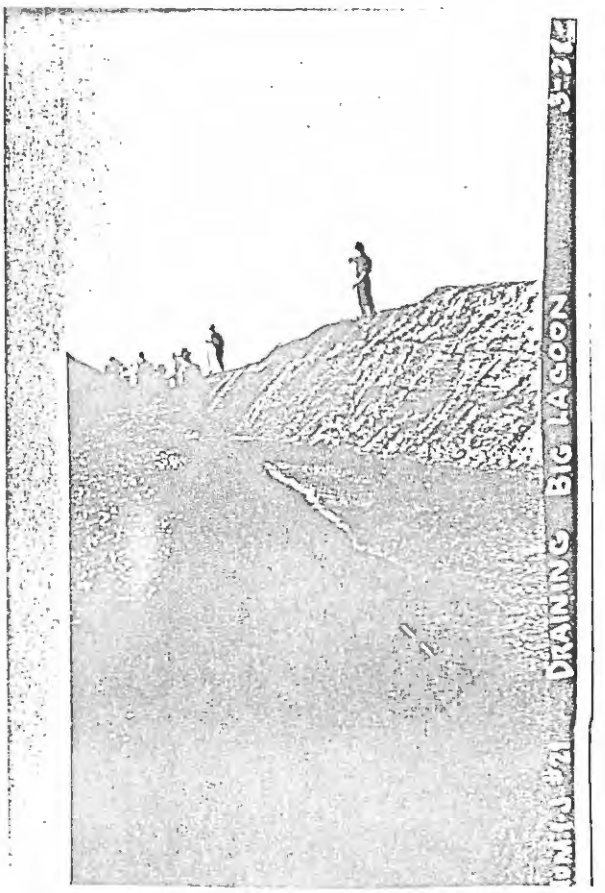
No. 27: View northeast of Big Lagoon from south end of Big Lagoon. Note wave washed sand, tidal marks on the edge of lagoon, and snags in background. (Photo No. 3 by Erickson, ca. 1890, source Palmquist)

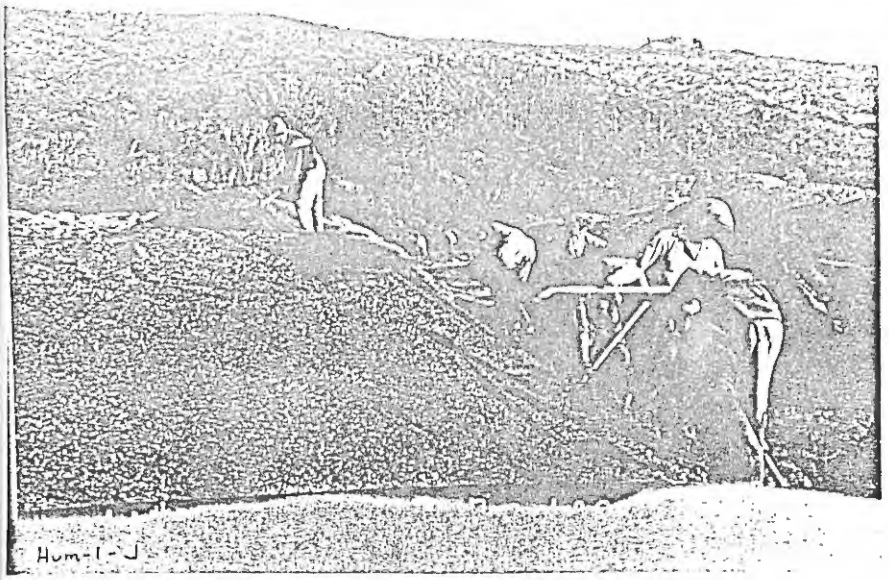


No. 28: View northeast of bluffs at south end of Big Lagoon. This is the only known photograph showing Big Lagoon open to the ocean at the south end. Note tidal marks on beach and recently caved blocks eroded off bluffs, ca. 1900-10. (Photo taken by tourist from Berkeley, source Palmquist)

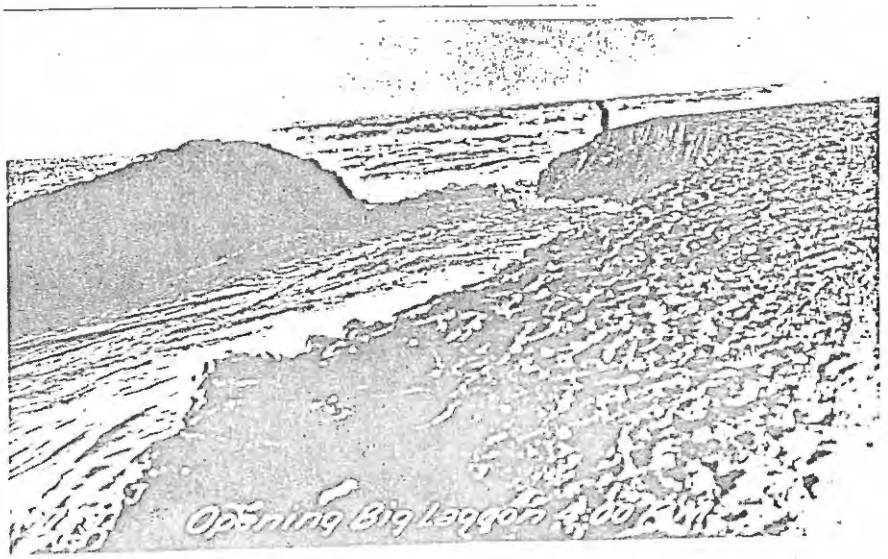
No. 29: View west of Big Lagoon breaking out at the north end. (Photo taken by Eleanor Ethel Tracy in 1903-04) (DeLong, 1978)

No. 30: View west through hand dug trench to north end of Big Lagoon for purposes of draining the lagoon during high water. (March 1928, Photo No. 21, HUM-1-J, Caltrans-Eureka Office)

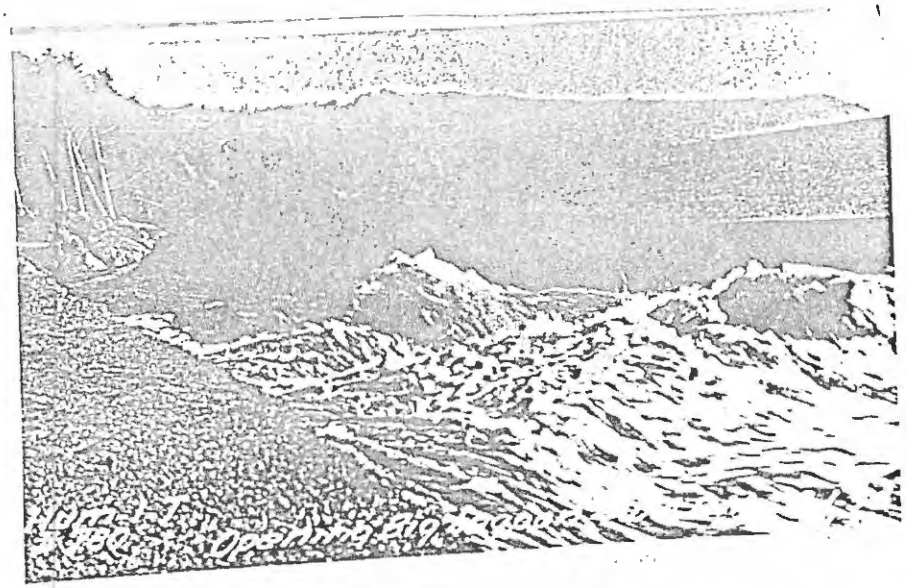




No. 31: View east along hand dug trench at north end of Big Lagoon. (March 1928, Caltrans-Eureka Office)

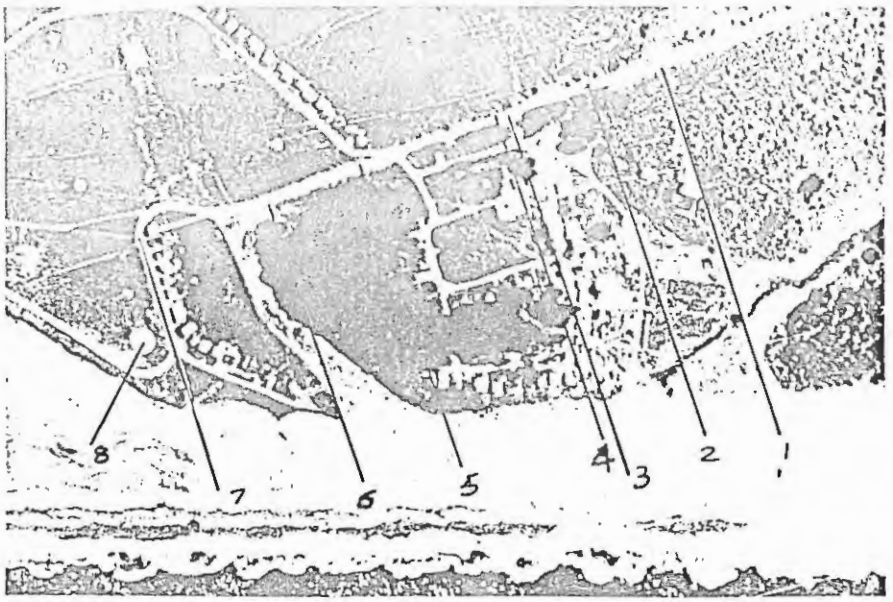


No. 32: View west of lagoon breaking out through hand dug trench at north end of Big Lagoon. (March 1, 1954 at 4:00 p.m., photo taken by E. L. M. Photo No. 779, HUM-1-J, Caltrans-Eureka Office)



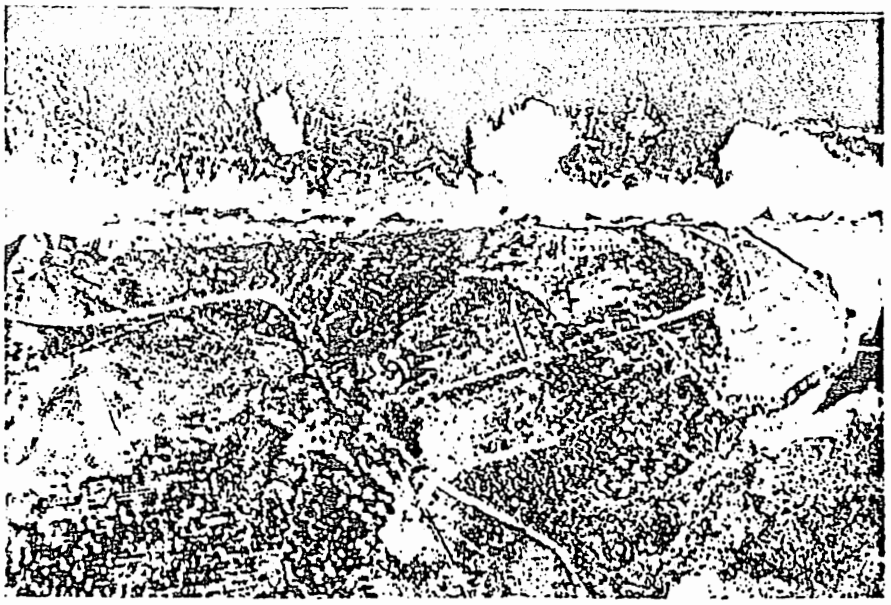
No. 33: View east of Big Lagoon at the north end draining through hand dug trench. (March 1, 1954, Photo by E. L. M. Photo No. 780, HUM-1-J, Caltrans-Eureka Office)

No. 34: View north of the northerly portion of Agate Beach, Big Lagoon Subdivision, and Big Lagoon Park Company land at south end of Big Lagoon. Note wave cut bench along beach. (March 27, 1980, Tuttle)

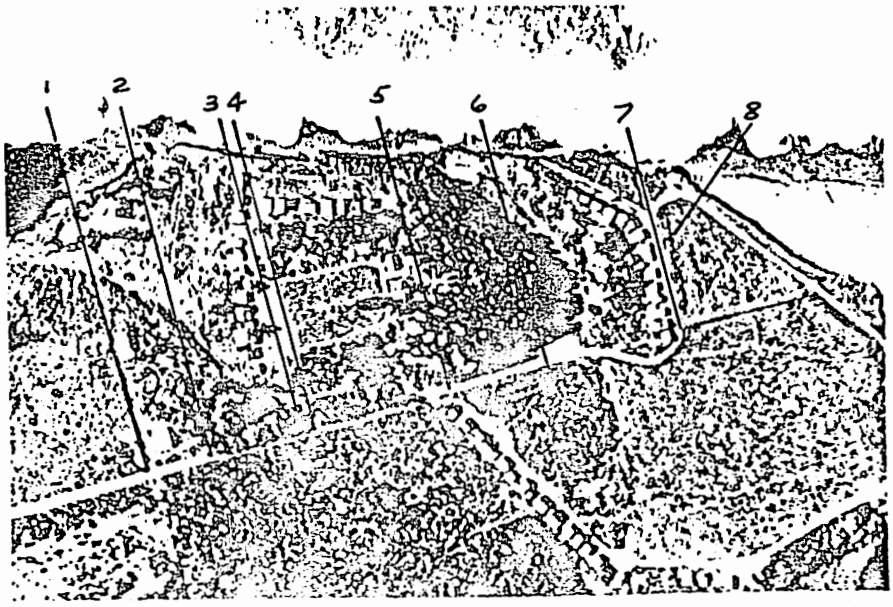


No. 35: Aerial photo of south end of Big Lagoon at Big Lagoon Park Company land. (August 28, 1931. Showsmmeasurement stations one through eight. Photo No. C1680-C15, Teledyne Geotronics)

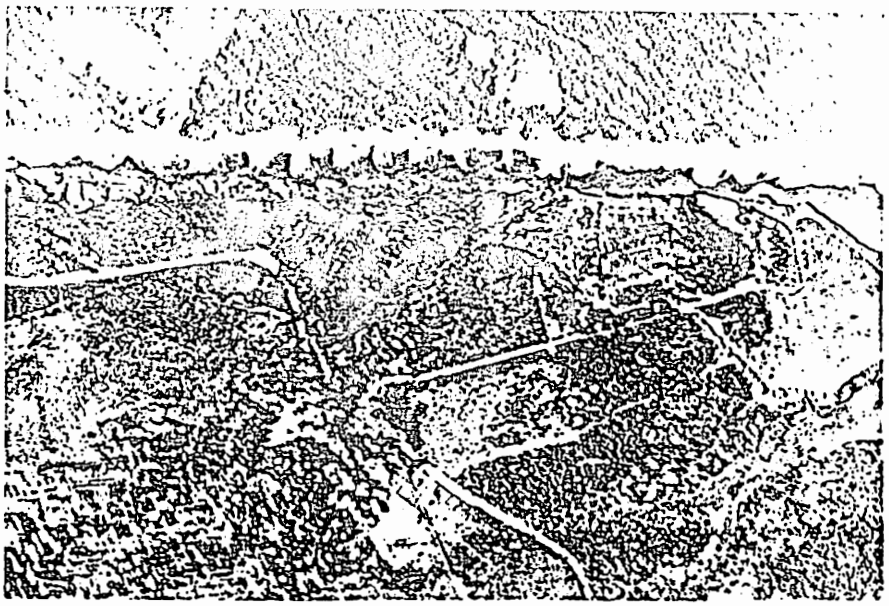
No. 36: Aerial photograph of south end of Big Lagoon showing bluffs along Big Lagoon Park Company property and northerly section of Big Lagoon Subdivision. (August 28, 1931. Shows measurement stations one through five, ten, and eleven. Photo No. C1680-C15, Teledyne Geotronics)



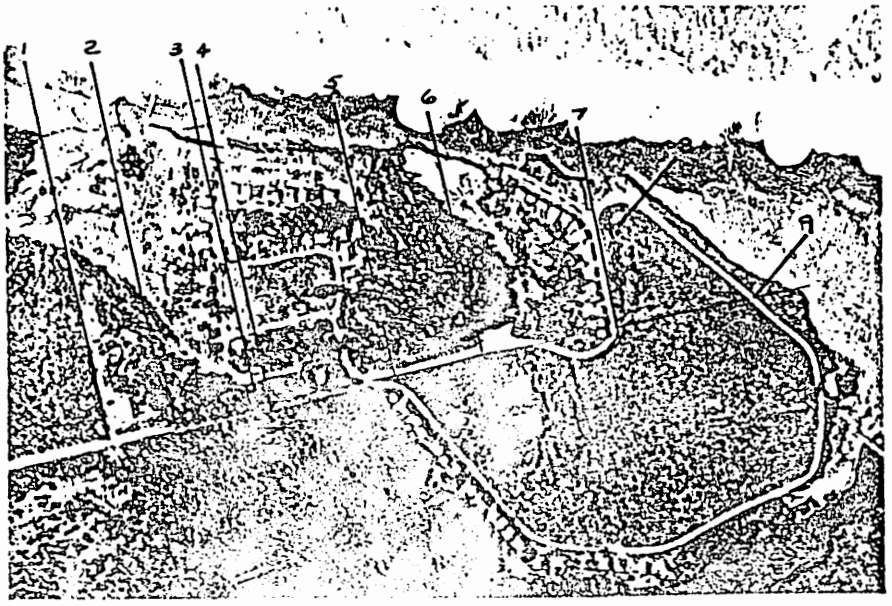
No. 37: Aerial photograph of Big Lagoon Subdivision, Big Lagoon Park Company and Big Lagoon County Park. (November 6, 1941. Note surf attacking base of bluffs. Photo No. C7490-726, Teledyne Geotronics)



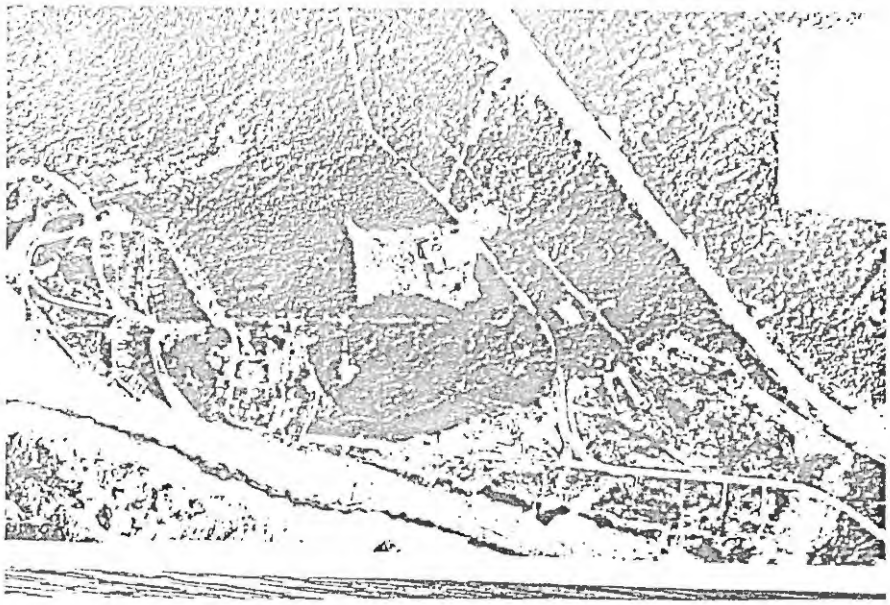
No. 38: Aerial photograph of Big Lagoon Park Company property showing surf attacking the base of bluffs. (November 6, 1941. Shows measurement stations one through nine, Teledyne Geotronics)



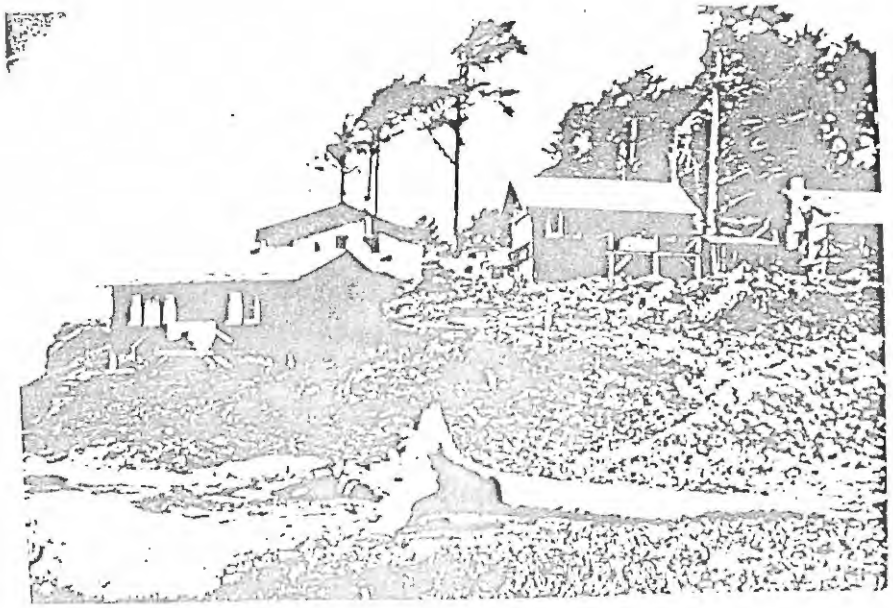
No. 39: Aerial photograph of Big Lagoon Subdivision, Big Lagoon Park Company and portion of Big Lagoon County Park. (February 16, 1942, Photo No. CVL-9Z-134. Compare bluff line in this photo with line in photo No. 38. USDA, Salt Lake City, Utah)



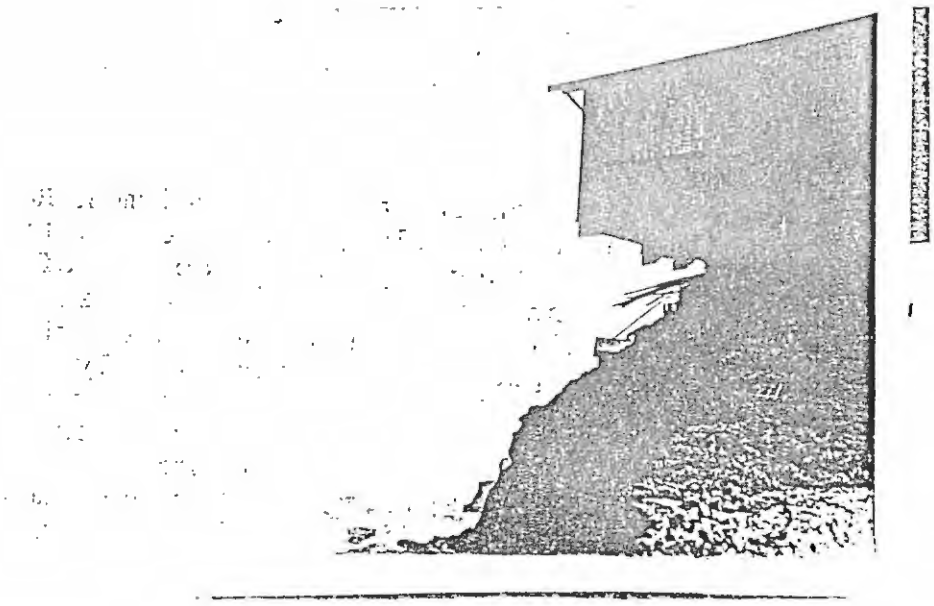
No. 40: Close-up of aerial photo No. 39 showing Big Lagoon Park Company property and portion of Big Lagoon County Park. (Shows measurement stations one through nine. February 16, 1942. Photo No. CVL-9B-134. Compare to Photo No. 39. USDA, Salt Lake City, Utah)



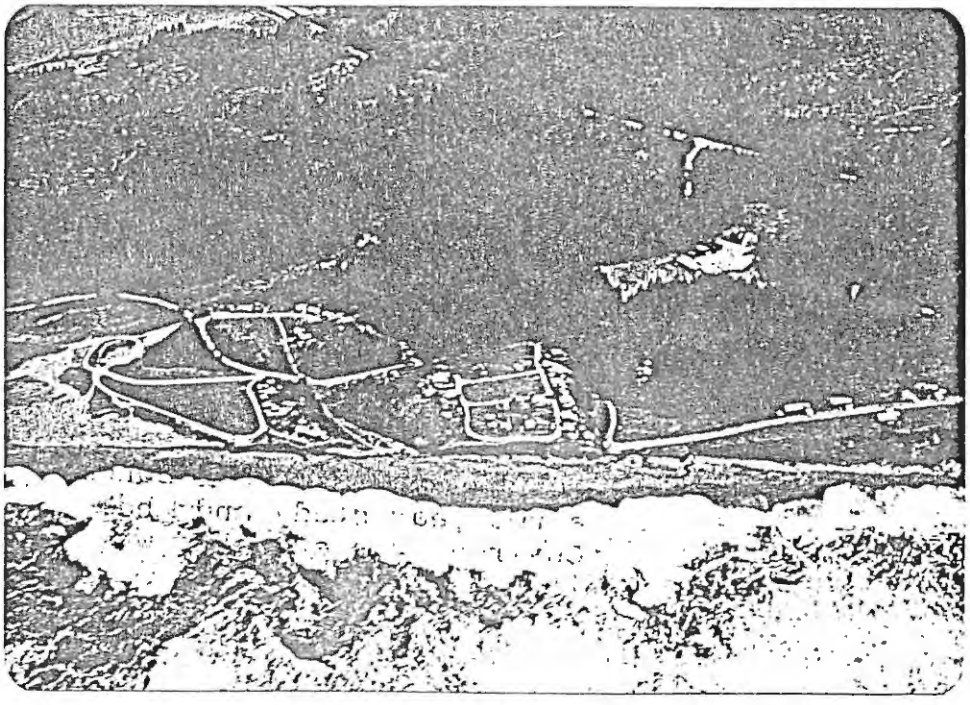
No. 41: Aerial photograph of Big Lagoon Subdivision, Big Lagoon Park Company and portion of Big Lagoon County Park. Note width of beach and preliminary development of streets and driveways for Big Lagoon Subdivision. Photo undated. Estimated between 1966 to 1970. (Humboldt County Department of Public Works)



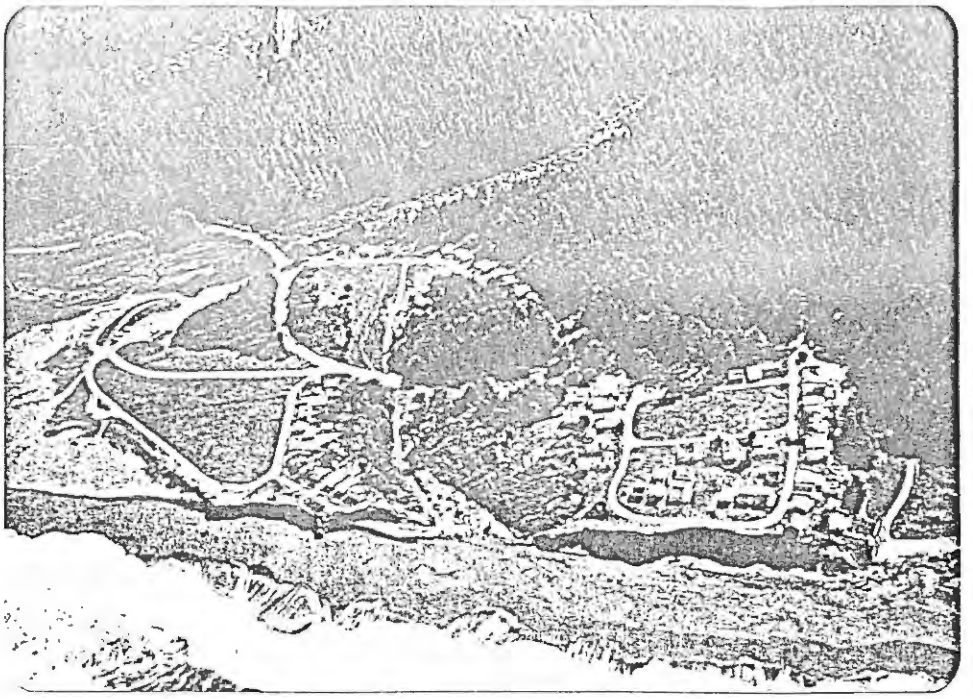
No. 42: View north of cabins in Big Lagoon Park Company from a point near the mouth of Roundhouse Creek. Note cabin in left foreground and compare with photo No. 43. Cabin to right of center in background has four feet remaining in front of it and can be seen in photo no. 58. (Culver, Nene, 1937-38)



No. 43: View north of same cabin in left foreground of photo No. 42. Several cabins were left cantilevered over the bluff due to the extremely high rate of bluff erosion in February 1940 and October 1941. (Davis, Ray, 1940-41)

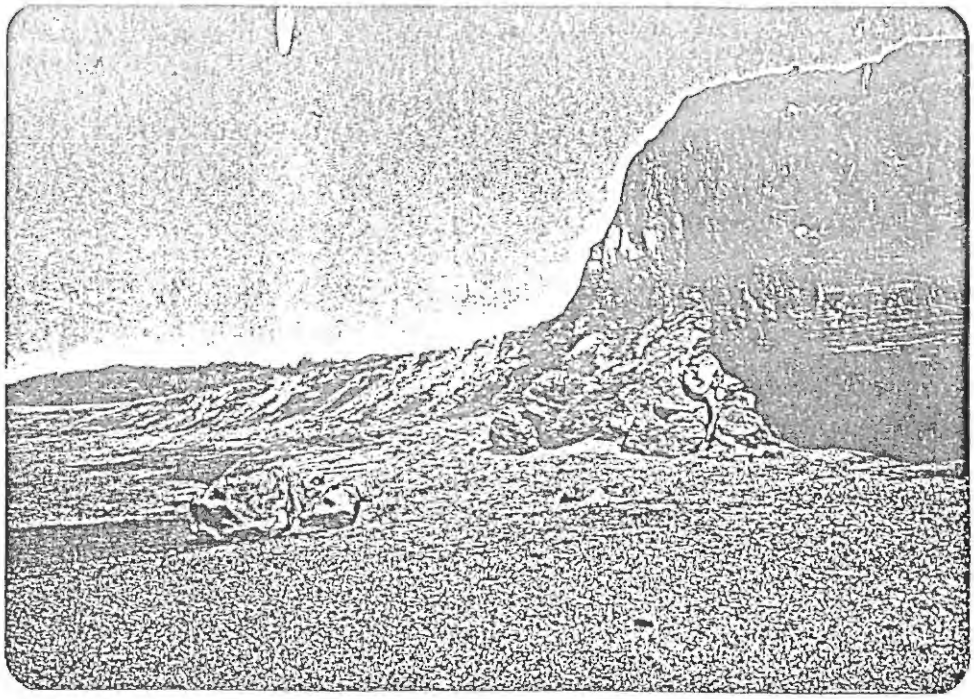


No. 44: View east of Big Lagoon Park, Big Lagoon Park Company cabins, and Big Lagoon Subdivision northerly portion. (March 27, 1980, 9:30 a.m., Tuttle)

