

FIELD JOURNAL

ALEXANDER WETMORE

JULY 8 TO NOV. 21, 1914.

July 8, Wednesday, 1914.
left Washington this evening 6:10 via Ches
& Ohio. car very hot while standing in
the station but was cool & pleasant once
we were under way as there was a
strong south breeze. From Washington on
out through Fairfax, Manassas & beyond
until dark fields & woods were bright
green with signs of recent heavy rains.

July 9, Thursday.
crossed the mountains in west
Virginia last night and found it
very cool in fact almost cold. wind
blew H. last night the time of our
arrival in Kansas City, from
Charlottesville, Va. in a night message.
This morning we are practically
out of the mountains when I woke at
six. The moonlight last night gave
hints of the scenery but we passed
the finest part of the road in the
darkness. Now west of the Alleghanes
the country is very dry and it has
not rained for several weeks. changed time
at Huntington W. Va. From here on
northwest to Cincinnati the track
followed the valley of the Ohio River
often right along the shore as the
stream meandered in its flood plain.
The river was very low with broad
mudbars and gravelly slopes exposed.

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Saw men apparently gathering claims and several small shallow draft stern wheel steamers. In several places jetties were in operation to large towns on the Ohio side of the river. From a point a short distance north of Huntington to near Manchester Ky. a blight on the numerous buckeyes was very noticeable the leaves showing ^{work of Cicada} brown ^{septentrionalis} in large areas. Some other species were affected but could not be distinguished from the main. At Marysville Ky. during a few minutes stop I saw in the willows along the river Catbirds, Song Sparrows and English Sparrows. Also a family of Chickadee (carolinensis) and one Melanerpes erythrocephalus. Several Progne subis were flying about a small steamer, the Courier, lighting on the pilot house and I wondered if they were nesting on her & following her in the river.

Above Augusta Ky. a large tract of Cecut trees were brown as though from the attacks of Chalcidius locustis. I saw Bronzed Grackle here. The Ohio is fringed all along with Salix sp. and many Platanus. Country rock here showing in exposures in limestone ($CaCO_3$). This region in Audubon day must have been very interesting to the naturalist.

At Cincinnati we crossed the Ohio River. Just outside on the north side was a huge glacial moraine and beyond all the

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hill was rounded by glacial action. More
 Bronzed grackles were seen. The whole area
 to Indianapolis was exceedingly dry so
 that it was dusty & dirty on the train.
 clumps of locust were seen in several
 places in considerable areas but no work
 of Chalcids was noticed so that this
 insect may not extend farther north.
 Last Spring a year ago I saw nictitator
 in Kentucky below Covington.

A buzzard was seen at Greensburg
 Indiana.

Near Beech Grove Indiana, nine
 miles east of Indianapolis we were
 held up half an hour in the country
 by a derailed car in a freight ahead.
 Noted Kingbird, Indigo Bunting, Field
 Sparrow, Bluebird, ^{morning Dove} & Juv Crows seen.
 clumps of elder were still partly in
 bloom though some had passed over
 into fruit. Wild Sparrows here and
 clumps of wild rose. On the latter I
 collected a Thrips that might be
Hords new one discovered at Plum Point
 Md. also a large black species on Heracleum.
 Collected Diabrotica 12-punctata, Tetrasopos
tetrasopos, Corimelaena sp. Larva very
 abundant - level country across here.

at Sandford, Ill. on siding fields,
 Melanerpe, Bluejay, Meadowlark, Quail
 Zenaidura & Oniscalus were seen or heard.
 took green Pentatomid or Aclepias.

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Across Indiana & Illinois were large numbers of Mourning Doves gathered especially in the grainfields. Noticed one flock of perhaps twenty together. From the vicinity of Terre Haute to St. Louis rains had laid a good deal of dust around St. Louis 7:18 P.M. & left at 9:10 on the Burlington for Kansas City. Very hot in the station.

July 10, Friday

This morning at daylight we were well across Missouri. Everything was green as could be from the rains and the difference in the lush growth near the track between here & farther east was very noticeable. Tringed Gentian in bloom, two species of Asclepias. Corn three times as large as in Kentucky. Near Kansas City heard my first *T. piza americana*.

Around Kansas City 7:40 A.M. & left at 7:50 on the Burlington. As we stopped at East Havenworth for a few minutes *Diellisalis* were piping in the fields tick tick see see see and their songs could be heard occasionally above the noise of the train. Missouri river was very muddy and had been high but was going down. Quite hot. Great numbers of *Picus rufus* through Missouri many more than any where else.

From St. Joseph the road went up the east bank of the Missouri and then crossed near Palo Alto and went on west. Some large fields of alfalfa here. Large numbers

July 10

of Spiza americana all along. I saw them frequently on low perches & heard their songs continually. Falls City Neb. saw one Goldfinch. and near Rulo Neb. a solitary sandpiper flew up from the border of a muddy pool. Rather early for them. At Dawson Nebraska Sturnella magna was heard singing. At Burchard Neb. I heard Downy Woodpecker heard twice in separate localities among the cottonwoods. House Wren, singing. heard in other localities too. and Yellow Warbler.

At Wymore Neb. a Cardinal was singing clearly.

The country this far along the tract was level with broad meadows extending to low lime stone hills. at Pawnee the road climbed to the high rolling prairie of the uplands. and beyond here the change to prairie conditions was noticed at once. Near Endicott some scrubby hills were seen with their slopes between covered with small Amerens, Ulmus, Ulex nequedo and Populus. Buffalo plum common. Beyond here the trees became restricted more & more to narrow lines following the streams. I saw some signs of the banks having been cleared to allow the ready dissipation of flood water.

at Hardy Neb. the first song of Sturnella neglecta greeted 125 west of the East eastern meadowland heard.

at Guide Rock in the evening Wood

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Thrushes were heard singing from the groves of cottonwoods, Bluejays were calling and I heard the Kingbird (eastern) and an Orchard Oriole. Large numbers of grackles were flying in to roost. Many small parties of Barn Swallows were seen flying in to some roost along the Blue River for a long distance. The track ran almost on the Kansas-Nebraska line and I believe crossed into Kansas twice for short distances. The Blue River paralleled the track on the south for a long distance now approaching and now meandering to the line of bluffs marking the boundary of its flood stream. It is a fair sized stream here, rather high and very muddy lined with cottonwoods & willows.

enormous fields of wheat & corn line either side and one can imagine remnants of the former prairie & suble prairie & flora crowded here to a narrow line along the stream and existing precariously threatened by the encroaching fields on the one hand and by recurring floods of water, now gaining ground in some neglected swampy area and now losing when they are drained.

at Red Cloud I heard the explosive notes of two Arkansas Kingbirds which were here with the eastern Tyrannus tyrannus, also a Bell's Oriole Spiza americana was still common but was seen no more as it was dark.

Nothing could be more interesting than to
note the meeting + overlapping of these
eastern + western forms of life!

July 10

July 11, Saturday.
Up this morning at five and was dressed
when the train pulled in to Fort Morgan. A fine
clear morning and birds were abundant all
along to Denver. Much of the country here is
under irrigation only the higher portions being
unbroken. Lark Buntings were common in small
flocks and many of them were apparently
through nesting. Several Song Sparrows were noted
near the track and the large Arkansas
Kingbirds were often in sight either flying
or perched on the wires + high weeds. A

pair of eastern Kingbirds were seen at
Hudson. Several flocks of Horned Larks were
noted on large flock scrub fir or more
being in a cornfield. Western Mourning
Doves singly or two or three together
were in sight continually. One flew parallel
with the train for some distance slowly
falling behind and so near that
I could see the spots on the tail
distinctly. We were not making fifty miles
an hour in my estimation at the time.
Meadowlark common. Many thick-billed
Redwings. The tule ground ponds in the Bass
region harbored many yellow heads still in
good plumage. A Shrike and some house
finches were seen. The Lark Sparrow was
common. One Burrowing Owl sat on
a fence post in the sun watching the

July 11

train as it went by. One Killdeer stood by a pool of water. At one place a dozen magpies flew out together and whirled off to the nearest bush of cottonwoods. A Nighthawk flew out and over the Barshakle where coots and Ducks (specie?) the Great Blue Heron stood in water nearly to their bodies.

Crairie dogs were fairly common. Sunflowers were in bloom, though yesterday in Nebraska & Missouri plants showed no buds. Black-eyed susans were abundant. One field of several acres that had been plowed & then abandoned was covered with them all in full bloom.

In the Barshakle region were many groves of cottonwoods. Sand Creek was dry as usual. Warrind in Denver 7:50.

Bob Rockwell came down & we had a good talk. He says that Cooper (T. L. man) is a doddering old fool. Bob advised him to come in Friday night go out to Brighton and leave there at 2 or 3 a. m. with a heavy rig & making the round of the gun clubs Saturday a. m. and get the hunters red handed. Instead he came in Monday night and proceeded to "make a reconnaissance".

In consequence every one was on directly and all were calling Rockwell up about the warden. At Barshakle the same thing was repeated. Rockwell told him to go down a couple of stations below Barshakle on Friday night get a heavy rig & drive around to the gun clubs & get the hunters as they came in with the birds.

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Instead he went down then posing as a postoffice inspector & the hunters were all wild immediately. Some farmers with smokeheads gave him some information but it was only by the grace of God that he found out anything. Bob had some interesting on Minds as an imitator & I gave him my note on the mocker in city park which imitated the grey Kingbird. He said he found a bird at Boyers imitating the Crow & Bluejay exactly.

From Denver the train rose slowly onto the divide and as far as Palmer Lake it was well familiar with the country. (Left Denver at 9:00 via D. & R. G.). Saw one Lewis Woodpecker in somewhat open country - near Garland. It was flying about crowlike and circling through the air as though catching insects. A few Red-shafted Flickers were seen too & many magpies. From Palmer Lake we descended to Colorado Springs, a pleasant appearing city and then on into Pueblo and Canon City. The country here was typical foothill country. The Arkansas River was of considerable interest - to me and here it was of moderate size with a swift current. The Royal Gorge came fully up to expectations though I did not join the tourists in the open "observation car" so called. Too many cinders flying

July 12,

10.

at Parkdale just above the gorge a peculiar stunted branched cactus appeared but I was unable to get specimens. It grew two feet tall & had a deep red flower. This continued straggling to about 7000 feet. At 6500 feet it is mixed with spruce and oak and at about this point narrow-leaved cottonwoods began though the broad-leaved species persisted up to 7000 feet. Junca was common and Pinus bloomeri was seen as high up as Buenavista at 7900 feet altitude. The ascent was nearly though gradual and I was pleased to find friends making their appearance. Smoking aspens joined little thickets at 8000 feet and at 9000 were a few Engelmann's spruces. A thunder & rain storm came up about six and the cold rain drove through the sagebrush of the open flats while vivid flashes of lightning came all about us resulting in thunder claps startling in their loudness & clearness.

When Lemmings Pass was crossed at 10200 feet it was dark & soon after I went to bed. At the altitude some & did not prove about much. Very cool & pleasant up here. Very few birds. I had a glimpse of one Rock Wren & that was all.

July 12, Sunday.

July 12

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This morning when I woke we were well over the Utah line in a stretch of desert with abrupt mesas, dry arroyos about and snow capped mountains in the distance. This continued to Soldier Summit where we went over a steep incline and then dropped down into an irrigated country which became greatly improved as the Salt Lake Valley was approached. Saw two ravens in the desert.

Utah Lake a broad stretch of water was passed above Provo and then going through an irrigated stretch of great fertility Salt Lake City was reached at 2:35 P.M. secured a room & bath ^{1.50 per day} at the Cullen Hotel, proceeded to clean up and then had my baggage sent over. Went out & walked around awhile & then rode out to the end of ^{west} seventh south carline to look at the country. It was quite hot but not oppressive.

In Salt Lake there are an abundance of drinking fountains in public places & the water is off the finest.

I spent the evening in writing & went to bed early.

July 13, Monday.

This morning was up at six. Rather hot last night and this morning

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the city was overhung by haze through which the sun rays came feebly. I have dressed & went out for breakfast.

At nine called on Hon. Fred Chambers Game Commissioner of Utah at Room 701 Walker Building. He said that he was very glad to see me as the smaldy among the wild fowl was just beginning. on July 5 he found at the Bear River gun club numbers of "fluffy little snips" affected. He had written Dr. Fisher that it began on June 15 as an affected buck was found there but heavy rains flooded the marshes in the area affected and the fresh water coming in checked the outbreak for the time being.

He told of one remarkable incident that occurred last week. At a certain ranch ten or twelve miles from the city ^(near state gun club?) the barn stands about 500 yards from the house. Adult chickens were kept about the barn and at the house was a brood of young. As the young grew to "frying size" they became a nuisance about the house and were moved to the barn on Thursday night (July 9). Friday night four of these young were taken with the "disease". The same water supplied both barn & house and the adults

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Birds were not affected at all. This seemed to Mr. Chambers to point to a bacterial disease.

Mr. Byrnes & Mr. Voorhus & three assistants ^(The assistant staff proved to be boys out for the fun of it) were sent to the Bear River Curb a few days ago and will be back Wednesday.

Chambers said that the only three birds ^{of those on the margin} not affected were the Black-crowned Night heron, Snowy egret and the hood. The Marsh Hawk is affected at the height of the disease.

Tried to find Dr. Mohler at the Federal Building but they knew little of his whereabouts, expecting him vaguely about Saturday. Mr. Knowles was in charge.

Mr. Louis B. McCormick to whom I had a letter was in the hospital & will not be out for ten days.

In the afternoon I saw Mr. Chambers again and it was arranged that I go to Bear River Wednesday morning.

Then called on Mr. M. R. Stewart and with him found C. N. Griffin president of the New state gun club which controls the marshes at the mouth of Jordan River practically 10,000 acres of land.

Mr. Stewart said that a slight outbreak of the disease occurred about 1902 or 1903 the exact date being

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uncertain. Perhaps 500 birds died on their grounds in a small area but this was forgotten.

about 1906 or 1907 the real trouble began but not until 1910 did it assume alarming proportions. On that year ^{approximately 500,000} 500,000 ducks were gathered & destroyed on their grounds and it was estimated that as many more crawled into the grass and were not found. The marshes were dried that winter burned over to destroy absolutely all vegetation and then allowed to bake in the sun until huge cracks formed in the earth. And then in the spring they were allowed to fill again. In the hot weather the disease broke out again. In 1912 the marshes were dried again and baked & burned over and water was not admitted until September 20. There was no trouble this year.

In 1913 there was a much greater rainfall in June than usual so that instead of the customary ^{1.91} of an inch for June which is the average for 39 years 3.37 fell and the marshes were well filled with fresh water. As a result no ducks were lost. The present year 1914 promises the same results as rainfall for June was very heavy and the marshes are full.

Such is a brief history of the disease on the New State gun clubs grounds all facts to be verified later.

Dr. Stewart's experience with the disease is as follows.

It appears each year about August 10 and continues until the middle of November. Birds put in fresh water recover in 98 per cent of the cases tried. And when plenty of fresh water is present in the marshes are not affected which in his idea precludes the presence of bacteria as a disease. As has been established great amounts of sulphur are given off in the air from the smelters in the form of $S O_2$ and this speedily assimilates another atom of oxygen forming sulphur trioxide. This is deposited on the vegetation & ground and with the coming of rains is washed into the ~~the~~ streams. Sulphur has a great affinity for water and the two unite immediately forming $H_2 S O_4$. When these birds get this acid, as Dr. Stewart's words "each little stomach acts as a strainer and some of them get the acid" and are killed. One fact in support of this is that the physiological ~~effect~~ effect of Sulphur is to cause diarrhoea and

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all the birds have a severe diarrhoea. He recounted the idea that it was a contagious disease & that it was contracted by association by cats, dogs, donkeys etc.,

The disease too had been attributed to the presence of sewerage in the water. ^{at Jordan River} and in 1910 the mortality was attributed to this; however that winter a bill was put through the council and the sewer extended beyond the mouth of the Jordan River so that was eliminated. The fact that for long weeks out of the four the south winds drive the smelter smoke across the marshes would seem to allow the deposition of this sulphur trioxide.

Mr. Griffin, president of the New Star Gun Club believes that the birds die overnight and attributes the cause to a virulent poison. He says that the birds come down to infected pools and drink & never leave them except to crawl out on some tussock of grass when they die within thirty-four hours. But in this Mr. Stewart did not concur. Griffin said that he had cleared all pools of dead birds and that in a day or so it would be

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filled with dead birds again. He said that last year the only birds lost were in a stagnant pond or bay with no circulation of water. In this the water was only three or four inches deep and was covered with scum & filled with "wrigglers".

These gentlemen both said that they had had water analyses made but that nothing ever came of them and attributed this guardedly to some pressure brought to bear on the chemists. Mr. Stewart showed me red litmus showing blue streaks some of which had been tested in water known to be infected and some in the Jordan River itself so that the presence of some acid was shown.

From the following one might differ in the following.

1. If the disease is due to an acid why is it in years of plentiful rainfall why is disease held in check as there is abundant drainage. Outbreaks are said to occur after a heavy rain following a long dry spell. However with plentiful rain the acid would be held constantly diluted.
2. Again Mr. Stewart says that some of the get the acid. It is more probable that all get but only a certain.

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number secure a toxic amount.

Again the birds may differ in their resistance to the disease.

3. The disease was present in the first year after the extension of the sewer but not subsequently. After one year germs or bacteria might have been eliminated and the ground sterilized.

One point comes to me here. The outbreak comes every year about August when the birds are in molt and consequently in a weakened condition. At this time then they would be more susceptible to external influences whether bacterial or toxic.

This evening I rode out to the end of east 2nd South Carline which took me up onto a bench overlooking the city. A long trail of smoke from the smelter stretched out in a thin line across the marshes of the Jordan river and another long line came reaching up from the Murray smelter. This thin greyish smoke hung level above the city and almost obscured the line of the lake shore to the south. A thunder storm showed flashes of lightning that were almost obscured by the haze through which they passed showing as faint reddish flashes. A good many birds up here. Met Mr. Malcom deputy warden in chambers office.

GOVERNMENT EXPERT IS HERE TO STUDY DUCKS

Deseret Evening News
July 13, 1914.

Alex Wetmore, government expert of the bureau of economic investigation of the interior department at Washington, arrived in this city this morning, to give his personal attention to the duck malady and to see what he could do in furthering the solution of the problem. Prof. Wetmore is at the Cullen hotel, and will go to Bear river bay Thursday, to begin investigations.

The state fish and game commissioner will work with Prof. Wetmore, and has already sent Prof. Byrnes and Voorhees of the state university up there to make a start, assisted by three helpers. He expresses the belief that with this expert force at work, the malady that has occasioned such heavy loss among the ducks in the past few years, and has brought out so many conflicting theories and opinions as to its cause and origin, will be cleared up. Commissioner Chambers will extend every possible help to the experts, and will be present himself, at some of their investigations. Prof. Wetmore says the government is earnest in ferreting out this mystery, and will leave no stone unturned to effect a successful solution.