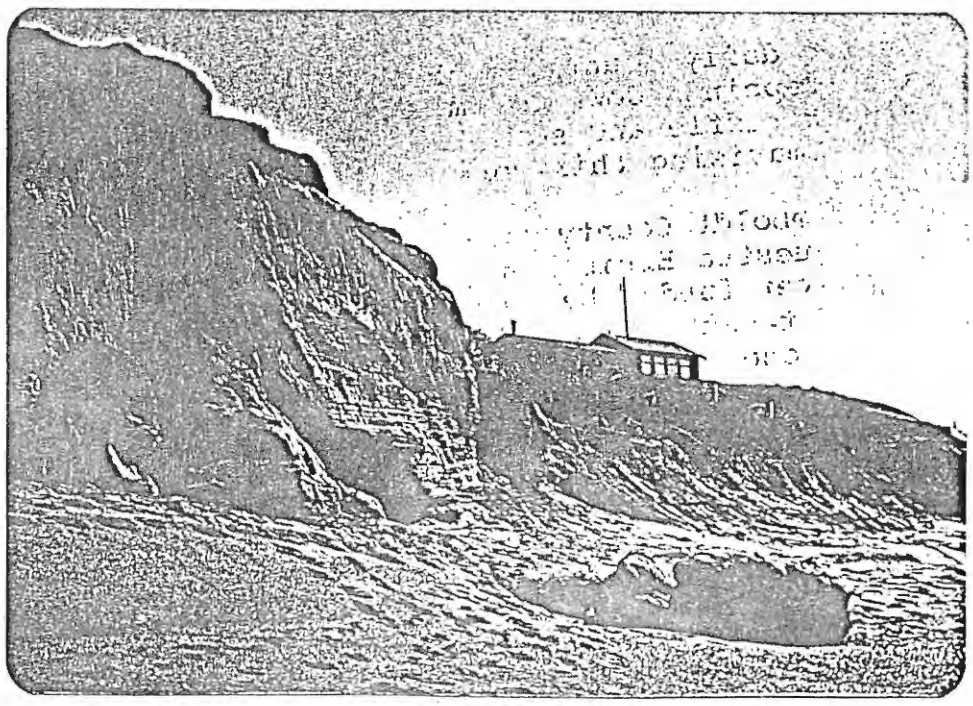


No. 45: Close-up of bluffs along Big Lagoon Park Company land. (March 27, 1980, Tuttle)

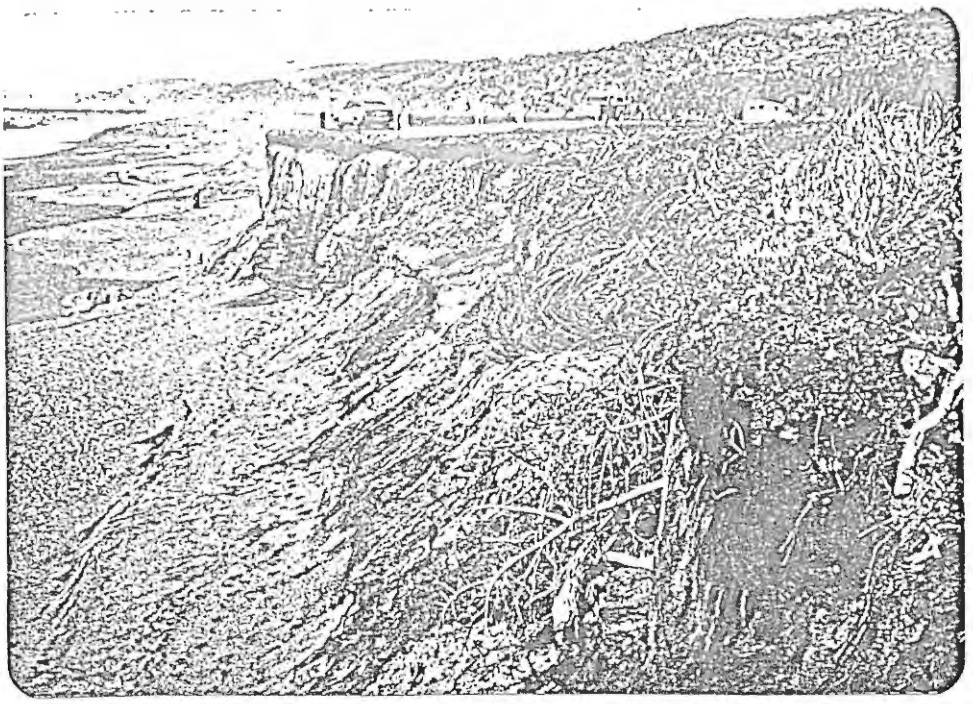
No. 46: View northeast of wave cut beach and bluffs at south end of Big Lagoon along Big Lagoon County Park. This photo taken at approximately the same place as Photo No. 28. (March 9, 1980, Tuttle)



No. 47: View north of recent block of bluff failure close to southwestern corner of Big Lagoon County Park. Note how waves cut underneath the bluff removing its foundation. (March 9, 1980, Tuttle)

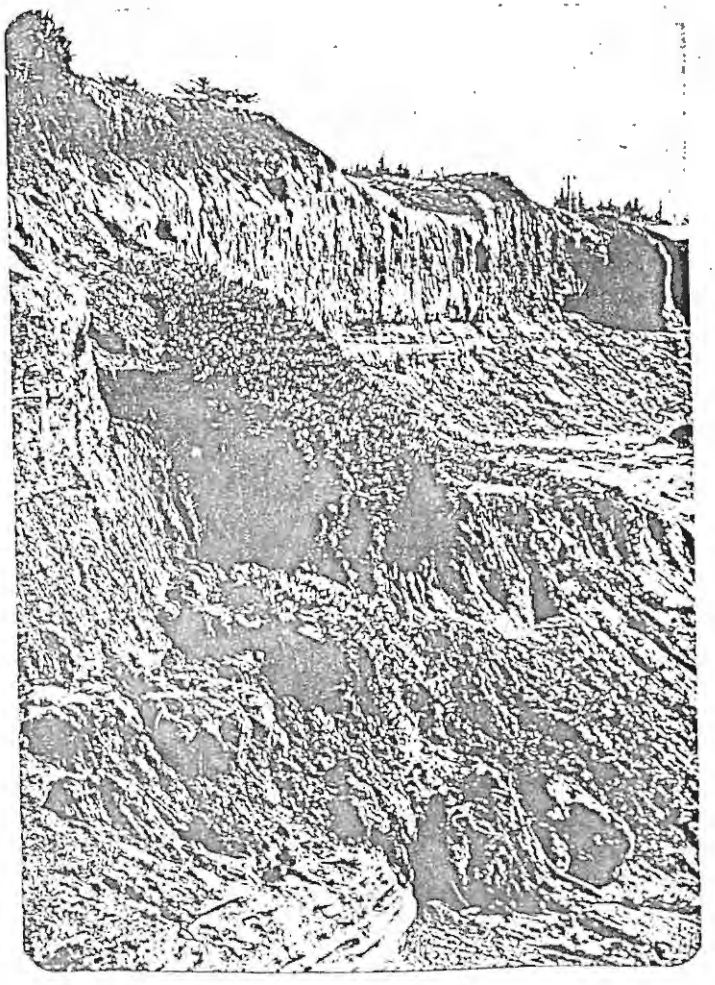


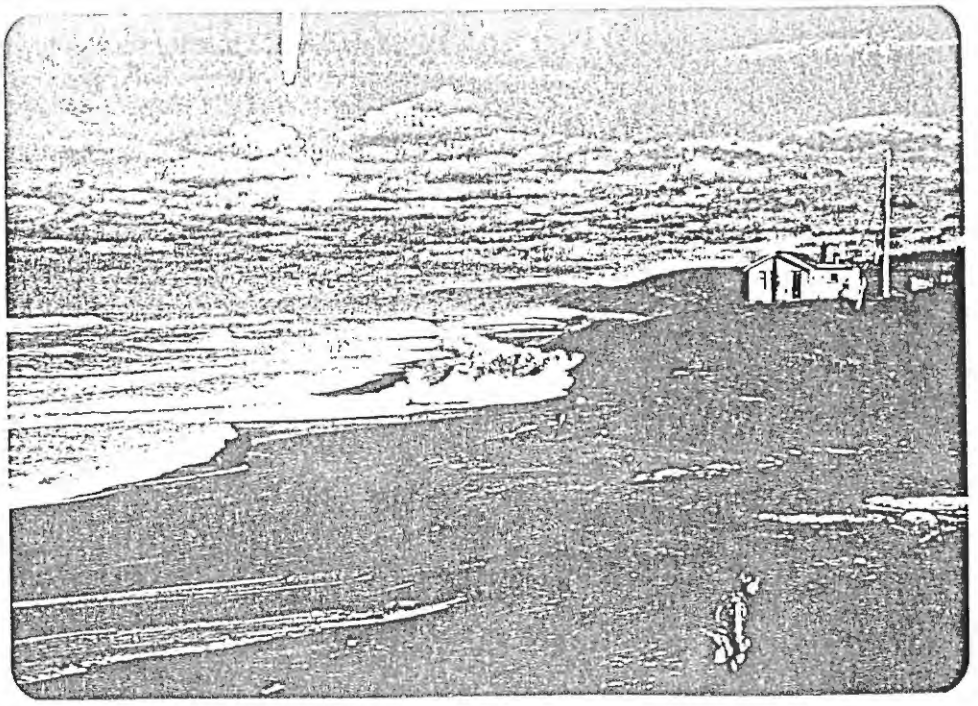
No. 48: View south of bluffs at southwest corner of Big Lagoon County Park and wave cut beach topped with vegetation and debris. Summer beach profile has dropped approximately ten feet at this area. (March 9, 1980, Tuttle)



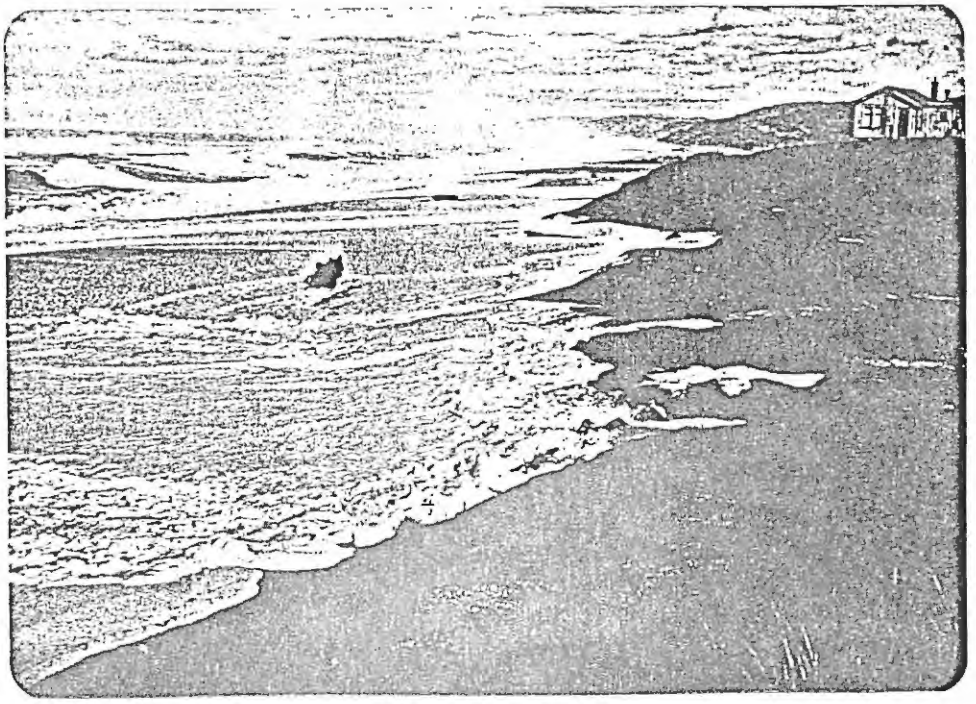
No. 49: View north of wave cut beach topped with vegetation and recently eroded bluffs at southwest corner of Big Lagoon County Park. (March 9, 1980, Tuttle)

No. 50: View south of recently failed wave cut beach sediments at southwest corner area of Big Lagoon County Park. (March 9, 1980, Tuttle)

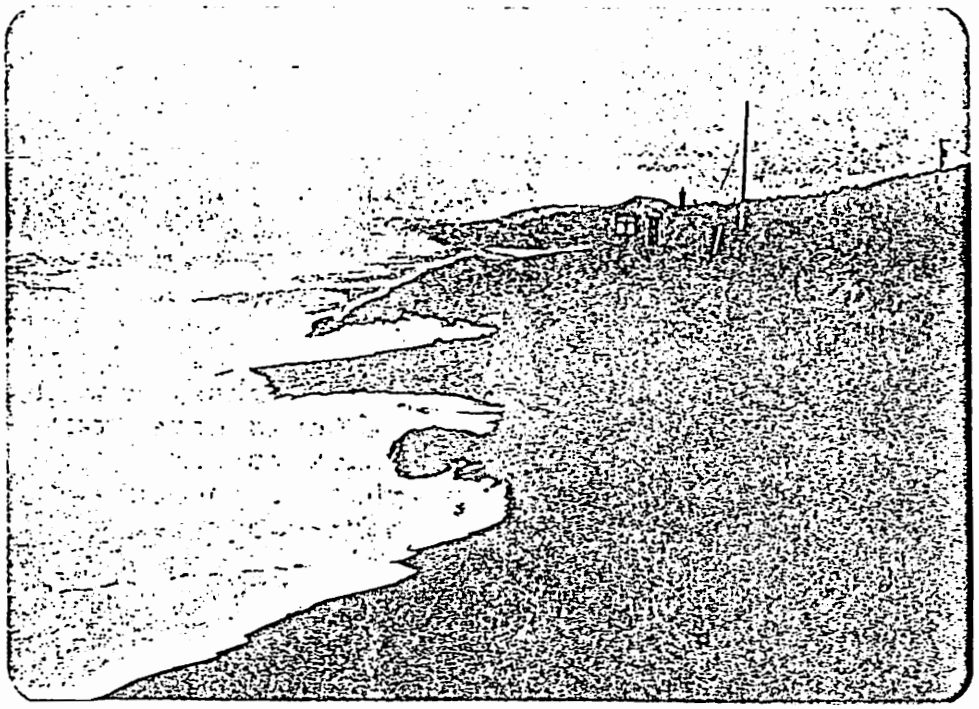




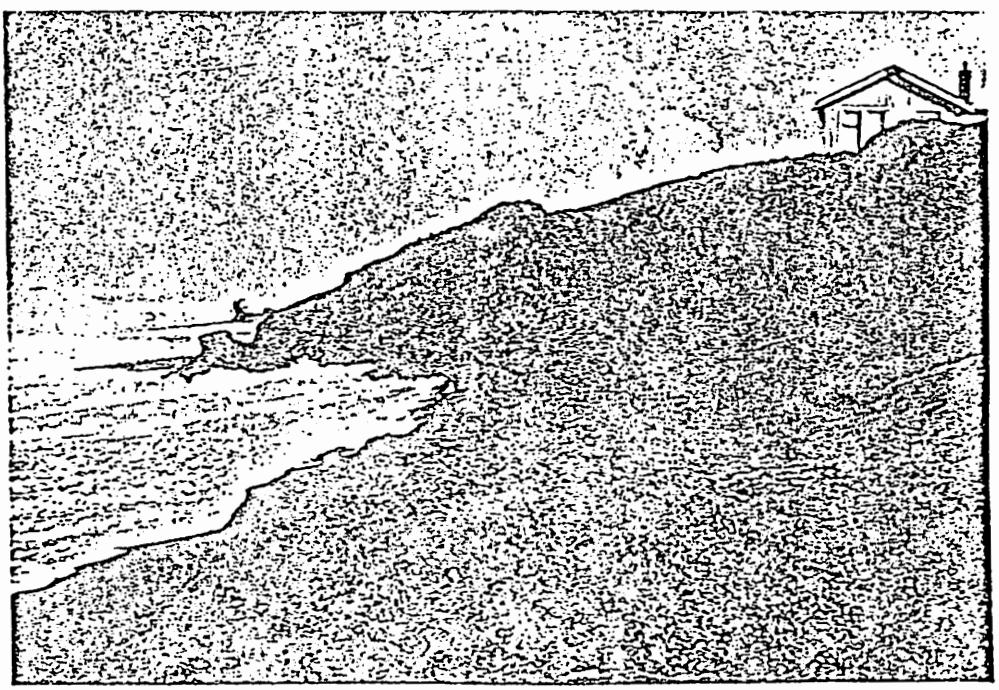
No. 51: View north of waves attacking bluffs in front of cabin number 1020 at south end of Devils Canyon Road in Big Lagoon Park Company. (January 8, 1978, 11:45 a.m., Tuttle)



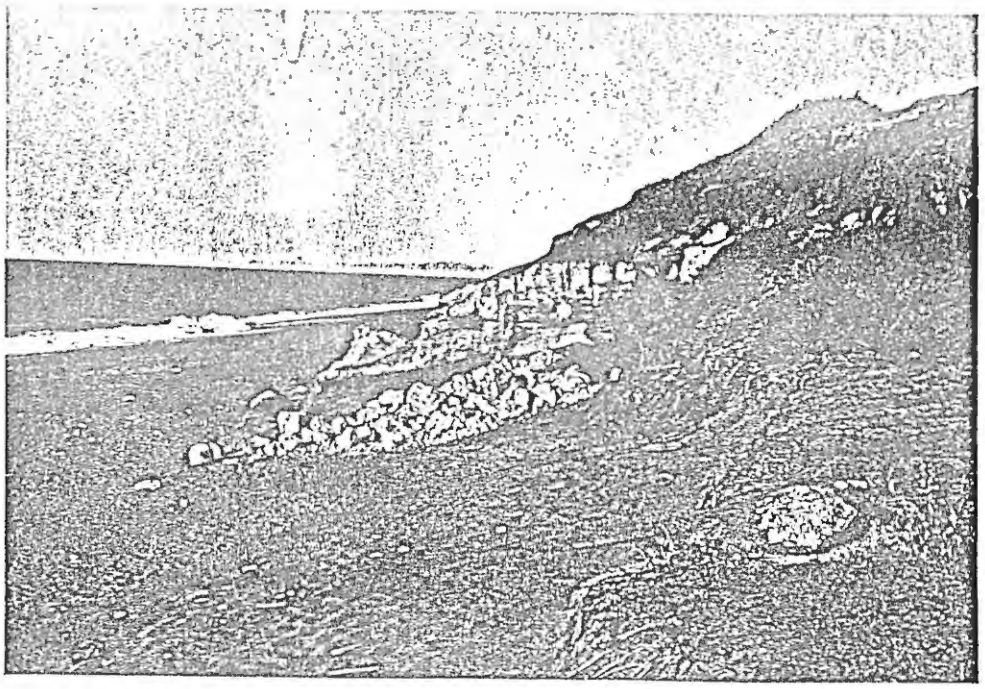
No. 52: View north of high run up to bluffs during storm of January 8, 1978. Similar to view in photo No. 51. (January 8, 1978, Tuttle)



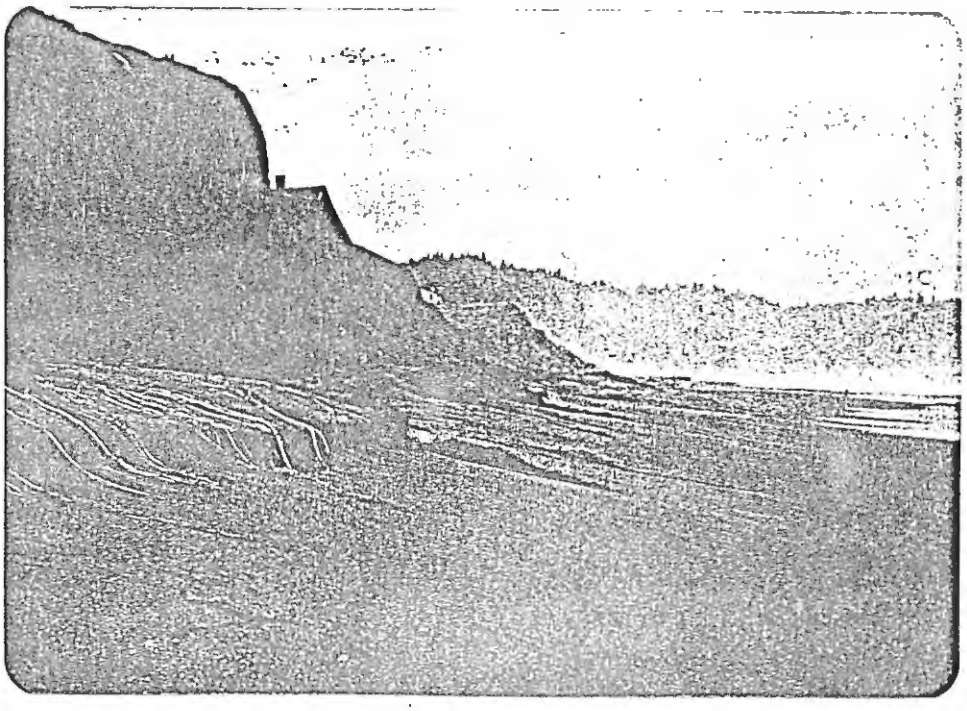
No. 53: Same view as in photos 51 and 52 of high run up and surf attacking base of bluffs in front of cabin No. 1020. (December 31, 1979, Tuttle)



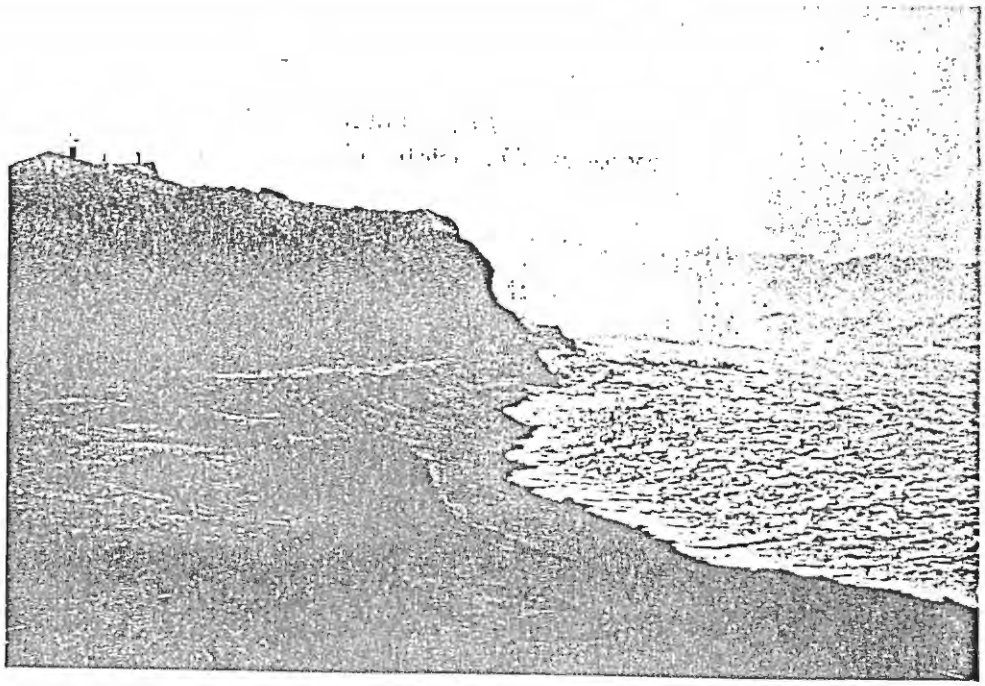
No. 54: View north to bluffs in front of cabin 1020 showing surf attacking base of bluffs and summer beach. (November 8, 1980, 11:00 a.m., Tuttle)



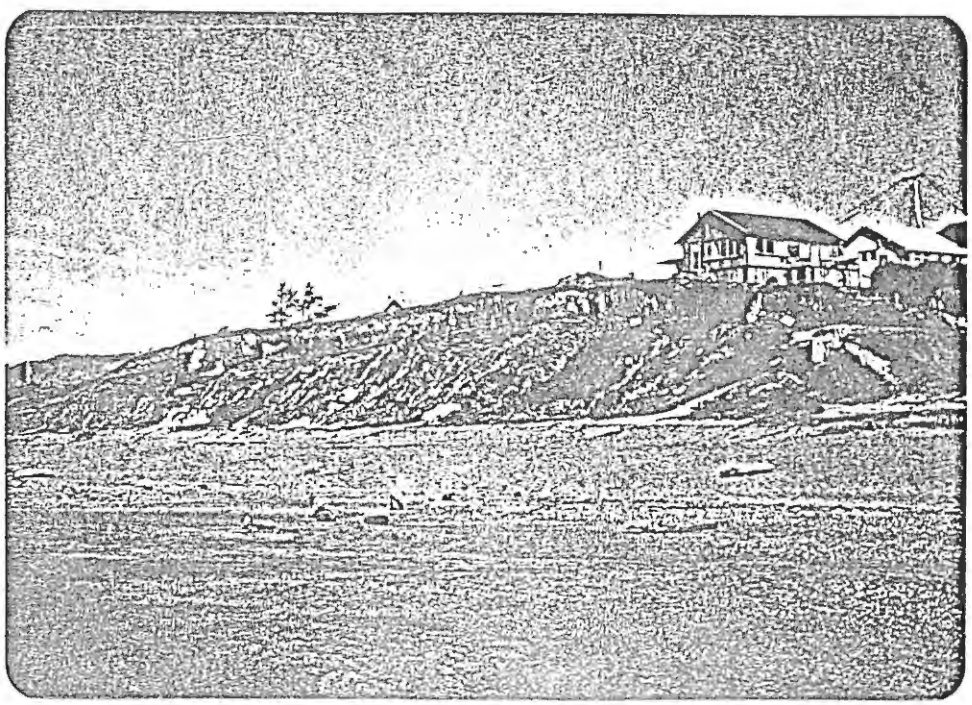
No. 55: Typical bluff failure in front of cabins number 1005 and 1020 immediately west of Devils Canyon Road in Big Lagoon Park Company Land. (December 14, 1980, Tuttle)



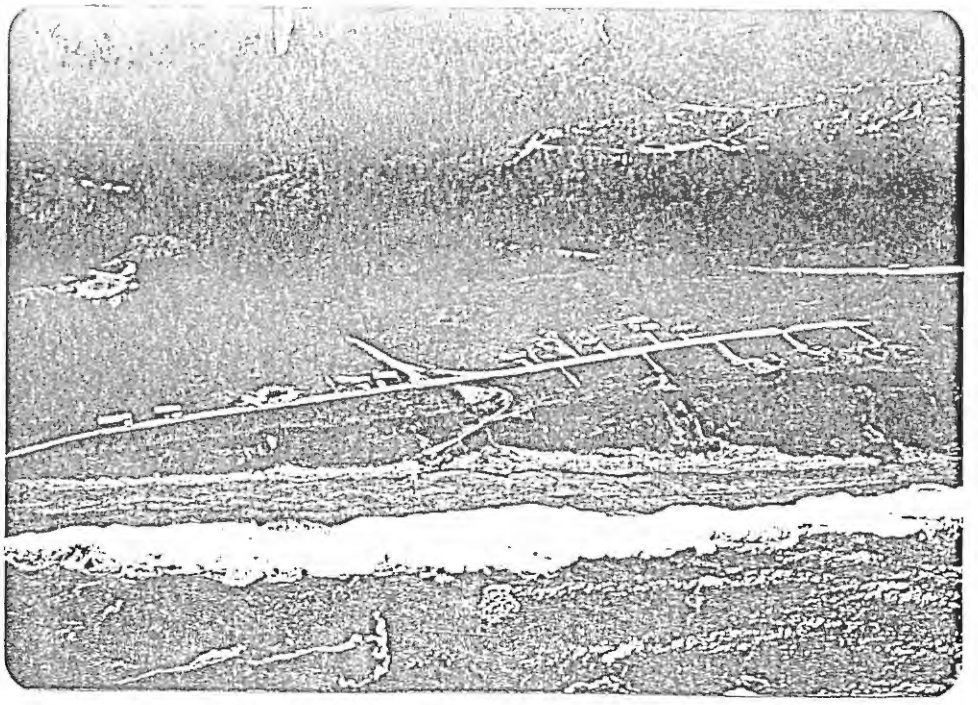
No. 56: View south of beach profile and bluffs immediately west of beach drive in Big Lagoon Park Company. (December 31, 1979, Tuttle)



No. 57: View south of bluffs under wave attack immediately west of Beach Drive in Big Lagoon Park Company land. (November 8, 1980, 11:00 a.m., Tuttle)

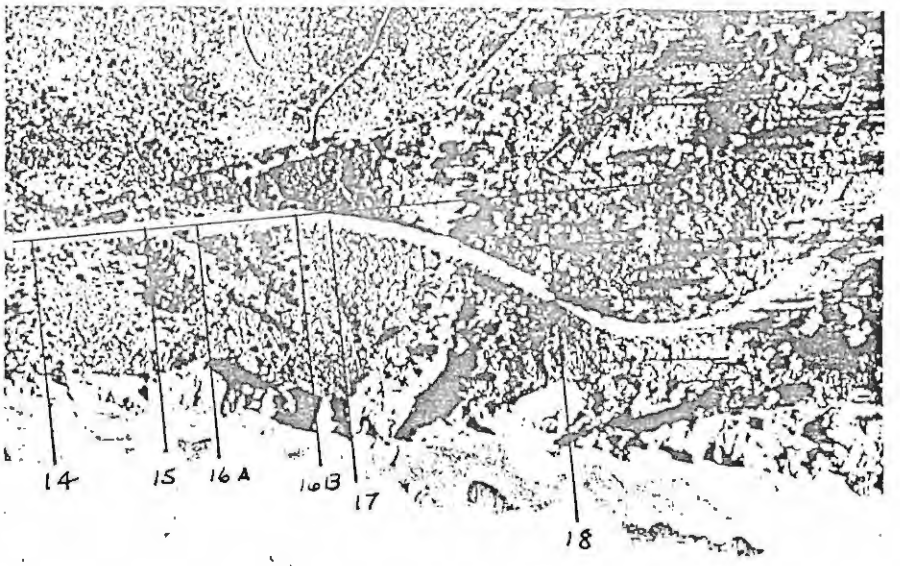


No. 58: View northeast of bluffs immediately west of Beach Drive in Big Lagoon Park Company land. Note gray cabin in right foreground and compare with Photo No. 42.

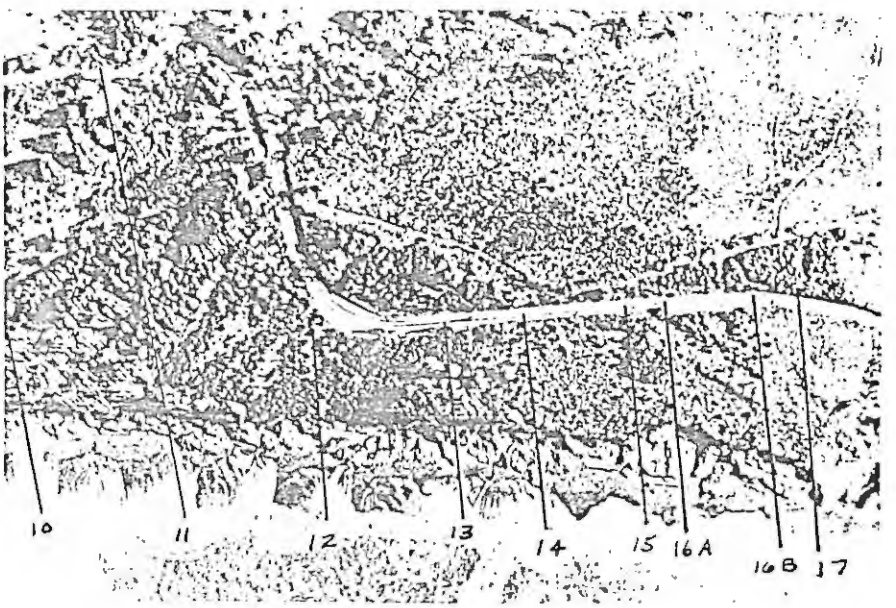


No. 59: Aerial view east of Big Lagoon Subdivision showing lots from right to left, one through thirty-three on west side of Ocean View Drive. (April 12, 1975, Falis, Robert)

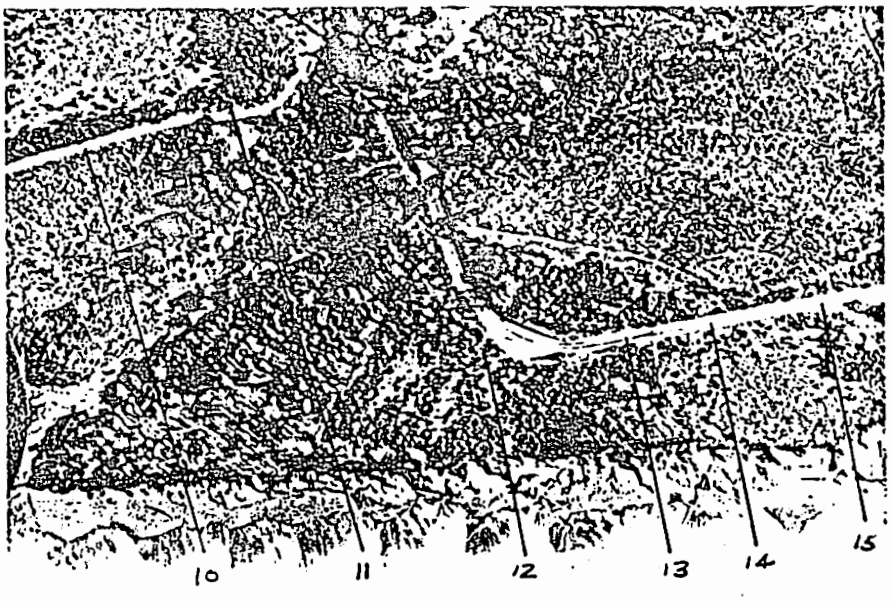
No. 60: Aerial photo dated November 6, 1941 of southerly portion of Big Lagoon Subdivision showing lots sixteen through thirty-three. Photo also shows measurement stations one, and ten through fourteen. Note surf is attacking base of bluff in left portion near station one. (Photo No. C7490-726, Teledyne Geotronics)



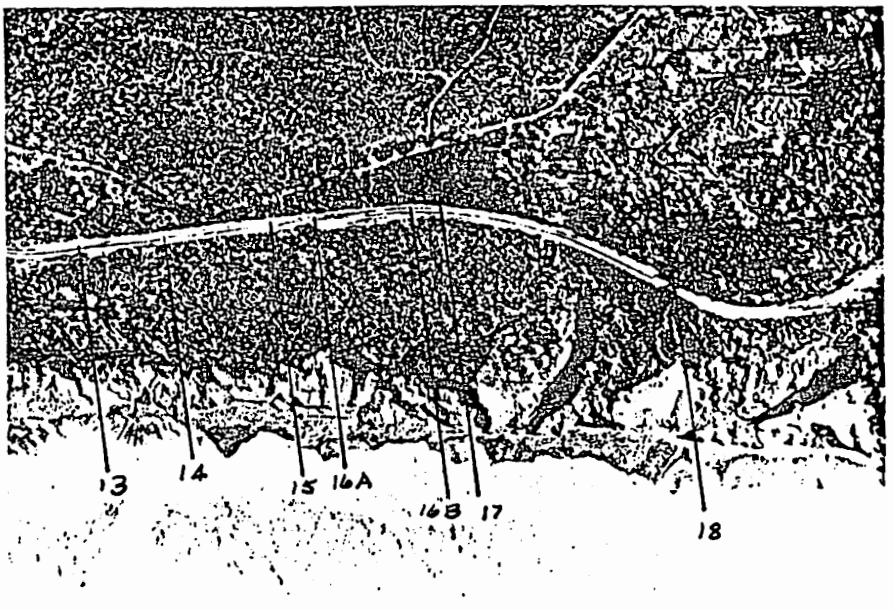
No. 61: Aerial photo dated November 6, 1941 of portion of Big Lagoon Subdivision showing lots three through fifteen and measurement stations fifteen through eighteen. (Photo No. 7490-726, Teledyne Geotronics)



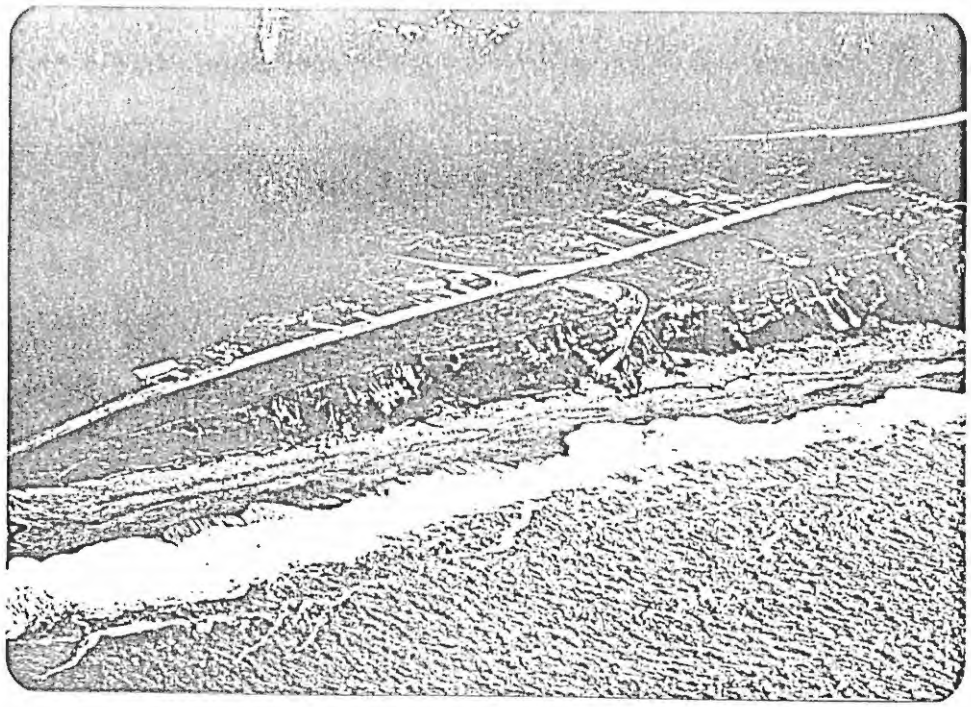
No. 62: Aerial photo of Big Lagoon Subdivision area. February 16, 1942 showing lots one through thirty-one and measurement stations ten through seventeen. Note surf attacking base of bluff. (Photo No. CVL-9B-134. USDA, Salt Lake City, Utah)



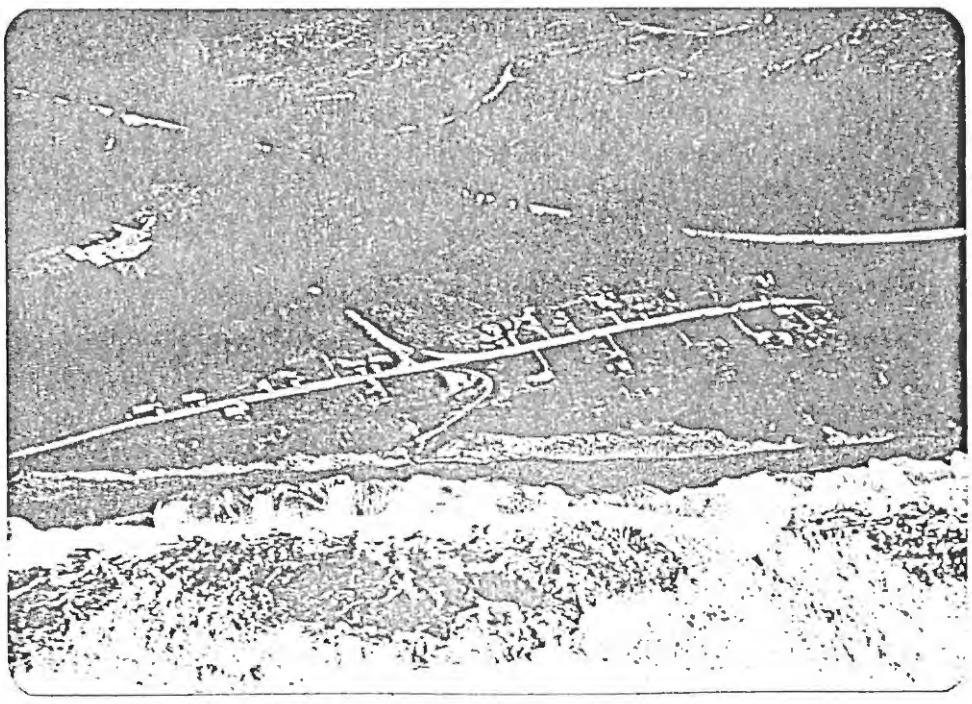
No. 63: Aerial photo of Big Lagoon Subdivision showing lots fifteen through thirty-three and measurement stations ten through fifteen. (Photo dated February 16, 1942. Photo No. CVL-9B-134, NE-1/4. USDA, Salt Lake City, Utah)



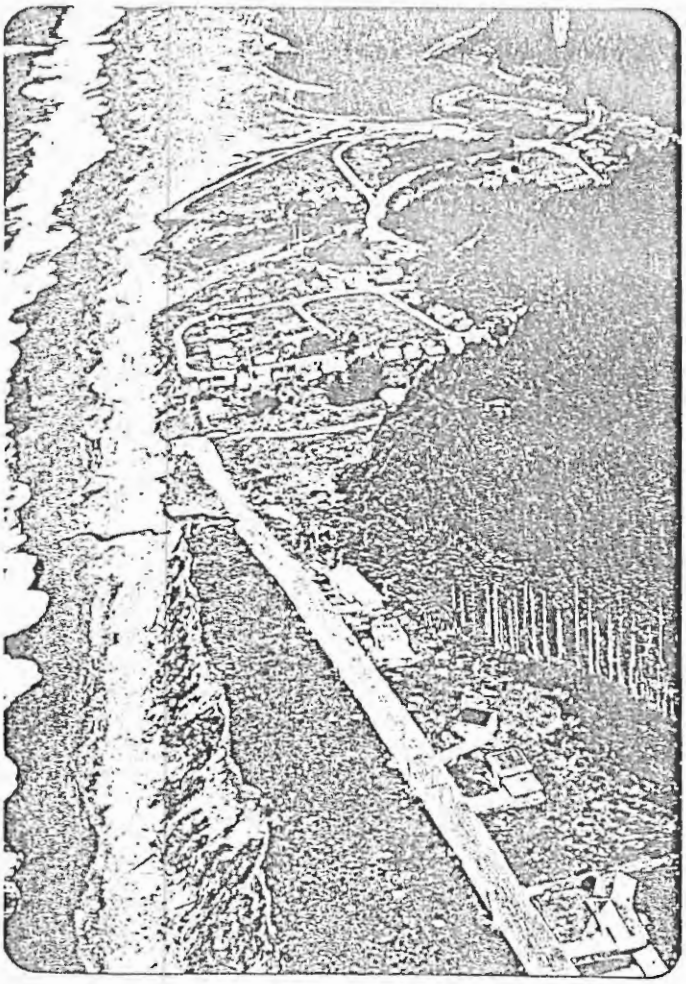
No. 64: Aerial photo of southerly portion of Big Lagoon Subdivision showing lots one through twenty-two and measurement stations thirteen through eighteen. (Photo dated February 16, 1942. Photo No. CVL-9B-134, NE-1/4. Note large eroded canyons in right portion and surf attacking base of bluffs. USDA, Salt Lake City, Utah)



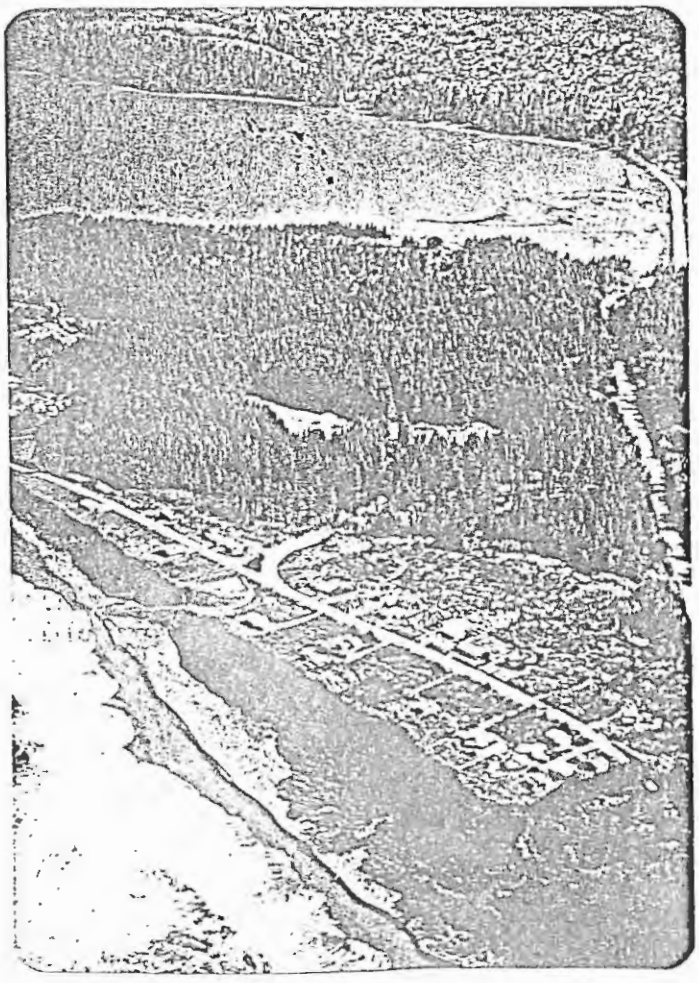
No. 65: View southeast of Big Lagoon Subdivision on March 9, 1974. Note only three to four houses constructed west of Ocean View Drive.



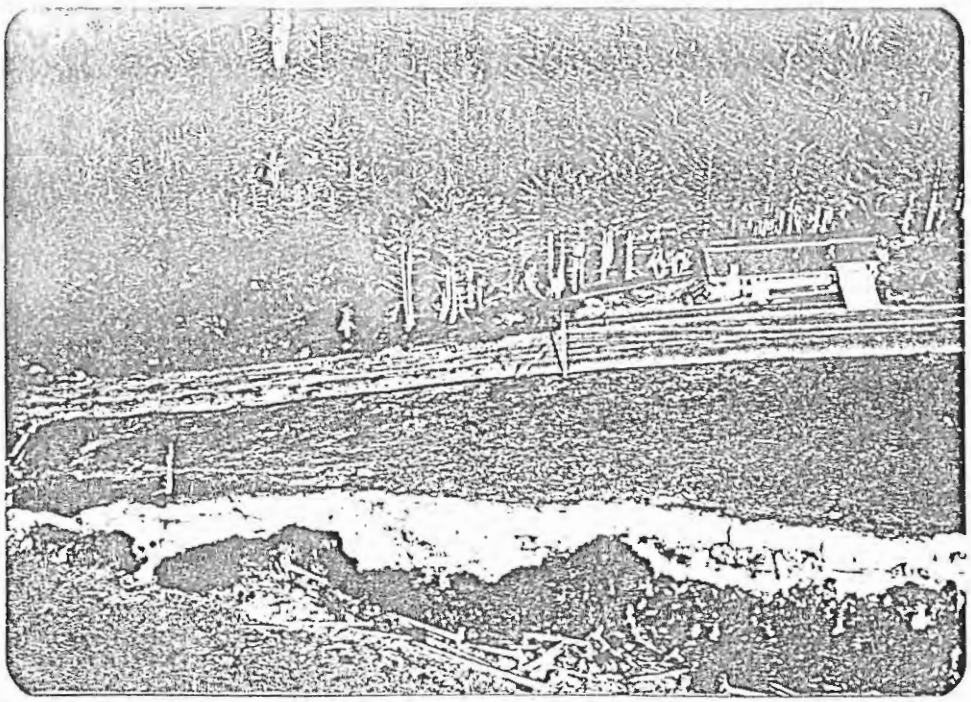
No. 66: View east of Big Lagoon Subdivision on March 27, 1980 at 9:30 a.m. Note approximately eleven houses built west of Ocean View Drive. Also note wave cut bench appears to exist west of base of bluffs along southerly portion. (March 27, 1980, Tuttle)



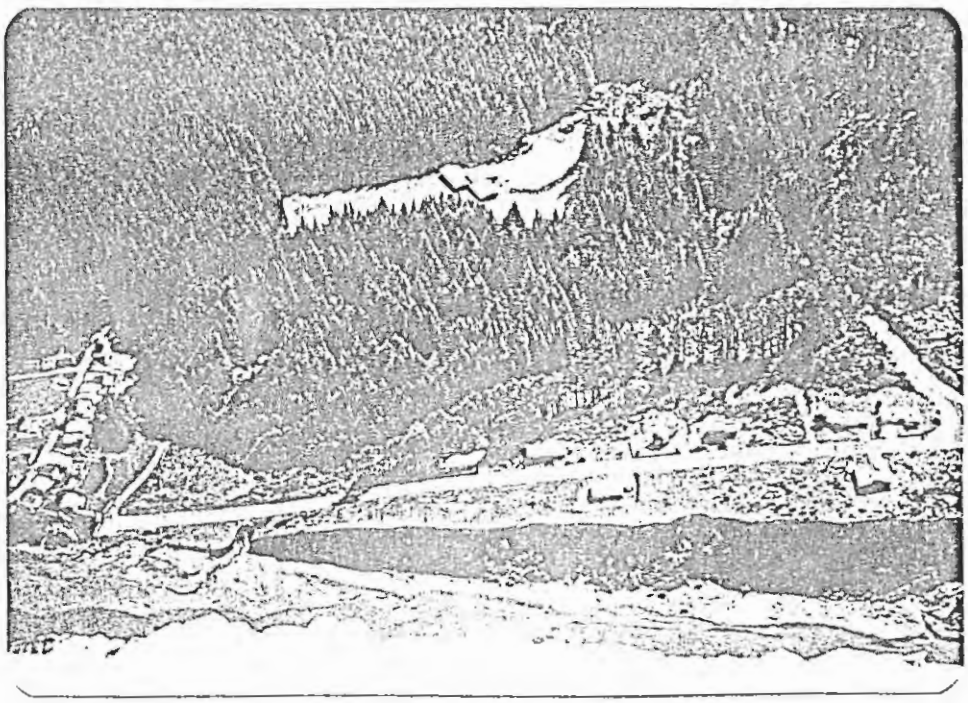
No. 67: View north of northerly portion of Big Lagoon Subdivision, Big Lagoon Park Company Land, Big Lagoon County Park. (VanDeMark, Dave, March 9, 1974)



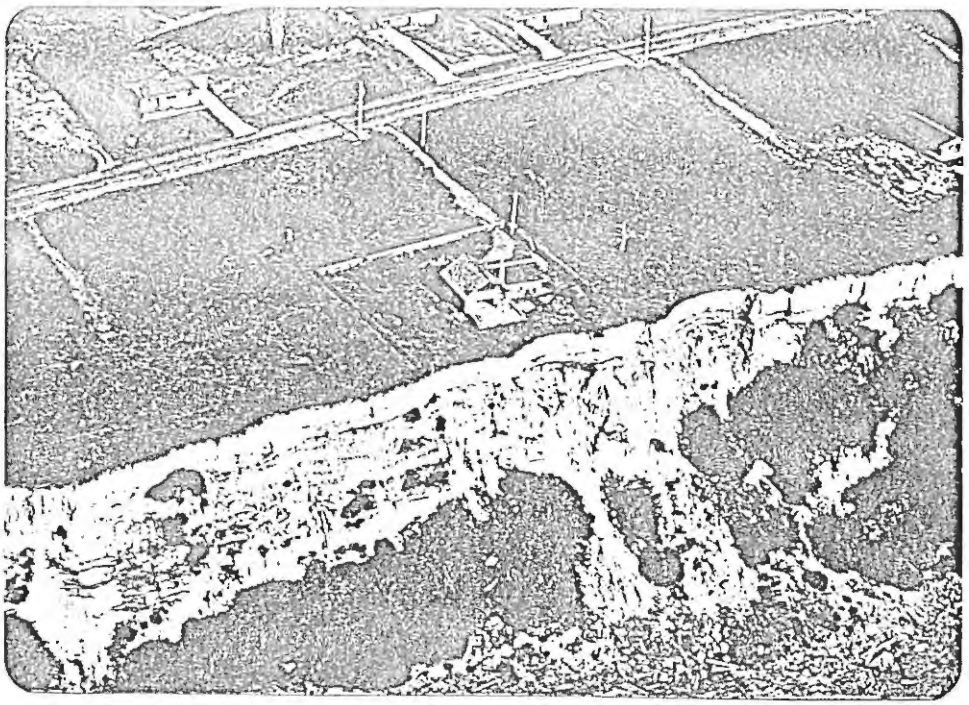
No. 68: View northeast of Big Lagoon Subdivision with Big Lagoon in the background. Note wave cut bench along base of bluffs. (March 27, 1980, 9:30 a.m., Tuttle)



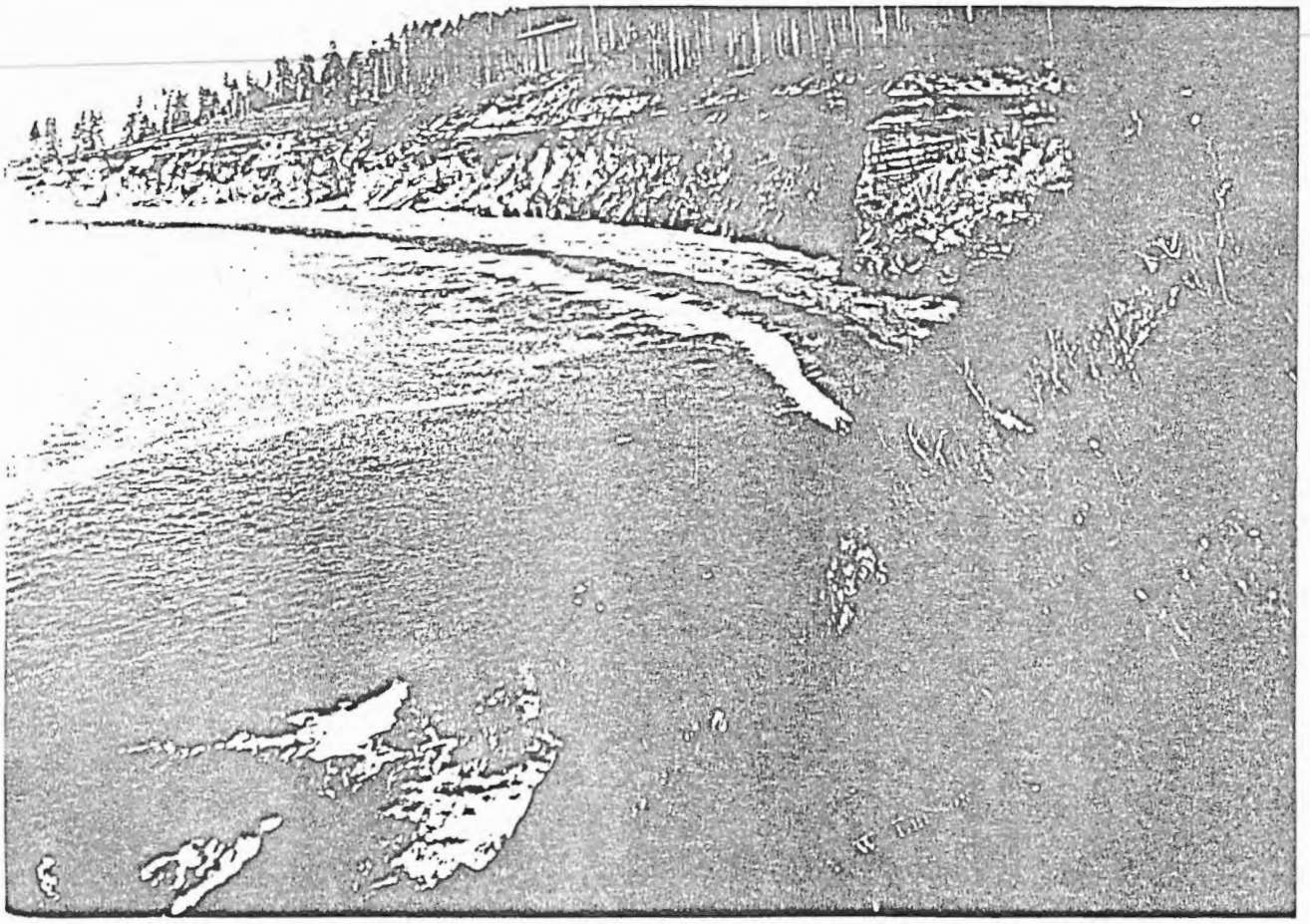
No. 69: View west of lot thirty-three in Big Lagoon Subdivision. (July 29, 1975, Falis, Robert)



No. 70: View west of lots twenty-six through thirty-three in Big Lagoon Subdivision. March 27, 1980, Tuttle)



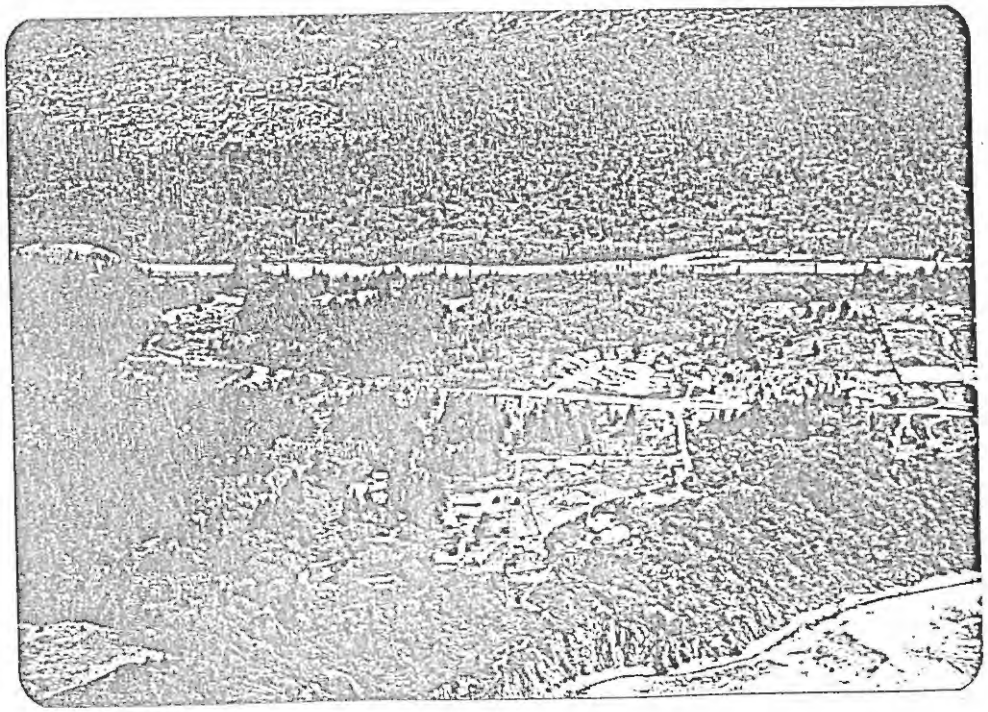
No. 71: View west of lots fifteen, sixteen and nineteen near measurement station fourteen of Big Lagoon Subdivision. (July 29, 1975, Falis, Robert)



No. 72: View northeast of bluffs along Agate Beach in Patricks Point State Park. Note surf reaches base of bluff. (Ca. 1910 by A. W. Erickson. Source Peter Palmquist)

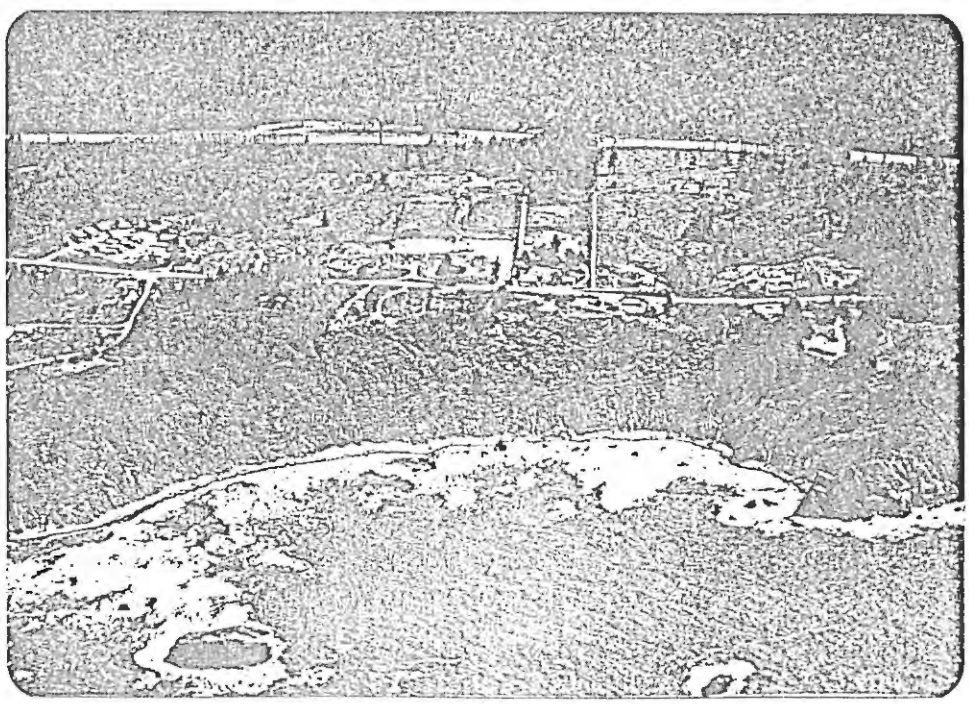
No. 73: View northeast of bluffs along Agate Beach taken from approximately the same point of photo No. 72 roughly seventy years later. (April 27, 1980, Tuttle)

No. 74: View northeast from Lookout Point in Patricks Point State Park showing storm surf hitting beach. (January 8, 1978, 9:00 a.m., Tuttle)