WILL INVESTIGATE DUCK MALADY HERE

Salt Lake Tribune
July 14,
Dr. Alex Wetmore, special investigator of the United States biological survey, who has been sent to Utah by the federal department to investigate the duck malady in this state, arrived in Salt Lake yesterday and spent the afternoon conferring with Fred W. Chambers, state fish and game commissioner. Dr. Wetmore will leave Wednesday for Bear river in Boxelder county, where he will begin his investigation of the duck malady. He will make a scientific analysis of the water where the ducks and snipes live in order to determine the cause of the malady.

July 14, Tuesday

This morning was up at six. a heavy thunderstorm last night with much wind but no rain. This morning as yesterday the sun over the straits was thin & weak though above it appeared to be covered only by very light fleecy clouds. apparently a haze hung over the city itself cutting out the light.

At eight nine went up to see Mr. Chambers again. He said that in 1910 he furnished ten men & the New State Gun Club furnished ten and these men in twelve days gathered 485,000 birds. (suggested!)

At Bear River Mr. Chambers arranged with the canal companies to let all the water run into the river for three days and close their gates. This was done, the marshes flooded & the birds washed out into Bear River Bay. For three miles & one half the shore was lined with dead bird for strips 20 feet wide & the birds were piled up 3 deep. I find however that all the birds are not ducks as has been the idea in Washington. The worst was the greatest sufferer and was practically exterminated in 1910. Among the ducks the Bluewinged Teal suffers most and

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and the mallard perhaps the least. Other species shoveller, widgeon etc are killed in varying amounts.

Mr. Chambers says that the little Snowy Egret has a colony of 25,000 in Bear River and the Glossy Ibis a colony of the same number. He says that the Glossy Ibis made its first appearance here in 1909 and was unknown to him previously.

Made a deposit in the Farmers + Stockgrowers Bank of which Mr. Signey is cashier and was very well treated.

Broke a tooth yesterday + had it filled by Mr. McEnany room 403 in the Judge Building. A very good dentist.

This afternoon saw Mr. Chambers again, and he called the Duckville Gun Club on Bear River + made arrangements for me to go up there in the morning. He said that he thought that on examination I would find that the disease was due to typhoid bacilli! He gave me a permit to collect.

Went up there and got a ticket to Corvallis on the Oregon Short line and found that the rate was \$2.00 with no reduction on a round trip.

As there was nothing else to do for an hour or so got on a

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subberick wagon and took in the town for 75 cents.

Had dinner at six and then took a Fort Houlgas car getting off at the mouth of Dry Canyon north-east of town. From here I could see out over the entire valley which was hazy as usual over the city with occasional flashes of lightning towards the lake. With my binoculars I could make out enough that was obscured before. Mt. Majestic southeast of town is said to rise to 11,600 feet and shows snow yet on the high slopes. These Wasatch mountains show very little timber and the Copper range across the valley is equally barren.

The lower part of Dry Canyon through which a small stream runs was rather barren. A grove of Cottonwood boulders stood at the mouth and higher up oak, wild plum, wild rose, were common. An occasional willow grew along the stream and I saw a Rhus (near glabra) and poison ivy. Higher up mountain grape and currant were abundant and the thickets were dense reaching to the tops of the slopes. Rabbit brush + sage were common and I saw one plant of Mentzelia from which I collected

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several thrups.

Several Monarch butterflies were noted & dragon flies (*Libellula* sp.) were very abundant. Gerrid nymphs were noted in a small pool. Saw one rabbit which stopped running when I squeaked. Towards dark it returned to town. Birds were fairly common but were few in number of species. Only nine species were noted of which the most common or rather most characteristic of the region seemed to be *Pipilo montanus* and *Passerina amoena*.

July 15, Wednesday.

This morning was up at 5:30 shaved & made a train on the Oregon Short line at 7:00 A.M. a clear day again as usual. Went north to Brigham through Ogden & then took a branch road up the Malad Valley to Corinne. The way north through the valley paralleled the lake most of the way and occasionally was right near marshes. Saw wovelets several times. Farmington & Kayville & other small towns were passed, a farming district & very prosperous. At Brigham I bought some of the finest red cherries I have ever seen, big red meaty fellows. At Corinne Mr. Cook from the Blackfoot

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Gum Club met me and took me
 down Bear River in a launch. At last
 some time to get a wagon to transfer
 my baggage and in the meanwhile
 I became acquainted with Mr.
 Hadley, a gentleman seventy years
 old, a broken mason and an old
 timer here. He told me that it
 required only about twelve years
 for these combarcely piblars to get a
 good growth. It put off about
 twenty feet and the ground they
 make a good shade but otherwise
 grow too tall.

Mr. Hadley expressed the belief
 that the land trouble was due
 to the smelters and that it came
 from arsenious poisoning. He said
 that to me with experience the
 presence of smelter refuse could be
 seen easily in a run in the
 water. He said that some day he
 will take me down to the Chesapeake
 Bay Gum Club. He also wanted me
 to promise to come up in two or
 three weeks and we would take
 a wagon + go up in the mountains
 for two or three days fishing.

Mr. Cook had a long narrow
 launch which he had built small
 and which made about twelve
 miles an hour though heavily
 loaded. The Duckville Gum Club

We went 2 1/2 miles downstream from Corinne
 and is near the mouth of Bear
 River near where it runs into Bear
 River Bay. We loaded my outfit at
 a small wharf and started. The
 sun was hot but cool breeze
 kept us from feeling the heat. The
 banks at first were about 8 to 10 feet
 high but kept getting lower & lower.
 15 miles below Corinne they were
 about three feet high and then
 came down to nearly a foot
 at 25 miles the marshes began
 and continued all along. The
 famous Bear River Gun Club is only
 1 1/2 miles above the Duckville.
 Has 83 members, dues \$ 50 per year.
 The Duckville Club has 100 members
 dues \$ 25 per year. The clubhouse is
 a good frame building with
 plenty of room and on the
 edge of the river. An open wharf
 or landing runs in front with
 widely separated supports to form
 a sort of float. ^{But with} The
 river is just beyond. Back of the
 house the marshes begin at
 once. Open pools & stretches
 and large areas of grass
 with smaller patches of timber
 mainly along the channels make
 up the marshes.

Coming down the river I was

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greatly interested in the bird
 life along. I spotted Lampyris +
 Killdeer were numerous. There were
 large numbers of Cinnamon or Seal
 and occasionally Pintails. I sometimes
 see little compact groups of Seal,
 Willets, Avocets and Killdeer
 were seen on the banks. A Black
 Terns, flew over head with many
 White-faced gossy also

after dinner at the club I went
 out in the marshes nearby. Waded
 in without using boots as that is the
 best way. The water is apt in the
 channels is not deep and Mr. Cook says
 that there are parts of them that will
 soon be dry. Birds are very numerous
 Avocets come up just back of the
 house and seals, other birds etc
 are in sight continually. Was out
 in the marshes almost three hours
 and picked up two sick ducks, a
 teal and a Widgeon & an one or
 two others that I could not get as
 though they could not fly they
 could crawl past across the water.

Mr. Cook says that the first birds
 that were troubled were noted about
 July 1 or at least before the fourth and
 that he had seen none that were
 bad yet all being able to fly enough
 so that to get them they had to
 shot. Mrs. Cook saw a sick Black

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necked still which was sick about
a week ago and which since has died.
I made a careful post mortem of the
baldfat in detail

The dead was found
in water at the edge of the bank unable
to ascend or thru such elevation. Diarrhoea
present greenish in color with white
subrogous matter present. Nerves uncontracted
This bird could spread its wings
laterally a little but had little control
of them. When they caught a wood
louse in crawling along the
ground the bird could only struggle
and was unable to loosen them. It
could not support the body upright
but progressed slowly & painfully by
shoving forward its breast by
means of its feet the body could
not be raised wholly only the
part being elevated the breast being
on the ground.

Upper & lower eyelids were jammed
to the eyeball, the lower one half covering
the ball. When the eyelids were loosened
they were found to be partly paralyzed with
a watery exudate. The nictitating membrane
could be brought forward half over eyeball
and the lower lid brought fully up to
cover $\frac{1}{2}$ the eyeball but the upper was not
moved. Fair control of eye muscles
the neck muscles seemed rather
strong

In the ... shes ... stirred snails floating at the surface with the foot exposed to the surface then the animals drifted about moving the shell from side to side and would not sink when handled nor could I make them stay under stress. The same species were working at bottom. Without critical examination I thought that perhaps the lung was filled with air rendering them buoyant. Specimens collected (*Limnaea palustris* & *Physa gyrina*?)

July 16, Thursday.

This morning was up at six and finished writing my notes before breakfast.

Then went out across the dry flats east of the club-house. Long stretches of baked mud were entirely bare & others were covered with a growth of a fleshy herb (specimen *Salicornia*).

Near the club were some fields overgrown with a bearded grass, ^{*Andropogon j. latifolius*} and here I found a few Savannah sparrows. Song Sparrows are not at all common here.

Crossed on over to stretch of water known as Pintail neck washing through the shallow water and then came back to the clubhouse along overflow no. 1. Birds were everywhere.

I think I found the explanation

July 16

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of the "little fluffy snipe" found on the flats were which Chambers reported to me. A two wire telephon line with the wires 15 feet up in ends across the flat and scattered irregularly along about 15 feet south of them. I picked up 4 Western Sandpipers, the wing of another and one snowy plover. These had evidently been killed by striking the wire.

Picked up four insects, adults all of them which had evidently died of the disease. All were dry or maggots & had been dead for several days. Also one still two thirds grown.

In the reeds I found a young coot half grown, which was so decomposed that I could not handle it.

All the sick ducks I saw were along overflow no. 1. One jungle fowl had been dead for several days and could not be handled.

Saw a number of places along where ducks had lain on the grass piled up considerably. I picked out a good many feathers in hunting through the ponds on the flats. No other sick birds were seen which bears out what others have told me here that the first birds seen were

July 17,

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in the channels.

I saw one Cinnamon teal in the water that was sick & could not fly though it swam swiftly and quacked anxiously. The wings were weakened and were not held up as usual and the shoulders dragging in the water forced the tips of the wings up above the back instead of allowing them to lie down against the sides as they should.

I shot one male Redhead, a healthy bird for examination. A flock of five Cinnamon teal flew past over the marsh and circled swiftly back. As they passed me I dropped one a young bird not quite grown. This bird on dissection proved to have a greenish white diarrhoea and was undoubtedly in the first stages of the disease.

Spent the afternoon in making post-mortems etc and in the evening went down to the Bear River Gun Club. They have a big place there with shower baths etc and things in good shape but it is too big for comfort. They have steam heat, card room etc. And a small collection of mounted birds mainly ducks. Among I saw one tuberosus ruddy duck taken

here on the march ^{July 10} late in the ^{32.} fall.

Mr. Clifford Horn, was caretaker here & we had quite a talk. He claimed that in 1910 he & eight others gathered 75,000 dead ducks in ~~the~~ Bay. He & Mr. Cook both said that ~~in~~ in cleaning up the ducks they would work along getting a dozen or fifteen a day from Channel 1 perhaps and then would come a rain and the next day the place would be literally alive with dead & sick ducks. He believed that some of them live for several days and that some die but once. He said that sometimes they would pick up birds when gathering dead ones that were alive and active but that frequently they died in ~~the~~ three or four hours before the return to the Clubhouse.

He also told of finding dead birds which looked as though they had fallen out of the air as they lay in hollows in the mud.

Mr. Cook says that he had a pen at the mouth of Channel 1 in which he kept ducks that were sick & that with food they nearly all recovered & got out. Now these birds got the Channel water in which ducks outside died. I can't see what made the difference there.

July 17, Friday

This morning I went down the river to channel three and worked the marshes around channel 3 and between 3 & 3½. There is another club down here Sackell's and then nothing more. The Bear River Duck Club are said to own all of North Bay but the other places have only small holdings. That of the Sackells you club for example being a mile square. The rest of the land is government land.

Today I saw only two sick birds and both were in the main channel of No. 3. Neither could fly but as they came out above me I could not get near them to catch them. One was a cinnamon teal and it slipped along next the shore with its neck stretched out flat along the shore swimming for dear life. In a careful search of the marshes no other birds were seen so that it is proven that the first sick birds come in along the banks of the channels where the water is swift and do not occur in the shallow pools of the marshes.

I am told that numbers of families along here drink the river water so it seems strange.

July 17

that none of them are affected
 by it in any way of the trouble
 comes from the water.
 Down here found many
 more Red-heads than round
 No 1 also numbers of Mallards
 and quite a few Pintails
 Mosquitoes were worse in the
 marshes here.

Great numbers of carp are
 present in the river and in the
 evening and all night until
 morning make a great splashing.
 I found a shallow lough this
 morning that was full of them.
 Hansen here catches them and
 takes them in to Brigham where
 they are ground up and fed to
 the young trout at the fish hatchery.
 Noticed the snails floating
 again today at the surface of the
 water.

All day at the club the
 mosquitoes were very little but
 at nightfall they rise in swarms
 and come all about. The
 swallows preparing to roost in
 the reeds must catch large
 numbers of them.
 Had a half hour to spare
 this evening & picked up a few
 insects. Beetles very scarce but
 many Hemiptera & Black Flies were sweeping.

July 18, Saturday

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This morning I took the boat and went out channel 1 to where it opened into Pintail neck. From here I could see across the open into South Bay for several miles and birds were in sight everywhere. Long lines of water swam in the channels, many birds were flying about and flocks of Pelicans showed white and clear or were blurred by the heat waves. There were large numbers of Blue's here also - a ^{immense} number of shells & corals. This size of this large open area of shallow water was not appreciated until I looked across it with my glasses.

I searched both sides of Channel one where the sick birds were found at first but saw none though I looked carefully. Near the ^{cinnamom} mouth I picked up one ~~Blue winged~~ Seal on the bank that had been dead for several days.

and beyond the mouth of in Pintail neck four coots lay in a small space three of them partly decomposed and one which had probably died during the night. On examination this bird showed no diarrhoea and on dissection I found three infected areas each half an inch long & hard.

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put which - in doubtless had caused
its death.

Near here a Ring-billed gull was
the water but it was so far gone that
I could not tell much about it. The
feathers round the neck however were
not stained.

A white jared glossy cowbird
in the water with the Redwings
greatly discolored. No sign of diarrhoea
for a further discussion of these birds
see beyond.

Coming out saw one bird
swimming ahead of me. It has may
have been sick but it rose and I
lost it. A green-winged teal got out
and flopped along the surface for
a few feet & I shot it. This bird was
undoubtedly sick.

There seems now to be a
sort of yell in the trouble. I might
undoubtedly it will break out again
shortly.

Mr. Cook says that birds recovered
when put in running water and we will
build a cage next week & test this.

The mosquitoes are quite bad around
in the evening but do not bother much
in the day. My work is calling large
numbers of Blowflies.

For two nights now there has
been a heavy dew & I am expecting
that it will rain.

Otherwise the organs were normal & death was undoubtedly due to these growths in the intestine

July 19, Sunday.

This morning I went out of followed the telephon line across the dry flats just to see what birds had been striking it. All the sandpipers that met were in one stretch about half a mile across and none were found beyond this so that it seems to be a natural flyway. Now, on going across I picked up 11 Western Sandpipers, 1 Phalarope, Wilson's, 1 Coot and 1 Long-billed Curlew. Two of the Western Sandpipers were alive & were running about though one had the Carpal joint of the right wing completely gone. The Curlew showed evidence of having hit hard as both arms of the furculum were broken and the side of the sternum split.

Along the river bank is a narrow growth of willows, here with an occasional wild rose, bordered inland by a band of grasses with much sweet clover. This stretches off into the dry alkali flats gradually flats which during the winter are flooded & land birds are surprisingly few in number of species & individuals. The Savannah Sparrow, ^{Song Sparrow} Maryland Yellowthroat & Kingbird are the characteristic

meas outside of the Red wings & yellow heads. Brewer's Blackbirds & Meadowlarks are entirely missing as are numerous other island species.

This morning I collected a few insects along the narrow belt of prairie. *Rhynchota* ^{the} ~~the~~ most abundant insects. Thrips swarm in some localities while Beetles are very few in number and Hymenoptera still more so.

This evening leaf hoppers, small Carabids & Roach beetles fairly swarmed at the lights. No large species were seen though I looked for them on the screens outside. Lepidoptera too are only fairly common.

There is evidently a rain coming as for two mornings there has been a dew and the insects in the evening dew, the same.

For several evenings there have been numbers of swallows about but this evening their numbers increased fourfold so that the air was swarming with them. Bank swallows were most numerous with a few Cliff Barns & Tree swallows.

This evening a grayish haze of smoke(?) hung over the hills & north bays in a band flying closely on the marshes while the air above was clear. This was not present inland.

July 20, Monday.

This morning at eleven left the Duckville Gun Club & went to Corinne. Spent the morning in writing packing up some specimens etc.

Sky partly overcast this morning but sun shone most of the time. Sat on the bow of the launch all the way up & could see over the country. The marshes do not go much farther up than the Red River duck Club the ~~the~~ alkali flats which are flooded in high water occupying the banks of the river with occasional sloughs or channels running out from the river. In its lower course the river is fairly straight but near Corinne the stream more sinuous with sharper bends. The first cottonwoods appear about ten miles above Duckville only willows being found below. Gradually trees become more numerous & plum bush appears as the bank grows higher and the willow growth of two species become more dense. With these conditions a few more land birds appear.

About fifteen miles up from Duckville hay fields appear and from here on more or less of the land is arable.

Corinne is a small town of

four or five hundred inhabitants
which was formerly a very place
according to accounts.

at Spring ^{is} met Mr. Jim Joudis
who told me that Mr. J. J. J. J.
of Salt Lake claims that
the church would not appear
in the late fall years ago.

Reached Salt Lake about five
got my mail & spent the evening in
writing. Promoted now to the \$1600
roll

July 21, Tuesday.

This morning I called on Mr.
Chambers but did not find him in
so went to see Mr. M^c Cormick who
arranged for me to visit the
New State Ynd Club tomorrow.
Mr. M^c Cormick seemed to combat
Mr. Stewart's sulphuric acid theory
and was inclined to attribute the
trouble to some bacteria which had
not yet been isolated. He said that
some times when a flock of birds
was started up that sometimes
a few would gradually lag behind
& drop back into the water as
that sometimes a bird would
drop from a flock overhead as though
shot. This latter statement is
supported by some & combated
by others. A number of birds
are reported sick at the New

stay from Club now. Mr. Chambers
had not much news to say.

Mr. Mohler is expected in town
today & was told at the
Federal Building.

Chambers & Mr. Byrne were to come
to the hotel at 3⁰⁰ P.M. but did
not show up.

Called on Mr. Gant but he had
nothing definitely new to offer
merely the usual information.

Mr. M. Cornick banded some
birds which he had given the
~~water~~ treatment & ~~of~~ ~~several~~
records were returned to him.
Must try & get these. he did not
have them.

July 22, Wednesday.

Last night I worked in the library
for over two hours. in the night
it rained and kept it up until about
ten this morning.

Mr. Mohler has not yet arrived
and they do not know at the B. & O. office
when he is liable to be in.

I looked out hunting rooms to
get a place to keep my things and
after considerable trouble found one
that seems to be a very good
place.

Called on Mr. Hart but was
not greatly impressed with his
knowledge of the duck situation etc

he very kindly spent me the use
of a microscope.

at four Mr. Ellerbeck & his brother
Jim came to take me out to the
New State Gun Club. Mr. Byrnes who
is working on the problem was along.
Spent of, met him for the first time.
He has no interest in birds & says that
he has taken up the work merely because
Chambers wanted him to. He is going
to California next week & will not
do anything more until fall. He claims
that he has improved the presence
of acid in the water to his own satisfaction
absolutely. He also claimed that he
had bacterial cultures from the birds
but could not communicate the disease
with them. He also claimed that the
disease could be transmitted but
when I questioned as to whether it
was infectious or contagious he did
not know.

Mr. Ellerbeck has hunted out here
a great deal and is very familiar
with the situation. He said that when
the trouble first appeared that they
were all afraid of the birds for
fear of contagion but that soon this was
overcome. In 1911 they piled up
large numbers of birds & put lime
on them to destroy them but Mr. James
Ellerbeck said that this merely
preserved them as next spring he

Kicked the piles apart and found
the neat, well preserved in some of
them. While birds in the marshes
rolled away & entailed a big spread.
The club here is a little bit 65 per
cent of the water in the Jordan River
but now are getting only about 25 %.

I saw a nest of mud in cinders
road has been built in the ground
and about the club house the soil
has been built up with cinders. There
is the main club house which is closed
and then four or five small cabins
belonging to members one of which
was the property of Mr. Ellerbeck.

Burnes & Jim Ellerbeck went off
to a region known as the puddle, in
a push boat & came back with 3
sick spoonbills, a coot, a green winged
and blue winged teal & a Killdeer all
helpless birds that they caught.

Mr. Ellerbeck & I took rowboats
and went over to what was known
as Lungs Lake & the Mallard Ponds.
We saw only four sick birds, 2 Canada
teal, a pintail and another. Only teal
only was helpless so that we could
catch it. This bird lay in the water
in a little shallow bay. This bird
was entirely helpless & could barely
struggle when handled. When I
pulled the wings out it could not
crawl them back and could not

support itself on to feet. The protractors of
the back were held protracted out -
The lower eyelid was paralyzed as was
the membrana nictitans. The greenish
diarrhoea with white specks in it
was present & stained the abdomen.
When held down it could not support
the head. Though it could hold it up
in a normal position.

Formerly for years the sewer from
Salt Lake emptied in here but shortly
the beginning of the duck's malady the
trouble was attributed to the sewage
and the sewage ^{city} was forced to
extend the line into the lake itself
after a great deal of opposition. The
sewage here has greatly enriched
the soil and cat tails & rushes were
growing much more luxuriantly
than at Bear River - large areas
were covered with a dense growth
of "blue grass" bearing an abundant
crop of seed. This & a narrow
bed of Potamogeton were the staple
duck foods that I saw. I saw
only about 125 ducks all told.
I saw abundant especially the
Western Sandpiper.

she well at the lake a flowing
well is strongly sulphurous and
sulphur odors were found all
through the marshes amounting
almost to a stench in places especially

out toward the $\frac{1}{2}$ front.
Returned to town about nine.
I found Byrnes rather a queer young
fellow with quite an opinion of his
own ability. He wears a wrist watch
and wore some very good clothes
for marsh work. And I think at
first was rather inclined to look
down on my outfit.

I can't for the life of me
see how how sulphuric acid could
affect these birds here. The streams
are all strongly alkaline & if acid
would be present it would tend only
to neutralize the alkali.

Talked for a long time with
Mr. ~~Charles~~ ^{Harry} Finch of Finch & Rogers
Cafe and found him very well informed.
He has been shooting in this country
since about 1895 and has known
of no trouble among the ducks before
the big outbreak - He described to me
the incredible numbers that he
had seen dead. He said that the
mudflats & channels gradually
dried out and baked & cracked
in the sun. Then when the water came
in on these again and the ducks
came into these shallow pools they
died like flies. The mortality at
such a time being much greater
than usual in the drying channels.
Both he & Mr. Ellerbe said that

it was not unusual to see a flock of birds start up & after circling out hour or two drop back to the water too weak to keep up.

He says that in the spring in February, March & April as the birds come north a few sick birds appeared. He also placed the end of the trouble before the shooting season on Oct. 1.

July 23, 1914, Thursday
this morning I took the seven o'clock train again for Corinne on the Oregon short and went back to the Duckwith gun club.

On the trip down the river was the same as usual, though I do not think that as many birds were in sight as on previous occasions. I am told that forty years ago a steamer the City of Corinne ran from Salt Lake City to Corinne and that Salt works were located on a beach on North Bay almost at the city. So that siltling in has been comparatively rapid. Noted Cottonwoods & a Lombardy poplar six miles above Duckwith marking the location of an old house.

When the Duckwith is on sick birds are reported from as far inland as Corinne. In 1911 the trouble was not bad in the lower river but in Chesapeake Bay six miles above Duckwith 2000 birds were packed

up the un... bearing the channels
killed all sick birds found.

At the junct... you enquired of
Harsen & took up the... and they
had seen only one bird sick up there
this is six miles above Blackville

At the junct... they had a Peruvian
for me which had been picked up
on the... this bird was an
adult with worn feathers and some
signs of the rosy color of breeding
so soon present along the sides
except for a whitish diarrhoea
the hawk it did not have all
the symptoms of the trouble it
could hold the wings up at
the sides but could not fly. It
could stand erect with difficulty
and sat on the heels (tarsus) or
on the breast. Walking was very
difficult. The anus was swollen
& greatly inflamed. With blue tennus
the excreta showed a strong acid
test ~~as~~ as I had expected showing
that the white matter was from
the kidneys mainly. Anal temperature
was 98.1. I poured about a
pint of water down its throat in
the afternoon at three periods
and fed it about 35 minnows from
1 to 2 inches long. These were swallowed
readily. The throat seemed very dry.

July 24, Friday.

This morning I went down channel
on in a boat & mud across the
flats to mud point.

Picked up 2 avocets one young
one being pultrid & saw three lesser
coots one of them being a bird five
& another 8 days old.

Saw a number of dead frogs
floating in the water.

A test made of the river water
yesterday at the clubhouse showed
that it was distinctly alkaline
(made with litmus paper). If any
acid was present in this water
its effect would be entirely neutralized
by the bases so that the source
of the trouble must be sought elsewhere.
When the flats dry up and too the
basic deposits glister white in the
sun showing their nature to one
familiar with western alkali flats.

I believe that many birds which
die at this time are adult birds
who have used their lives & are worn
out. Weakened by the ~~strain~~ ^{strain} of
reproduction & caring for their young
they give out when immediately
after they are subjected to the
still greater strain on their systems
imposed by the ~~poison~~ ^{poison} post breeding
season mott. This to my mind
would account for the death or

rather disability of the adult avocet
described in. The notes for Wotay,
with its vitality thus lowered,
it gave out under the strain
on its strength brought about by
the tape worms.

Young birds do seem especially
liable to round worms. The young
Coot captured today had many
of the symptoms. So the young
Grackle captured in Washington
last year which had 20 many in
the intestinal canal.

July 25, Saturday.

This morning I took the rowboat
and went down the river and out
onto South Bay toward the mouth of
Channel 3. At noon Cook came down
with the launch and towed me back.
The current sets through here with great
force make it difficult to come back
with the flat bottomed boats necessary
for going across the mud.

There was considerable water in
the bay and on the west side near
the marsh it was just above my
knees. The sun was very hot.

The mudflats here were covered
with birds in greater numbers than
I have seen them elsewhere. Three or
four hundred Pelicans gathered in a
flock were the most conspicuous
objects while great numbers of ducks

were resting on the water - gathered
in flocks. gulls & waders gathered
together and swarms of little
western Sandpipers walked about on the
flats.

Three dead California gulls were
picked and I caught one bird
which had the legs almost paralyzed
and which could not fly. A dead
Ring-billed gull was found also. All
were adults.

Half a dozen western Sandpipers
were found dead on the flats
but were old. Most of them had been
eaten by gulls.

On the rushes on the west
shore of the bay ducks were gathered
in much greater numbers than around
the clubhouse. I believe that a great
many are now beginning the moult
of the wing feathers as I heard a
great deal of flapping in the rushes.
I found two other nests occupied
over here & others up the bay.
Four Pintail ducks were found
at the edge of the rushes, three
dead & one nearly so. These all were
growing wing feathers. I made
careful tests of the water, using
them and found that with litmus
paper it was distinctly alkaline. Two
of the birds were paired and I bought
the other two in with me. A gull

had certain he utrails of me and it
seems to me of this nature can be
transmitted that such a virus would
surely be set
formerly there was much more
water in these marshes than I present
and more & more is used each year
for irrigation. This tends to dry up
the mud flats and to lower the
water in the river greatly. The river here
at the gun club has dropped a foot
in ten days and today fell away two
inches or more. This water is taken
out by a big canal built within a
few years above Corvum. The birds
begin to die when the marshes
get dry & keep it up until water
becomes plentiful again in the
fall so that the use of this
water in irrigation seems possible
factor as well to be considered at
least. By drying the pools in the
marshes the alkalis would be greatly
concentrated and too they would
be strong on flats flooded after a
rainfall. Even the river water would
be more alkaline through the washing
of the irrigated lands. The symptoms
of the disease would tend to
this theory, also the fact that the
birds recover when given good
water. There has been little sickness
here on Bear River this year as well.

is high. ~~had~~

These conditions would hold on both the Jordan & Weber rivers. The taking of all the eas. and too could cause the trouble at Tulare lake.

This can be tested out.

Another point in favor of this is that at the new State game Club last year with plenty of water there was no trouble.

So the main effect is the puddles ducks feeding in shallow ponds.

July 20, Sunday.

Took day & spent in working with
the boys on hand canal in cleaning
up various old jobs.

At noon went up to Knudsen's but
in the lunch room (heard) that Mr.
Moller was there but found that the
men had just left, this clubhouse
has not been open in several years
and in consequence the buildings
are badly run down.

In some of the rooms building paper
had been nailed to the walls and
back of this was almost a solid
mass of mud wasp nests. Never had
I seen so many of them.

In one corner I found a small
colony of bats & collected thirteen of
them and nichols.

Walked across to the Bear River Club
Club along the telephone wires but found
no dead birds here.

The river was gone down more
than a foot in the last week
and will affect the marshes soon -
but present the growth of vegetation
is holding the water back so
that the water level is not being
lowered as rapidly as it would be
otherwise.

July 27, Monday.

This morning I repacked my outfit and at nine started for Corvallis in the launch. Lost my watch & job in the row last night - fell through that damaged wharf. Tried to get them out this morning - it could not. So had no idea of time after we left the clubhouse.

There was a severe electrical storm last night & it rained a little but not a great deal. More wind than anything else this morning for a time I was rather hot & steaming but soon dried off. The trip into Corvallis went good & unusual except that the motor gave some trouble. Cook put the muffler on this time and consequently I could hear the birds a little.

Had a little trouble in getting my baggage transferred in Corvallis but not much.

Heard that the big canal up above here has been in operation since 1894 and that it takes practically all the water from the river, ~~that is~~ the water found below the dam being that that runs in from the sides. Formerly there was abundance of water but now that ~~more~~ land is being put under water they are cutting down on the supply furnished to the farmer. When water was used lavishly in orchards

A much larger part was returned to the river than now, when spread over a large area much more is lost by evaporation. Which would account for the low water in the river for the last few years and too large amounts of mineral salts would be leached out of the soil & put in the river.

Bought some Jim cherries in Brigham. He does not care much for the peaches here.

A hot dusty ride down to Salt Lake. Arrived at 4:45

Had my trunk sent over to my room & unpacked it - and after writing a little went to bed.

July 28, 1914. Tuesday

This morning was up at 6:30. Called Perkins at the New State Jun Club & made arrangements to go out there in the morning on the early train.

A letter to Mrs. Fisher today reads as follows.

At Bear River, I found conditions about as before. Only a few sick ducks were ~~examined~~ noted but I examined a number of other birds which were helpless or had died from a number of causes other than the duck malady. For example one White Pelican adult male captured alive & killed with ether had the supra renal capsules badly diseased, the spleen

and the testes affected. (semis breakdown?)
An adult ♀ ad had two tapeworms
in the intestine one of which was
275 millimeters in length.

An immature Coot had a lump of
roundworms under the lower mandible
that spread all along the jaw & extended
up the side of the breast.

And I find that most of the birds
found as yet have some simple cause
for their disability, and I believe that
a good many birds outside of ducks
which have been found dead previously
have died from some cause other than
the duck malady.

In regard to the duck trouble the
following facts seem evident at present.

1. The disease begins at this time of
the year because of the molt. The
birds are immature, or are adults
weakened by the care of the breeding
season and under an increased strain
upon their systems imposed by the
necessity of renewing their feathers. There
can be no question that in this state
the birds are greatly weakened and any
added stress upon the systems would
meet with little resistance.

2. It seems evident that low water
is an important factor as when there is
plenty of water there is little mortality.

3. The birds most affected seem to
be mainly "puddlers" in their manner

of judging which would point to an infection in shallow water.

I have been testing the water in the Bear River country with litmus paper, a crude method but one sufficiently accurate and can find nothing but a distinctly alkaline reaction. And to look at the flats here dried by the sun, with their typical white deposits one would expect nothing else. For an acid (sulphuric for example) to be causative enough would have to be added so that the base in the water would be neutralized with an excess of acid remaining above this. Rather a hard condition for me to imagine at present. And anxious to try these tests in the Jordan River.

Everyone is greatly interested in this duck matter and I have told you and there is considerable feeling rife over it. So that it is necessary for me to be very careful in what is said in order to remain neutral myself. At present they are after Mr. Chamberlain with two schemes, one to build scare crows in the shallow pools to keep the ducks out and the other is to hire men to fire blank cartridges to keep the birds on the move. He has refused to do this and asked me today what I thought about it. I told him that scarecrows would be useless and that the ducks would probably

use them for shade in about a day,
and as for shooting that the ducks
would feed at night anyway and that
his territory was too large to make it
feasible.

I am beginning to think myself that the
whole thing rests upon the water supply
and hope that this will prove true
as in that case preventive measures will
be feasible. "

July 29, Wednesday.

Up this morning at 5:30 breakfast at
Finch and then took a train at 7:00 A.M.
on the Oregon Short Line for Wood's Cross
Station, eight miles from Salt Lake. Arrived
at 7:12 and went out to the New-
State gun Club 2 1/2 miles west.

This Club is right near the mouth
of the Jordan River and is at the foot
of the marshes. The country between
it & Wood's Cross is very level with
a slow descent toward the marshes.
At first the land is fertile and is
farmed but later for the last mile
nothing but grass grows on it. No trees
after leaving Plouin except around a
few houses. Passed a small area of
sage flats on the way. Saw quite a
number of land birds that I did not
find in the bear river country. They
showed the marshes & alkali flats
extended for miles before an area
suitable for the existence of land birds

was reached while we were marching
& the "plains" are contiguous.

Mr. George Parkin is in charge of the grounds of the New State Game Club and assigned me a place in the old clubhouse which when he had cleaned it out was a room thirty feet long by 15 wide with a small window in the end and an outside door. In the evening I repaired the screen in the window hung a screen door put a button on the other door, swept out and made things presentable.

From the club the Wahsatch range seems but a step and the slopes above the Wood Cross have more timber and a higher and more bush growth than near Comber.

In the morning the sky was heavily overcast with a veil of smoke in Salt Lake City as usual but at Wood Cross the air was clear a veil of smoke hid the Ophir range however and fleecy cirrus clouds obscured the sun somewhat. After unpacking my chest I went down towards the Mallard Pools on a boat. The water level here is about as it was on my last visit, perhaps an inch lower. I watched carefully all ^{around} ^{the} ^{lake} but saw only two ^{small} ducks. Saw perhaps 1200 ducks.

The club has built up its marshes by diverting water from

The Jordan River into a series of channels which carry water to the flats. 4 miles of these works have been constructed recently. By this it is possible to reach any part of the marsh by boat.

In the afternoon went with Mr. Purina out Channel D across the Jordan River which is a stream here forty feet wide and is said to be very deep. Walked on over ground a so-called lake a shallow pond that opened in a narrow course inland for a mile. Nowhere was it more than ~~a~~ a foot or a half deep and the greater portion was much a shallow discharge area of mudflats dried - how'd it former - but.

On the south this lake was bounded by the sewer from Salt Lake City which empties into the lake beyond here a filthy open stream disagreeable beyond words.

In the lake were perhaps 500 wocets judging in flocks with a few Phalarope & a smaller number of Skink. On the shore & in the water I counted 49 dead wocets and picked up eight that were alive but helpless. Most of them were either on the dried mud or in the water but near the south end where the water was very foul. Found some high by

With litmus paper, red & blue I made tests of the water in the following places.

Water in main channel near clubhouse showed faint alkaline reaction. Blue litmus not affected.

Water below spillway no No. 11 gave alkaline reaction.

Water at middle lake dam was alkaline. Water on flat beyond No. 5 one inch deep strongly alkaline.

Mud bordering a lake where it was almost dry was strongly alkaline turned litmus at once.

Water beside a dead pintail changed red litmus in 30 seconds.

Found a place where the ground was drying & cracking. The water in the cracks was distinctly alkaline.

Foul black mud bordering the lake in one place was alkaline. This too contained much CN_4 .

Thus in all these tests I found no trace of an acid. Blue litmus and red litmus were both tried at each station but the blue litmus did not change. In handling it care is necessary not to touch the fingers with it as the skin gives a strong acid reaction at once.

The avocets captured showed the following temperatures. all taken in anus.

① 96.5 bird very weak, could not stand and was unable to struggle much. This was a young bird picked up in two inches of water. The wings fell away from the sides and the legs were almost entirely paralyzed. It tried to help itself rise by means of bill but could not. Unarticulated. faeces thin

② 97.2 bird a little stronger, could barely stand & could not walk. Could rise on tarsus by raising itself with the tips of the wings and then fall forward after balancing a moment. Musc stained.

③ 104.0 Bird could stand & run but was unsteady on feet. flapped its wings but could not fly.

④ 103.8 could not support body on legs but had the use of the wings and could draw them in place on the sides of the body.

⑤ 103.6. A young bird that could stand and run but that was uncertain on feet.

⑥ 107.2. Bird was unable to stand or to progress or to progress by means of wing. I think the high temperature here was due to fear.

⑦ 103.8 Bird could barely balance on legs and then would fall on breast. wings were quite strong.

⑧ 101.4. legs helpless wings quite strong.

In all these birds the most marked symptom seemed to be the

weakness of the legs. Though first of course the power of flight was lost. If these birds were found nowhere else taken here I should attribute the trouble to the proximity of the sewer but that hardly seems feasible except as a spot of local infection.

Two ~~other~~ pintails were found lying dead, one of them being on land and the other a bird that had been dead for two days lying in two inches of water.

Picked up a young red-head that was not able to hold up its head. It was a bird about a week old. anal temperature 102.4. I did not think what this bird would live at all but brought it home gave it a little water & put it in with the ducks. When it could not hold the head up at all, let it fall in the water & could not raise it up enough to breathe so that I had to watch it. In the evening it was a little better after giving it fresh water to drink and some orange to balance the head with. Difficultly.