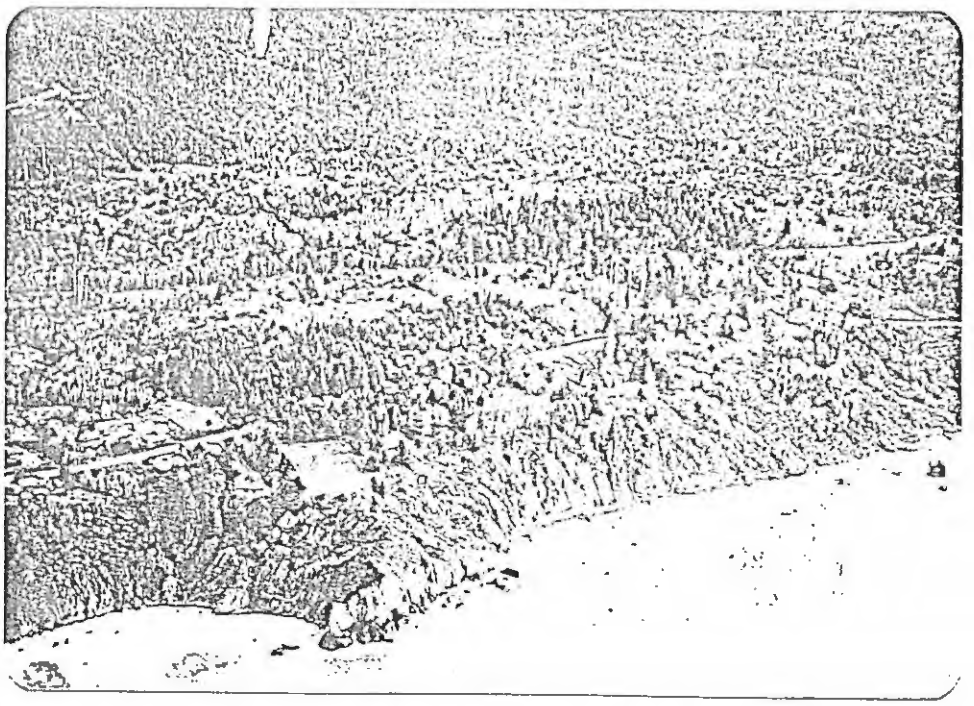


No. 75: View east of bluffs immediately south of the south edge property line of Patricks Point State Park. This beach has been locally known as Cannonball Beach. (April 12, 1975, Fallis, Robert)

No. 76: Same bluffs as in photo No. 75. (March 27, 1980, Tuttle)



No. 77: View of bluffs south of photos 75 and 76 located in section thirty-four showing the Old Patricks Point school in the background east of Patricks Point Drive. (April 12, 1975, Falis, Robert)



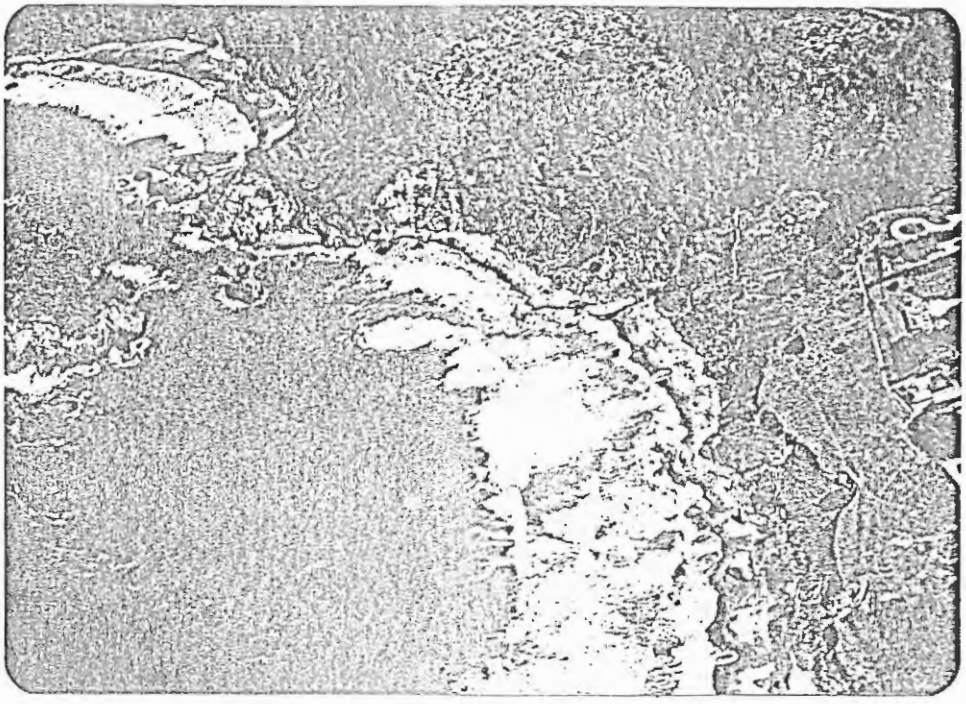
No. 78: View of bluffs immediately south of those in Photo No. 77. (January 25, 1978, 12:43 p.m., VanDeMark, Dave)

No. 79: Aerial photo of shoreline at Scotty's Point showing measurement stations three through seven. (Photo No. CVL-9B-138D, February 16, 1942, USDA, Salt Lake City, Utah)

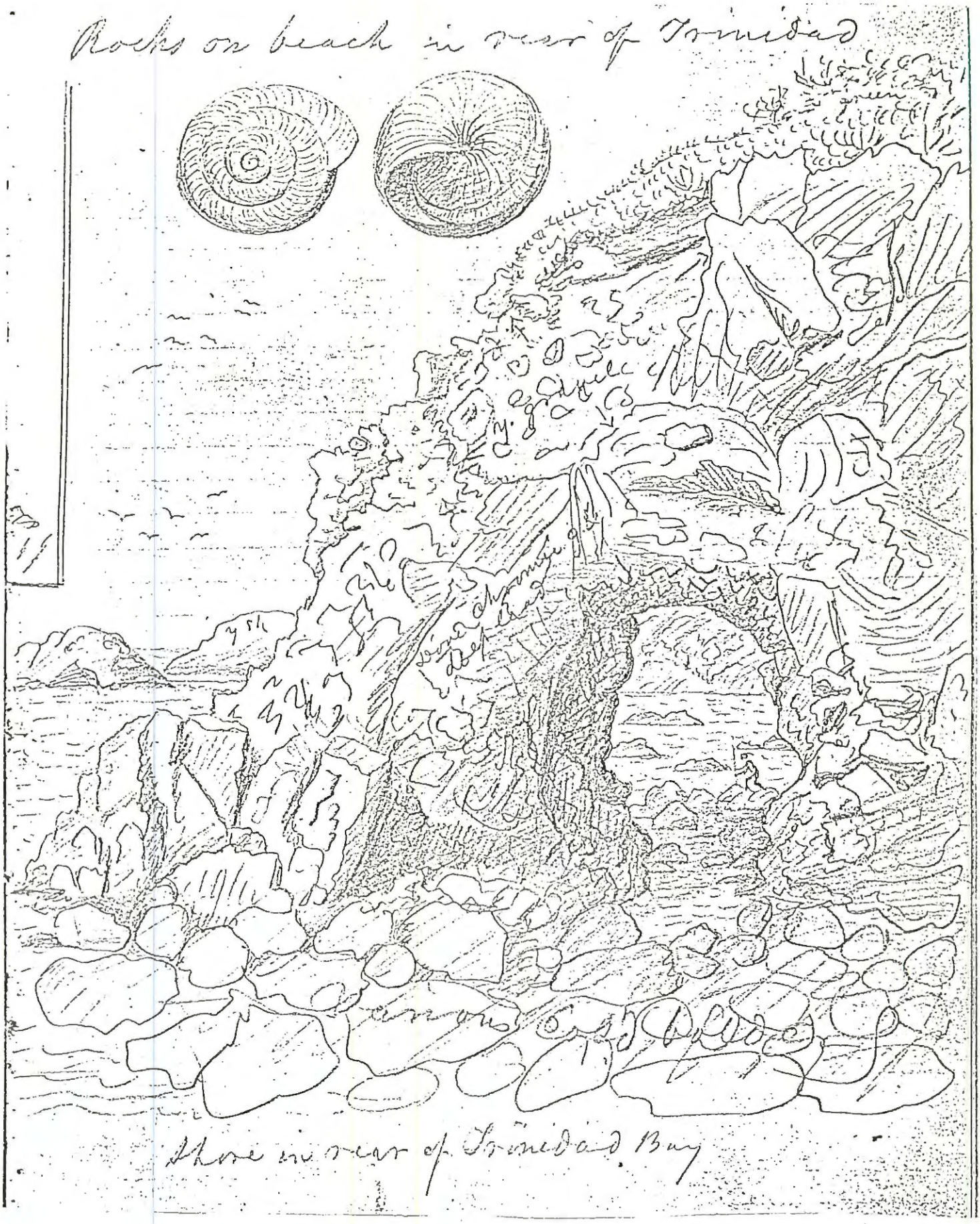
No. 80: Aerial photo of next portion of shoreline south of Photo No. 79 showing measurement station eight, nine, ten and an upper portion of eleven. (Photo No. CVL-9B-138D, February 16, 1942, USDA, Salt Lake City, Utah)

No. 81: Aerial photo of shoreline near Colonial Inn showing measurement stations eleven, twelve and thirteen. (Photo No. CVL-9B-138B, February 16, 1942, USDA, Salt Lake City, Utah)

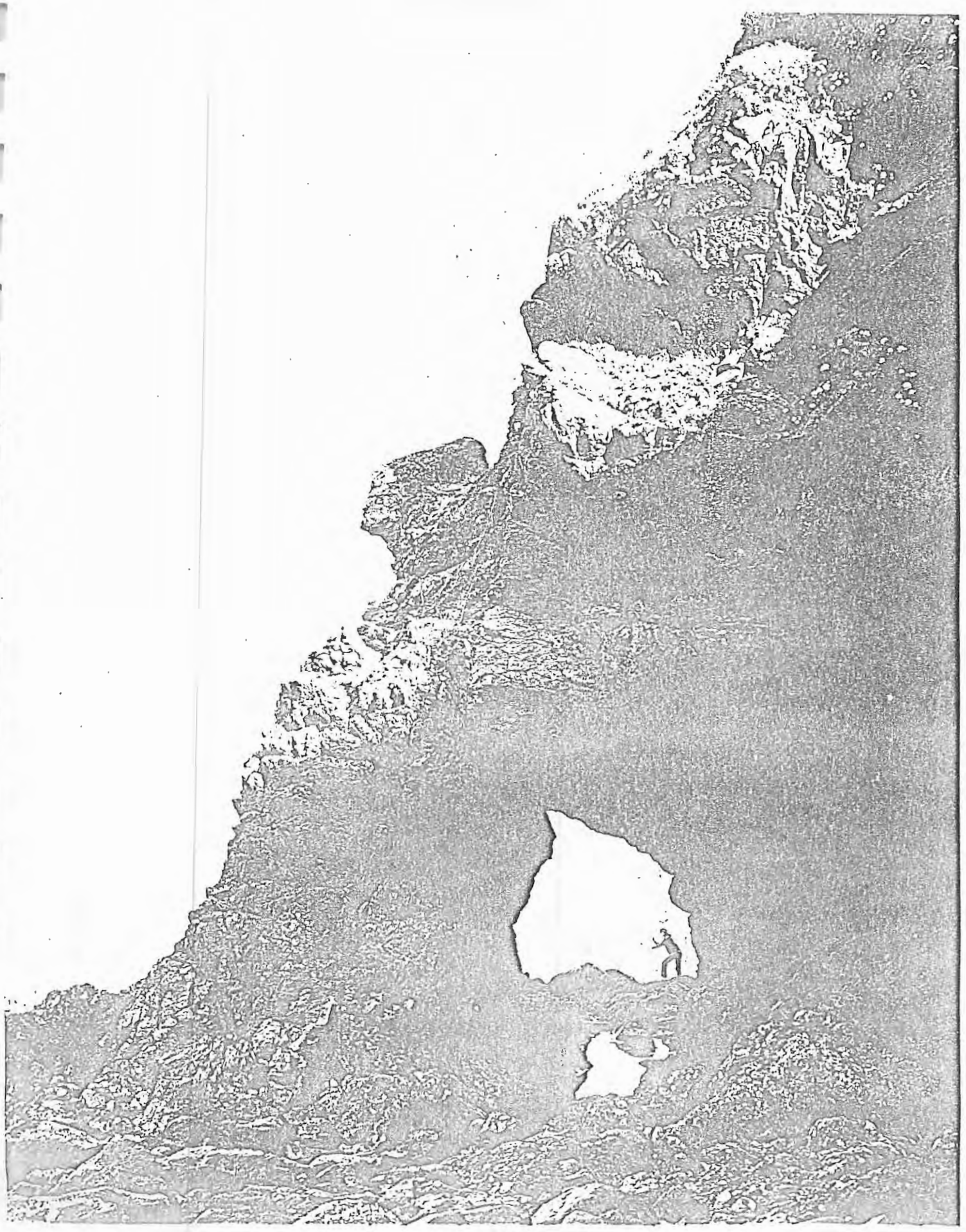
No. 82: Aerial photo of coastline from White Rock to Pewetole Island. The Anderson property is close to the center of this photograph with the bluffs facing northwest. (Photo No. CVL-9B-138, February 16, 1942, USDA, Salt Lake City, Utah)



No. 83: View north showing College Cove in the background. Eastern edge of Pewetole Island on the left portion of the photograph. Trinidad Beach State Park in the middle of the photograph and a portion of the bluffs and beach immediately west of the town of Trinidad in the foreground in the lower right. (April 12, 1975, Woodward, Linda)

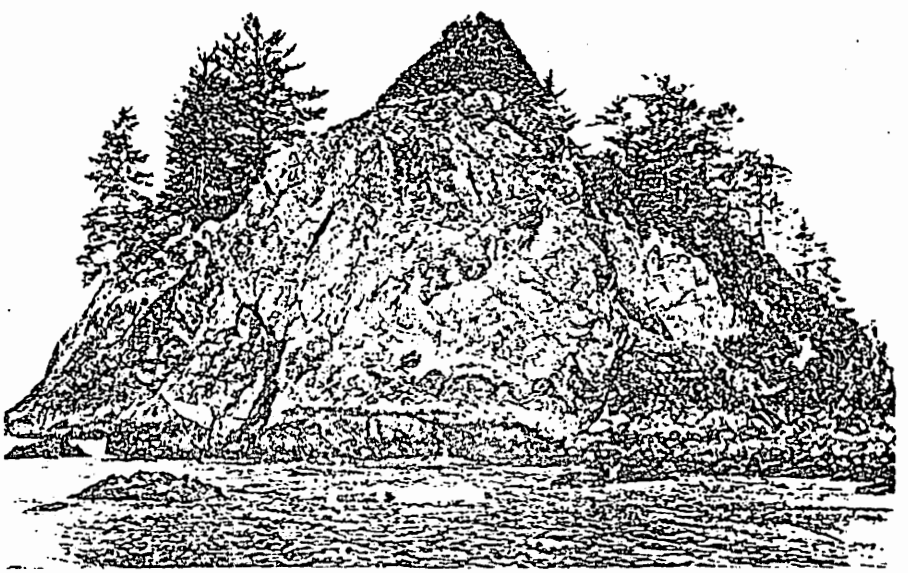


No. 84: Sketch of rock cave on Trinidad State Park Beach immediately east of Pewetole Island. This sketch was made by J. Goldsborough Bruff in February 1851. The view is north towards College Cove. (Read and Gaines, 1944)



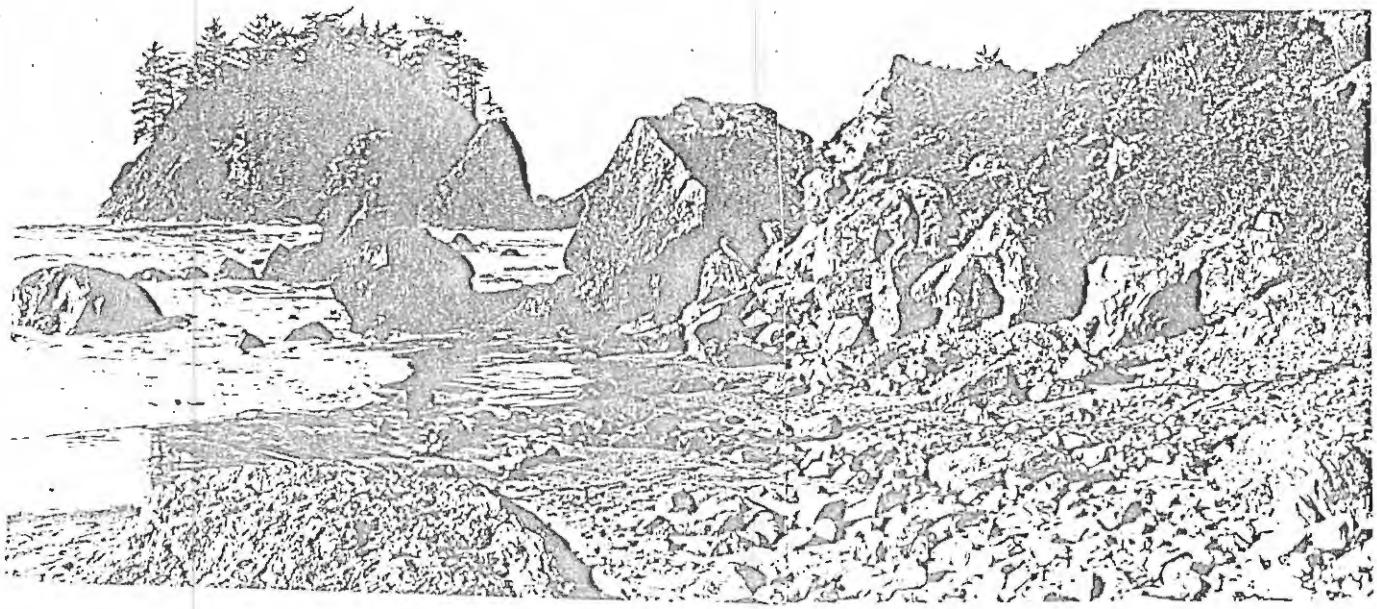
No. 85: Photograph from same point as sketch shown in No. 84. (April 18, 1980, Glatzel, William)

No. 86: Sketch of offshore rock immediately east of Pewetole Island made by J. Goldsborough Bruff in February 1851. (Read & Gaines, 1944)

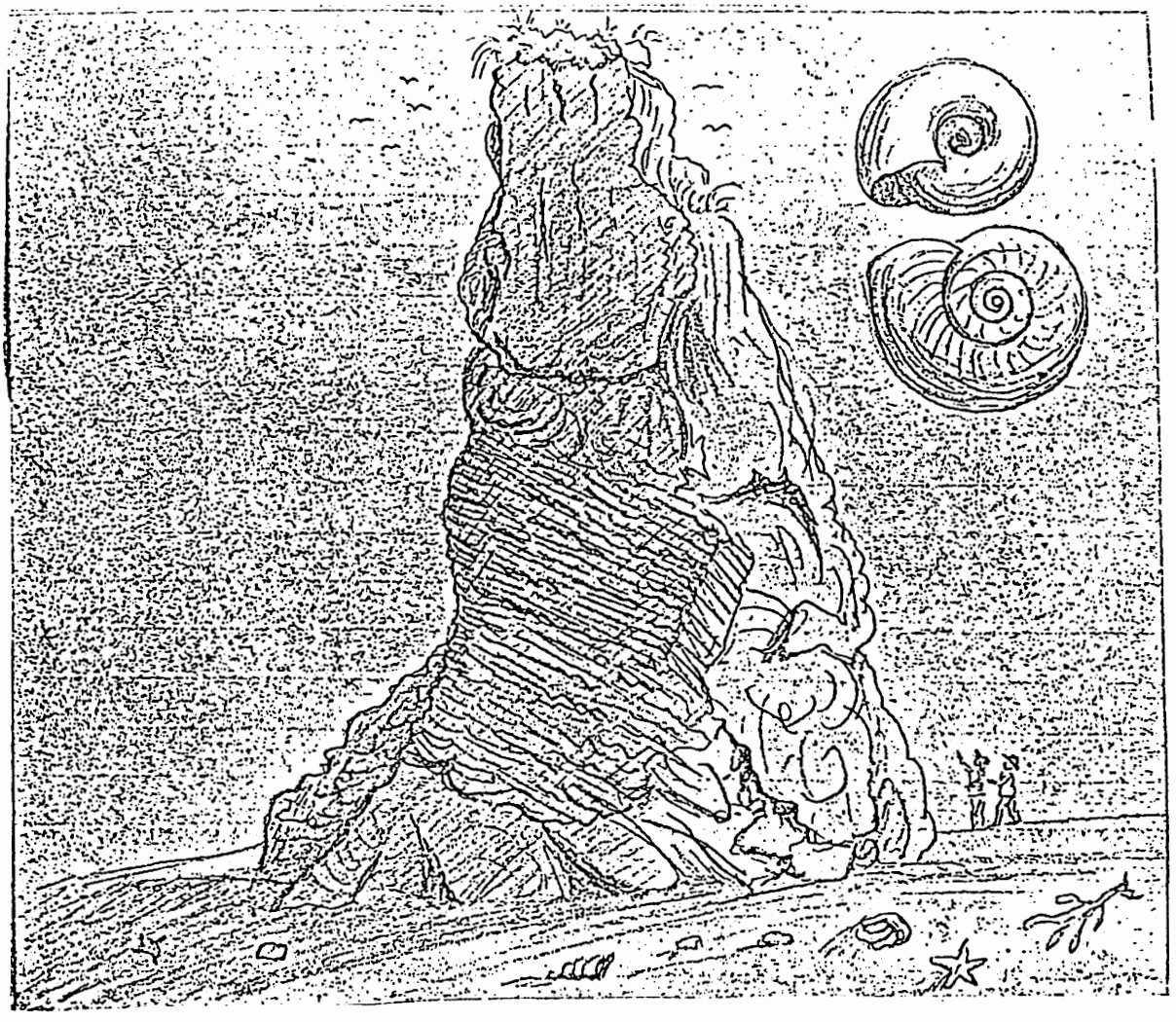


No. 87: Photo taken from same point as sketch in No. 86. Note that Bruff did not sketch Pewetole Island immediately behing the rock feature. (April 18, 1980, Glatzel, William)

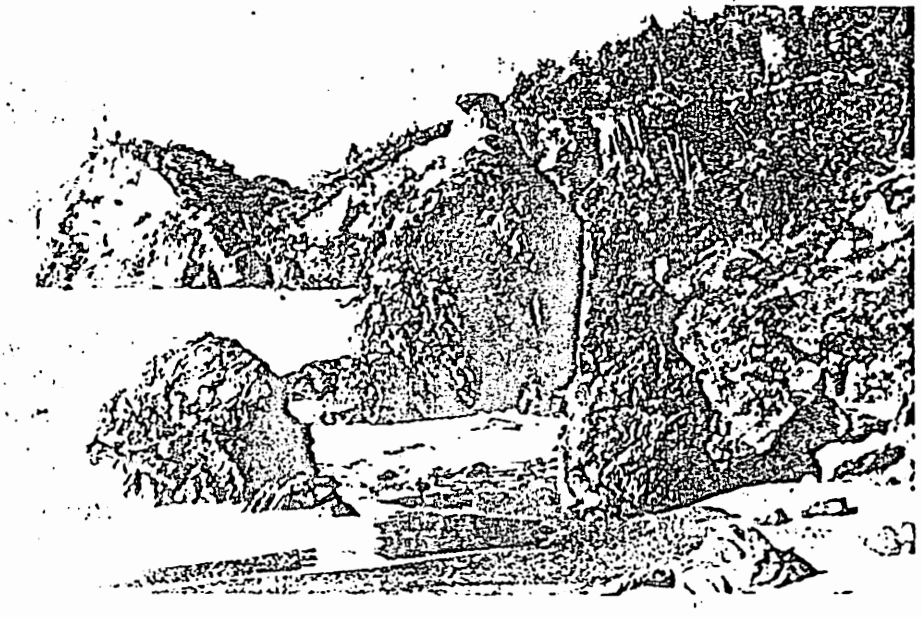
No. 88: View north to Pewetole Island from beach in front of Trinidad taken by A. W. Erickson around 1910. (Peter Palmquist)



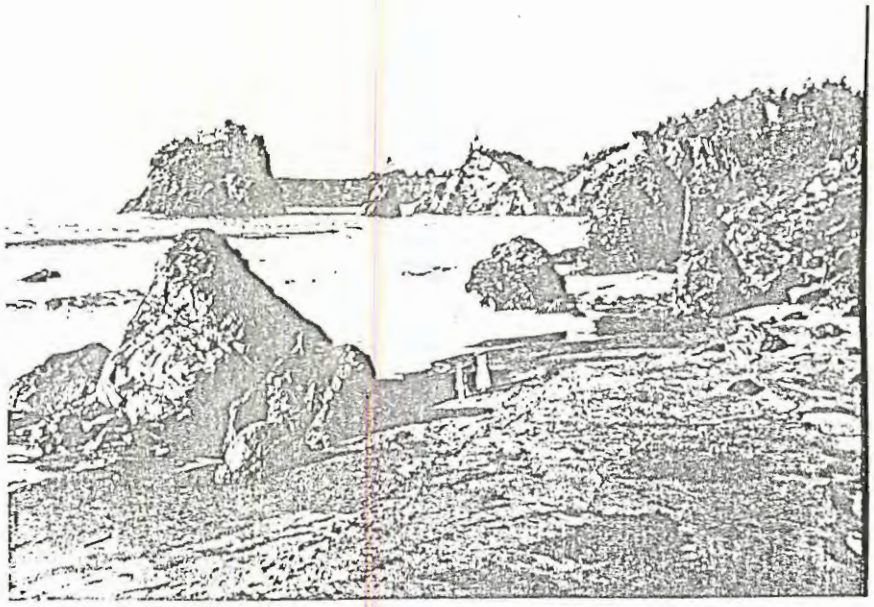
No. 89: Present day view from same point as photo taken by Erickson shown in No. 88. Note beach profile is very similar to that seventy years ago. (November 27, 1980, Tuttle)



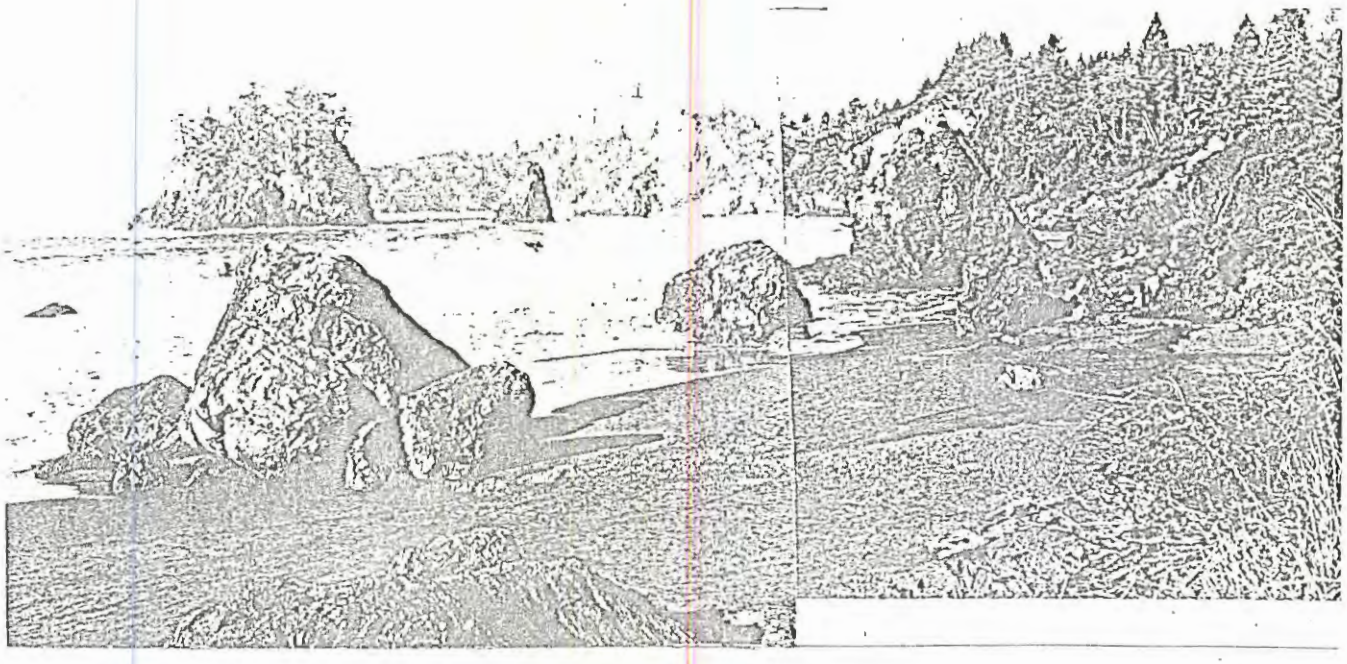
No. 90: Sketch of rocks on beach near Trinidad made by J. Goldsborough Bruff in February 1851. (Read & Gaines, 1944)



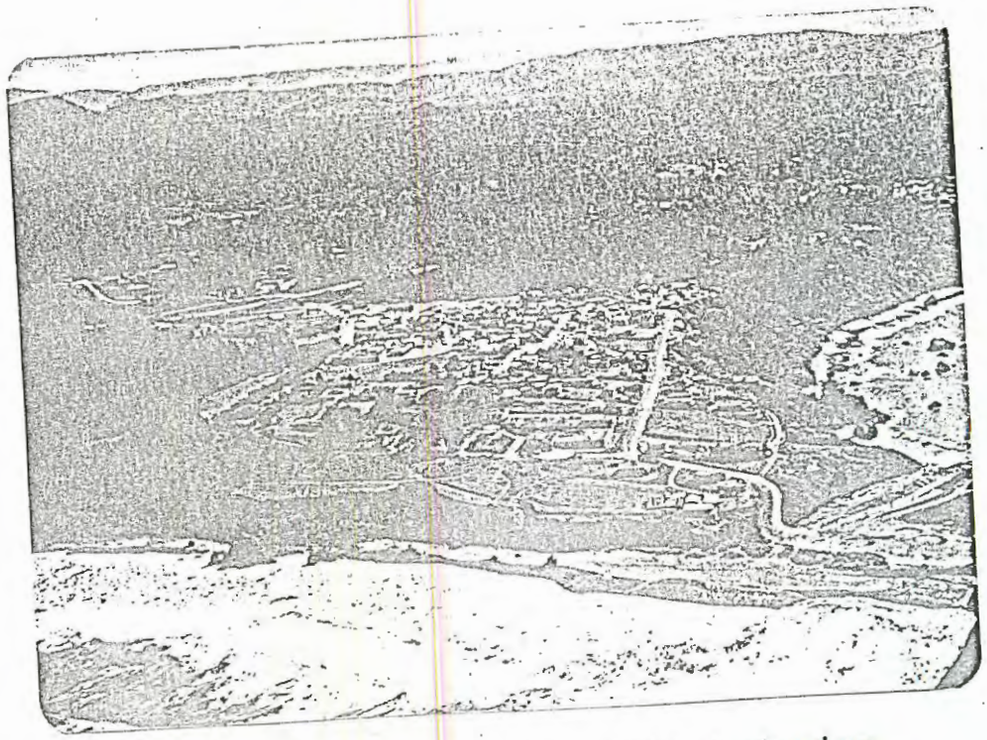
No. 91: Close-up view of photo taken by A. W. Erickson around 1910. Rock in right-hand foreground with vertical edge facing west may be the same feature sketched by Bruff shown in No. 90. (Peter Palmquist)