Went to bed tonight about 9:30. I rec'd that mosquitoes were not bad here but found them quite numerous in the evening and was glad that I had the screens fixed.

July 22 Thursday.

This morning the color of the sky is seen about yellow. The wind is from the north. I bought this of the Union number yard.

The air at Lake City was entirely obscured by smoke which hung there until late in the afternoon though the air at here was clear.

Bountiful is a rambling place consisting of several square miles - with three divisions East West & South Bountiful respectively.

I saw a very large quantity of asparagus. Long washed grasses are said to visit this in flocks in the fall and are known as pine birds. Do they are said to come into the marshes.

The water here at the gun club comes from a flowing well in of large volumes of gas escape with it so that it burns freely when ignited. It is a strongly impregnated with sulphur & disintegrates. To some though I don't mind it much. I thought that it would act as a purgative but has not troubled me yet.

I worked all the afternoon on those woods with the results which follow. I have now seen the beeches which I found in the rocky cavity of some of them, before.

The young Red-head which I brought
was quite lively in morning. By
noon it could swim a little
until struck at a fly that was near
it. Until evening it refused to
drink itself and I had to make it.
The integument of the tarsi was
peeling away. At night it tried to
wash itself but did not have much
success. It showed fear of me too.
I gave it a little cornmeal & water
having nothing else for it. One eye
has been gummed shut. The recovery
of this bird has been quite marvelous.
By evening it was able to swim fully.
The water here in these marshes
is much higher than usual at
this time of the year. As high in
fact as in the fall in shooting
season.

Mr. Griffin capt. & Mr. Stewart came
out in a boat in the evening. Griffin
said that the sewer had been turned
into the lake where I found the
weeds this spring in my attempt
to fill it up. Had been turned in in
February & cut off in May.

Mr. Stewart elaborated on his
smoke theory at some length. Pounded
out the symphony to me. The smoke
from garfugal was plainly visible
& I could see the lights of a
concentration plant near it.

Jul. 21, Friday.

This morning I went over to what are known as the duck puddles where the sick birds were secured on a previous visit and hunted all through them. Two teal that may have been sick were seen in the channel leading to it and in the puddles two spoonbills that could not fly were found. They were very active on the water. I attempted to get one. It loved to see me. It could stand & run but the wings were helpless. This bird I carried in my sack nearly all the forenoon. When I found it in the water the anal & abdominal feathers were clean but when it sat around they soon became stained from the excrement.

The water here in the puddles shows distinctly alkaline to litmus.

From here I went on west to Goose Island, a small sandy elevation with two or three bunches of greasewood on it. It was only a couple of hundred feet long and I was surprised to find a Brewer's Sparrow on it. No other similar area is to be found for several miles.

The water sweeps in here in storms as was shown by an flood wash. I found large numbers of duck bodies washed up here and

among them picked up in American
merganser. Many dead ducks were
piled in heaps here and I found
them but this instead of consuming
them found a casing ~~around~~ around
them water & in light. I found one
of the cases in the water today &
what I broke I - pen but not know
what it was. On the outside it
resembled some calcareous sponge
as head wings & feet were gone leaving
only an oval case. Many of the birds
washed up on the water front were in
this same condition.

I shot two avocets this afternoon
both birds flying about. Both contained
large liver worms and one had
one small leech in the body
cavity. One bird was very thin &
would undoubtedly have been down
before long while the other was
fat & in good condition. This infestation
seems then to be rather general. I
saw a number of dead birds.

This afternoon I built a pen
6x10 feet of inch mesh chicken wire
in which to put ducks and placed
my young redhead & the spruce
in it.

water in the "paddles" & hauled
distinctly alkaline to it.

August 1, Saturday.

This morning I went over to what is known as Knowlton's dam - the west end north of the clubhouse.

The way as usual cut across the marshes by channels the water in No. 7 which I followed first was low & I waded. My load most of the distance to No. 8 on the other side was almost closed by the rushes. Below the line I went on down to the edge of the marsh toward the lake. As usual it was a bare expanse of mud & salt water swept in by storm tides all vegetation.

These mud flats a foul smelling place the odor of sulphur being especially strong & this is concentrated in a few places until it is very rank. Ordinarily the flats have a layer of thin greyish silt on top and below some heavy black mud into which I sink at times. My knees and which again is compact & firm. Here in this region found many places with a sand bottom where the current was swift enough to wash the silt away.

The logs here at the club range these marshes my day and kill all birds that they can so that it is not always safe to attribute dead birds to the malarial

One green-winged teal without wing feathers (which I picked up) hunched distinctly when it had been bitten through the neck.

I found a young Redhead and a Ruddy not more than three days old lying dead in the water. The Ruddy had a large leech in the nasal cavity which was very probably the cause of death.

One adult mallard was found at the edge of the channel lying with the head supported on the neck and could not raise it from the water once it had fallen. Its wings hung loosely at the shoulder and the bird could barely move them & the feet (anal temperature 100.2) were loose and without control. The feathers of the same were stained as soon as the bird was removed from the water though they were clean before. Might not a partial paralysis of the cloacal sphincter be the cause of the so-called diarrhoea. Duck faeces are always loose, watery, amorphous and the staining of the feathers is caused when the birds are on land and cannot or do not raise the body in defecating.

Another mallard (male) was found at the edge of a lake. It was able to push along swiftly with the feet aided by the wings. As I wrote a line concerning it it started and ran.

August 2, ~~Saturday~~ Sunday.

Very hot today. This morning I walked
over to a grove of willow cottonwoods & ash
which had been set out on the flats
a mile from the club. Two towing
pipes supplied water, one being very
heavily charged with gas. The trees
on one side even at present probably
because the water had not reached
them. On the other were a pleasant
grove more low bordered by trees, a
welcome sight after the monotony of
the marshes & the barren alkali
flats. The eastern end of the wetland
section was heavily ground with
common thistles. The whole occupied
perhaps an acre and the trees
were up to 30 feet tall.

I had expected to find many
small birds in here but I was disappointed
except a flock of Magpies flew from
side to side as I walked through
the grass. More larks were seen on the
borders. And a Kingbird was heard
calling once. Later a Broad leaved
gummiter was seen to start at a snail's
flycatcher and they were all hushed as
it would be common to start as other birds
do. The plains east of the rocks, & this
place would be a new bird
a common species. The birds here seem
to prefer the vicinity of houses. At
Hedden a mile away where

There are many trees here very abundant
there was no lack of insect life
here and I collected quite a few. Found
Tetraneura p. on milkweed similar to the
cactus here and making the same
squeaking noise. on visiting my feet
of the human feet to find so many
in the shoes were detected. Small
hymenoptera & flies were common. Many
was on sweet clover & thistles. A *Chrysomelid*
Chrysomelid was abundant. What I
think is a *Cicada* is common on the
fleshy plant growing on the alkali
flats.

I crossed over to a field that still
contained the original greasewood
and rabbit brush and found more birds
here. The greasewood was now
three ft. high and grew as always
in several clumps.

Grasshoppers were very abundant
in grass fields and on *Vegeta* flies
abundant.

The flats are always very bare
when water stood, and when dry
showed a crystalline deposit on the
surface making it white and
glittering in the sun. Below the earth
was dark. These flats dried &
cracked in irregular lines all over
their surface.

Mr. Griffin, manager of the club was here today and I had a long talk with him. He told me that six or seven years ago the Jordan River ran down through here in two branches, the main river & another channel known as . . . The club preserve here is practically all a made marsh. The river has been dammed up and the water directed through made channels so that more and more of the bare alkali flats have been turned in marsh covered with grass.

Up until 1911 all sewage from the city emptied into the Jordan River just above the club grounds and a good share of the water came from sewage. Since then the city after ~~strong~~ complaint by the club extended the sewer ~~out~~ onto the lake front the club giving them a dumping ground at their ~~own~~ front property. This has cut out most of the sewage.

However one Frank Rudy whose place is just south of here had a contract with the city for one dollar whereby he diverted part of the city ~~and~~ sewage for irrigation purposes, the residue going into the river. When the new ditch was put through he dug a branch from it into his place, allowing the water to run into the river again, doing this

so he claimed to keep his contract alive.
So that this sewage, not great in amount
comes in through the river and so
onto the club grounds. Mr. Griffin says
that he has detected signs of it
in the water on the ground.

in 1910 when the big killing came
then was a tremendous storm in
February and it did not rain again
until November according to Mr. Griffin and
the whole flats here were almost down
the pools, shrinking until they were
hardly 1/2 of their normal size. (I saw
the weather reports I find that the
annual rainfall for 1910 was 11.25 inches
the normal amount being 16.22 and the
actual minimum 10.33. January, February,
March, April, May & June were all far
below normal, July .05 above and August
& September below again. October above
November & December below.)

Late in July and the first part of
August the sickness began to come
and the ducks began to die. They
were gathered then in small pools
and died by the thousands. Mr.
Griffin claims that a million by count
were picked up on their grounds
but in this I know he exaggerates. Mr.
Parlin says that men who did the
work told him that they got 40,000
birds, actually. By club standards ordinarily
this is given as 485,000.

August 3, Monday.

This morning I went down what is known as Coast Bay for nearly two miles and then bringing around came back through the Mallard holes and up the river to the Club.

There is a broad stretch of shallow water here that in the morning is dotted with holes come out of the rushes to just and here I thought I might find some sick birds.

Just below the club I ran onto one Pintail that could not fly but was very active and could swim rapidly. After quite a chase I succeeded in capturing it. It was an adult male in eclipse plumage. could stand erect and bit at me. The bird was rather thin, wings retracted and no watery matter in eyes. anal temperature 104.9. It was in full plumage. I find that now I can tell these sick birds at a distance now. They swim indifferently one way or another. When they see me usually take two or three strokes of the wings in trying to rise and then start & swim rapidly away.

Below here I came onto another Pintail and two Mallards which

got away in the grass. But I managed to catch a spoonbill.
This bird was swimming swiftly and when I came onto it, it dove. The genus of all of these birds when taken from the water is clean. This bird was in good condition but was thin in good plumage. Anal temperature 105.4.

I found two young coots half grown but with the wing feathers undeveloped lying dead below here and caught another in the grass that was well & healthy. All of these had the wing claw present on the pollex. Anal temperature of the live bird 102.2.

The water all through was distinctly though weakly alkaline.

I notice that in two Mallards brought in the disease seems to run a course. One was quite strong & could stand erect but in a day was prostrate and could not move along the ground but now is some better. She was almost entirely helpless but at once a discharge began from the eyes & nostril.

3 Spoonbills brought in recovered at once & one can now fly. The other shows a slight sinus discharge around the eye.

Left Woods Cross 6:20 P.M. arrived Salt Lake 6:36

August 4, Tuesday.

In his morning after considerably writing and various errands I went in to see Mr. Chambers. And while there Mr. Jim Knudsen of Brigham came in.

Mr. Chambers says that there has been very little trouble with the birds dying from the marshes supplied by the surplus canal, Rudy's and others.

Mr. Knudsen's reports a small lake partially dry four miles from Brigham where he found a hundred or more birds shot or dead but says that in a trip to Willard where the trouble last year was worse he noted none.

I asked him about the egrets and he estimated the number nesting near Brigham at four or five thousand. He said that Hansen reported as many from the mouth of Bear River but I contested that point strongly. He says that he first began to notice these birds eight or nine years ago but believes that they were here before as they undoubtedly were.

In the afternoon I went to Ogden on the electric line leaving Salt Lake at three and reaching Ogden a few minutes past four. This was some farther inland than the railroad and borders on follows the benches of the foothills for a long distance

It is much prettier & more interesting
along here and the scenery is more
typically western than in the flats.
Now a. a. dust roads wind off
through and unproductive fields & very
little for here is the patch of green. It
has its own line which above it is the
foothills around in places with black
scrub. The Weber River at Ogden Wash
has a moderate flood plain, with
high very banks along most of the
space between. It runs with small
Cottonwoods & willows as a western
River should have. A welcome sight
to my eyes after the flats & marshes
in which I have been working.

In Ogden I called upon Dr.
U. P. Bigelow at your appointment in the
Ogden State Bank building. From him
I received the clearest & most valuable
account of the duck trouble that I have
yet had. He is president of the
Bear River Duck Club and is greatly
interested in the trouble that they
have had with the ducks.
He told me that the first intimation
he had of any thing wrong with the
ducks was in newspaper notice in
the winter a year or two previous
to 1910, to the effect that a number
of ducks had been found helpless
in the marshes of the Jordan River.
1910 was an abnormally dry

year. little rain came and the
whole country was very much parched.
Naturally this would raise the water
level of the river to a great extent.
In the latter part of July or the first of
August reports came of a curious
trouble among the ducks of the
Jordan River marshes. and as August
passed reports of the peculiar mortality
increased and finally a few were
reported from the mouth of the Weber
River. Nothing was heard from Bear
River and the trouble was attributed
to the sewage in the Jordan. On
labor day he went to Bear River and
going out found about fifty ducks
dead or helpless and within a
week the trouble was in full swing.
It grew so bad that the opening
of the club was called off notices
were sent out to the members and
there was no shooting that year.
Men were hired to go through the
marshes and pick up the birds
and bury them. The stretch on
South Bay was said to have
been terrible. Over 2 1/2 million ducks
are estimated to have been lost that
season. With the coming of cool
weather in the fall the trouble
abated. So receded in each of the
following years until the present,
from five to seven hundred dollars

are 2 pint each year in picking up
the dead birds but as the malady
abates with the beginning of the
shooting season the club has been
opened each year.

At first people were afraid of the
birds but gradually came to handle
them. They seemed to die most in
the stagnant water of the shallow pools
and the malady was aggravated
by rains. I heard shallow waters
forming on the flats and the
birds coming out to feed in them
died in hundreds, - infection seeming
to come rapidly. The pintails were
hit especially hard being a bird
that hastens out to feed in newly
formed pools seeming to delight
especially in them.

By some the trouble has been
attributed to refuse from the sugar
- beet factories. One man at Garland
- who feeds his cattle on the
refuse from the beet factories and
fattens them for the market loses
~~them~~ 2 percent of his stock each year.
Presumably from acid formed. Which
is said to eat the stomach.
This refuse is said to be formed
in the water of the streams and
to settle in the pools.

Others particularly a Dr. in
Ugden attribute it to some

fungous growth in the shallow pools.
While another theory is that of
sulphurous acid poisoning from waste
given off from the river.

At Bear River the main trouble has
been in South Bay just as the trouble
began in 1910 the Bear River Gun Club
finished a canal drawing water from
Sulphur Creek ~~into~~ a tributary of the
Malade River into North Bay and
this volume of fresh water pouring in
kept the water in the Bay pure.
(look this up.)

Mr. Biglow suggested that extensive
use of water for irrigation might have
something to do with the trouble. The
Malade River (French for Bad water) was
formerly noted for its bad water, but with
the opening of the valley to settlement
and the digging of springs & flowing
wells, it has gradually changed until
until now the water is good.

The return trip to Salt Lake
leaving Ogden at seven was very
pleasant. The day had sun hot
but the evening was cool with a
refreshing breeze and many birds
seen about. In crossing the Ogden
River I saw a Catbird and two or
three night hawks. Reached Salt Lake
at eight o'clock and wrote until
nearly dawn.

One doctor in Ogden who had dissected the birds claimed that Autopsies showed all the symptoms of typhoid fever. (He overlooked the fact I think that many of the sick birds are fat and emaciation goes with typhoid)

In 1910 because of the unusual conditions anthrax killed about 50 head of stock in the Bear River Valley, an unusual disease so far north and some attributed the mortality among the ducks to this. A letter from Davis dated 3rd August 5, Wednesday mentioned a few sick pintails.

This morning I left Salt Lake at seven and went to Woods Cross again. Last night the wind was such that it carried the smoke away from the city instead of banking it up against the hills and I'd awake to find it clear & pleasant. Ordinarily the sky is overcast by haze and my throat & nose are irritated. I note that many of the early rains cough a good deal and consider this a bad place for phthisis. At Woods Cross when I could see across the flats I found that the smoke from the smelters lay over the Jordan River marshes and the lake obscuring the view of the Ophir range, Antelope Island and lying the mountains in the northward and here it hung

a greyish pall for the most of the forenoon.

Old Bally, the horse balked three times going down to the duff but finally we arrived. I went out in the boat and went up the Jordan River for the edge of the New & Old grounds. The river is deep here with low banks not more than a foot high.

Noted only one clump of willows in the distance. *Reville* and now appear in the marshes below. The banks are given over to grassy meadows some of which are cut for hay and to the west was a great area from up to *Sarcobatus* with some *Chrysothamnus* and occasional open alkaline patches.

Over the pally within five miles are half a dozen clumps of trees.

I saw practically no water birds on the river and very few on either side.

All movement is beginning among the birds. Large flocks of *Albia* came in today and I notice restless tendencies among many.

This morning it was cool though the day was exceedingly hot. Very few mosquitoes about this evening.

I found two small plants of
Chrysanthemum ^{nowadays} ~~Hyemingenis~~ (species?)
which were fairly covered with a
species of Phymata. The two plants
measured each about 18 inches
across and consisted of 40 to 50
stems rising from a single root
~~and~~ from which they diverged &
rose on a thick comp. all were
in blossom and the bugs were in
the flower heads, crawling up the
stems or even walking on the ground
below. Half a dozen had seized prey
flies, bees, moths, was a butterfly
etc. and I collected those that
I could find to show their food.
Many dried husks of insects lay below
on the ground sucked dry & discarded
and among such I noticed
one *Pieris rapae*.

August 6, Thursday.

This morning went down in a boat to Knowlton's dam. The sky was overcast as though it might rain.

Found one black green-winged teal a bird that could swim and caught it readily. It attempted to dive when I came up to it, but could not get the rump lower than just below the surface. This bird was thin & light. When placed in the pen with the other ducks, it once walked over & sat down with them perfectly at home. In the boat I had it shrouded with ~~grass~~ sedge which I had cut and which I unloaded at the club & pulled it out & laid it on the ground. Ammure hably it got up & walked over to the shade of a boat when it sat down.

A number of Wilson's Snipe have come in in the last day or so and were all over the marshes. Last night it was decidedly cool towards morning.

Did not see any more ducks up near here in this region. I wanted to host several to examine them for intestinal tubes but only succeeded in getting one mallard.

August 7, Friday.

This I was up a job thirty and
drove to Wood's Cross. I got an
early morning train for Brigham.
Fine & cool in his morning.

wild not feel very well at first for
some reason. eyes bothered me and
I used a salt. eyes were almost
shut with matter this morning.
The ride to Brigham was about as
usual.

visited Jim Knudsen met me there
and we went out in his auto
to the marshes on Bear River. He reported
that nine days ago in one swale
he saw two or three hundred sick
ducks and we expected to find
numbers of them. However
water had gone and there were
no birds. All the old sloughs were
dry flats with the sound cracking on
them and in only two channels
& one small lake was there any
water. I saw frequent signs of
dead birds and there must have
been a fair number sick here. However
the coyotes had worked all through
and undoubtedly had packed
many away.

A few birds were seen in what
water there was and in one place
we caught a small green-winged
Teal. This bird could spring into

the air but could not fly. There
seemed to be trouble in raising the wings
above the back though the downward
stroke was easy. The bird swam
& dove readily.