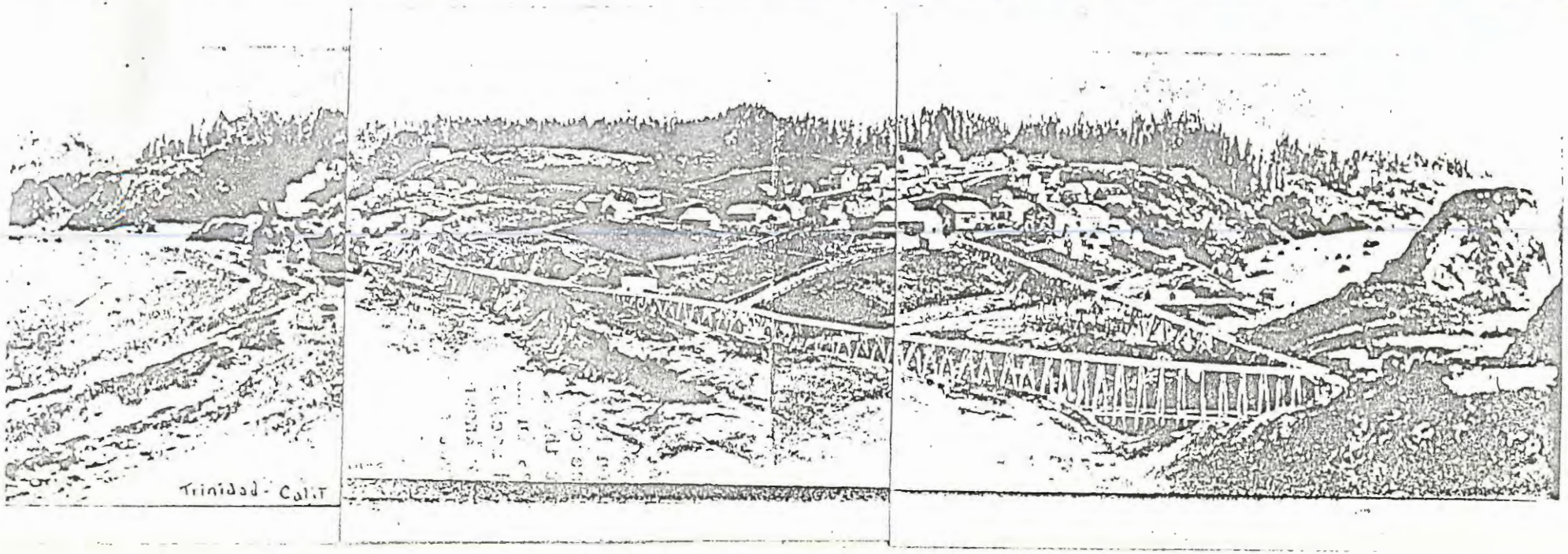
No. 92: View north along the Trinidad State Park Beach showing Pewetole Island in background taken by A. W. Erickson around 1910. (Peter Palmquist)



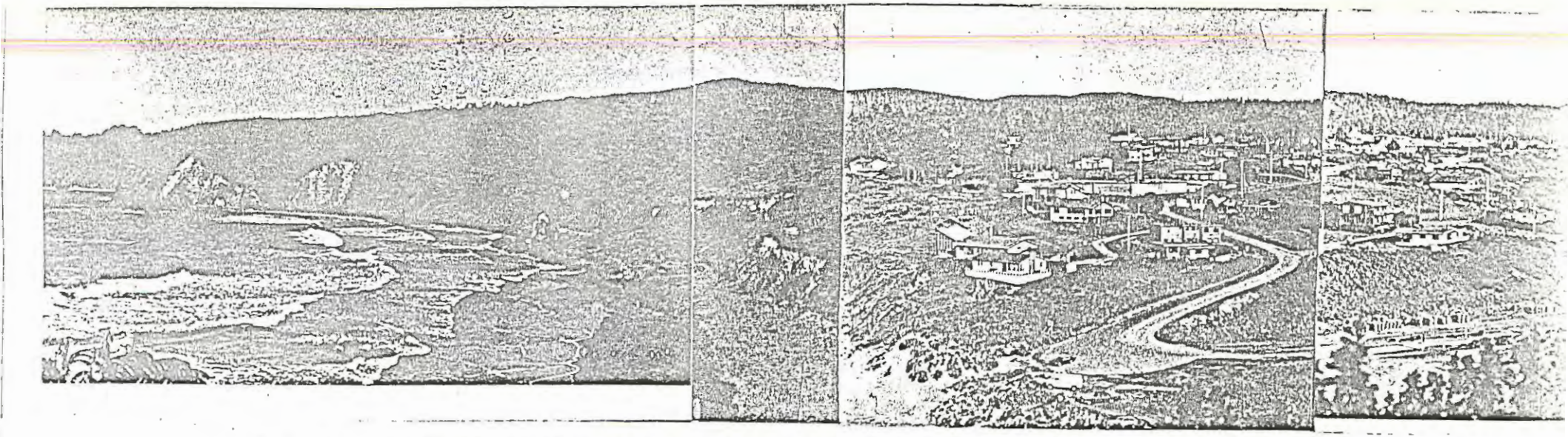
No. 93: Photo taken from same point as No. 92. Note similarity in beach profile, placement of rocks compared to photo No. 92. (November 27, 1980, Tuttle)



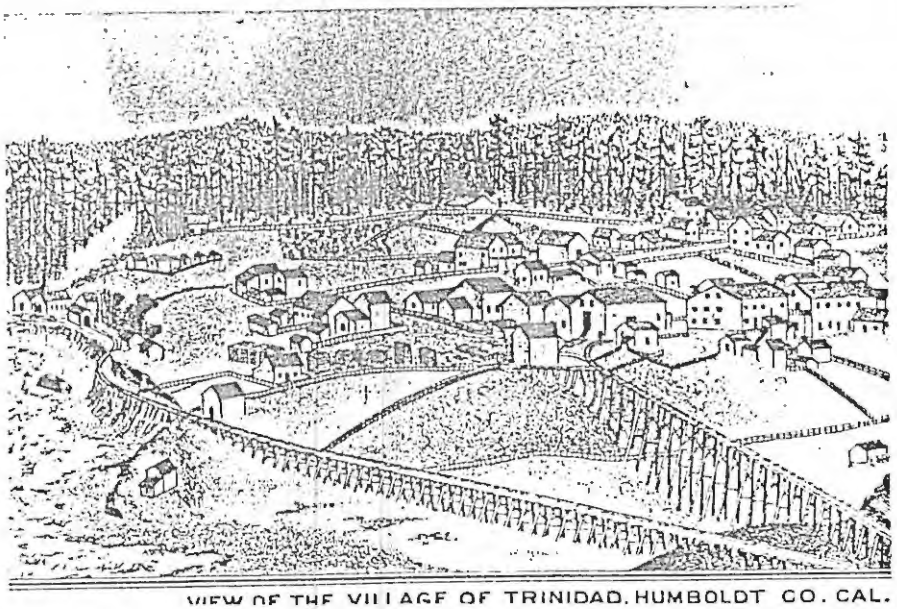
No. 94: View east over the town of Trinidad showing the bluffs around the west edge of town, beach and offshore rocks. (March 27, 1980, Tuttle)



No. 95: View northeast of the town of Trinidad in 1875 showing bluff edge along western side of Trinidad. (Source Glen Saunders)

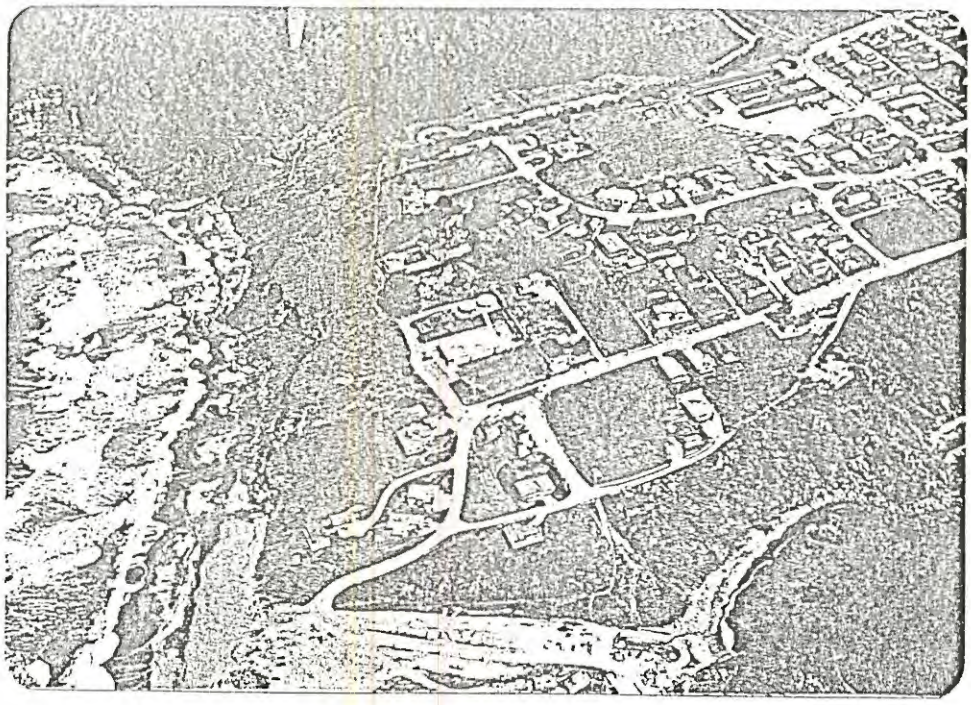


No. 96: Photograph of Trinidad from same point as No. 95 one hundred and five years later. (November 27, 1980, Tuttle)

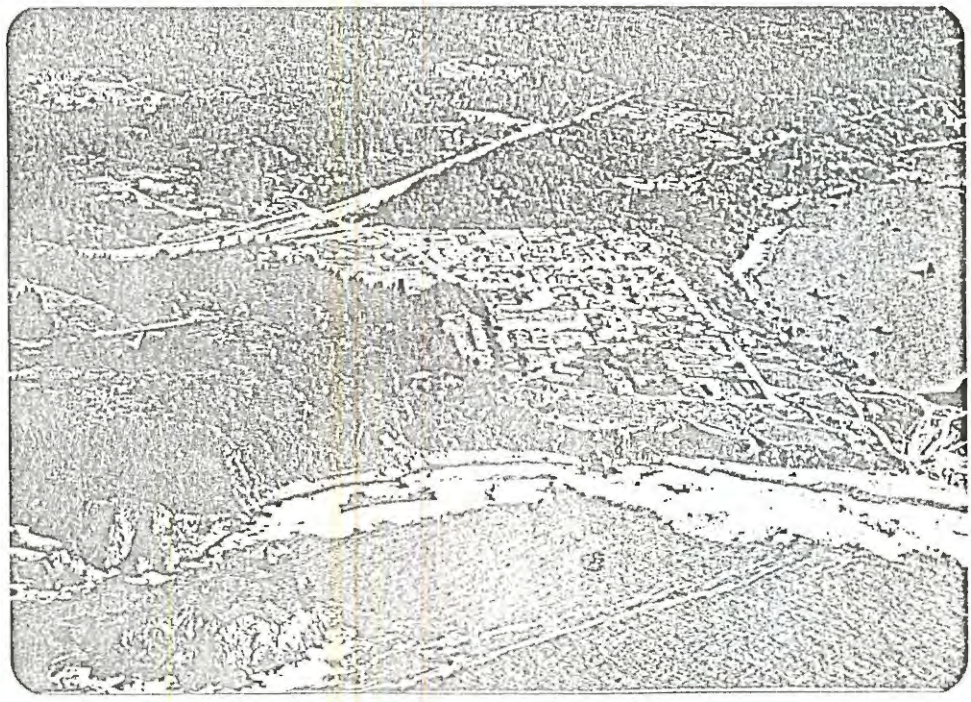


No. 97: View northeast of Trinidad sketched in 1875-80; compare with No. 95. (Source Elliott, Wallace W., 1881)

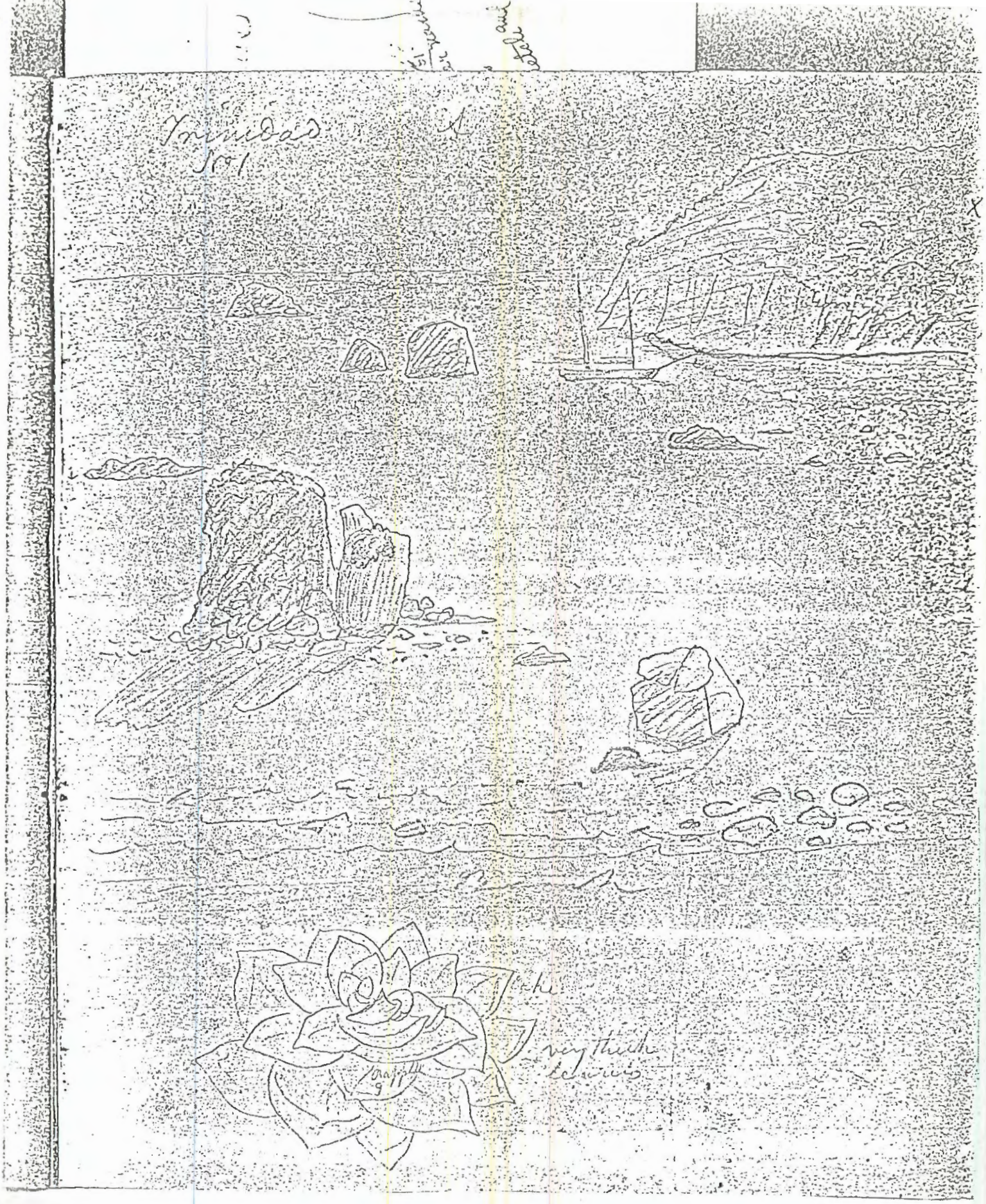
No. 98: View northerly of bluffs along western edge of the City of Trinidad and Pewetole Island plus the westerly bluffs of the Trinidad Harbor near the wharf. (April 12, 1975, Woodward, Linda)



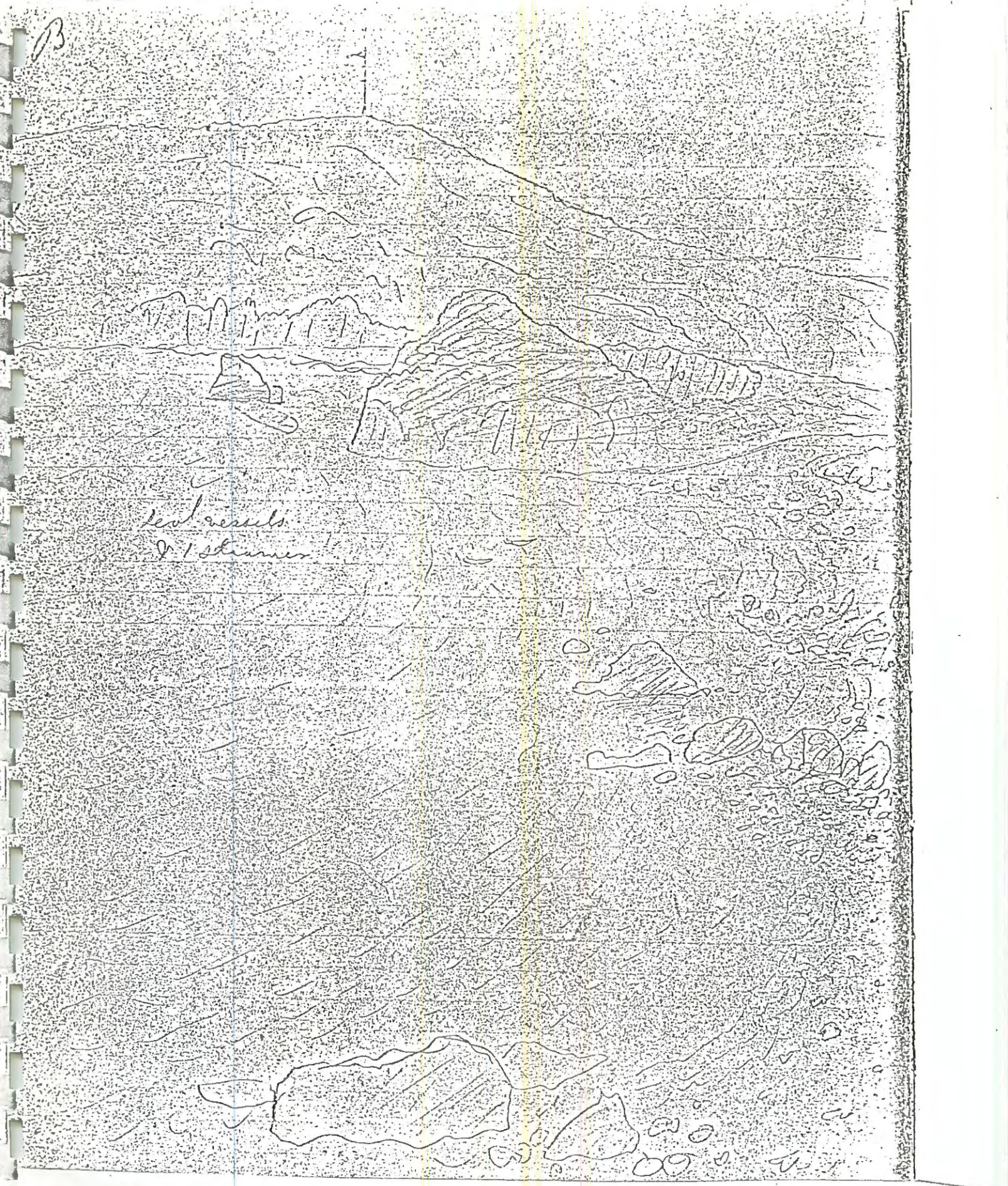
No. 99: View north over the town of Trinidad showing bluffs along western edge and portion of southern edge east of the wharf. (April 12, 1975, Fallis,Robert)



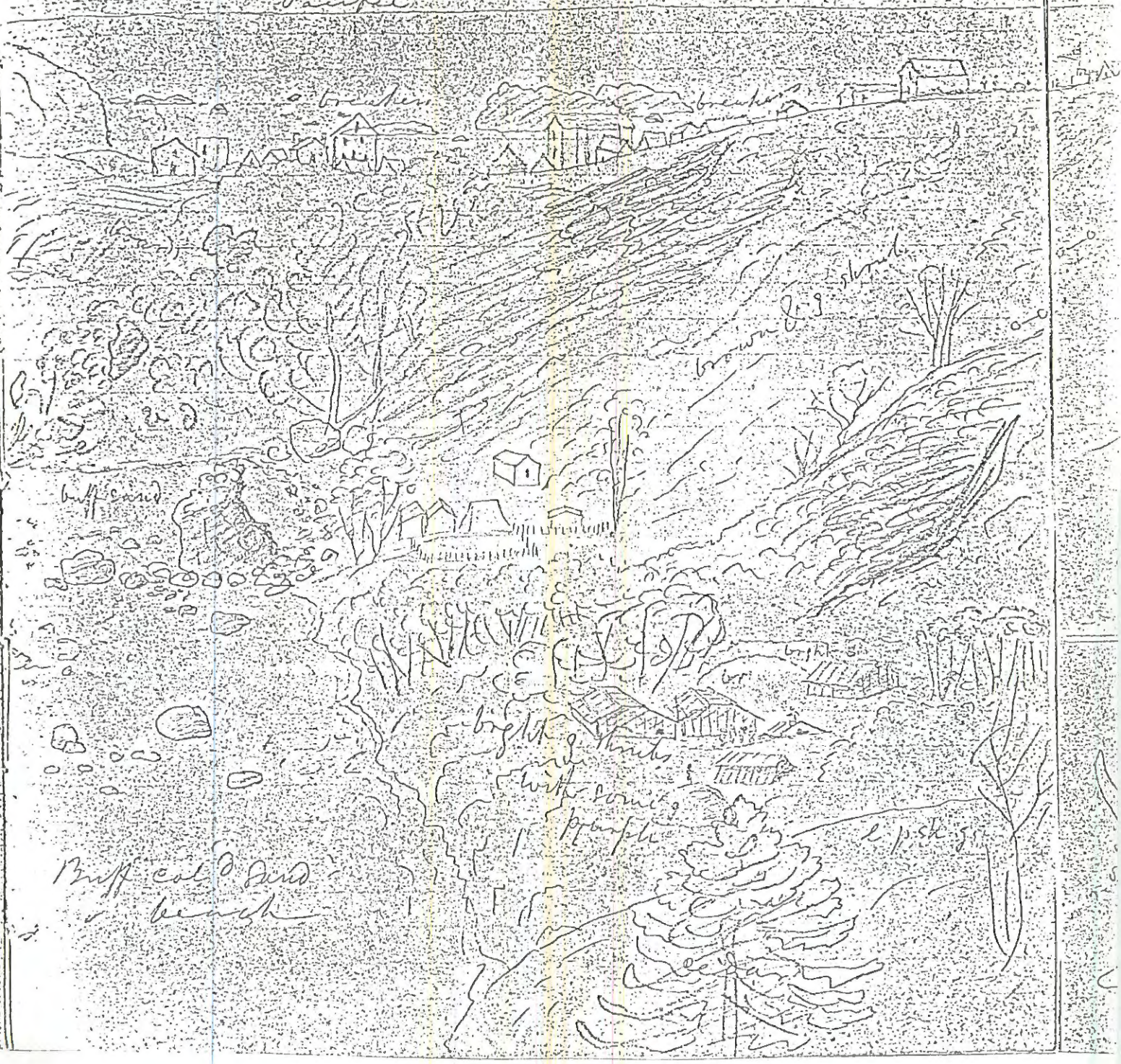
No. 100: View east of the shoreline from Pewetole Island to an area south of Trinidad showing bluffs and beach features and offshore rocks. (October 23, 1975, Perry, Ralph)



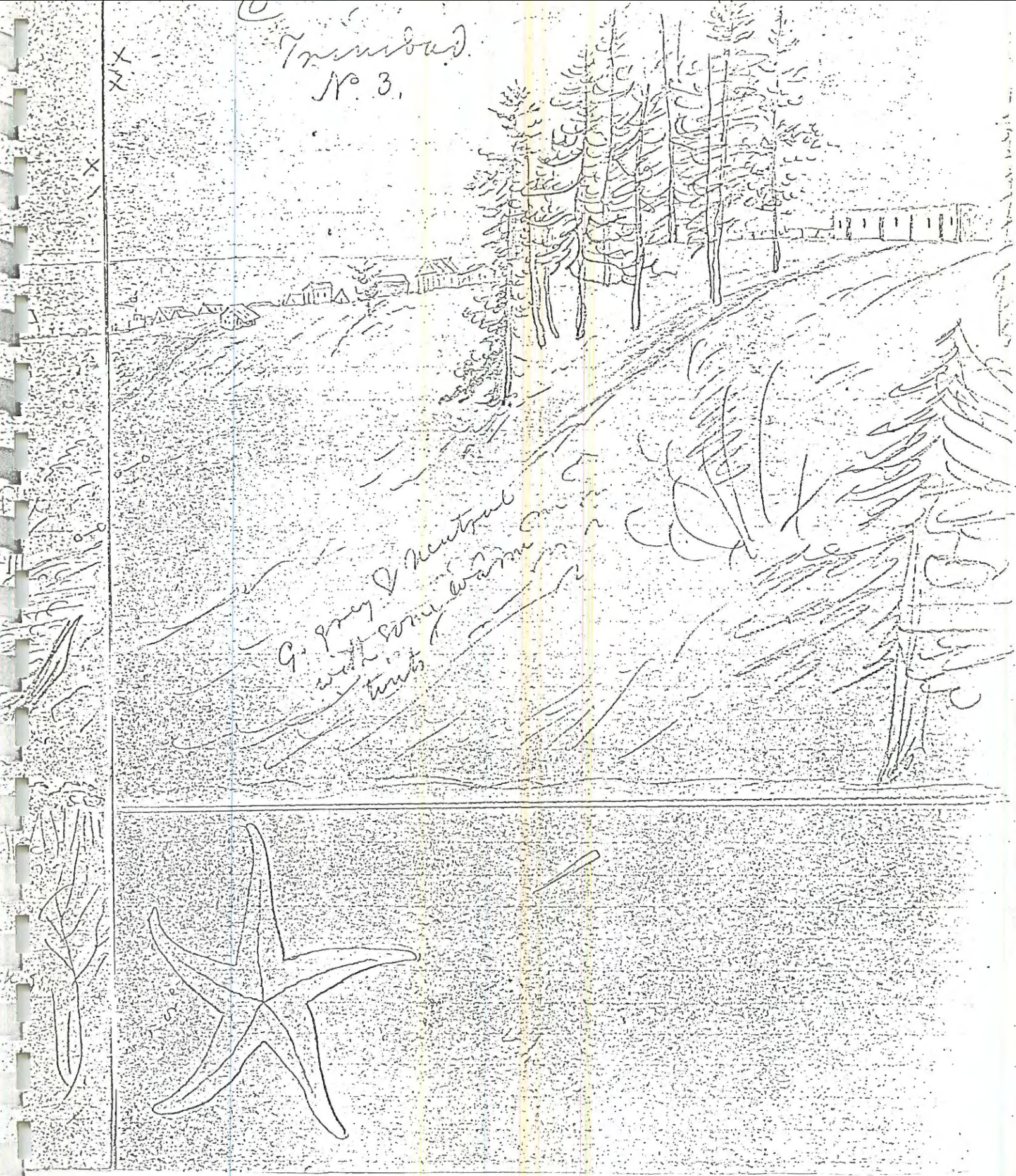
No. 101: View west of the town of Trinidad, village of Tsurai and Trinidad Head. Sketch by J. Goldsborough Bruff in February 1851. Shows vegetation, beach, some offshore rocks and manmade structures. (Read and Gaines, 1944.)


B
Leaf veins
& stamens

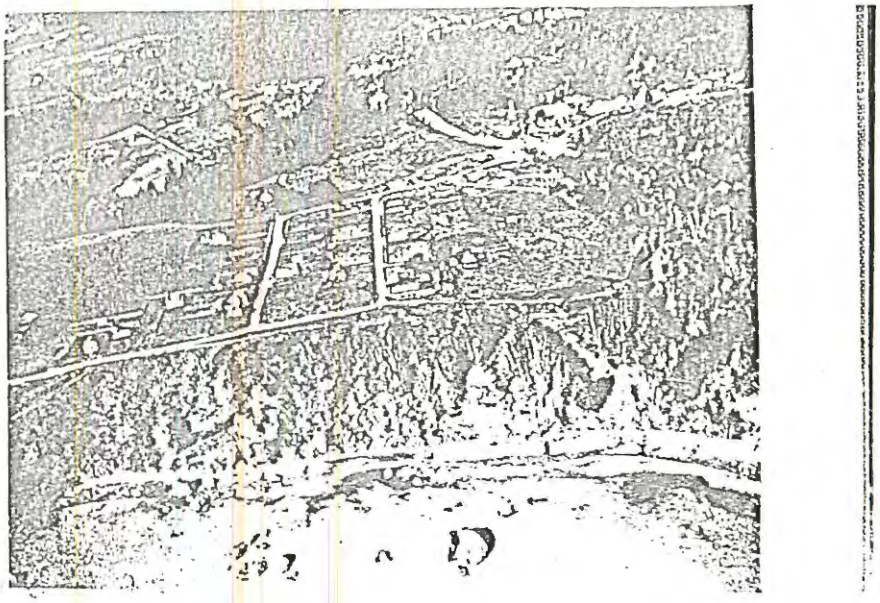
Trinidad No. 2



Transfer
No. 3.