The Pintail *gen* could fly but not
strongly. Altogether we did not see
more than a dozen or fifteen ducks
& greets were fairly common and
I picked up four with the same
symptoms as those handled previously.

Also one young Black-necked Stilt.
The mud here was of a grayish
color & very smooth to the touch &
contained much limy material. So litmus
at showed slightly alkaline.

The birds seem invariably to
get sick in the shallow pools when
they are trying up suggesting a
concentration of something in the
water.

Further over we visited a
breeding rookery of Snowy Herons
and this in some rushes growing
six feet tall. Mr. Knudsen who knows
birds very well told me that the
first birds to use this rookery in
the spring were the Great Blue Herons
and that they come in about April
20. The last of May the Night Herons
assemble here and then the middle
of June come the Snowy Herons. The
last to arrive getting

in late in June and remaining with
the Snowy Geese. These birds had
the tops of the rushes well broken down
to form a level and I saw many
old nests.

Mr. Knudsen believes in the
transmissibility of the trouble among the
birds and would not allow his
boys to handle them. He claims that
when he was out picking up dead
ducks on a previous year that his
chickens contracted the trouble from
the nets & the pitchforks used and that
a dozen of them died.

The country here was level
and smooth down from Brigham
and we were right near the
big bend in Bear River.

Returned to Brigham, then to
Ugden & then took a local for Woods
Cross.

Met Mr. A. J. Moyer, District Warden
here he attributed the trouble to
the ducks to Black allate after
much circumlocution & promise of
secrecy.

I believe that the trouble
at Brigham has been somewhat
exaggerated as I saw signs
of from 50 to 60 dead birds only.

August 8, Saturday.

Worked most of the day on the birds secured yesterday and then in the afternoon packed up and in the evening left Wood's Cross for Salt Lake at 6:20. It was very hot today.

Numbers of ducks are gathering in in flocks and I saw about a hundred in the evening in a flock. The level of the water remains about about the same here on these marshes. The water in the channel is rather muddy while where the well comes in it kept clear by the running water.

Last night was cool again truly the beginning of fall.

Found mail in Salt Lake but nothing from the office. Received the proof of my Humboldt paper from Dr. Richmond and compared it this evening. The editor changed my title making it longer but made very few corrections in my English or wording.

August 9, Sunday.

This morning rose at five thirty had breakfast and then took the car for Mt. Olive where I caught the thirty electric car going up Emigration Canyon. Went to the end of the line at Pine Crest. fare 40 cents cash way.

The road followed along the bed of a small stream for quite a ways with slopes rising above covered with thick oak scrub growing densely or in scattered patches. Along the stream were dense growths of willow & Mountain maple. Then leaving this stream bed the road rose abruptly making two switch backs until Pine Crest was reached at 7000 feet.

There is a hotel here & numerous cabins a typical summer resort. Large placards announced the fact that no shooting was allowed in this canyon so I went up toward the head of the valley and climbed a ridge at 9500 feet or a little better and descended into the next canyon east. The slopes were covered with dense thickets of quaking aspens and I saw *Sylphocarpha* sp. Nine Bark and mountain maple, a Crane flower (*Geranium* sp) was very common in full bloom. I saw a little Oregon grape but not much. In the canyon which I descended were a few

Populus balsamea and on the high slopes grow sage. The slopes were almost entirely bare of tree tree growth. The ^{woods} vegetation being shrubs. General to this belt is a thickets of the small number of Canadian game birds seen. Only a few small groves of Conifers were encountered.

At noon I found a spring and ate lunch. Birds were very scarce and only a few were seen. Clear & warm all day but with a good breeze so that it was not uncomfortable. Crossed around over the hills to the cabin and came back at four fifteen. A very poor bird country all along.

Called Cook in the evening and spent the evening in writing. It seems very hot to me in Salt Lake City and the people here seem rather thin blooded than the mornings. I put them in with the car windows closed a great deal.

Tried to buy some alcohol tonight but was refused as it was Sunday.

Collected quite a number of insects in the higher altitudes of ^{forest} and found Irips abundant on the flowers.

August 10, Monday.

Caught the early train for Corinne this morning. When Cook met me and we went to Harberville for the lunch. Bought lumber & wire for a duck pen in Corinne.

I noticed a few changes in the swarms since my last trip here. Very few Coots and almost no ducks were seen in the area. The Willet were missing too.

Near Big Bend the noise of the lunch frightened an enormous flock of ducks numbering several thousands from some swamps and all went off toward North Bay.

Hawks too were common and Myrtle Herons present in the usual number.

A few Cinnamon Seal rook shells about with newly hatched young young.

Arrived at the pen about a little after two and after dinner made a pen 6 x 12 with two inch mesh wire in which to put some ducks.

Numbers of birds flying in the evening. Only a few Swallows are here now.

Hansen reported seeing a few sick ducks today.

August 11, Tuesday.

This morning I went down channel No 1 in the boat. The water is about a foot lower than when I was here last and I found that the flats across Pintail neck and a large lake just below the clubhouse were almost by large areas of moist mud were exposed while the shallows with water an inch or so deep were grown with ~~algae~~ ^{epiphyton} sp.

The Common Loaf have largely disappeared and there were few ducks in the channel when foraged they were common. The birds were gathered on the mudflats. Pintails were most abundant and Mallards next a decided change from our last trip. When I frightened the ducks the rose in flocks and circled back & forth the whole morning.

The mortality seems to be beginning among them. I saw 15 dead Pintails 5 Spoonbills, 3 green winged teal & 1 Mallard besides four eels & 3 covecks. Brought in three Pintails & 2 mallards alive. I found one green winged teal which had most of the skin & flesh torn from the base of the tail by a Raven and the birds were still where a Pintail had been picked in the same way by a gull. These places are soon fly blown and the birds are literally eaten by maggots which still hang

On a lake just below the clubhouse
I found most of the birds and though
it was early morning a number
of the dead ones had been dead only
four or five hours as they were still
stiff with rigor mortis. So they must
have died at the time when bodily
functions were at the lowest pt. These
birds that I found in shallow water
all lie with the head outstretched
and the wings very slightly expanded.
Evidently they lie without struggle.
One Mallard that I caught was
in the water and could not dive to
escape. Repeatedly it sought to thrust its
head down, but could not. On land it
held its bill with the point resting on
the ground. anal temp. 104.4.

The two Seal - which had been picked
by the Raven - showed respectively 102.6 and
97°. One of them had the anus encrusted
so that it was closed. These birds could
swim but were helpless on land. Another bird
had crawled into the grass at the edge
of the channel seeking shelter from the
blazing sun and was entirely helpless.
The anus in this bird protruded, was
watery and showed a few signs of
blood. The excrement was almost entirely
white & was firm & hard. The temperature was
too low to register, below 95°. The lower
eyelid was raised over the eyeball.

One Mallard was found helpless on land.
A Pintail was found helpless with a

a watery fluid exuding from eyes. Anal temp. 102.9. Another had the same protruded + somewhat swollen + inflamed. Excrement contained white renal matter, a small amount of gum + an albumen like fluid.

After Post mortem I can get find no trace of Parasites common at Woods Cross

Large numbers of birds were on the flats standing in flocks about on the ground.

Worked this afternoon at the clubhouse on the birds I secured.

Placed the pen made yesterday afternoon in channel one just inside the mouth where it opens from the river. There is a good swift current here all the while so that fresh water comes in constantly. A dam is no well here but this water coming down stream is fresh. Pinned the pen which is 10 x 12 so that one half was in the water the water at the lower end being 15 inches deep. The top was covered with rushes to furnish shade.

August 12, Wednesday

This morning I went down Crawford No. 2. This leads down into to the mudflats just off Mud Point and I found great numbers of birds here. There is a fair line of willows along the banks of the overflow and the usual variety of sedge & rushes & cattails. Most of the hollow lanes here were by ^{the} ~~the~~ mouth of the overflow, were gathered quite a few ducks, in the water and resting on shore. A few sick birds were seen here but all were active and could not be captured in the deep water. Below here on the mudflats were literally thousands of pintails with a great many Mallards and a smaller number of Green winged Teal & spoonbills.

After reaching the open the channels runs along between sand banks for a short distance back of which are shallow flats covered with one to three inches of water in which grows a species of ~~plant~~ ^{Potamogeton} and a green alga with a yellow scum like top. The spores of this are appearing now and cover the surface of the moss in the water in places with small broken patches of dark red. It is in these pools & shallow lakes with their

stay near water that I think the
ducks get sick. At any rate and
along the edge of the overflow is
where I find the birds. When
once they come down it is only a
matter of a day or two in my
opinion before the hot sun finishes
them. I am getting more & more
strongly in a mineral or combination
in the water which affects and
which is increased in quantity in
the evaporating shallow pools.

Today I found the following dead

Green-winged Teal	12
Pintail	4
Spoonbill	1
Stilt	8
Coot	2
Others	1
	28

The great number of these birds
lay on the shallow lanes studied
to above. Besides these I bought
in alive one mallard, 3 pintail, one
green-winged teal, and two coots now.
The coot put in yesterday was
entirely all right today and was
picking about in the water. The
pen that I have is made of 2-inch
mesh wire and one green-wing escaped
through it today. A he others got half
way out & then stuck.

August 13 Thursday.

This morning I went down the to mouth of Channel 3 and out on South Bay. Found conditions here much as at the mouths of the other overflows. The water was a great deal lower than on my previous visit and large areas were entirely dry while others which I had crossed readily with the boat were entirely dry.

A few ducks were encountered in the lower part of the channel but the great sight came on the open flats below. Flock after flock, mainly of Pintails, were banked up as far as I could see, standing about, preening their feathers, or sleep. Some were standing and some sitting down. There was a fair number of Mallards among them and a sprinkling of Hooded Green-winged teal and a possible section after section took a swim with a great roar of wings and the birds rose and circled about coming swiftly over my head until finally accustomed to them, often I would not look up. This continued all the while I was on the flats. In the distance were long lines of pelicans like a Monday's Washing through the shimmering heat waves. and scullied about were Cormorants, great Blue Herons

and many others.

The mud in these flats at places is black & sticky and ^{blows} way to my knees but ordinarily the bottom in the swifter channels is sandy & firm & is washed out by the current. Shallow water extends for long distances on either side six inch to three inches of water over the mud. Ordinarily this is grown with ~~chara~~ ^{Polymeron} & moss though a few spots are bare. The water is ^{very} clear, but shows a slight milky color while in the channels it is muddy from the river. A whitish scum is found on the river water even where the current is swift.

Notes that the moss was discharging its pores were also, dark red patches appearing on the water.

The following were found dead.

Ring-billed gull	1
Calif gull	1
Stiff	2
Pintail	10
Green-winged teal	12
Osprey	1

The teal seems to be in great suffering though much fewer in number than the Pintail. Most of the dead & sick Pintails that I find are males. Have seen only three or four females so far. One male green-winged teal died on Oct 1 but could not stand. The left

leg seemed stronger than the right. wings
were slightly loose at the sides. Anal
opening somewhat enlarged, with a watery
discharge. The lining was irritated.
Anal temperature 103.5

Another male greenwing was slightly
weaker. Left leg slightly stronger than
right. Anal temperature 103.3.

Pintail female. When I picked this
bird up the feet hung down loosely
and the bird could barely raise them.
The wings too hung entirely loose from
the sides. The head was very weak
and the bird seemed to breathe with
difficulty as the head was raised
with each breathe. The lower eyelids
were raised over the eyes and the
~~white~~ eyes gave a watery discharge.
Anal temperature 100.3.

Another pintail male had its
wings somewhat distended and slightly
inflamed with watery feces very thin
with some renal matter showing. The
wings were loose at the sides, the feet
hung down and the wing could barely
support its head. Anal temperature
106.50 surprisingly high.

Another male, same species was
slightly weaker than the last with
Anal temperature of 103°. The anus
was distended and inflamed.

A spoonbill male was lying on
a dry bank entirely helpless. The

head was extended on the neck the wings being loosely and only occasionally used, they in the first moved convulsively. The anal temperature was 102.5. The anus was distended when the bird was picked up and then was ~~drawn~~ retracted somewhat. The faeces were watery with white anal matter & some green saum like substance.

A greenwinged Teal head was entirely helpless. The faeces were watery with white matter present. Anal temperature 101.8.

A female cinnamon teal was too weak to stand. The wings being loose from sides and the feathers of the wings were held somewhat loose though helpless. This bird showed some spirit as it endeavored to peck at my hand when it touched its bump and demonstrated with low drake like quack.

A male greenwing was found helpless. The lower jaw half closed the eyes. The anal temperature was 106°. The faeces were practically solid with white matter so that it appeared like a heavy chalk mixture with a slight greenish tinge.

A male Pintail could not support itself its head at all, the anus was irritated and the faeces greenish white. Anal temperature 102.6.

Another a female was somewhat stronger with a temperature of 103.

A few of these birds were found crawling out on the dry areas. Signs immediately along the overflow but most were lying in shallow water in the areas on either side. I saw a small number of birds that swam readily and were strong. The green-wing teal swam off ~~and~~ keeping as low in the water as possible with the head straight in front just above the water.

Ravens + gulls presumably attack them while still alive. I saw a number with the lower part of the beak while others had the entrails dragged out.

I am inclined to believe that the ~~same~~ California + Ring-billed gulls die of the trouble. I found them lying on the mud flat on the coast with ~~the~~ ~~beak~~ ~~showing~~ ~~the~~ ~~anal~~ ~~opening~~ ~~large~~ ~~round~~ ~~and~~ ~~obscured~~. The Calif. gull, had died during the night as its bill had marked the mud in front of it plainly.

Two men who act as guides in the fall were out here today and were shooting at every bird that flew. Lots of company in the evening.

August 17, Friday.

This morning I built another small pen 3x4 feet this time and 5 feet high. Was almost as much work as building the large one. Had a lot of writing to do and I managed to get caught up on it at last. Has been too much company around evenings.

Yesterday I put four pintails in my cage, none of which were able to lift their heads, one died during the night and another a little later on in the day while the others roused up and are on the way to recovery. They got so that by help of the wings and feet they could partly raise themselves and slide into the water where they could swim readily. Others which were in this condition yesterday are all right now although I notice that one or two cannot walk quite in a natural manner.

I put the new cage (No 1) out on the dry flats east on a place where the ground was dry dusty & loose. Got water from a lake or channel where I found numbers of dead ducks Tuesday and put in a pair and placed one pintail & a Greenwinged Teal in the cage. The Greenwing crawled out through the wire & escaped. This is the second one that I have had crawl through

this was much less than.

The lake water in the shallow lake which I visited in the afternoon had a curious white appearance due to the bubbles of CH_4 rising all through it slowly and catching in the surface film. Tuesday morning I found a dozen dead & living ducks on this lake but today I did not find a single additional one except for an egret. There were a few Mallard & Pintail on the lower portion near the channel and a female Cinnamon Teal with a brood of young (downy) which I had seen Tuesday was still present with apparently none of them being affected. It must take several days for birds to be affected or perhaps they have not been using this lake to feed in.

August 15, 1914.

This morning I went down the river to overflow No. 4 and down it to North Bay. This overflow was grown up with rushes in several places. This overflow is smaller than the others and does not have much water going down it. I found more sick ducks here than in any of the other localities and found most of the birds in the channel of the overflow with others scattering

over the flats. The following were counted so far as I went:

<i>Neltion carolinense</i>	105
<i>Sayula acula</i>	22
<i>Sayula clypeata</i>	7
<i>Amus platyrynchus</i>	5
<i>Mareca americana</i>	1
<i>Plegadis guarauna</i>	1
<i>Recurvirostra americana</i>	1
Total.	142

So that the penwings seemed to be the greatest sufferers and the Pintails next. It must something in the way these birds feed that renders them susceptible. I brought in fourteen - live in all stages of the disease and saw a number that I did not catch. There had never been large numbers of these birds in the nests that I had not find. There was a slight current down it but the water was somewhat stagnant, a layer with a whitish scum and with an oily white scum on the surface film.

There were large numbers of birds here in the rushes that were unable to fly and I heard them spluttering off and saw birds across made they half ran half flew through the growth. The rushes down here made a

dense high growth that stood
about my head and shallow
water matted its throughs them.
Across with Bay I could see for
a long distance toward prairie
and north with Mountain.

Not many Coyote tracks through
here and most of the birds and
the dry flats were picked clean
only the breast bones and wings
remaining.

The sky was overcast much
of the forenoon and a few drops
of rain fell. It was very warm.

All the birds in my pen
a part of the water puddles have
died but the others have
entirely recovered. The wocets put

in have all ~~recovered~~ died but
me. The ducks are quite active
now. So the active principle

that is poisoning them occurs
in stagnant water without contact
These birds from only the water

from Bear River have recovered in
good shape. The percentage of
recoveries being high. Birds that

were absolutely helpless have been
able to swim and walk after two
days under these conditions. And
so we could turn loose now.

August 16 Sunday

Today was clear & sunny
as usual. Was out this morning
with Cook in the mull boat and
had a great ride. This is a flat
bottomed affair with a large
paddle wheel on either side tipped
with steel blades. It was very
slowly in deep water but a
fathom or two inches of water
makes better than twelve miles
in an hour, sliding along over the
surface at a great rate. The moss
checks it and it is only run
when the moss is gone. Aspected
up one wet point that we
passed at about fifteen miles
an hour.

We went out past Mudpoint
and down to where I could see
down to Flaughter Island. There were
great numbers of ducks here and
we passed an occasional one.
In the afternoon packed up a
shipment of specimens and then
took a walk along the uphone
line to see what birds had been
striking. Found only four. Within
sandpipers and they were at
least a week old.

The ducks on the large
pen are getting along first rate
now and a number of them

were entirely recovered. They ate
the seeds of dock (*Rumex* sp.)
greedily and also (joppet) of
Salicornia rubra. Can get no grain
for them until it goes to consume.
There is none found here.

This morning there were four
leal that (yellow) were quite helpless.
When in this condition I put them
on the mud at the edge of the
water when they could drink
my wish out. I then to not want
to touch water. Once or twice a
day I noted the all open in the
water and then up so that they
are forced to drink and it seems to
benefit them though they choke
a little. Birds flying about with
heart lying lax upon the ground
frequently revive and are able
to swim when placed in the water.
When sitting on the shore they seem
to fall into a sort of coma from
which the shock of the water revives
them, probably exciting a reflex
movement which they are abraded.
I left in the shell state many of
them die which otherwise would
survive. When about half recovered
they delight in the wavy sand and shake
their tails, make futile attempts at
washing and begin to rise in the
water and flutter the wings they

cannot raise the wings over the
back though they try so often
it is not safe to follow birds
just roused from water is stay in
the water as frequently after the
first excitement they weaken again
the head droops and they trem-
ble. In most of these weaker birds
the eyes are squinted shut but
when I pull the web part they
clear up. The course of a
day the discharge too occurs
in the nasal passages and runs
down through the epiglottis into
the upper trachea so that many
of the birds wheeze & cough,
wobbling the head. Sometimes
the head is raised with each
breath & though inhalation was
difficult.

Took the pintail kept a pen
& out this morning and put it
back with the others.

Aug 17, Monday

This morning packed up and left
the gun club for Corvum about ten
The wind, just right for the first part
of the night was strong from the south
and this suddenly shifted to the north
and this morning it was quite cool, the
first real fall morning. The ^{gun} swallows
clustered about on the willows at the
side of an old ridge and no doubt
will soon be leaving. Two curlews flew
over early whistling and I think there
was considerable movement among the
waders last night. The fall hawk papers
reported large numbers of birds among
the night colonies of a local authority
in "Chaleroles". A Rump threatened this
morning but did not come.

Last night I had four green winged
Seal that were pretty big and had
on the shore in the pen with heads stretched
out but this morning they were in the
water and swimming about. Some of the
sick birds had the feathers ruffled and
were shivering with cold. One was
vitality. I threw the ill one this
morning as it spent most of its time
on the duck's back and was too heavy for the
Seal.

The trip up the river was as usual.
There were a few green winged seal along
but not much else in the way of ducks.
Mudhens have almost vanished.

the same and just time make the
train. In Brigham I met I can't remember
who had been up at Buckville and he
told me such good conditions during the
hunting season. He is a guide at Buckville
in the fall. He says that very few Chimney
Swallows were present at the time of the opening
and that they get a few Canada geese but
not many.

He thought it very strange that this
trouble among the chicks had broken out
so suddenly and that it may have
been present before but have been overlooked.
He spoke of seeing one Mallard on No 4
that acted much as these sick birds
do now, back about 1908.

He said that last year Chesapeake
Bay alone about the first of September
he and others picked up ten
thousand birds in three days and a
little more.

Left Brigham about 4:10 and did
not reach Salt Lake until about 2:30.
At Deshly made a good deal
of meat waiting for me.

Aug. 18, 1914

Today spent in Salt Lake City. Mr.
Chambus was not in town. Was in to see
Mr. McCormick for a few minutes. I suggested
to him that it might be a good
plan - at Bear River to build a pen
in which to keep sick birds in case
they died in numbers so that it was

necessary to pick things up. Therefore the men gathering them have wrong the necks of sick birds. He was strongly in favor of it and promised his support.

Saw Mr. Steward in the afternoon out around about the usual time of talk.

Worked in the library a large part of the afternoon in going through various works on Chemistry, Bacteriology and Physiology.

In the evening went out to Liberty Park for an hour or two. This is quite a large park with growths mainly of box elder & ash trees. Some of the Box-elders are very large and sturdy. There are a number of artificial lakes in the park in which there are a few ducks.

Aug. 19, Tuesday, Wednesday.

This morning I went to Woods Cross leaving Ball Lake at 7:00 and reaching Woods Cross at 7:12. Went at once to the New State Gun Club and my right hand my stiff cramped and was in the marshes. Went down the east lake and down past the second dam toward Salt water. I found the bottom in this east lake overlaid with a slimy mud. In many places the mud was very black and gave rise from it giving a strong odor of sulphur, I believe the black is iron sulphide. Chara sp. and a narrow leaved Potamogeton grew in this lake and the green algae found in

at Bear River giving off the dark
 red spots.
 Below the dam on the area affected
 by salt water when the grass was
 killed was a fairly closely heavy
 silt under the water on the surface
 of the mud which is, however, assumed
 to be somewhat earthy consistency.
 Ducks were somewhat affected
 through here & I picked up the
 following dead:

green winged teal	20
poorwill	1
Mallard	1
Pintail	4
wood	7
W. Sandpiper	1
Shill	3.

On the salt area I picked up
 four Western Sandpipers & a Wilson
 Phalarope that were unable to fly
 but could run swiftly and they
 proved to have the duck malady.
 One Phalarope which could fly fairly
 well which I had proved had the
 lungs affected.

On the evening the boys brought
 me a least Sandpiper and a
 lesser yellowlegs & a Killdeer all of which
 proved to have the duck malady.
 There were many ducks about
 now and I saw three or four
 hundred this morning. They remain

constantly in sight of the house
now that the fog which formerly
ran loose about the new
balm away. There were four of them
- two hunting logs & a collie and
they spent most of their time in
the marshes among the birds and
without doubt killed many. I am
learned of these and made the men
in charge take them away. This
should have been done in the early
part of the season as

The young ducks
- the young ducks were the first
- over the flats in the open when
- the grass was killed.

This morning when I came out
the wind had drifted the smoke out
across the flats until it hung low
like a grey cloud. Houses at half
a mile wide almost obscured and
beyond them nothing could be seen
but the smoke. This extended north
as far as I could see but was
especially heavy in the Jordan delta.
None or less of it remained all
day and in the evening a new
cloud began to settle. Mixed with
the grey was a streak of dead
black from some rookery that hung
in a long line far out on the flats.
It was cool and pleasant all
day today.

August 20, Thursday.

Last night it was quite cool especially towards morning. Went down along the channels to Knowlton's levee and then down into the water front conditions changed considerably from my last visit. I found the following dead

preserved dead 5

Birdy Duck 1

Tit 1

and brought in we preserved dead alive.

These birds were along the channel formed by above the dam and in the upper part of the lake.

In the lower part of the lake the moss had almost entirely vanished leaving a sandy bottom where the current was swift and mud in other places. The places where I found large numbers of dead ducks getting in a small pool entirely free from moss & showed a sandy bottom. The mud in the small channels down towards mill water is black thin and has a strong odor of sulphurated Hydrogen. As I walked through the shallow pools I stirred up like ink on either side. The channels were sometimes six inches deep in loosely piled decaying vegetable matter which would give way readily beneath me. A few sandy islands occurred throughout

There were many waterfowl here
on the lake front marshes and many
P. halarope. Ducks were common in
the marshes.

The water is low here now and
Mr. Parkin tells me that the river
is lower than he has ever seen. Water
still remains in the channels but is
going down slowly. Mr. Griffin
superintendent claims that he can
turn the water out of the surplus
canal which comes out near Salt
Lake City and runs out through Rudys
back into the river whenever he wants to.
However it has not been done & I under-
stand from other sources that the farmers
in that section have a right to the
water until they have finished irrigating
and that after they see through he
can have it.

In the afternoon Mr. Bigelow in
Ogden called me and said that
four or five thousand birds were reported
sick at Hooper at the mouth of the
Wren. So I packed up hurriedly
made a number of post mortems
and went in to Salt Lake leaving Woods
Cross at 6:20 and arriving at
6:35

Very warm in Salt Lake.

August 21, Friday.

This was a fine turkey and
breakfast and a ride in the garden on
the Bamberg line, seven o'clock car.
arrived in Lyden at eight. Went to
the Lyden State Bank and saw Mr
Bigelow and he told me that Mr.
W.D. Bernap would be here soon to
drive me down the Bear River.

Mr. P. Bigelow told me that they
had built a dam ^{upstream} to Malack
eight or nine miles above Corium. This
throws water through canals into
Sulphur Creek and then from Sulphur
Creek by a canal over five miles
long into the northeast corner of North
Bay thus insuring a supply of fresh
water there.

The Bear River dam will own all
of North Bay and a tract of unsurveyed
land in South Bay. Mr. Bigelow told
me that they owned both sides of
No 3 channel. The Duckville people
do their shooting on government land.
The Bear River Club restricts hunting in
North Bay to its own members.

Mr. Bigelow thinks that the main
body of Pintails found in this region are
and a large body of fresh water with
of the ground on Bear River & the water
here is deep and hunters do not
disturb them except along the edges.

Cattle & horses kept in the marshes
along near Salt Lake & Murray are very

has in the discharge from the courts
at Murray it is said to be impossible
to keep chickens except under shelter.
Farmers in other sections will not buy
alfalfa grown in that region knowingly
as it is said to affect them.

He also told me that seal
the greenwings decay more readily than
any other of the ducks.

On the bank I met an English
gentleman - Mr. Neal who was
a very well informed man and a member
of the Bear River Hunt Club. He told me
that in October he has found numbers of
Shore larks sick on the flats at Pimlico neck.
This is the only land bird affected to his
knowledge. About the first of November last
year a north wind blew the water up
onto the flats north of the river across from
the club. The pintails came up in great
numbers to feed on their lettuce, turn and
rest morning on these flooded flats he
found at least a hundred fat heavy birds
depress, one or two dead. I do not comment
I hardly believe this. As the sick birds
examined the elementary canal empty
so that think they find nothing for a
day or two before they finally get down.
He corroborated the statement that
the banks is always the worst when
the rains flood the dried up flats and
the birds come in to feed.

Mr Belnap finally arrived and

We drove to his place ten miles west
& south of Ogden through a level
farming country with many houses
and all under cultivation. Haddison
and then a company with Mr. John
S. Odell; Mr. Wm. Simpson drove
down to the mouth of the river
three miles farther on. This led us
across a long series of flats or
barrens in which the water had
recently receded. The River itself
has divided into two channels
between the flats had growth
of cockleburrs, xalicomia & such things.
The banks of the River were almost
entirely barren mud flats with only
an occasional clump of sedge or
they call it "Sagebrush" grass. There was
no cover for the birds to amount to
anything at all and I don't see
where they go to roost. They hatch
in the fields of pasture nearby and
I was that of one field of alfalfa
which contained 11 nests at the first
cutting.

In spite of these conditions there
were thousands of ducks mainly
Green-winged Teal, Pintails, Mallards, with
~~Blue-winged~~ a few Cinnamon Teal &
Spoonbills. Along the mud shores dead
and dying birds lay distributed quite
evenly for a distance of two miles
and probably more. We selected an

average locality	stuffed off	one
hundred yards	east of them	counted
The birds south	The following	result.
Common	deal	1
Mallard		13
green-winged teal		84
Goosander		4
Pintail		34
Woot		1
Forster's tern		1
	Total	<hr/> 138

Using 125 and an average and computing the job both above of the two miles involved was a total of approximately 8800 birds a very conservative estimate in my own mind I believe that there were at least ten thousand. Besides these several thousand birds walked off across the Warren head of the bay unable to fly.

These birds acted exactly as they do in other localities when I have worked. I cut open and examined a green-winged teal and a Mallard which I captured alive and found the same conditions to exist internally. The intestine as customary was nearly empty and on being slit showed the customary irritation and on the hand line little points of blood marking the dilated capillaries were visible. The stomach in each case contained gravel, bulbe

^{Potamogeton}
~~of a sp.~~ and a small amount
of vegetable fiber. The excreta were
white with renal matter and very
loose.

In addition to these I ~~saw~~ three
California gulls which had the malady
or at least one fine adult which I
captured did have it. This bird could
walk and swim rapidly but could
not fly. In getting it open I thought
at first that I was simply gorged
as the stomach was enormously distended.
On opening I found that it contained
a mass of earth as large as my fist
and about a pound in weight. The
intestine exhibited the same condition as
in the ducks. This would indicate
an intense irritation in the canal
and a coating up of the stomach in
an attempt to alleviate it.

An Obois and a Murrelet or Coot
too exhibited all of the characteristic
symptoms of the disease.

I saw two or three Forsters'
terns which were down but in one
which I opened I found an appearance
which would indicate a tubercular
intestinal trouble as there were spots
of infection all along the inner surface
of the gut.

The water in the channel here
had a peculiar unhealthy greenish
appearance. There was considerable

Potamogeton here and Chara which
on the banks were the duck lettuce and
samphire (Sabiceornia rubra) The ducks
in their eagerness for the bulbs of the
Potamogeton had worked out so-called
"Duck holes" all through the shallow
water, which were six inches deep and
and from two or three inches to four
or five feet across. With such a
number of ducks gathered as there are
here compared to the amount of water
the food supply must be an important
factor. In digging these holes of
course the soil is merely loosened
and washed away by the current.
The water in its present low stage
is rather sluggish.

The Utah Idaho sugar Co established
a sugar factory here ~~three~~ miles from
Laden in 1898 and the drainage from
the process of manufacture was
at first turned into the irrigation
ditches. Specifically that draining from
the silos. In the fall the water
from this source, very black and evil
in smell, was the only water in
the ditches after the irrigating water
was shut off in the fall. This water
drained in a slough at South Hooper.
In this same slough Geo. Quilliam
lost around 75 tame ducks which
were said to have died with the duck
disease. Mr. Belnap is going to get

complete data as possible on this and send it to me.

Mr. Stoddard and Mr. Simpson tell me that as long ago as the hunting season (October) of 1904 they found a number of Ducks that acted queerly. They found them in the Bayonet grass (sedge) and they could not fly but could only flutter off across the water. They shot them & found them fat & in good condition and remarked about them wondering what was the matter.

After that little was noted until 1910 when the birds died by myriads. They had hauled ²⁴⁰ sick birds into a fresh water pond and most of them had recovered.

These gentlemen were deeply interested in the subject and had given it much consideration. Mr. Belnap and Mr. Simpson blamed the sugar factory for the trouble while Mr. Stoddard had formed no settled opinion.

Mr. Belnap drove me in to Ogden in the evening and I caught a fine velvet car for Salt Lake.

Found Father down this at my room and we talked for quite a while.

Wilson's Western Sandpipers and a Phalarope were found wet today.

August 22, Saturday

This morning I spent in writing up my notes and worked in the library for an hour. At four fifteen in the afternoon took the train for Corinne arriving two ~~afternoon~~ after six. Had a number of purchases to make and then left for a night run to Duckville.

It was not our char't but the river was a foot lower than ordinary and I had some trouble in getting over the bars in the upper part of the river.

About half of my ducks got out a day or two ago and I found that sixteen were left of the original lot. Arrived at Duckville about 11:30

August 23, Sunday.

I spent the whole day in making three pens 3x5 feet each in writing up my notes. The river was up three or four inches this morning.

These small experimental pens measure three by five feet and are covered on sides & top with two inch mesh screen wire. I put them about fifteen feet apart near the bank of the river beyond the boat house. The back end of each one rests in the grass and the other end in open ground. On one corner near

The wood placed a rich pan
under in the ground which is
to contain water.

August 24, 1914

This morning early I started
experiments at 3 (which was with
concentrations of CaCl₂)

I started down 2 1/2 with father but
the sun was too much for him
so that I had to bring him back
to the clubhouse. When I went down
No 1 if when it comes out on the
flats I found the channel very
shallow in most places. and the
flats toward pintail neck were
entirely bare & dry.

I saw two pintails and a
couple of Seal in the lower part of
one which contained could not fly
but could not capture them. And
the first lake which was almost
dry I picked up a spoonbill and
a Stilt and in the next one I
saw three dead Pintails and one
sick one. From here I brought water for
experiment 4.

Picked up two dead greenwings and
saw two or three others. There were large
numbers of ducks on the flats here
but few were sick.

Then the afternoon I examined the
Stilt and found that it undoubtedly
had the duck malady. It was

helpless, could not swim or fly
and lay with head extended in
the mud. In the stomach I found
many insects of *Notonecta* sp. and
bits of elytra of *Berosus* sp. ~~It~~ So
me this would indicate a rapid
infection or poisoning. The lumen of
the canal was whitish, not irregularly
and contained one small flat worm.
The bird was in immature form.

Two seal bladders contained
seeds of sedge and bulbs of ~~*Scilla*~~ ^{*Scilla*} sp.
in considerable amount. These two
birds when picked up were still in
rigor mortis.

August 20, Tuesday.

This morning two more seal escaped
from the small experimental pens. They flew
up near the top & go out through the
mesh. One did this while I was present.
After breakfast I went down to Sacville's
and went out No. 4. The water here was
very low and the lake on the right was
dried up entirely save for a little water
in a patch of rushes. I found very
few birds about here that had died
recently and consider that this lake
was a point of infection. In my last
visit here numbers of birds newly
dead & dying were found in its vicinity
and now that the lake is gone conditions
have changed. It seems now that the
trouble comes when these lakes are

are partially evaporated or run off. The
birds are just in them at this time
because of the food available in the
shallow pools. I ran the dred surface
of this lake & craped up three buckets
of soil to test the theory that those flats
when flooded by rains are severe centers
of infection. Also took a sample of water
from that remaining in the rushes.

Below on North Bay the flats
for a long distance were bare and
merely soft mud. There were a few
sick birds in here but not many and
some of these seemed to be birds which
had lived in a helpless condition for
some time as several birds picked up were
very thin. It hardly seems that many
of them get it in the bay here as yet
large numbers of rollers are running
about on the newly dried flats which are
still muddy with small pools of water.
None were seen here were affected and I
should think that if any trouble was
present here it would be concentrated in
the tiny pools.

A number of ibis were seen affected.
They sit about in a corner and pull out
feels one great blue heron that could
fly only a short distance but could
not capture.

The mud here was soft and clear
and the birds gathered were
pleasured with it. A number had

balls of mud hardened on the tip
of the bill adding weight to my belief
that they had been dead for some time.
When they get helpless they try at times
to use up end of the bill, & the soft
mud accumulates a little & it then
& hardens into a ball. One immature
Seal had such a ball on web through.
The sparrowbill whose post mortem
followed as a typical case of the
trouble in a virulent form. I am
firmly convinced that these birds require
a day or more to die as the intestine
is entirely empty.

Common clam identified as
Anodonta wahlameteris.

August 26, Wednesday.

This morning the sky was overcast but I thought it would clear. It rained quite hard last night for a few minutes enough to wet the ground, and this morning the river was three or four inches higher. Went down No. 3. There was a strong south wind blowing and this was holding the water, carrying out of the overflow and banking it up flooding the flats so that a large area which had been dried off was not flooded with from one to three inches of water. The top of the mud there is $\frac{1}{4}$ to $\frac{1}{2}$ inch of greyish deposit and this was churned up by the waves until the water was clouded. Most of the moss has gone out down here.

A large number of dead birds were seen were a week old, at least and were dried and mummified. Six or eight Green-winged Seal were found fresh and two or three pintails. I brought in 6 Pintail, 6 Green-winged Seal, 1 Coochet, + 2 Shitte alive. All birds which had apparently sickened ^{very} recently.

A Blue Green-winged Seal. I picked up stone dead in the middle of a flat 150 yds from water. It had died there within a very short time after it settled as the ground beneath was clean save for a single ~~of~~ spot of excreta.

such as would come from one passage.
The feathers around the anus too were
fresh and clean. I saw other
sick birds walking about on the flats
and judge that this was one of them.
Death in this case must have come
very soon after the bird was down -
see the ~~quack~~ post mortem following.

The birds which I found in the
water at the mouth point where the
overflow debouch onto the flats are
very active ~~not~~ usually intent to catch
them to ⁱⁿ quite a chase. I believe
firmly that the large number of these
birds recover and get well. Only those
which limb onto the bank away
from the water die finally. I cannot
see why so many should not recover
in the water of the channels here as
in my pen #1 in the overflow at the
gun club. There is a swift current in
the channels and the water from that
must be the same as that above.

Today I shot a healthy pintail and
bringing it home removed the intestine
and placed it beside that of a
sick bird. In the healthy bird the
intestine was distended with matter
taken as food, the intestinal walls were
soft and pliant, thin to the touch
and pale in color. In marked contrast
the gut from the sick bird felt hard
and firm, was empty, not more than

me third the diameter of the other
and distinctly reddened by irritation.
The discharge from the bowels
in the sick bird is distinctly a
dyentery brought about by the severe
irritation of the intestine. Sometimes
the irritation is slight in some places
appearing merely as reddened points in
the lumen ~~and~~ which are more intense
in patches showing as longer reddened
capillary filaments and again the
irritation is severe and uniform through.