No. 102: View north over Trinidad and north Trinidad showing bluffs south of the town and the beach. (Ca. 1928 by Kenny Kilburn)

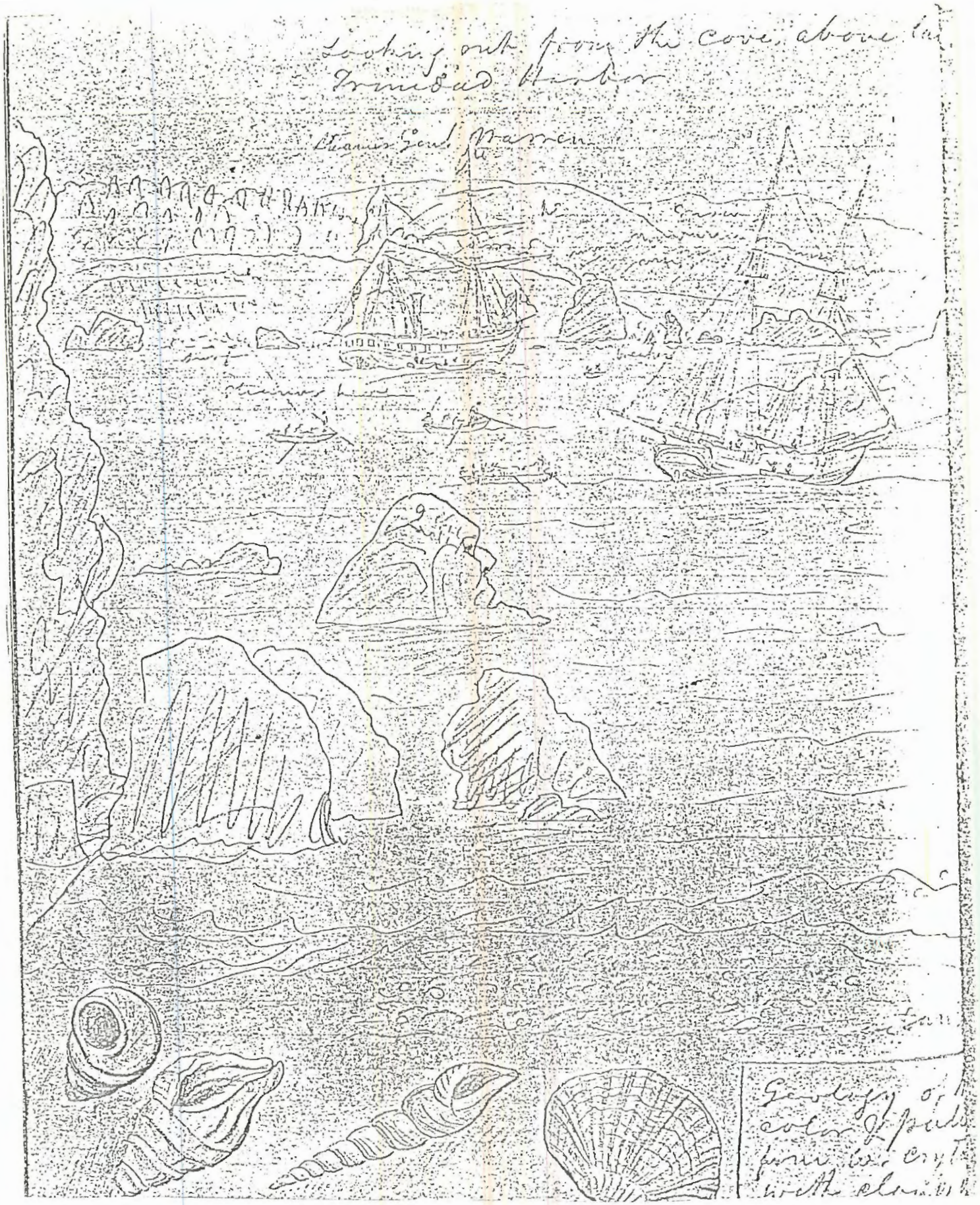


No. 103: View north of the town of Trinidad showing bluffs near the Tsurai village. (Ca. 1950, photo by Pierce Flying Service of Eureka)

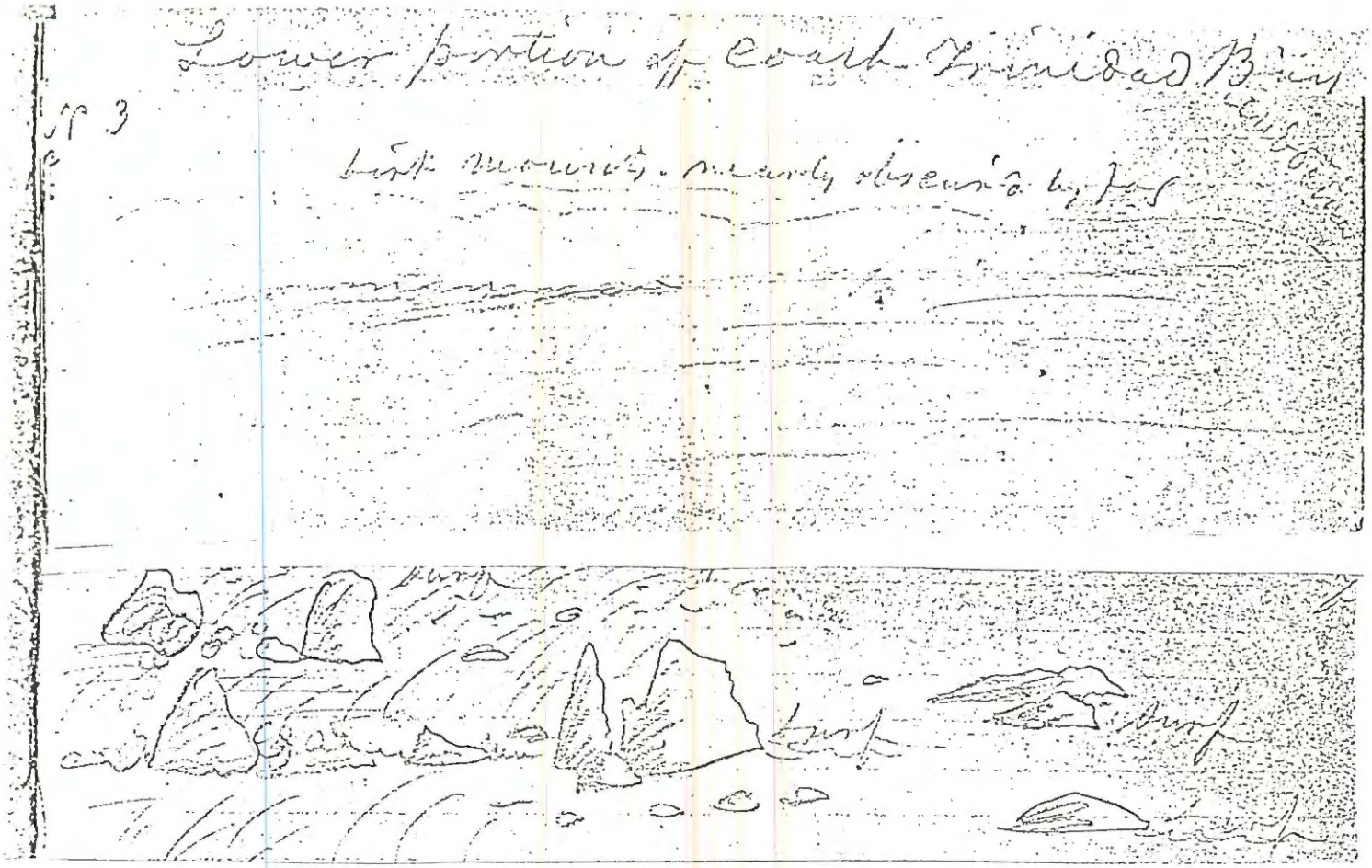
No. 104: View north over Trinidad Head and town of Trinidad showing harbor fully occupied in the summertime. Note vegetation on slopes south bordering the southern edge of town. (July 29, 1975, Fallis, Robert)

No. 105: View southeast of shoreline from Trinidad to Little River showing bluffs and offshore rocks and related beaches. (October 27, 1975, Perry, Ralph)

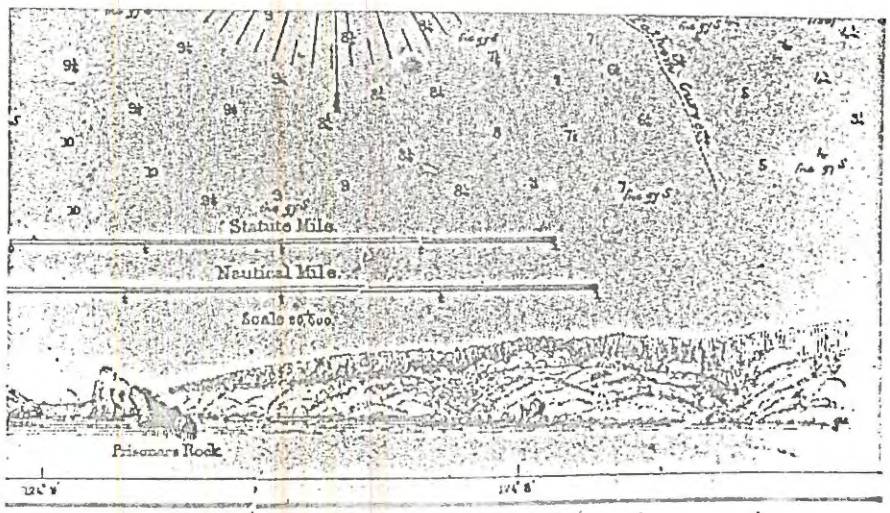
No. 106: View northwest of the shoreline along Scenic Drive, Trinidad, Trinidad Head and on to College Cove, (August 30, 1977, 4:30 p.m.,T.M.)



No. 107: View southeast to bluffs along Scenic Drive from Trinidad Head as sketched by J. Goldsborough Bruff in February 1851. (Read & Gaines, 1944)

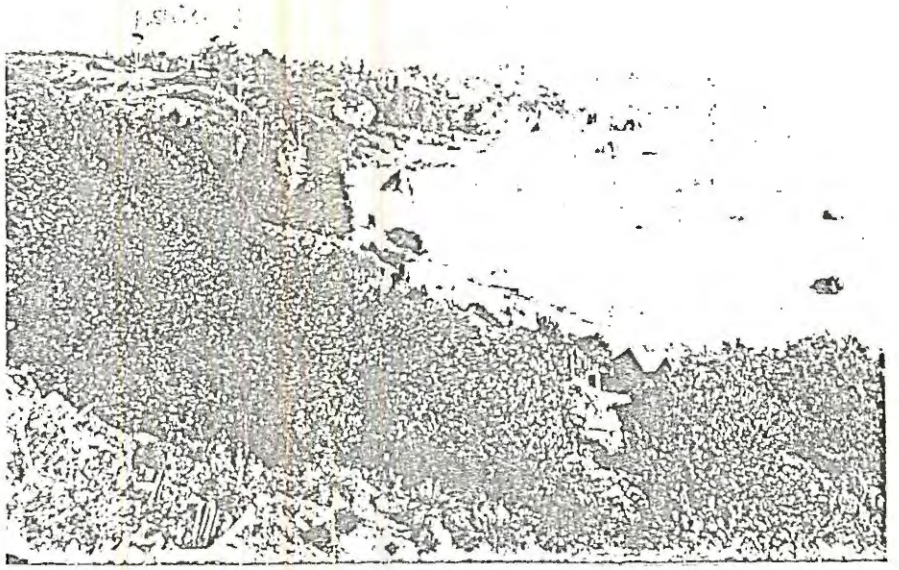


No. 108: View southeast from Trinidad as sketched by J. Goldsborough Bruff in February 1851 showing bluffs, vegetation and offshore rocks from Trinidad to Little River. (Read & Gaines, 1944)



Forwarded to the Chief of Engineers, U.S.
... Letter of April 17th 1880.

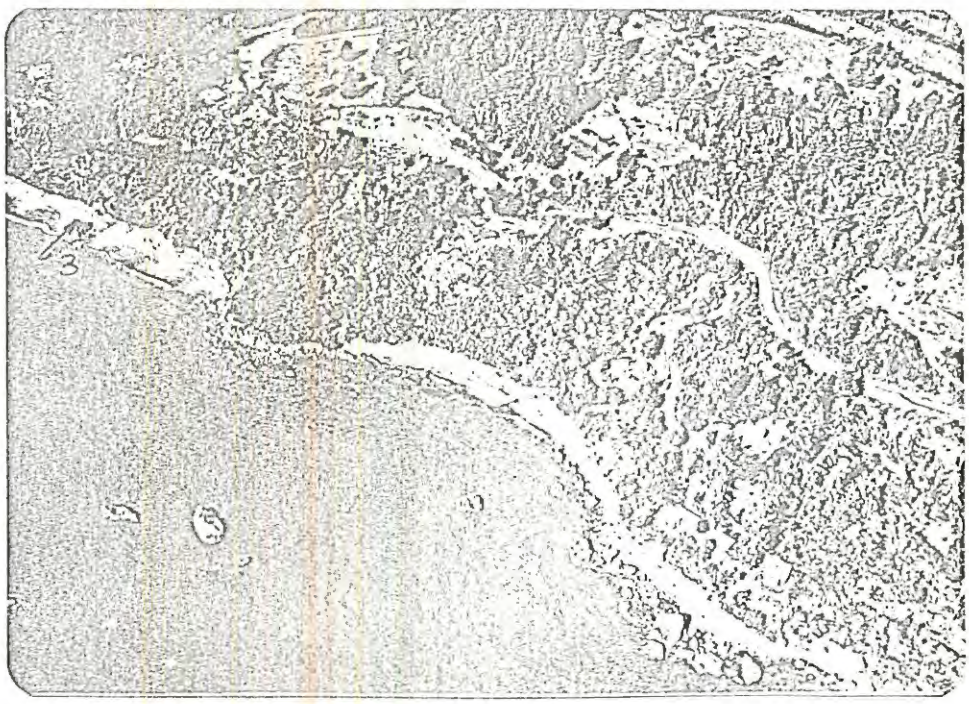
No. 109: Sketch of bluffs and vegetation along Scenic Drive to Trinidad viewed from a ship south of Trinidad. This sketch appears on U.S. Coast Survey chart 633 dated 1873. The sketch was probably made in 1870 at the same time that the topography was surved by A. F. Rogers.



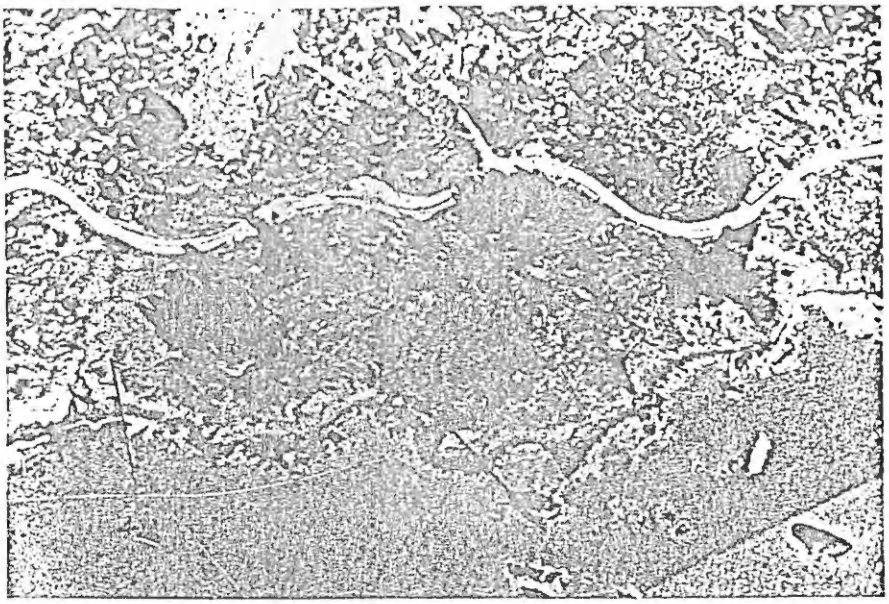
No. 110: View southeast along bluffs of Scenic Drive from a point above the village of Tsurai. Measurement station number three is the pointed rock at surf line a little above center of photo. (Photo taken by Mr. Seely of Arcata, ca. 1910. Source Peter Palmquist)

No. 111: Aerial view of bluffs immediately south of Trinidad showing measurement station number three, the rock in surf zone. (January 25, 1978, 12:36 p.m., VanDeMark, Dave)

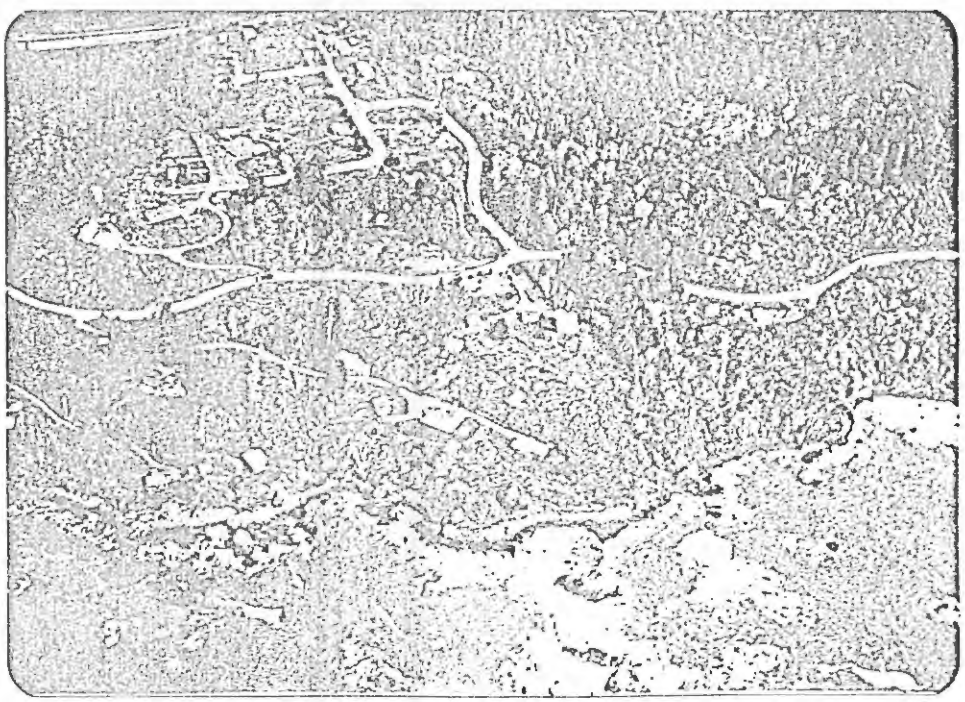
No. 112: Aerial photograph of bluffs just south of Trinidad along Scenic Drive showing measurement station number three. (Photo number CVL-9B-121B, dated February 16, 1942. USDA, Salt Lake City, Utah)



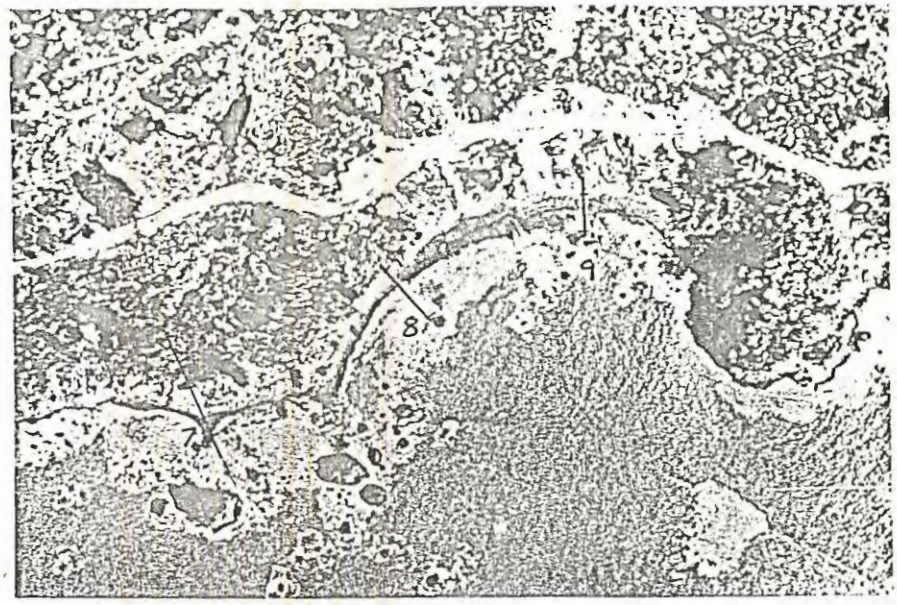
No. 113: Aerial photo of bluffs along Scenic Drive showing measurement station number three, four and five. (October 23, 1975, Perry, Ralph)



No. 114: Aerial photo of shoreline along Scenic Drive showing measurement stations four, five and six near Remak Point. (Photo Number CVL-9B-121D, dated February 16, 1942. USDA, Salt Lake City, Utah)

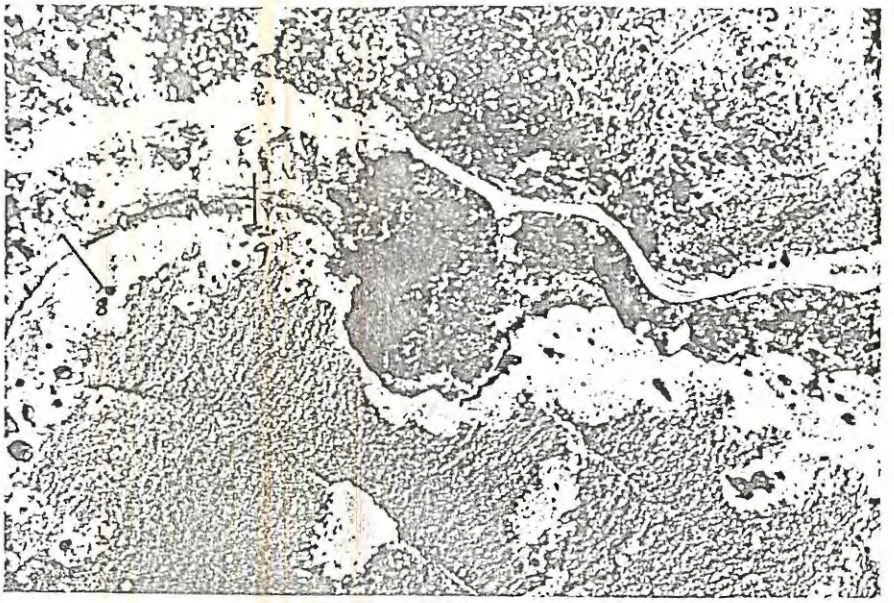


No. 115: Recent aerial photograph of same region shown in number 114. (January 25, 1978, 12:34 p.m., VanDeMark, Dave)



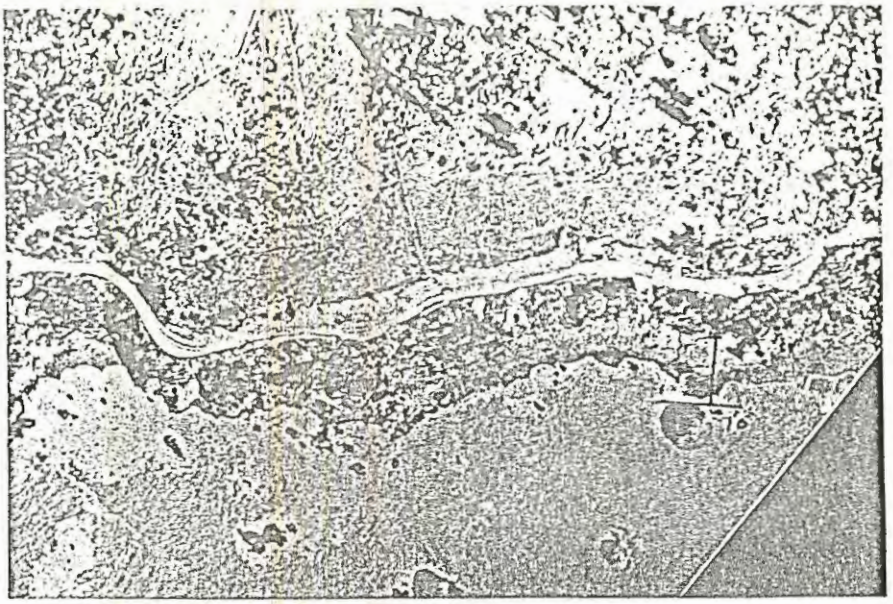
No. 116: Aerial photo of shoreline along Scenic Drive at Sotsin Point showing measurement stations seven, eight and nine. (Photo No. CVL-9B-121D, dated February 16, 1942) (USDA, Salt Lake City, Utah)

No. 117: Aerial view of shoreline immediately south of the Indian reservation area along Scenic Drive showing measurement stations five, six, seven and eight. (January 25, 1978, 12:33 p.m., VanDeMark, Dave)



No. 118: Aerial of shoreline along Scenic Drive at Sotsin Point showing measurement stations eight and nine. (Photo No. CVL-9B-121E/C, dated February 16, 1942. USDA, Salt Lake City, Utah)

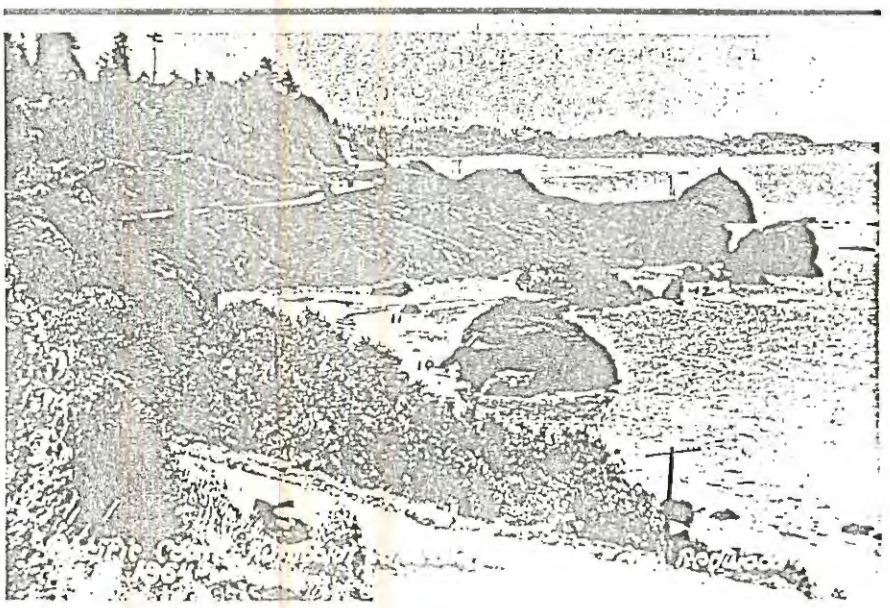
No. 119: Aerial view of Sotsin Point showing measurement stations eight and nine. (January 25, 1978, 12:32 p.m., VanDeMark, Dave)



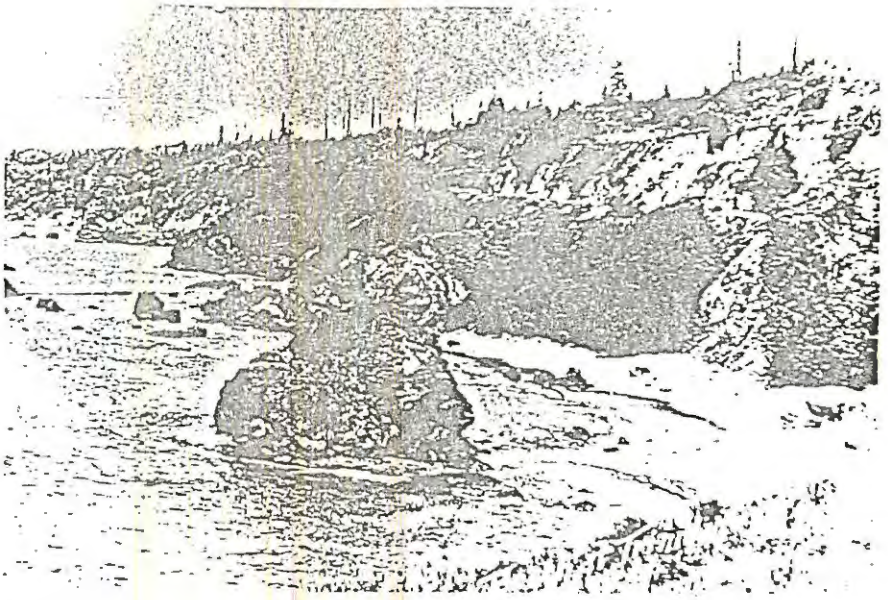
No. 120: Aerial view of shoreline along Scenic Drive showing measurement station number ten just south of Sotsin Point area and north of Luffenholtz Creek County Park. (Photo No. CVL-9B-121D, dated February 16, 1942. USDA, Salt Lake City, Utah)

No. 121: Aerial view of shoreline along Scenic Drive at Luffenholtz Creek County Park showing measurement stations ten, eleven and twelve. (Photo No. CVL-9B-121E/C, dated February 16, 1942, USDA, Salt Lake City, Utah)

No. 122: Aerial view of shoreline at mouth of Luffenholtz Creek showing measurement stations ten, eleven and twelve. (October 23, 1975, Perry, Ralph)



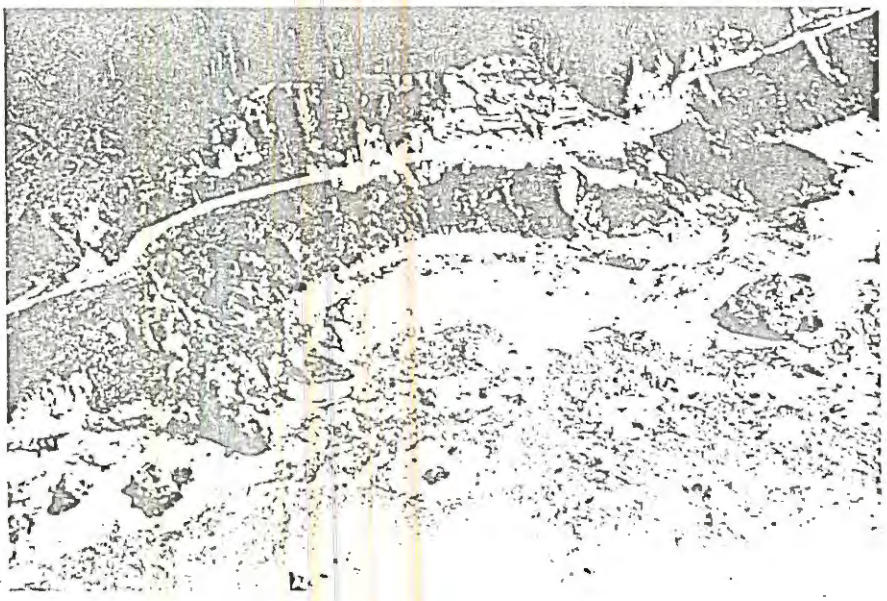
No. 123: View south of shoreline immediately north of Luffenholtz Creek County Park showing measurement stations ten, eleven and twelve from an undated postcard, ca. 1938. (Humboldt County Department of Public Works)