I cannot believe at present other
than that the trouble is due to some
irritant poison. The irritation of the
intestine with its accompanying
dyentery is the only true indication
of the trouble present. The catarrhal
affection is wholly secondary due to what
I cannot say. That it is a poison is
indicated by the paralysis of the motor
nerves, affecting first the wings and
then the legs & lastly the neck.

The birds as soon as infested seem
to stop eating so that the gut is
emptied rapidly. I am inclined to believe
that the muscular activity is greatly
lessened with the irritation. As usually
some matter is present in it which the
gut is nearly empty save for the mucus.
The ~~first~~ sick birds picked up
today I believe have sickened within
a day I believe i.e. since the rains

late yesterday afternoon. The trouble too
appears violent as seven Greenwinged
Teal died in the boat on the way in
an unusual thing. Sometimes
I use one but usually all live.
In bringing them in I place them
in the front of the boat and cover
them with sedge to shade them from
the sun. In addition I sprinkle the
sedge with water. Birds left exposed
to the sun fail rapidly and I
think that many are killed by the
heat on intensely hot days. Cool nights
and semi cloudy days on the other
hand tend to revive them.

Many birds are so active that
I find it necessary to loop a bit
of grass or string around the neck
to hold them in to the side and
also to tie the feet in order to keep them
in the boat.

Have four small experimental pens
going now.

The following temperatures (anal) were
recorded on live birds brought in.

<i>Dafila acuta</i> (males)	105.0, 99.2, 99.6, 99.4, 101.3, 95-
<i>Hellm. carolinensis</i> (males)	101.0, 99.4, 105.0, 104.5, 105.9, 106.1
<i>Picus americana</i> (males)	98.4
<i>Himantopus mexicanus</i>	99.9, 103.2

August 27, Thursday.

This morning I went out the left hand channel of No. 2. It was clear but cool with a strong breeze.

I found about a dozen dead Green-winged Seal and six or eight Pintails dead which were still fresh while all the other dead birds noted were a week or more old. I saw however live birds, helpless at intervals all over the flats, the greater number of them being green-winged Seal with Pintails coming next. I brought in the following alive

- Pintail 9
- Mallard 2
- Cinnamon Seal 2
- Spoonbill 1
- Skull 2
- Greenwinged Seal 46.

I found one small island at the mouth of East Pass I gathered 18 Birds and as many more swam away as I came out to them. They lay mainly in the water at the edges of the tules. This island was out in open water and offered shelter to trapped birds from all sides. I notice that birds picked up in the open swim up and become bright when I get in among the rushes, and try to get out and hide.

The birds secured have nearly all of them certain become sick since the rain the night of the 26th. A few birds which were thin & run down may have been sick longer but the larger number in this condition have come to this ailment.

The flats here have a grayish light sediment spread on the mud which rises readily in the water and which beaten up by the wind and rain drops can build up may be the seat of trouble. Took two water samples today being careful to secure them from places near which sick birds were found in some numbers.

The trouble now seems to be voracity. 13 out of the 46 Seal brought in died by nightfall and some of those that died were so active that I had to tie their wings & put to keep them in the boat and I thought they would pull through all right.

I found some gelatinous like bodies hanging to the Potamogeton & collected a number.

In putting the birds in the pens I give the helpless ones a little water and then place them on the bank so that they will not drown.

Aug. 28, Friday

This morning part most of the
pennon working with the ducks.
I seal on 14 Pintails dead during
the night so that the percentage recovery
will be low. A good many however
have roused up a good hope with
a number and that infection has
set in and I hear one Pintail especially
squeezing and coughing loudly. Others
rattle in their throats then inspiring
and still there though they make no
noise raise the head and open the bill
with each take a rough breathing
was difficult.

Twenty one green winged teal
have died so far from the I brought
in yesterday so that the mortality
appears particularly virulent now.
And to strike hardest in these
birds. Those that have been here
gone very rapidly failing & dying
sometimes within a couple of
hours from when I had considered
them going well. West birds however
could not swim strongly & have kept
in the water placing them in the water
only at intervals. When the pen is
crowded the stronger birds force their
way over under a cover of them.

A day elapses at least after the
birds recover before they seem to
eat much, though I see them
drinking a good deal.

With birds that are reasonably
some one of the first impulses
on being put in the pen is to
flutter wildly to the far end and
try vainly to get out through the
wire. I hear becoming common they
swim about a great many baths
and preen themselves. Sometimes
birds land on the water in the
left in the water in order to clean
themselves though I fly 1/2 m. to
no more than at the head or the
back. Some of the very small
try to pick at the back part of the
edge. Usually with birds that
are fairly strong in twenty-four hours
they become bright and active
stand up and flutter the wings.
Sometimes for days these birds
they are unable to raise the wings
to full length above the back.
I on 14th of the birds envelop
the cutaneous growth. In a few cases
this is merely an affection of the
nasal passages and ordinarily the
eyes are affected too and the eyelids
glare about so that the birds are blind.
Considerable quantities of matter gather
around the roots. I open these with
my fingers. In 55% the matter is
clear watery and in the other half
clouded and thickened whitish and
mucus like.

Birds do not seem to be in any particular panic. Most of those which crowd are gulls, not the lot birds are very migratory. I have seen two pintails, red they are in a stand. The with breasts touch and feet and pull at each for several minutes. In fighting in the water they expose the breasts to the beak of the other. They can do little damage to each other as the thrusts & pulls are far from strong.

Many of the little seal and an occasional pintails pecks at my hand. In the last stages of the trouble when the birds are lying with extended heads unable to rise, breathing at times is difficult and the birds frequently raise the patens of the hump.

The ship being at length taken by a Mallard and a common seal in the lake west of #1 both in the first stages. The double wing could not fly but left the seal and walked off more than a hundred yards across the mudflats. In each the anal excretion was clear as water but gelatinous and viscid. So that the white renal matter comes later.

August 29, Saturday

This morning I went out & hunted again. Clear morning with little breeze and rather warm.

On Pintail neck dead birds were seen about at intervals and I estimated that from Mulpoint about a thousand birds lay dead. The greater number were Green-winged Teal after which came Pintails with an occasional Mallard or shoveller. The little islands of bog & rushes that stood isolated in the water contained numbers of sick which had me to them for refuge but I saw only a few dead birds in them. From the same island from which I secured 18 birds on Thursday I got about 25 more today. Many of them were very active. The disease or malady in this present lot seemed to be violent in the extreme but from appearances I believe that it is dying down again now. There are very few more birds down now than on Thursday. A secure means from the little islands as they gather in here instinctively to hide. These observations

of the last two or three days find support to the theory that when a rain comes and floods the flats the birds die in large numbers.

The following were brought in today.

Pintail 11

Green-winged Teal 22

Mallard 4

Coot 2

Avocet 1

I am convinced now that the birds become "fished" in shallow water, mainly. The green-winged teal are the main sufferers and they feed continually by walking about on the mud like large sandpipers and working in the shallowest pools.

I found a barren female today that was assuming the plumage of the male. This bird was caught but was strangled in the boat by a leech which crawled now from the nasal cavity into the epiglottis closing it completely. In dissection it could barely find the ovaries in this bird; the oviducts were small. There was no trace of a dilatation of the uterus. The head was

Crested and was colored as
in the male and the belly was
white the white bar too showed
in front of the shoulder. She had
a red hanger into the pharynx.

The birds I brought in today
did much better than those I
secured yesterday and I think that
only a few of them will die. They
were a brighter stronger lot and
the only one lost was the bird
strangled by the leech. This would
show that the trouble is losing
vitalence for the time being.

Tonight there are four Seal
which are weak and two
Pintails, absolutely helpless from the
lot brought in. Shubs says two
Seal, 1 Pintail, 1 Mallard & 1 Spoonbill
'died' last night. The Pintail was a
very sick bird when brought in and
the other birds which I had been in
the cage from 5 to 6 days were
exceedingly thin and run down so that
in their cases I suspect some other
trouble. The Spoonbill especially was
extremely thin.

August 30, Sunday.

This morning I was busy a good share of the morning getting things in shape to leave. One or two pentad died during the night. This was one of your birds brought in Thursday which were unable to move and lay on the ground with the head extended. I gave them water three or four times a day and this one bird had learned to drink when I held it. The other birds in pen 1 seemed in good condition your Seal which were far gone were swimming about this morning. At night is when the birds seem to make the greatest strides toward recovery or conversely to die in the large number.

Some of the birds in the pens have marked individuality. One Green-winged Seal make his way to the shore at the back of the cage and then flies down to the other end alighting on the backs of the ducks crowded up there. Immediately he makes his way through them to land and repeats the performance. Some of the adult birds - males - peck and annoy the sick birds but do not seem to hurt them.

About eleven I returned the birds from the smaller experimental pens to pen #1 and for half an hour they did nothing but drink wash and preen themselves. An unlimited supply of water seemed a great boon to them. The experiments carried on all resulted negatively.

A number of the birds are still coughing and whizzing.

The sulphur theory for the trouble it seemed to me is combatted by the fact that the shallow lakes no. 1 & 4 act in my opinion as points of infection. SO_2 or any other compound blowing up across the lake to the water surface could never get in here and it could hardly come this far in the air in sufficient quantity to be of damage.

I believe that the excretion of the kidney will be found to play an important part in solving the problem of the trouble. When toxic elements are present in large amounts in the blood the kidneys serve as a means of eliminating them. Since the two birds captured Friday in the first stages showed little of the renal matter this must come as a later symptom of the trouble, a desperate effort of the body to purify itself. I have seen one or two birds in which this matter came out almost solid unmixed with other matter.

By the way the birds mentioned as in the first stages showed no dysentery but expelled the cloaca forcing out the matter contained.

The trouble to me at present seems to come from a toxic element present in the water for the following reasons:

1. The lumen of the gut shows intense irritation through out its length (This is the undoubted cause of the dysentery)
 2. The birds undergo a slow paralysis of the ~~stomach~~ motor muscles of the wings extending to the legs & other parts of the body, pointing to a poison.
 3. There is an abnormal increase of renal matter in an effort to rid the body of this poison.
 4. The birds most severely affected are fat & in excellent condition otherwise, pointing to a poison & not a disease.
 5. There are no lesions of any sort present such as would be caused by the disease.
 6. The fact that many survive when given fairly good water would point to a poison.
- The fact that the disease begins in July and largely ceases in October may be attributed to the fact that by July there is much stagnant low water while in October the water level is high enough to relieve these conditions. Mr. Cool tells me too that in April when the birds return from the south he find a few sick birds around the mouths of the overflows. From this it might seem that the toxic element was present then in small

quantities but that the more
to it later when it becomes more condensed
it affects them again:

The mud and sand Hanson both have lost
domestic ducks and geese which they
attempted to keep.

The trouble may come from either a
ptomains or a poison. If the former it
will be very difficult to discover. I am
not familiar with the physiological action
of ptomaines.

Left Blueville a noon and made
Corinne in good time. The water is
higher now & there was no trouble. Bird
life along was the same as usual. The
ducks found along shore earlier have
disappeared as have the Avocets largely.
These birds are now found in the sloughs.

From Corinne I went to Brigham by
train and then by electric road to
Ogden where I changed to the Bannock
route for Salt Lake. The road lay along the
base of the foothills giving me a good
view of the country.

August 31, Monday.

This morning in Salt Lake after making a few purchases, I called on Mr. Chambers. Found a telegram telling me that Mr. Fisher would be at the Cullen Hotel Sept. 2.

Nothing much new. Mr. Chambers proposes to fake some moving pictures of dead ducks along the Weber River, would have the ducks thrown in piles on built up earth to exaggerate the number dead and also throw up "muds" in the distance to simulate others. Then he proposes to send these east to enlist aid for the purpose of ascertaining the cause of the trouble.

Mr. Matson was in the office and told me that when the birds were dying the worst he had found a few on Great Salt Lake. Three hundred were found in one slough and a number were seen on the lake itself. This I had not heard before.

A few birds are reported as sick on the Central Gun Club grounds which draws its water from the Sulphur Canal.

Worked for an hour in the library trying to gain some information on Stomoxys but found little.

After dinner I met Mr. Griffin on the

strut and went up to his office for
a while. He told me that he had been
pretty well all over the New State grounds
at the end of the week. Had picked up
only one sick duck a Shoveler. Had seen
a few dead ones but attributed them
to Coyotes etc.

The agreement between the city &
the gun club whereby the sewer was
extended to the lake was reached on
July 13, 1911. Last year the grounds here
were dried and thoroughly baked
and the same has been done with
the lake on # 29 when I found the
ducks formerly dying in numbers.

At 3:50 I went to Woods Cross and
down to the New State gun club. Had the
bally horse and was an hour reaching
the grounds. Found the water higher
than on my last visit and was told that
the water from the surplus canal was
being turned in slowly into the river.

The Ducks shut here are all
doing well. The young Redheads have grown
a great deal. The bird that I brought
in sick has been stunted and does not

appear glossy as the others. The
teal & pintails fly up frequently to the
top of the cage. The Coot died a few
days ago. The excrement of all appeared
firm & hard.

These men out here are firm
advocates of drying off the grounds
burning them over to prevent the
trouble with the birds. They
suggest that if the same thing was
done up on Bear River they would
have less trouble.

Mr. Parkin had a porcupine tied up
by a rope, ~~which~~ he had caught it that
morning. An old sow tackled it up by the
barn & got her nose full of quills. Another
was killed on my last trip out here and
I saw one in a cage in front of a movie
house in Salt Lake. A placard said that
it had been caught in the main part of
the city. It seems strange to find them
down here - I heard of one killed near
Dickville last summer. Formerly they were
said to be fairly common about Bountiful.

September 1, Tuesday

This morning went down the east bay and back through the Mallard holes up the river. There were considerable numbers of birds in here mainly green-winged teal, Pintail & Mallards with a few Sponsbills & Common teal. More birds than I have ever seen here before. There were numbers of shorebirds on the lakefront also.

The lake & the channels here were largely clear of moss and of foam & sand bottom in many places. The water has been very low but now has come up a gain to what it was on my former visit. A foam & a very swift current in the lower part of the river channel. The water here is always murky and appears black. The mud underneath a greyish silt spread over it like a thin blanket is black as coal, fine and gives off a strong odor of sulphur. As I walk it stir up in the water on either side like nit.

Any test should show sulphur in this water from the number of flowing sulphur wells present in the flats above the marshes. I can recall eight within a mile and a half of the new State game Club.

The birds were somewhat affected down in this lower part of the marsh. pools form here & become stagnant. Most of those seen were very active and could not be caught and I believe that a large number of them will recover as they were in the swift running channels.

The following were seen exact.

Mallard 2

Pintail 3

Greenwinged Teal 30

The following sick birds were noted.

Greenwinged Teal 45

Pintail 6

Spoonbill 1

Mallard 3

I brought in the following alive.

Greenwinged Teal 14.

Pintail 2.

Shoveller 1.

It will be noticed that the number of clean' ones seen was small compared to the sick ones. I brought in all the sick birds I could catch also a small number. I do not consider the trouble out here.

In talking with Mr. Griffin yesterday in Salt Lake he told me that Saturday he had been down to the east Bay, and had seen only one sick bird while a few dead ones may have been killed by Coyotes! The two results hardly tally!

In the afternoon I went out through the duck paddles on the west side and saw about a dozen sick green winged teal and one spoonbill two or three dead birds were noted.

Mr. Griffin advised me yesterday to go out in this direction as I might find something!!

I opened three birds this afternoon and found in each a flatworm in the cloaca. Several birds taken today were very active: on pressing the cloaca the excreta was found to be ~~to~~

Somewhat viscid, transparent or slightly clouded and show a very slight amount of renal matter or none at all.

In the evening I went in to Salt Lake on the 6:20 train - a man with whom I talked on the train corroborated Matson's statement that there had been in former years sick birds on Utah hals. He told me that there was a beet factory at Payson and cutting stations where the material is put in silos at Spanish Fork & Provo.

September 2, Wednesday.

Was to meet Mr. Fisher at the Cullen hotel today but he did not arrive. Spent a large part of the day in making out my August expense account and the monthly tabulated statement. Expense for the last month was \$133.01 with \$20 additional expended from last month. Talked with Mr. Chambers on the phone but did not see him.

September 3, Thursday.

Found Mr. Fisher at the Cullen this morning with Mr. Piper. Met them at eight. They had been delayed and did not arrive until one third this morning. After they had breakfast went into Executive session with Mr. Fisher. After ten and then in company with him called on Mr. H. B. McCormick. Discussed the strict situation and also the effect of the law against spring shooting. In the afternoon at 1:30 with Mr. Fisher and Piper called on Mr. Chambers, Game Commissioner. Commissioner wished to go to the Weber and Mouth of Bear River with us but finally it was decided that he would meet us in Ogden and visit the mouth of the Weber only. After leaving him I separated from the others and bought a small pair of prospector's scales, a pound of

magnesium chloride and some other supplies and then at 3:30 met the others at Mr. Chambers office. Went with him on the boat near to Murray and then drove two miles to his fish hatchery. He had a series of narrow cement lined ponds 3 feet deep six feet wide and 75 ft for 100 feet long in which were trout ranging from two to eight years old. A channel below the hatchery contained yearlings. We had the pleasure of catching 15 yearlings and took them to town for our breakfast in the morning.

Was with Dr. Fisher in the evening and he and Piper were busy with a sheep man named M. Clark in the evening.

Have an additional point in favor of a poison or ptomain theory. The trouble affects certain ducks, shorebirds and gulls an unusual condition for a disease. a bacterial infection is liable to be found only in one species or group of allied species.

September 4, Friday

Met Mr. Fisher & Piper at the Cullen at a quarter of seven this morning and then we had breakfast at Finch & Rogers. Trout were fine. Piper and the doctor showed me how to bone them in an easy way. Left for Ogden at eight on the Oregon Short line reaching Ogden at nine. Checked hand baggage and then went to the Ogden State Ball introducing Mr. Fisher to Mr. A. P. Bigelow. Went out and secured a Cadillac touring car for the trip to the mouth of the Weber. Game Commissioner Fred Chamber came out too and about ten thirty we left for the country getting a lunch at a grocery. Went through Kaneville to Belnap's place. John Stobbs was not at home and Belnap was absent also. After some trouble we located Mr. Belnap and shortly after noon left his place in a lumber wagon for the marshes. Too soft to go down with the machine. Drove to the North Shore Gun Club across the south channel. Noted a large number of ducks and two sick ones in the pond below Belnap's. The south channel was low but still held considerable water with a moderate current. No ducks on it.

The north channel had gone down at least six inches and the water was entirely stagnant. The west end was almost dry. Pools on the flats ~~showed~~

near the gun club showed a heavy saline incrustation $\frac{1}{8}$ of an inch thick and firm as thin ice below which remained an inch or so of water still. Beyond this was the main channel almost dry immediately at the club and was ~~the~~ east cut off by a bar into a lake. The actual shore line had receded from ~~ten~~ to 50 feet since my last visit.