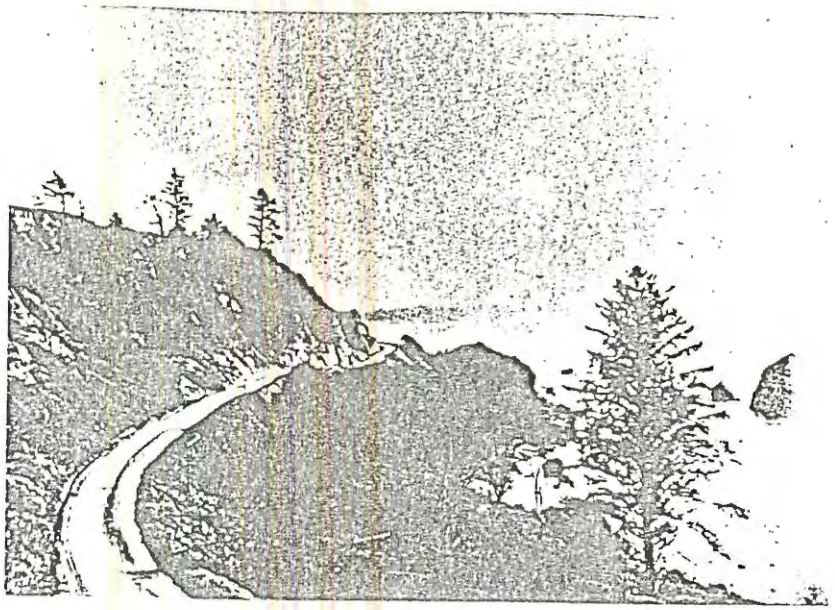
No. 124: View north of the beach and bluffs north of mouth of Luffenholtz Creek, ca. 1925. (Source Peter Palmquist)

No. 125: Aerial view of shoreline along Scenic Drive south of Luffenholtz Creek County Park showing measurement stations thirteen through sixteen. (Photo No. CVL-9B-121E/C, dated February 16, 1942, USDA, Salt Lake City, Utah)

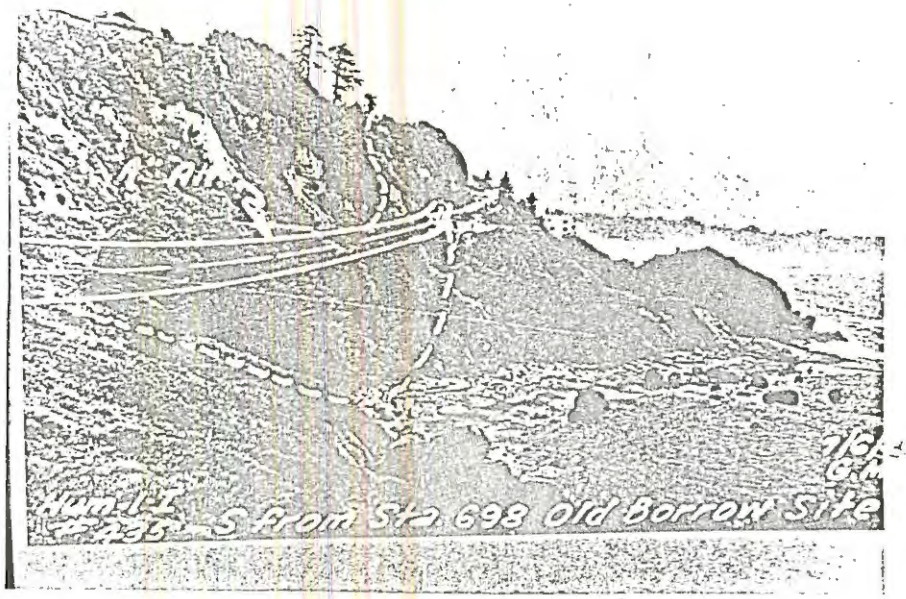
NO. 126: Aerial view of same portion of shoreline as No. 125. Note amount of build out along top bluff compared to photo No. 125. January 25, 1978, 12:30 p.m., VanDeMark, Dave)



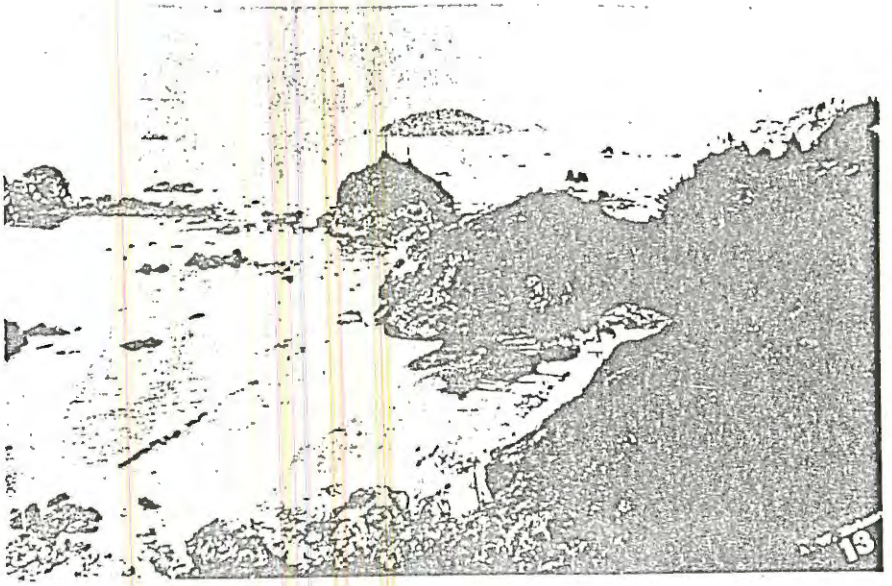
No. 127: Aerial view of shoreline from Luffenholtz Creek County Park south to Houda's Landing. Note amount of barren slopes due to recent construction. (Ca. 1928 by Kenny Kilburn)



No. 128: View south of Scenic Drive and related bluffs from Luffenholtz Creek County Park at highway center line station 696. (Ca. 1931, Caltrans photo archives, Sacramento)



No. 129: View south from old highway station 698 at present day Luffenholtz Creek County Park of bluffs and shoreline south to Houda's Landing. (Photo No. 435, dated July 6, 1954, taken by V.M. Source Caltrans Photo Archives, Eureka Office)

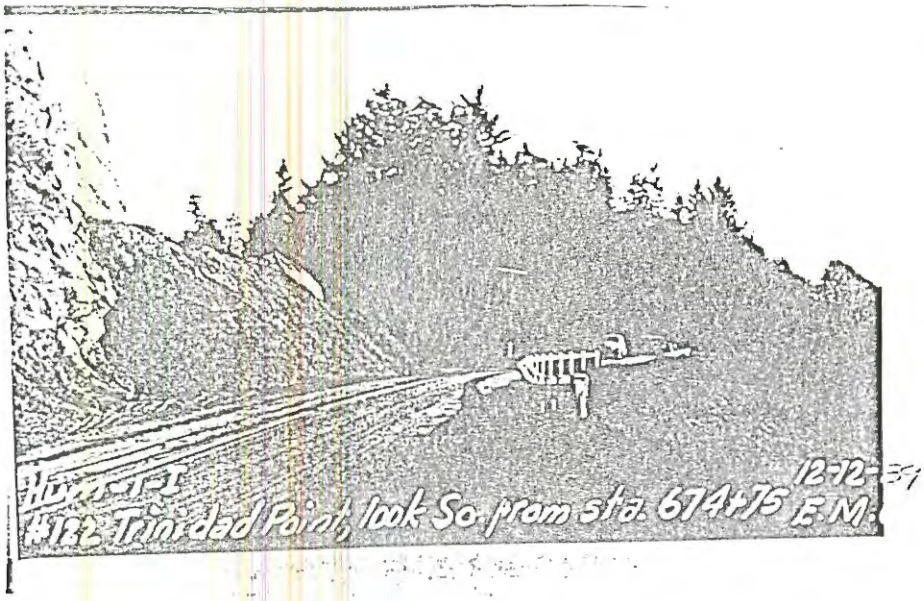


No. 130: View north to Houda's Landing from a point where Scenic Drive first reaches the shoreline coming from the south. (Photo No. 13 by A. W. Erickson) (Ca. 1900, source Peter Palmquist)

No. 131: View north of Houda's Landing and adjacent slopes along the beach on the right-hand side of the photograph. (Ca. 1908-1910 from a private album owned by a party in Berkeley) Source Peter Palmquist.

No. 132: View south from Houda's Landing of the reconstruction of a portion of Scenic Drive whereby the fill was reconstructed from the rock bench near ocean level all the way back up the slope to the road. Photo is looking south from opposite station 684+50 and was taken by E.M.C. on December 12, 1939. (Photo No. 124, Caltrans Photo Archives, Eureka Office)

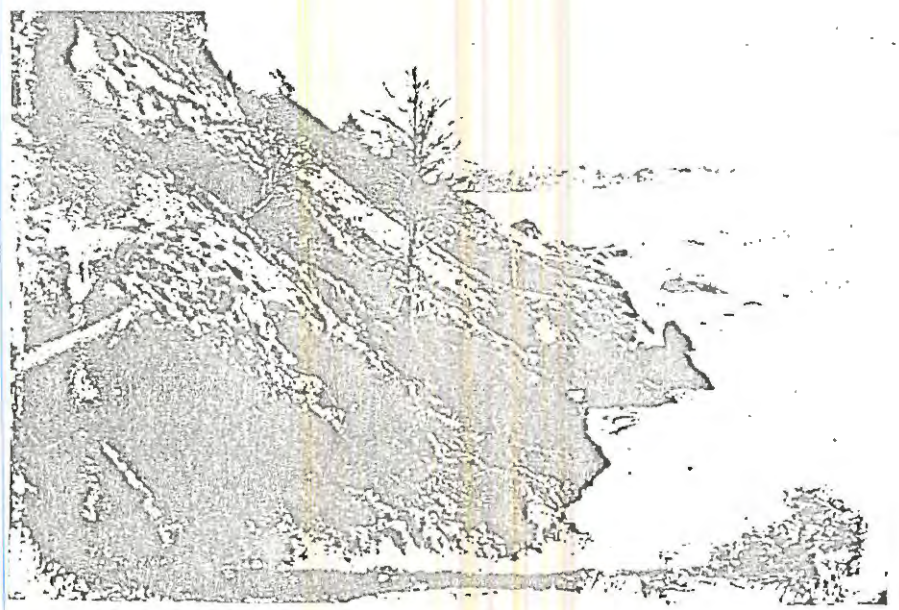
No. 133: View north of reconstruction of Scenic Drive from station 674+75. Houda's Landing is just off the left edge of the picture. Photo taken by E.M.C. on December 12, 1939. (Photo No. 123, Caltrans Photo Archives, Eureka Office)



No. 134: View south from station 674+75 of construction project on Scenic Drive at the point where Scenic Drive first reaches the shoreline. Construction project involved removal of the point thereby steepening the slope of the bluff. Photo taken by E.M.C. on December 12, 1939. (Photo No. 122, Caltrans Photo Archives, Eureka Office)

No. 135: View west towards ocean on Scenic Drive at Point where Scenic Drive first reaches the shoreline. Note bulldozer working on cut through the point thus steepening the bluff face. Photo by E.M.C. December 12, 1939. (Photo No. 121, Caltrans Photo Archives, Eureka Office)

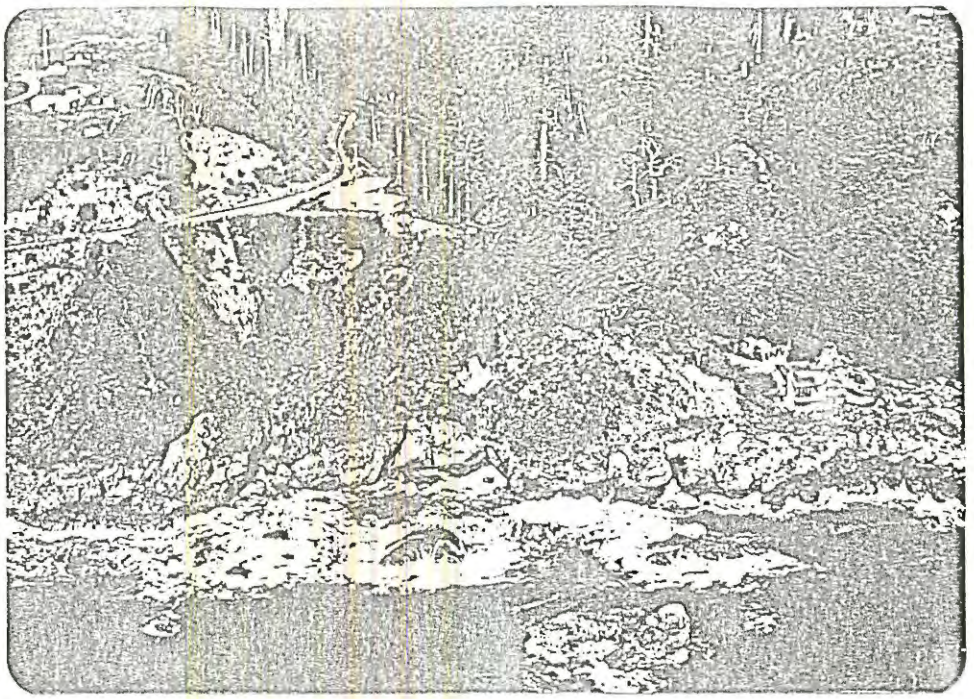
No. 136:
Taken from approximately the same point as No. 135. This photo shows portion of bluff that failed during earthquake which occurred around 2:00 a.m., November 8, 1980. This photo taken November 8, 1980 at 10:15 a.m. (Tuttle)



No. 137: View south of slope between road and ocean from Houda's Landing. (Ca. 1930, Caltrans Photo Archives, Sacramento Office)

No. 138: View south from same point as No. 137. Shows slope between ocean and Scenic Drive. Compare with No. 137. (November 27, 1980, Tuttle)

No. 139: View of shoreline at Houda's Landing showing surf attacking base of rock bench. Note trees growing on bluffs above Scenic Drive. (July 29, 1975, Fallis, Robert)



No. 140: View of shoreline and bluffs at point where Scenic Drive first reaches shoreline. Bluff opposite white house is point where construction shown in Photos No. 134 and 135 took place in 1939. Also bluff failure shown in Photo No. 136 during earthquake occurred on this face. (July 29, 1975, Fallis, Robert)

No. 141: Aerial view of shoreline bluffs, Scenic Drive and development on the high bluff from Luffenholtz Creek County Park south to point where Scenic Drive first reaches the ocean. (January 25, 1978, 12:23 p.m., VanDeMark, Dave)

No. 142: View westerly of same portion of Scenic Drive showing wave direction, wave refraction around offshore rocks and beaches in coves. (August 30, 1977, 4:30 p.m., T.M.)

No. 143: Aerial view from mouth of Little River to Houda's Landing showing general wave direction, refraction and reflected waves off of point of land north of mouth of Little River. (October 23, 1975, Perry, Ralph)

No. 144: Color infrared photo of Scenic Drive from Trinidad to mouth of Little River showing offshore sediment currents, wave direction, refraction patterns and reflection patterns. Mission 259. (January 27, 1974, Corps of Engineers, San Francisco Office)

No. 145: Color infrared aerial photograph from Trinidad to mouth of Little River showing wave direction and offshore sediment patterns along Scenic Drive. (April 4, 1973, Corps of Engineers, San Francisco Office)

Table 1. Measurements from centerline and projected centerline of Old Highway 101 to coastal bluffs and slide scarps at Truttmen Sink at northend of Big Lagoon using 1931, 1942, and 1974 aerial photographs.

Station	Distance from Base Line					Retreat of Toe		Retreat of Scarp	Remarks*
	To toe of Slope			To Top of Slide Scarp or Unvegetated Bluff		1931 to 1942	1931 to 1974	1931 to 1974	
	1931	1942	1974	1931	1974				
1	46'	93'	100'	--	--	47'	54'	--	Near southwest corner of parking lot in Dry Lagoon State Park
2	0	0	25'	--	--	0	25'	--	
3	90'	58'	0	0	--	32'	90'	--	
4	241'	205'	150'	90'	0	36'	91'	90'	
5	382'	348'	320'	49'	0	34'	62'	49'	
6	447'	410'	375'	240'	160'	37'	72'	80'	
7	658'	598'	575'	--	--	60'	83'	--	Slide scarp not distinguishable - whole hill moving in this area
8	705'	622'	580'	337'	100'	83'	125'	237'	This station is in a large landslide which was noted as a slide on May 2, 1923 in survey notes
9	632'	615'	600'	450'	80'	17'	32'	370'	Near south edge of old slide noted May 2, 1923
10	680'	626'	638'	450'	25'	54'	42'	425'	Old Trinidad Trail left beach near this station. Trace shows on 1931 aerial photo.
11	765'	756'	670'	--	--	9'	95'	--	
12	686'	645'	620'	--	--	41'	66'	--	Near north edge of opening of Big Lagoon

*All distances are in feet from a base line formed by extending the center line of Old Highway 101 north at bearing N2°14'E beginning at Station 810+00

Items Used: Book Hum-1-J #43 May 2, 1923; Sheet 26, Highway Hum-1-J, Plan and Profile April 17, 1922; August 28, 1931 aerial photo, enlarged to 1"=200'; February 16, 1942 aerial photo, enlarged to 1"=200'; August 1974 aerial photo, enlarged to 1"=500'.

Table 2. Measurements from Park Road and Ocean View Drive to top of coastal bluffs at south end of Big Lagoon using 1931, 1941, 1942, and 1974 aerial photographs.

Station	Distance from Base Line To Top of Bluff				Bluff Retreat				Remarks*
	Aug 28 1931	Nov 6 1941	Feb 16 1942	Aug 1974	1931 to 1941	Nov 6, 1941 to Feb 16, 1942	1931 to 1974	1941 to 1974	
1	840'	810'	791'	772'	30'	19'	68'		Location of station 1 is south property line of Big Lagoon Park Company. Base line is west edge of Park Road - Sta 1-11.
2	805'	780'	773'	762'	25'	7'	43'		
3	733'	691'	689'	664'	42'	10'	69'		Through cabin #1006
4	720'	681'	667'	639'	39'	10'	80'		
5	648'	590'	582'	565'	58'	8'	83'		A little north of cabin #1060
6	585'	540'	525'	495'	45'	15'	90'		Through swale
7	430'	396'	384'	374'	34'	12'	56'		Along north edge of Big Lagoon Park Road
8	15'	15'	--	12'	0'	--	3'		Near northern property line of Big Lagoon Park Company
9	46'	50'		30'			16'		In County Park
10	935'	902'	905'	865'	30'	30'	70'		Lot 33, Big Lagoon Subdivision
11	1,050'	1,000'	983'	938'	50'	17'	112'		Lot 29, Big Lagoon Subdivision
12		255'	240'	202'		15'		53'	Base line is center line of Ocean View Lane

Table 2. Measurements from Park Road and Ocean View Drive to top of coastal bluffs at south end of Big Lagoon using 1931, 1941, 1942, and 1974 aerial photographs. (continued)

Station	Distance from Base Line To Top of Bluff				Bluff Retreat				Remarks*
	Aug 28 1931	Nov 6 1941	Feb 16 1942	Aug 1974	1931 to 1941	Nov 6, 1941 to Feb 16, 1942	1931 to 1974	1941 to 1974	
13		300'		255'				45'	Lot 20, Big Lagoon Subdivision
14		335'	828'	285'		7'		50'	Lot 16
15		365'	362'	320'		3'		45'	Lot 12
16a		330'		260'				70'	Lot 11
16b		445'	434'	355'		11'		90'	Lot 7
17		476'	467'	400'		9'		76'	Lot 4
18		467'		315'				152'	

*All distances are in feet from a base line.

Items Used -
August 28, 1931 aerial photo, enlarged to 1" = 200'
November 6, 1941 aerial photo, enlarged to 1" = 200'
February 16, 1942 aerial photo, enlarged to 1" = 200'
August, 1974 aerial photo, enlarged to 1" = 500'

Table 3. Measurements from centerline of Ocean View Drive to top of coastal bluffs at Big Lagoon Subdivision using 1941 and 1974 aerial photographs and surveyed distances made in 1962 and shown on the subdivision map.

Station	Distance from Centerline of Ocean View Dr.			Retreat			Remarks
	Nov 1941	Aug 1962	Aug 1974	1941 to 1962	1962 to 1974	1941 to 1974	
1	110'	85'	72'	25'	13'	38'	Lot 33
10	150'	132'	113'	18'	19'	37'	Lot 32
11	215'	165'	153'	50'	12'	62'	Lot 29
12	255'	215'	202'	40'	13'	53'	Lot 24
13	300'	275'	255'	25'	20'	45'	Lot 20
14	335'	295'	285'	40'	10'	50'	Lot 16
15	365'	320'	320'	45'	0	45'	Lot 12
16 a	330'	315'	260'	15'	55'	70'	Lot 11
16 b	445'	385'	355'	60'	30'	90'	Lot 7
17	476'	400'	400'	76'	0	76'	Lot 4

Table 4. Measurements from centerline of Patricks Point Drive to coastal bluffs from Scotty Point to White Rock using 1942 and 1974 aerial photographs.

Station	Distance from Baseline		Retreat of Toe	Retreat of Top of Bluff or Slide Scarp	Remarks
	1942	1974			
1	488'	480'	8'		At north edge of 1942 photo #CVL-9B-138
2	392'	404'	-12'		Aggraded westward due to land creep
3	355'	440'	-85'		Great distortion in 1942 photo. Top of slide scarp 8' south of baseline
4a	228'	280'	-52'		Great distortion in 1942 photo. Toe of slope
4b	197'	200'		-3'	Great distortion in 1942 photo. Top of slide scarp
5a	224'	280'	-56'		Great distortion in 1942 photo. Toe of slope
5b	186'	200'		-14'	Great distortion in 1942 photo. Top of slide scarp
6	674'	640'	34'		360' south of Scotty Point
7	560'	490'	70'		In a cave. Toe of slope.
8	490'	545'	55'		In a cave. Toe of slope.
9	565'	640'	-75'		On a point behind a large rock. Toe of slope

Table 4. Measurements from centerline of Patricks Point Drive to coastal bluffs from Scotty Point to White Rock using 1942 and 1974 aerial photographs. (continued)

Station	Distance from Baseline		Retreat of Toe	Retreat of Top of Bluff or Slide Scarp	Remarks
	1942	1974			
10	438'	420'	18'		Toe of slope
11a	874'	885'	-11'		
11b	786	Not visible			
11c	515'	600'		-85'	
12	852'	880'	-28'		
13	430'	430'	0'		Top of scarp on prairie

Items Used -
February 16, 1942 aerial photo, enlarged to 1" = 224'
August, 1974 aerial photo, enlarged to 1" = 500'
Plan and Profile Sheet #8 of Hum-1-J plans dated April 17, 1922

Table 5 . Measurements from offshore rocks to land features along the shoreline from Scotty Point to White Rock on 1870 U. S. Survey Chart No. 1179 and 1942 aerial photograph.

Location	Distance to Shoreline or Top of Scarp		Retreat	Remarks
	1870	1942		
Rock 335' north of Scotty Pt.	225'	246'	21'	Near study station #5. Toe of slope.
Olmeyes Rock	44'	60'	16'	150' south of station #7. Toe of slope
Cove between Olmeyes Rock & rock to the south	350'	350'	0'	Study station 8. Toe of slope.
Rock 200' south of station #11	150'	150'	0'	Toe of slope.
Station #12	540'	550'	-10'	Toe of slope.
Station #13	730'	475'	255'	Retreat of top of erosional scarp.
Rock 90' south of station #11	247'	610'	363'	Retreat of top of erosional scarp.

Table 6. Measurements to coastal features from centerline of Patricks Point Drive in 1920 and 1974, using notes from Highway Survey Book #24, Hum-I-J and 1974 aerial photographs.

Station in Survey Book #24	Distance to Shoreline		Relation to Study Stations	Retreat	Remarks
	1920	1974			
173+50	600'	420'±	Between 2 & 3	180'	
164+00	1,050'	750'	100' north of station 6	300'	
158+00	1,100'	650'	200' south of station 7	450'	
142+00	350'	260'	At station 10	90'	
121+00	850'	---			Could not locate precisely enough

Table 7. Measurements from offshore rocks and property lines to coastal bluffs in the southeast corner, Section 15, T8N, R1W, using an 1870 U.S. Coast Survey Map No. 1179, 1942 and 1974 aerial photographs.

Location	Distance		Retreat	Remarks
	1870	1942		
D-450	665'	820'	155'	
D-740	630'	830'	200'	To top of bluff or prairie
D-990	620'	735'	115'	To top of bluff or prairie
D-1450	380'	560'	180'	To top of bluff or prairie In fault zone
D-1660	220'	370'	150'	To top of bluff or prairie

Additional Measurements

Station	Distance to Top of Bluff		Retreat	Remarks
	1942	1974		
1	198'	160'	38'	On north property line of Anderson parcel
2	331'	310'	21'	
3	210'	166'	44'	

Table 8. Measurements from centerline of city streets to top of coastal bluffs along western edge of tne City of Trinidad using an 1870 U. S. Coastal Survey Map No. 1179 and 1942 and 1974 aerial photographs.

Station	Distance to Bluff			Retreat		Remarks
	1870	1942	1974	1870 to 1942	1870 to 1974	
1	668'	615'	600'	53'	68'	
2	500'	482'	480'	18'	20'	
3	575'	530'	530'	45'	45'	

Station	Distance to Toe of Slope			Retreat		Remarks
	1870	1942	1974	1870 to 1942	1870 to 1974	
1	668'	615'	600'	53'	68'	
2	590'	550'	520'	40'	70'	
3	660'	615'	610	45'	50'	

Table 9. Measurements from offshore rocks to onshore land features along the shoreline from Trinidad to Moonstone Beach using 1942 and 1974 aerial photographs.

Station	Distance to Land Feature		Change in Shoreline	Remarks
	1942	1974		
1	88	75	Aggraded 13 feet	Rock at surf line about 500' southeast of Memorial Lighthouse. Measurement to top of scarp above beach.
2	134	120	Aggraded 14 feet	Rock 600' southeast of station 1. Measurement to top of eroded bluff face.
3	85	80	Aggraded 5 feet	
4	269	260	Aggraded 9 feet	Measurement from rock offshore near mouth of McConnahas Mill Creek to top of eroded bluff.
5a	260	260	--	Measurement to top of eroded bluff.
5b	205	205	--	Measurement to toe of eroded bluff.
6	15.7	Not visible	--	Rocks not visible on 1974 aerial photograph.
7	139	120	Aggraded 19 feet	Measurement to edge of vegetation
8	68	90	Retreated 22 feet	Measurement to toe of slope at beach.
9	101	118	Retreated 17 feet	Measurement to toe of slope in a cove.
10	180	200	Aggraded 20 feet	Located 300' north of mouth of Luffenholtz Creek
11	205	190	Aggraded 15 feet	Measurement at old slipout 200' north of Luffenholtz Creek County Park
12	185	210	Retreated 25 feet	Measurement near foot of trail to beach from Luffenholtz County Park parking lot.

Table 9. Measurements from offshore rocks to onshore land features along the shoreline from Trinidad to Moonstone Beach using 1942 and 1974 aerial photographs. (continued)

Station	Distance to Land Feature		Change in Shoreline	Remarks
	1942	1974		
13	87	85	Aggraded 2 feet	Measurement in cove 600' south of Luffenholtz County Park to vegetation line at beach.
14	310	380	Retreated 70 feet	Measurement to toe of eroded bluff about 230' north of Houda's Landing.
15	490	550	Retreated 60 feet	Measurement to toe of old landslide in cove just south of Houda's Landing.
16	105	105	--	Measurement to shoreline where Scenic Drive first meets the coastline.

Notes and Measurements at Big Lagoon, from U. S. Government Field Notes for T9N, R1W, HM Under a Contract dated August 24, 1875. Survey commenced December 3, 1875, by S. W. Foreman.

Running north on the Section line between Sections 23 and 24

39.00 chains - enter prairie

60.22 chains - intersect trail running NE & SW

71.00 chains - East margin of ocean beach. When plotted on 1931 photo this shows 300' of bluff retreat.

Running east between Sections 13 and 24

6.00 chains - Trail running NE & SW. When plotted, trail is 65' west of bluff in 1974 and on edge of bluff in 1931.

8.00 chains - barn on line

12.00 chains - Bywater's house on line (shows on 1918 survey by Lentell)

42.50 chains - trail NE & SW

50.00 chains - fence (N & S)

56.00 chains - house on line

69.00 chains - fence NE & SW

73.00 chains - enter flat land

Running west on line between Sections 23 & 26

18.00 chains - gulch - NW

22.00 chains - trail - N & S

38.00 chains - Intersect shore of ocean. This plots 1,500' west of bluff location in 1980.

Note: 80 chains = 5,280 feet = 1 mile
1 chain = 66 feet = 100 links

Measurements at Big Lagoon, from Survey No. 205 for Cottage Gardens Nurseries. J. N. Lentell, C.E. June 20-26, 1918. Scale: 1" = 400'.

1. Concrete monument is 60' east of the Park Road base line. Bluff measures 835' west of base line for Station #1.

2. Bluff measures 440' west of base line at Station #7.

3. Bywater's house noted December 3, 1875 at 12.00 chains (66 ft./chain) by Foreman.

4. Bluff measures 1,030'± west of base line at Station #11.

Measurements at Big Lagoon Subdivision, from CalTrans Field Survey Book Hum-1-J #24. c. 1920.

1. At road station 439, bluff edge is 1,230' from center line, versus 650' in 1941 which is near Station #17 of this study.

2. At road station 445, bluff edge is 950', versus 420' in 1941. This is close to Station #15 of this study.

3. At road station 452, bluff edge is 1,150', versus 580' in 1941. This is close to Station #12 of this study.

Interpretation of Results

This section of the report is arranged geographically from north to south beginning at the Gold Bluffs region and ending at the Moonstone Beach area. No specific measurements to the edge of bluffs were made from Gold Bluffs to the south end of Dry Lagoon because this area is in state or national parks and therefore there are no development pressures. Qualitative data were gathered on this region because the Redwood National Park has a road and recreational facilities in the area from Espa Lagoon to Fern Canyon and the California Department of Transportation maintains State Highway 101 across the Freshwater Lagoon spit. The California Department of Parks and Recreation maintains a parking lot at the north end of Stone Lagoon and the south end of Dry Lagoon.

In looking at the Gold Bluffs region the question is whether these bluffs have eroded significantly over the past 130 years. The region was settled by Indians between A.D. 900 and 1300 (E. L. Sasser, 1978). Over the following eight to nine hundred years the Yurok Indians that settled that area developed names for certain sections. The area a quarter-mile north of Squashan Creek they called "Where it thumps." They described it as a place where the earth falls down in large chunks. Many other people from 1850 through 1900 described the same phenomenon. This would indicate that the mechanism of the erosion of the Gold Bluffs area is essentially large blocks of consolidated material dropping off the bluff face.

DeMassey stated that chunks fell down after the surf had undermined them. Probably, the frequency of blocks falling has decreased since the beach widened, thus protecting the base of the

bluffs from surf.

It is not clear why the Yurok Indians called a depression at the south end of Espa Lagoon, "Earthquake his house -- pit." It would seem to imply some type of shaking earth or a pit that was created after an earthquake. Photo No. 2 is a sketch of the Espa Lagoon area after it had been settled by some gold miners.

In Photo No. 3 the swale roughly 1,000 feet north of the mouth of Redwood Creek is shown at elevation 80 feet. The Yurok Indians indicated that the ocean used to come in here. This is difficult to interpret, but implies an extreme rate of rise for this section of ocean front. There was an Indian village approximately 500 feet east of the swale.

After crossing the estuary and camping for the night, J. Goldsborough Bruff hiked up the draw one half mile north of the swale and stated he reached the brow of a tall cliff overlooking the sea beach. This at least indicates there was a bluff in 1851 at this point, and he also indicates that upon going down the bluff face they passed over wet blue mud and slatey fragments. He further indicates the beach was about 150 feet wide and increased in width to the north. Also, acccording to his journal, wave runup reached the base of the bluff.

In Photo No. 3, taken in 1980, it can be seen that the surf runup still reaches the base of the bluffs thereby indicating that conditions have not changed much at this point in 130 years.

Photo No. 1 also shows a view of the beach on which he would have walked northerly, and it can be seen that the beach slightly increases in width to the north.

Bruff visited both the upper and lower Gold Bluff mining camps. While he was traveling between them he stated that the cliffs were high, vertical and crumbling and the surf reached their base. The surf was so high that it was impossible to travel along this stretch.

On February 10, 1851 he reported that an immense slide of the cliffs occurred and that earth, rocks and trees rolled down in a great volume into the sea leaving a great loose ridge. It appears that he arrived during a time of very active erosion of the bluffs.

Eleven years later during the month of May another traveler found that it was impossible to travel along these bluffs until the tide was out.

Another traveler reported in 1878 that the surf beat against the base of the bluffs.

In 1896 the annual report of the state mineralogist indicated that the surf broke against and undermined the bluffs causing large masses to break down and disintegrate due to wave action. However, his report also indicated that after a storm the beach is narrow and steep while at other times it is piled up with sand several hundred feet wide. He did have knowledge that back in the 1850's the beach along this whole area was narrow and steep and that the waves washed at the base at every high tide. By 1896 this was true only at the south end of the Gold Bluffs, because at the northern part, for a distance of three miles, sand had accumulated to a width of two to eight hundred feet. And, of interest, he reported that a broad sandbar was forming about a mile from shore. He indicated this bar had been growing for the previous ten years. He surmised that the

material was coming down and out of the Klamath River. It is probable that the Klamath River carried a significant amount of sediment due to the tremendous amount of hydraulic mining that was occurring on the Trinity and Klamath Rivers.

In 1903 another traveler noted that while looking at the mouth of the Klamath in August, a circle of different color occurred where the Klamath emptied into the sea.

All of the above information would appear to indicate that the Gold Bluffs area from Redwood Creek north to Fern Canyon had actively been eroding perhaps as early as A.D. 1300. It would appear that the tremendous amount of material generated in the Klamath and Trinity River watershed caused the beach along the Gold Bluffs to grow in width such that the surf no longer reached the base of the bluffs north of Espa Lagoon. Therefore, the road to Fern Canyon is probably not in danger of being eroded by surf for several years.

The mouth of Redwood Creek has changed significantly with respect to the estuary. The sandspit on the south side of Redwood Creek, separating the ocean and the estuary, must have been relatively stable because the Indians had a sweat house existing on that sandbar as reported by Waterman (Waterman, 1920).

Goldsborough Bruff sketched the estuary and mouth area in February 1851 (Read and Gains, 1944). For comparative purposes Photo No. 5 was taken from approximately the same point that Bruff made his sketch. Comparing the two photographs indicates that an entire point has been eroded away and it is not clear whether the tall pointed rock was broken in half or not. Another tall pointed rock is about two to three hundred feet offshore as seen in Photo No. 6. However, in Photo

No. 5, a rock that looks like the lower half of the pointed rock in Bruff's sketch appears to be in approximately the correct location as in his sketch and would indicate only about twenty feet offshore. According to this analysis it would appear that the point has eroded easterly about 80 feet.

Photos 6, 7, 8, and 9 indicate that the estuary had filled in considerably since Bruff made his sketch in 1851.

Fifty years of erosion can be seen by carefully comparing Photos No. 5 and 7, and indicates the point has retreated about 30 feet. The beach appears to be progressing westward in time in comparing Photos No. 5 through 11.

Following the 1964 flood, levees were constructed as shown in Photo No. 3. The old channel was cut off and the amount of estuary decreased significantly. The levees have changed the hydraulics of the mouth considerably.

Freshwater Spit has remained fairly stable over a long time. The Yurok Indians had a name for a point a half-mile south of the north end of Freshwater Lagoon called "Boat where it goes over." This was the point where the sand barrier was narrowest. They also had a name for the place where the lagoon broke out which they indicated was located eight-tenths of a mile south of the north end.

Waterman gained evidence that the lagoon broke out at that point in 1899. Photo No. 14 is a rare photograph taken on March 24, 1938 of the lagoon broken through to the ocean. Photo No. 13 of the sand spit does not show any particular narrowest point, nor does Photo No. 15. In 1948 the California Department of Transportation constructed a new alignment of Highway 101 across the spit of

Freshwater Lagoon. On rare occasions surf runup reaches the roadway.

Between Freshwater and Stone Lagoon is a short section of land containing bluffs. They are best illustrated in Photo No. 12 taken in 1927. The Yurok Indians did not have any place names for physical features along this short stretch. The relationship of this area to other beaches north and south is illustrated in Photo 15.

Photo 15 shows that the sand spit for Stone Lagoon is located easterly of the Freshwater Spit approximately three to four hundred feet. It is probable the bluffs along this short stretch have eroded between 50 and 100 feet over the last 130 years. During storms the surf still reaches the base of the bluffs along this section.

An Indian village was settled at the south end of Stone Lagoon in A.D. 120, A.D. 490, and A.D. 1765, according to dates from samples during an archaeological investigation. Six years ago surf was actively eroding the base of the bluffs upon which a portion of the ruins of this site existed. It would seem reasonable that Indians would not settle a village immediately next to the edge of an actively eroding bluff, but it is difficult to determine how much land existed westward of the village when it was first occupied roughly 1,800 to 1,900 years ago.

The bluffs from the south end of Stone Lagoon to the north end of Dry Lagoon have been subjected to active wave erosion for a very long time. When Goldsborough Bruff hiked along this section on his way to the Gold Bluffs there was an implication that they could not get up and over Goat Rock, which is illustrated in Photo 16. However, they were able to travel along the beach to the rock. They had to back-track the next day and go up over the top via a long gradual

slope. After crossing the ridge of Goat Rock he indicated they went down a path of black mud and slatey fragments and then hiked three more miles through soft sand. He described the beach as thickly strewn with heavy driftwood, some of it immense trees.

The rock ledge found under the north end of the sand spit of Stone Lagoon may be part of the reason why Stone Lagoon breaks only at the south end (Caltrans, 1943).

The sand quarry on the beach at the south end of the sand spit of Dry Lagoon was used for a repaving project for Highway 101 in 1931. It is doubtful that this operation had much effect on the beach at Dry Lagoon. The earliest known picture of the beach profile at Dry Lagoon is Photo No. 16 taken between 1903 and 1904 (DeLong, 1978).

USC&GS map 1378 surveyed in 1873 indicates no beach from the north end of Dry Lagoon north to Goat Rock. The same appears in Photo No. 15 indicating little change in the beach along this section over the last hundred years.

The next section analyzed was from the south end of Dry Lagoon to the north end of Big Lagoon. It is shown in Photo No. 19 and is known as the Truttman Sink area.

The Indians had names for some of the rocks along this portion. The old original Trinidad trail to the Trinity mines turned inland at this point and followed in a southeast direction up the ridge line.

Richard Truttman recalled the buggy road went along the Big Lagoon sand spit to the north end then up the hill via three or four switchbacks, then down to Dry Lagoon. He further recalled that he and his brother used to sit on some rocks that are presently one hundred

and fifty feet offshore near the northerly end of the Truttman area. These may be the rocks in the lower right-hand corner of Photo No. 20. To his best recollection the Truttman landslide did begin to move after the road was built between 1921 and 1923 and that the slipout at the north end of the landslide caused the road to be closed in the winters of 1923 and 1924. On USC&GS map 1378 surveyed in 1873 the beach in front of the Truttman area appears very narrow.

Plans for the new alignment of Highway 101 across the Truttman area were approved April 17, 1922. Survey notes in book HUM-1-J No. 43, are dated May 2, 1923. On page 69 the notes say, "Between station 842+21 and 849+78 there is a slide in action." In Table 1 of this report, twelve measurement stations are described and the retreat of the toe of slope and of the erosional scarp between 1931 and 1974 is listed. The retreats of the scarp ranged between 49 and 425 feet whereas the toe retreat ranged from 25 feet to 125 feet. The 125 foot retreat of the toe is at station eight which is within the landslide noted in the survey book on May 2, 1923.

Photos No. 18 through 25 show the Truttman Sink area. Photo No. 18 is the earliest view on the ground of the area and is dated March 30, 1938. Photos No. 22 and 24 can be compared to show changes in shoreline that occurred between 1931 and 1942.

Table 1 shows that retreats during this eleven-year period ranged from 9 to 83 feet. Photos No. 22 and 24 show measurement stations three through nine, while Photos No. 23 and 25 contain stations nine through twelve.

The old Trinidad trail which shows most clearly in Photo No. 23 left the beach near station ten. This would indicate or imply that

a beach did exist even at high tide in 1850 when the trail was first constructed.

Measurement station number one is very close to the parking lot in Dry Lagoon State Park, and it can be seen that from 1931 to 1942, 47 feet of retreat of the bluffs occurred and from 1931 to 1974, 54 feet of retreat occurred.

The Truttman slide will probably continue to move for several years. The top of the slide scarp will progressively move eastward based on the fact that it has moved roughly four hundred feet in the last 45 to 50 years. This constant retrogression upward and easterly could ultimately have an effect on the new four-lane expressway, completed about 1975 in response to the constant maintenance problem of the old alignment. Photo No. 19 illustrates the Truttman slide, the old alignment, and the new expressway.

Of interest, the old original alignment laid out by the county surveyor sometime after 1886, but prior to 1903, was very close to the alignment of the new expressway completed in 1975.

The material makeup of the 3-1/2 mile long sand spit separating Big Lagoon from the ocean has apparently changed in the last hundred years. Many of the journals of the early explorers and miners consistently complained about the soft cohesionless, pebbly nature of the beach and that it tired them out very much in order to cross this beach.

In 1980, when one walks the beach, there is no sinking to the knees or even sinking over the top of shoes. The beach is no longer pebbly, but mostly of a sandy nature. The explanation of this could be that the amount of material moving along the coast increased

significantly following the sediment generated by the hydraulic mining on the Klamath River. The littoral drift and surf in this area was not capable of moving that much material and therefore the strong northwesterly/southeasterly winds blew the lighter fraction of the material inland thereby covering the sand spits of all of the lagoons with material smaller than that existing, thereby filling voids and increasing the ability of the beach to support loading.

The Indians had a name for a part or point on the Big Lagoon spit, 1-1/4 miles north of the south end, where the sand spit bent westerly towards the ocean. This is still noticeable in 1980 and there is no clear explanation for it.

Historically, the lagoon broke out at both the north and south end. It did not break out at the south end after about 1910. This may have been due to several artificial openings at the north end. Beginning around 1880 or 1890 the farmers who owned ranches at the southeast corner of the lagoon opened the north end artificially in order to keep their fields from being flooded. The Lagoon Lumber Company controlled the level in the years around 1908 through 1920 by artificially breaking open the north end of the sand spit. Then in 1926 and 1927 Caltrans constructed a wood trestle across Big Lagoon for Highway 101. Upon completion, it was found that the trestle was built a little low and when the lagoon filled during the winter, it was not unusual for the trestle to almost float; therefore, Caltrans used to artificially open the north end of the lagoon as shown in Photos No. 30 through 33.

This continued opening of the north end artificially for 30 years may have caused the spit to narrow at the north end thereby

making it easier to break naturally. The south end beach has grown in width considerably, thereby decreasing the exposure of the bluffs within the Big Lagoon County Park.

Photo No. 28 is the earliest known photograph of the lagoon broken at the south end and indicates several blocks of material that recently fell due to erosion of the underlying foundation by the surf. About 500 feet south of the southwest corner of Big Lagoon the Indians indicated that the beach ended and/or the cliffs ended.

Waterman translated this area to be "rocks where they end." It is not clear if this was meant to be where the bluffs ended, the beach ended, or eroded blocks of bluffs ended. Waterman interpreted this point to be the point where the cliffs ended and the sand beach begins; however, he did not indicate if the beach began as you looked north or south.

Early explorers indicated that the surf was against the base of the bluffs as you look south towards Patricks Point.

Photo No. 34 shows the region and where the bluffs end and perhaps where the beach ended also. It is probable that the Indians meant that, as you looked south, the so-called sand spit or beach ended at the same point where the bluffs began.

The Indians had a name for a place called "bluff gets low." Waterman interpreted this as the point where the beach ended at the line of cliffs which gradually increase in height towards Patricks Point.

In Photo No. 34 a small sand shelf is evident. It is unclear if this area is very slowly rising or if the amount of material stored is so great that an actual shelf is forming and there is some decrease

in the amount of surf activity and littoral transport over the last 40 to 50 years.

The point is significant for the property owners in the Big Lagoon Subdivision in that the southerly half of the most westerly properties may have some extra protection from surf.

In regards to the eroded blocks of material in Photo No. 28 it is probable that the rocks mentioned by Thomas Gihon where these exact same type of blocks at the same place. The Indian village that was under attack at that time was located on top of these bluffs which are now within the county park. This would indicate active erosion was occurring at least in April of 1850.

It is of interest to note that the report by the state mineralogist in 1890 indicated a large amount of peat was exposed at the south end of Big Lagoon when it broke out. He also indicated the sand spit was increasing its width seaward having gained 50 to 100 feet in width in the last four years.

In the summer of 1929 some 60 recreational cabins were built at the south end of Big Lagoon, 15 of which were built close to the edge of the bluffs. By 1935 the surf had reached the toe of the bank to an amount that was noted by one resident. In the last week of January 1940, and the first week of February, a significant amount of the bluffs were eroded. That summer many of the cabins were moved back from the bluffs. An additional significant amount of erosion occurred in October of 1941.

Table 2 documents and summarizes this early erosion and the overall erosion from 1931 through 1974 all along the Big Lagoon Park Company land and the Big Lagoon Subdivision land. It can be seen that

in the short period of ten to eleven years following construction of the cabins, retreats along the stretch of bluffs where the 15 cabins were located ranged from 25 to 58 feet.

Approximately ten cabins were moved back from the bluffs in the summers of 1940 and 1941. In a relatively short three-month period from November 6, 1941 to February 16, 1942, retreats along the same area ranged from eight to nineteen feet. Overall, since 1931 to 1974, retreats along the Big Lagoon Park Company land ranged from a low of 43 feet to a high of 90 feet.

The erosion of the bluffs occurs in a very short amount of time during catastrophic, infrequent storms whereby large swell and high seas, plus high tides, removes the sand from the beach thereby allowing the runup to run inland to the base of the bluffs. Large blocks of bluff material fall off thereby causing retreats of up to 20 feet in a relatively short time of two weeks to two months.

Photo No. 43 shows a typical example of what happened during the storms of 1940 and 1941, with a cabin literally hanging out over the bluffs.

Retreat along these bluffs over the last 10 years has been relatively insignificant with only one large block falling off in front of the grey cabin shown in the left portion of Photo No. 58. About 83 feet of land has eroded away west of this cabin since 1931.

Two recent block failures occurred in front of the Big Lagoon County Park as shown in Photos 47 and 55. Much of the old summer beach which built up over five or six years was also eroded as shown in Photos No. 47, 49, and 50.

Surf does reach the base of the bluffs along the stretch of

the Big Lagoon County Park and Big Lagoon County Park Company land as indicated in Photos No. 51 through 54, and 56 and 57.

The June 20, 1918 survey by Lentell indicated the bluff was close to its position in 1931, at measurement stations one, seven, and eleven.

Using government field survey notes dated August 24, 1875, the edge of the bluff is located 300 feet west of its location in 1931. While the 300 feet of retreat is difficult to believe, using the notes from the same survey book and running east between sections 13 and 24, the old trail plots on the edge of the bluff on the 1931 aerial photographs and 65 feet west of where the bluff was in 1974, which is a believable measurement.

The next area under discussion is the Big Lagoon Subdivision. Measurement stations 10 through 18 in Tables 2 and 3 pertain to this subdivision. It is well illustrated in Photos No. 59, 66, and 68.

This subdivision was created in 1962. Lots were sold in the early 1960's and construction began on some homes east of Ocean View Drive around 1967. By 1974 only a few houses had been constructed west of the road; however, by 1980 about eleven houses had been built as shown in Photos No. 66 and 68.

Bluff retreat along this section has ranged from 45 feet up to 152 feet according to measurements made off of the aerial photographs. These measurements were verified by using the surveyed measurements from the subdivision map as a cross-check.

Lot 33 at the most northerly end of the subdivision is also one of the most hazardous lots because the bluff is quite low. The retreat measured at this lot from 1941 to 1974 was 38 feet. The

3. Describe each drug and intravenous solution carried by paramedics to include:

   a. Class.
   b. Uses.
   c. Action.
   d. Dosage/route.
   e. Side effects.
   f. Contraindications.
   g. Special information.

largest retreat occurred at Lot 7 and was 90 feet.

Station 18 is south of the subdivision and indicated a 152 foot retreat. Lots 4, 7, 11, 12, 16, 20, 29, and 33 have all experienced retreats of 45 to 112 feet since 1941. Since the subdivision was created in 1962, measurements indicate that Lots 7 and 11 have experienced retreats of 30 feet and 55 feet respectively.

Lots 16, 20, 24, 29, 32, and 33 have experienced retreats from 10 to 20 feet, inclusive. These retreats are significant for these lots when it is noted that over one-third of Lot 4 has disappeared; half of Lot 7 has eroded away; half of Lot 11 is gone; about one-third of Lot 12 is gone; almost half of Lot 16 is gone; more than one-third of Lot 20 is gone; one-fourth of Lot 24 is gone; almost half of Lot 29 has eroded away; more than one-third of Lot 32 is gone; and approximately half of Lot 33 has eroded away.

All of this occurred since 1941 which would indicate the possibility that almost all of the remainder of these lots could be gone by the turn of the century.

Field notes in a Caltrans survey book HUM-1-J, No. 24, made in about 1920 indicated retreats of approximately 500 to 600 feet in the area along the Big Lagoon Subdivision. So far, no explanation has been developed to explain these measurements. The information contained in the 1918 survey by J. N. Lentell immediately north of this area would indicate the bluff location in 1918 was similar to that in 1931.

Historically, highway surveys have been very accurate, therefore it is perplexing why the three measurements in this survey book would be up to 500 feet in error.

Using information in the government field notes dated August 24, 1875, the location of the bluff plots 1,500 feet west of the location of the bluff in 1980. The map prepared in 1870 by the U. S. Coast Survey under registry number 1179 does not indicate any type of erosion of this nature and the alignment of the bluffs on that map is similar to that illustrated in Photo No. 72 taken in 1910.

Photo No. 73 taken from the same point 70 years later does indicate several alluvial fans and debris slides occurred along these bluffs. Journals of the early explorers indicated this stretch of beach was subject to surf runup to the base of the bluffs. The steep portion of these bluffs have become significantly more vegetated over the last 70 years.

Originally, the tops of these bluffs were covered with sitka spruce. Following the discovery of gold in the Trinity mines, and at Gold Bluffs, and in the sand of the sand spits, these plateaus were cleared and planted in hay and potatoes.

The next section of coastline under discussion is from Patricks Point State Park to the City of Trinidad. This stretch of coast contains a very rugged steep shoreline broken by many streams. The 1870 map indicated the area as essentially vegetated with sitka spruce and brush, and all of the coves had small narrow beaches.

It was very difficult to measure retreats along this area due to the great distortion in some of the early aerial photographs. Most of the measurements indicated the shoreline had grown westerly in fairly significant amounts ranging from 12 to 85 feet. Landslides and creep would account for some of this, but it was decided that distortion was the major cause.

The largest retreat measured was 70 feet which occurred in a cove at station 7, shown in the left-hand portion of Photo No. 79, just south of Scotty's Point.

Retreats were also measured using the 1870 map and comparing to the 1942 aerial photograph. At station 11, 1,800 feet north of the Colonial Inn, the top of the erosional scarp or bluff was calculated to have retreated 363 feet in 100 years. At station 13 the top of the erosional scarp had retreated 255 feet in 100 years. Station 13 is 670 feet north of the Colonial Inn.

At station 8, essentially no erosion was measured, which would imply a high degree of stability along that particular stretch of coastline. Another spot where no erosion was noted was about 200 feet south of station 11; however, the top of the erosional scarp showed a 363 foot retreat east. This would seem to indicate that the upper part of the slopes are continually creeping and moving downward providing some type of a stable shoreline with a constant feeding of material.

Using measurements from Caltrans survey book, HUM-1-J, No. 24, and comparing to 1974 aerial photographs, retreats ranging from 90 to 450 feet were calculated. It is significant to note that, using the survey notes, a retreat of 450 feet was measured at a point 200 feet south of station 7. However, when using the 1870 survey map a retreat within 50 feet of this same point was measured to be only 16 feet.

At a point 100 feet north of station 6, which would be 250 feet south of Scotty's Point, the survey notes indicated a 300 foot retreat compared to roughly a 10 to 15 foot retreat using the 1870 map.

These measurements are again perplexing because they are similar to those noted along the bluffs at Big Lagoon. They seem to be some 300 to 400 feet different than all other measurements. One way to resolve the matter would be to search through title company records for an accurate survey made for specific parcels along this area and obtain the actual on-the-ground measurements from the road to the top of the bluff and down to the toe of the slope. Photos No. 75 through 81 show this area.

The only area measured between White Rock and Trinidad Head was the bluff area on the Anderson property located in the southeast quarter of section 15 T8N, R1W. Retreats on this northwest-facing bluff ranged from 115 feet to 200 feet over a time span from 1870 to 1942.

From 1942 to 1974 the same area retreated from 21 to 44 feet. Therefore, it can be seen the retreat was fairly significant on this stretch of property.

The shoreline from Pewetole Island to Trinidad Head has not changed significantly since 1851. This conclusion is based upon study of photographs and illustrations numbered 84 through 97 in this report. Measurements of retreat of the bluffs along the western edge of Trinidad were made utilizing the 1870 map number 1179, and 1942 and 1974 aerial photographs. From 1870 to 1942 the top of the bluffs retreat from zero up to 85 feet at one point and the toe of the slope retreated from 20 to 75 feet at some points.

The beach profile appears to be quite stable, at least over the last one hundred years.

In regards to comparing Photos No. 86 and 87, it should be

noted that when Goldsborough Bruff sketched the small rock island in 1851, he did not sketch the large island immediately behind it. Therefore, when Photo No. 87 is viewed, the large island must be eliminated in order to see the small one in the foreground.

The bluffs along the south boundary of the City of Trinidad have apparently not changed very significantly since February 1851. The best estimate for the date of settlement of the Tsurai village on this slope is A.D. 1620.

Bruff's sketch of the village and this slope is well illustrated in Photo No. 101.

Also of significance are the bluffs he sketched which would be immediately west of the present day Trinidad wharf.

In early March or April of 1851, Ernest DeMassey indicated there was no beach at high tide although the beach extended many meters at low tide. He further indicated a steep bank rises abruptly; and looking at Bruff's sketch the bluff or bank does not appear to be that steep. However, there is an indication that surf at high tide would have attacked the toe of the slope directly. When Bruff arrived at Trinidad on January 21, 1851, he described the banks as small cliffs.

The next section under discussion will be from the Trinidad Head area to Moonstone Beach.

Photos No. 105 and 106 are good overall views of this stretch. Table 9 contains the measurements made along this stretch and several areas appeared to have aggraded westerly in amounts ranging from 2 to 20 feet. The largest retreat was 70 feet which occurred 230 feet north of Houda's Landing.

The earliest views of this area are in illustrations 107, 108, and 109. The vertical bluffs are clearly shown in 1851. They are not that evident in the sketch contained on U. S. Coast Survey Chart 633 dated 1873. Bruff's 1851 sketch is probably more accurate than the 1873 sketch.

Construction of the first county wagon road along this stretch probably triggered some local slides. That road was abandoned in 1906 due to several slipouts. These landslides occurred mostly between Station 673 and 690, which would be about 1,700 feet along the stretch from where Scenic Drive first reaches the ocean at its southern end, north to a point beyond Luffenholtz Creek County Park.

Caltrans constructed a new highway along the present alignment of Scenic Drive in 1922 and 1923. Some of their construction involved utilization of a strong jet of water to cut away the sand on the interior side of the road. Some of the sand was sidecast over the slope and is visible in Photo No. 127 and 137.

One of the earliest photos taken from Trinidad looking southeast along the northerly portion of Scenic Drive is Photo No. 110. A fairly broad beach existed at that time. Photo No. 111, taken about 60 years later, shows the beach very similar in width.

Photo No. 116 is at Sotsin Point and shows measurement stations 7, 8, and 9. An example of the variety of measurements found along this section of shoreline is that station 7 showed an aggradation of 19 feet, eight showed a retreat of 22 feet, and 9 showed a retreat of 17 feet. Eight and nine are in a cove area, and the upper slope appears to contain sand that was sidecast over the hill during the construction of Scenic Drive.

Station 12 is located near the foot of the trail to the beach from the Luffenholtz Creek County Park parking lot. This area showed a general retreat of about 25 feet since 1942. A still picture taken about 1938 shows this same slope heavily vegetated.

Photo No. 124 is a good view of the recently cut bluffs in 1925 just north of Luffenholtz Creek County Park along Scenic Drive.

The slopes immediately south of Houda's Landing failed sometime prior to 1939. Photos 132, 133, 137, and 138 show these slopes. In late December of 1939 the entire slope was reconstructed from the rock bench at the beach all the way back up the hill to the road, as illustrated in Photo No. 132. This slope apparently has not changed much since 1940 as evidenced by comparing Photos No. 137 and 138.

At station 674, the interior point of the upper bluff was steepened when the point was removed in 1939. On November 8, 1980, during the earthquake, a small portion of this bluff failed as shown in Photo No. 136. Within the last four years portions of this stretch have failed on the west side of Scenic Drive, necessitating the Humboldt County Department of Public Works to consider moving easterly if the road is to be retained open to traffic.

Photo No. 129 shows an alternative route that was considered by Caltrans in the early 1950's when they were having maintenance problems with Scenic Drive from Luffenholtz Creek County Park south to Houda's Landing.

This section of coastline is exposed to fairly strong surf because it is out of the lee of Trinidad Head especially for northwest swell. This is illustrated in Photos No. 144 and 145.

At station 14, 70 feet of retreat was measured of the toe of the eroded bluffs at a point about 230 feet north of Houda's Landing. At station 15 a retreat of 60 feet was measured. This was at the toe of the old landslide in the cove immediately south of Houda's Landing which was completely reconstructed in December of 1939.

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Book 120 - N 40° 00' to N 41° 00', W 124° 00' to W 125° 00'

1.	4/18/56	Eureka & South Bay -- 1:60,000
2.	5/25/43	Coast from Cooksie Creek to Centerville -- 1:40,000
3.	1/11/46	Hydesville to Ocean, Tompkins Hill to ocean, Table Bluff -- 1:11,000
4.	11/13/45	Lower Van Duzen, Eel-Rio Dell to Grizzly Bluff -- 1:12,000
5.	11/13/45	Eel Flood Plain and Delta -- 1:12,000 -- Excellent quality
6.	1/11/45	Coastal strip, False Cape to South Jetty and Buhne Point -- 1:10,000
7.	8/10/43	Obliques of South Eureka and Murray Field
8.	11/7/45	Rohnerville-Fortuna to ocean, Table Bluff to ocean -- 1:10,000
9.	1/11/46	Portions of Eel Delta and Table Bluff -- 1:11,000
10.	11/13/45	Eel River, Elinor to mouth of Van Duzen -- 1:12,000
11.	9/30/43	Dyerville to ocean at Four Mile Creek -- 1:38,000 -- Fair quality, snow and clouds
12.	6/8/43	Shelter Cove to Hydesville -- 1:40,000 -- 5 to 35 percent cloud cover
13.	5/25/43	Shelter Cove -- 1:40,000 -- Poor quality
14.	4/10/60	McKinleyville -- 1:10,000 -- Excellent quality
15.	4/17/56	Bull Creek north to Freshwater Park -- 1:60,000 -- Good quality
16.	4/17/56	Bull Creek south to Shelter Cove, all areas west to ocean -- 1:60,000 -- Good quality
17.	4/18/56	Shelter Cove to Bull Creek, west to Mattole River mouth -- 1:60,000 -- Good quality
18.	11/15/43	Table Bluff, South Bay, South Spit, Fields Landing, Fairhaven -- 1:21,500 -- Excellent quality
19.	9/21/56	Elinor to McKinleyville -- 1:61,600 -- Fair quality
20.	5/11/44	Samoa -- 1:18,000 -- Good quality
21.	5/11/44	10 obliques, Beatrice to McKinleyville -- 1:18,000 -- Good quality
22.	5/27/43	Coastal strip - Shelter Cove to Mattole River -- 1:40,000 -- Excellent quality
23.	6/8/43	Kings Peak to Fortuna and all area west to ocean -- 1:40,000 -- Poor quality
24.	11/15/43	Humboldt Bay area -- 1:21,500 -- Excellent quality

Book 105 - N 41° 00' to N 42° 00', W 125° 00' to 124° 00'

1.	8/10/43	Obliques of Crescent City -- Excellent quality
2.	9/21/56	McKinleyville to Smith River -- 1:61,660 -- Fair quality
3.	4/10/60	Dows Prairie to Moonstone -- 1:10,000 -- Excellent quality
4.	7/25/43 to 7/26/43	Lake Earl to Del Norte County North Line -- 1:40,000 -- Excellent quality

Book 121 - N 40° 00', W 123° 00'

1.	11/13/45	Southeastern Humboldt County -- 1:12,000 -- Excellent quality
2.	11/13/45	Southeastern Humboldt County -- 1:12,000 -- Excellent quality
3.	5/11/44	Southeastern Humboldt County, oblique

No aerial photographs were purchased at this time because none were taken earlier than those already available for the study and the budget was limited to about $100 for photographs.

The Still Picture Branch is in Room 18N in the National Archives Building. They have several thousand pictures indexed mostly by federal agencies. Therefore one has to review all the photos taken, for example, by the U. S. Forest Service in order to find a photograph taken in or near a particular National Forest. Two days of searching netted 60 rare photos of interest. One set of three-ring notebooks contained oblique aerial photos of places throughout California. Some of these photos were dated in the 1920's. They are called Airscapes, were taken by the Army Air Service, and are in the "stacks" in Room 19W.

The Library of Congress recently completed a new building. The Geography and Map Division is contained in the new building. Several maps were reviewed, most of which were published by private

map companies. Copies of three historic maps were purchased.

The Anthropological Research Center of the Smithsonian Institute in the National Museum of Natural History has historic photos mostly related to American Indians. Several boxes of photos were reviewed, and nine photos were copied.

Time did not permit a visit to the Prints and Photographs Division of the Library of Congress or the Naval Historical Center.