Birds were just immediately at the Clubhouse and were congregated just to west. mummified birds ~~and~~ and desiccated. Some almost unrecognizable were scattered at intervals over the flats and the band of dead birds was twice as wide and ~~as~~ on my previous visit to the east along one mud bar on the north side. They lay another very few feet. I took several snap shots pursuing a number of sick birds were in the channel. I saw one flock of about 150 together and on wading out found that only a few could fly and the others swam about me. I thought myself that there at least ten thousand ~~and~~ dead birds here but later Dr. Fisher gave about 2500 as an estimate. I believe however from my previous experience here that they were ~~decayed~~ decayed. But only an actual count could determine this.

The moss was largely gone from

the channel and I found the water warm. In middle channel it was about a foot deep and here the mud below the first layer was cool. I took three water samples here. One the shallows, one in deep water and one in a semi detached bay. A number of birds left the water and went off across the barrens on foot. Among these was a flock of mud hens. There were no crows of any sort save a few patches of Sedge.

So the conditions seemed worse than on my previous visit. Though the actual water area involved was restricted by one half, the birds however lay thick and the ~~actual~~ shore line as it receded was marked by dead birds. Birds do not disappear as readily here as on Bear River apparently partly because the barrens when the water recedes are dryer. I found the Cormorant still in positions which I remembered as a cessation on my previous visit and birds killed at the cut house for dissection remained as perfect mummies with the plumage smooth and intact. A pintail which I had placed as a sick bird in the pool at the club's flowing well had died and only the bony thoracic framework partly broken down marked

its position as if any in the shallow
water which will prove a quick
to the length of time necessary for
the disappearance of birds in the water.
One dead Redhead & other fergone
in decay was picked up and on
dissection a form of the intestine filled
with parasitic flatworms. The tissues
were broken down so that it could
not distinguish whether the lumen of the
gut was irritated or not.

The larger part of the sick and
dead birds were green-winged teal
and after them came Pintail. Scattering
Mallards and shovellers were noted
and a few coots. I found one California
Gull down and one or two above sea level
a western Sandpiper and a Wilson
Phalarope.

On our return Commissioner Chambers
wished to give his boy who was
along a chance for a shot at a
Great Blue Heron but we did not
stop in time fortunately and it flew. Mr
Fisher explained to him the birds value
as a destroyer of pocket gophers and also
told him that the fish concerned by
it was of little value.

Mr. Bidnap expressed his opinion
that a man should carry on work
on that river and Piper was of that
opinion too. If I had a good man
with me it would be possible but as I

am alone I consider it best to
confine my attention to Bear River where
I have an experimental laboratory well
started. so go to the Weber would
mean the construction of more pens
together with loss of time and the
season for work is too short as it
stands.

The auto came for us at four
o'clock at our gate. we were in Ogden.
I bought some journals and with
Piper's help packed the water samples
in the back room of the Hotel Marion
and we barely made a train at
5:20 for Corinne. I arrived in Corinne at
6:40 and had the stuff with supplies
purchased in town to the ranch
and left for Luckville at 8:00 P.M.
The road was well loaded but with a
full moon the trip was easily made.
It was cool but not unpleasant. a
few night herons were seen and one
or two short-eared owls. Arrived at
the Gun Club about eleven and went
to bed immediately.

Sept. 5, Saturday.

This morning went down Overflow No. 2
with Piper & I rowing. crossed into east
pass searching the sedge islands and
then went west to mud point, returning
through the right hand fork of #2
to the club about three
I had been told to believe that Chalkie

were back here and found them much
 better than on our departure a week ago.
 There were a good many dead birds
 scattered over the flats but most of
 them were old birds and unparatively
 few fresh ones were observed. We started
 in to make an actual count of all the
 birds observed but found them so
 scattered that we gave it up. The following
 were noted however down to the water
 on Pintail neck on the left hand fork at
 the outlet on # 2.

Green-winged Teal	42
Pintail	23
Mallard	3
Shoveler	3
Cinnamon Teal	1
Coot	1
Avocet	2
Black-necked Stilt	1
Pink-billed Gull	1
Total	<hr/> 77

There were numbers of sick birds
 in the overflow and about the tree clumps
 of rushes on the flats but nearly all were
 very active. A number left the water and
 walked out across the flats or, getting on
 shore lay flat down with extended head.
 In this position they were very inconspicuous.
 Others could fly in fast feet and still
 others could rise above the surface
 for a considerable distance. They seemed
 to me to be birds that were recovering

and most of those captured bore out
this theory as they were thin as cowbirds
birds always are.

We found about 20 sick birds
in the first sedge island at the mouth
of #2 Canal perhaps a dozen dead
one ~~east~~ west near mud point was
a good many dead birds in the rushes.
I pointed out the symptoms of the
trouble to Dr. Fisher and dissected two
birds for him. All agreed with Piper's
investigation last year.

We brought the following birds in alive

Green winged teal	23
Pintail	8
Mallard	1
Coot	1
Shoveller	1
Total.	34.

All were strong birds with the
except of 4 and were able to swim
immediately. Had they been sickening now
a dozen would have lain on the bank instead
of taking to the water.

Piper shot a Cinnamon teal as it flushed
by him and a Pintail high in the air.
These birds on dissection proved to
have the malady though they were still
alive. In each the intestine was hard
and wire like and practically empty. On
slightly splitting it I found patches of
irritation scattered along the lining of
the stomach contained gravel and

Potamogeton

seeds of ~~Chama~~ in the puntal the caeca contained much digested blood. I believe that both in another day would have been down in the flat unable to rise. Have been expecting this condition and have discovered it at last.

The Western Sandpiper picked up could stand and run rather feebly but could not fly though the bird could extend the wings. As this little shore bird is a shallow water fowler it strengthens my supposition that the trouble is to be found in the shallows. Its conduct exactly similar to that of the quack may be contrasted with that of the Coots & Sticks examined who walk first in the Cys. - I still believe that their trouble is due to intestinal parasites.

We spent the afternoon in skinning & dissecting birds and the evening in talk. Both Dr. Fisher & Mr. Piper agree with me that the trouble is to sugar but factories furnish a promising field for investigation. If my appropriation will permit Dr. Fisher has agreed to send me to Tulare lake and the matter will be investigated at once. I want to go for about two days leaving here October 11.

Dr. Fisher told me that apparently a similar trouble had broken out on a lake in Oregon, and Piper said that geese had been reported last month from

a lake near Fort Collins and that broke
from them had been sent in the experiment
which they for examination

Comparatively few wild ducks were
present in the flats this morning and
I was disappointed as I had wanted to
show them to Dr. Fisher. Only a dozen
or so of peacocks remained also.

September 6, Sunday.

This morning Dr. Fisher, Piper and I
went down overflow No. 1. Placed a pen
of ~~pen~~ birds on lake No. 1 and then
went on down into the flats.

There are still few ducks down
here but we saw a good many shore
birds.

The day was cloudy and cool.
Dead birds were scattered about over
the flats and intervals. Piper and Dr.
Fisher who each went down East Pass
and out a Mud Point in the mud boat. Some
numbers down that way also.

I picked up a sick little bird
on descending found that its gut contained
a large flat worm and could see no
vitality. In two Greenwinged teal
examined alive I found a flatworm in
the cloaca with a curious helmet like
head fastened firmly into the wall.
The sick birds seen all seemed to
be rather thin.

Shortly after noon we left for
Corinne in the launch. Reached Corinne

at four just in time to make the train
and then turned to Duckville.
Employed Ray Bosley this morning
at \$50 month's subsistence, securing
his services until the first of October.
Will work mainly here at Duckville
until October 1. The shooting season
opens then and for a few days the
club will be crowded and there will
be no room for me. Wish to leave this
for California if possible. do not
will look up Tom Wilson at Bingham
and around various see, as but few towns
Utah have etc.

Clear & cool down the river tonight
bright moonlight.

Noted two sets mallards and
half a dozen set green winged teal
on the river along near Chesapeake
Bay.

The Bora Bird picked up today died
from some other cause than the chief
malady. The stomach was filled with
sedge seeds and the intestine full. could
not get no irritation.

September 7, Monday.

Had Ray build a pair b. in just four
feet high covering it with inch mesh wire
this morning and after room placed
it in channel just above pen #1.
New is numbered 6 and is for
Teal, a pair hills and small birds.

larger ducks crowd these little
 fellows so much and frequently brown
 water on the large birds too peck
 and worry the smaller ones and I
 find the pintails especially bad in
 this respect two Pintails both unable
 to stand with fight sometimes for
 several minutes and I have often
 seen them bite and worry teal which
 were helpless this morning I found a
 green winged which could not rise
 with a strip of skin an inch long
 & half an inch wide freshly
 stripped from the rump & this I
 attribute to a Pintail the mallards
 worry the small ducks some but
 are not so bad this Heron Booby
 completed a small pen BX5 which
 I numbered 7.

In this pen I started experiment 10.
 giving the inmates of the pen dead
 birds filled with maggots in an
 attempt to produce the disease known
 as Limber neck.

Worked on birds all the morning
 and got various notes in shape.
 After noon I went down #1 and numbered
 40 birds filled with maggots.
 Brought in the following.

Green winged teal	2
Annemont teal	1
Killdeer	1

Went down to where the overflow

spread onto the flats only. I saw only few ducks on the flats. a larger flock of birds were seen in No. 1 but I did not attempt to catch them as my time was too short. I worked this evening until eleven o'clock.
September 8, Tuesday.

This morning there was a strong north wind with the thermometer at $49^{\circ}+$. All night the wind was south but toward morning it shifted directly north. Dry clear and rose up an inch.

Went out No. 1 onto the flats. On lake No. 2 I found that the strong wind had blown the water out from the lake leaving a large area of wet mud saturated with water so that at every step it oozed out beside my feet. Small pools an inch deep or less were spread over the flats. In the show of this water I collected the following dead ducks.

Mallard 1
Green-winged Teal 25
Cinnamon Teal 1

All at or on the flats where the wind had blown the water back and two-thirds of them were birds which had died last night. They looked almost like a pebbles. None of these fresh birds were in here yesterday afternoon so that they had come during the night and were unable to

get away. ^{prewinged}
one I shot ^{prewinged} which was down
and ^{prewinged} had the increment over
as water.

On Pintail net found that the
water had blown from the flats in the
same way as on this lake. As have had
4 ffty yards of mud with hollow
pools scattered over it by a recent line
of wind. I examined this ^{prewinged}
with ^{prewinged} glasses and noted two
or three sick birds and a dozen dead
ones. I was seeing this in about
30 ^{prewinged} birds in sight and twenty
five dead ones. Most of them ^{prewinged}
were ^{prewinged} dead and the others
were Pintails. So that these birds have
come in here within the last few days.
I gathered up a number and brought
them ^{prewinged} down on still down and
one was picked ^{prewinged} by the
bird and webby was found on
examination to have the duck trouble.

This afternoon Pen # 8 which Bosley had
built in the junction was placed on hole
2 over one of the shallow pools. Conditions
seemed exactly right here to produce the
malady.

This evening Mr. Vince Davis from
the Bear River Duck Club came down and
we talked a great deal in the evening.
He says that last year at the Big Club
they shot 12,000 ducks but considered

this below the average. At 5 o'clock he
had 1700 ducks on hand for a days shoot.
The Deer River Duck Club will use the
Duckworth gun club packs and sell
surplus ducks on the market. The
birds are picked and cleaned, divided
into Mallards, large ducks and small
ducks sent away. Members from outside
of Utah turn in their birds to the club
and Davis has kept an accurate
account of all the birds brought in, better
given away, sold, turned to members
of the club.

Formerly Mr. Davis ran a duck camp
and had hunters on from this state
For a year he said that his average
for the two months of the hunting season
was 106 to 15 per day. (Which would
make 3180 for 30 days). He always kept
account in a diary of his shoots and
one year sent out a tabulated statement
as a souvenir to prospective visitors
to his camp. He is well known in the sporting
magazines, and he is well known in
his home.

He told me rather proudly that
he had won the world's best
duck shot in the world by men who
had ranked the world over but said
that now his hunting days were over.
In thirty years he has seen here
a gradual change from salt water to
fresh. In his first days on his river

There was no marsh as the salt water kept it down and the river ran directly into Bear River Bay so that vigils of fair draught piled up and down from Salt Lake City to Corinne. Then the ducks that came were all deep water and who came in from the Bay to drink in the river. It is that stream there has been a gradual change the river has silted in the mouth when it joins the extension and flats of the marsh has crept slowly down. With these changes the deep water ducks have been gradually replaced by shallow water species.

He has seen 40 quans & Scoters here but has no recollection of Blue-winged Teal.

He has absolutely no recollection of sick birds previous to 1910.

He is a short, powerfully built man, smooth shaven, grey blue eyes with a healthy color. Speaks good English and I was well informed about birds and the water from him. I did not understand the word "duck" though he was familiar with the fact that in some species there was an eclipse plumage.

September 9. Wednesday.

The river was up about an inch today and it was cold this morning.

Sent Bosley down #2 overflow to secure what sick birds he could and bring them in. He was back 8 noon with

Gadwall	1
Pintail	5
Seal (green winged)	27
Cinnamon seal	3
Mallard	2
Western Sandpiper	3
	41.

Reported that not many birds were present on the flats.

The gadwall is the second one I have seen here. It did not differ in condition or symptoms from the others and was a strong bird able to swim. The Western Sandpiper were pretty with fellows and tame as would be. At first they swam out onto the water and climbed about on the seals' back as they swam about but soon returned to the water's edge where they drank copiously.

After dinner we took part #5 down the overflow, one and placed it half in the water at a point just above the mouth of hall #1. The pen was placed so that the current ran through. In this it placed light green winged seal, on some seals all

six birds but all individuals in my opinion with a fair chance of recovery under proper conditions. My object in this was to learn if by any chance they would recover this far down as the do at the mouth of the overflow. This pen has only a narrow strip of land separating it from pen # 2 on the lake.

This lake # 2 has received a great deal and the flats saturated with water yesterday are now by a current sets into lake # 1 from the overflow now.

Not many ducks about but I noted a number of Ring billed gulls & shot two.

This morning after making the round of the experimental pen I walked out along the willows and found a number of Passerine migrants, Wood Pewee, an Empidonax, Brewer's, Chipping and intermediate Sparrows, Goldfinch and Dickcissel. A long tailed Chat came in a willow at the club house. I saw a House Wren (Harm) linger over the meadows but will soon be gone.

Cook went to Conine today and brought me mail. He has as yet. Had a letter from Dr. Fisher in which he suggested alkaline solution as a possible cure in our problem.

This idea was based up his
experience with the brook in Lewis
lake. He has written Nelson regarding my
trip to Calif. A memo from Nelson
informed me that now employees
in the field were required to keep
field diaries to be filed in the office.
Letter from Bent which had been
opened. This is the second one.

Sept. 10 Thursday.

Wind east this morning, temperature 43°+ such cold is unusual this time of year yet you told. The days however are clear and bright typical fall days.

I and Rocky Brown & a man to pick up sick birds. He brought in the following:

- Crow 5
- Cinnamon teal 1
- Pintail 5
- Mallard 2

After making the round of my pens this morning Sept 7th. It was full up along the willows for a short distance. Saw: Mourning Dove, Lark sp. & other Wood Pewee: Saw also many other Weblers & Sparrows: Brewer's Blackbirds

Fred Hansen & Carl Hansen came by in the morning and watched me work for an hour or more. Some time ago he asked Hansen, he could not remember if again, but birds previous to this trouble would be said to. I say however he volunteered that he had remembered something. 18 years ago Joe Hansen and Adolph Jensen, visiting Blondie at that time in Kocanty seldom visited in ducks were so numerous near at hand. In the first part of the shooting season, early before they brought back 400 Mallards some

dead out most of them above and
nearly all fat. These birds were
helpless, unable to fly and at
the time were supposed to be
cripples gathered in their from heavy
shooting. However Fred said that
these birds all had the region about
the same stamp and said
furthermore that his wife would
fleshify to the same as she had
dressed the birds; and they were
sold on the market. Fred said that
he was sure that they were not
cripples as there were no shot
marks and no wading matter
showed in cleaning them. Hansen
said too that hundreds of birds
unable to fly gathered in open water
when the swans lay close and that
always these had been considered
crippled birds. However he believed now
that many were not birds.

Larsen considered them all
cripples but attached little weight
to his opinion as he tells nothing
large & serious and is rather windy.
Hansen on the other hand is a keen
observer and is interested in the
birds and I consider his observations
reliable.

From Larsen however I learned
that in winter the ducks come in
from the lake to feed on warm springs on

on the west side of the Promontory
mountains, coming in off the lake
for fresh water and that sick birds
are not known there from all reports.
He also told stories of finding sick
 Pintails in the mountains of Cache Valley
which I disbelieve. There are current
too many stories of men killing
flocks of ducks pass over and having
one bird separate from the lot and
fall dead with the mercy which
is utterly improbable.

Hansen says that in the early
day the river ducks were found
in the marshes much further up the
stream.

sent Bosly to Corinne this afternoon
as a chance offered to go in the
launch, with instructions to get my
mail and a bushel of wheat for
the ducks.

Was cold and chilly all day.
Made a number of small bird
skins.

Bosly returned about 9:30. had no
meat down.

Sept. 11, Friday.

Somewhat warmer this morning
south wind today and warmer all
day. With Boston wind down #3 in
photo boat and I then went on down
through south Bay. Large areas of
the flats here and here & dry now
that ten days ago were under water
and the channels run down through
them for a mile before entering the
open water. This bare area will
I think explain the deaths of ducks
for the past week.

There were thirty or thirty five
juvenged Seal, Puffins & Mallards
mainly the former in the mouth of
#3, but birds but very active.
Lying down a good many dead
birds were scattered about on the
newly dry mudflats and we
picked up a few birds most
fairly all those handled were
feather thin showing that they
had been wet for some time & were
in the road to recovery. Apparently very
few birds are getting sick now.

I found one & all of a Wading Grebe
that I think were newly down.

Apparently there is a lull in the
trouble and I can see no reason
why numbers of birds in these swiftly
running channels should not
recover. Conditions change little from

The mouths of the overflow stream
to open water. The swift water of the
channels which it carries considerably
silt washes the bottom clean until
sand remains, in the sides bays
& shallow stretches are the areas
of deep mud. And when these muds
especially in my mind the whitest
effluents overlying it is when the
trout come

worked in the afternoon at my
laboratory table. Was surprised to
find two western grebes I had in the
river this affected. But now it comes
to me that they did not live
strongly, sinking rather slowly.
And being only twenty five or thirty
feet at most we called King-
Billed gull picked up this morning was
affected too.

Mr. Will Bosley of Corning, a carpenter
came this evening when Cook came down
in the big boat to help repair a bridge.
In the evening he said that 40 years
ago there must have been willows
for down the bay. He old iron channel
ran west from Sachette and old
willow stumps of good size may
be found along it. About 5 or 6 years
ago with the rising of the
lake all willows were killed except
a long distance up stream and
eight years ago had come down

only as far as the Bear River Duck
Club all the willows grow extending
west has come on since that time.
The willows some just and
then the Black willows.

He told of the building of the Levee
City of Corinne and that it can not
one season show Corinne Salt Lake
and this the next year can from
Salt Lake to a walking track at
Garfield. I wonder this is
Salt water bathing, (as passage)
at the base of North Little Mountain
from which I bathed above Corinne.
The lake seems a creek
flow back every eight or ten years
but Bear River keeps getting more &
more the advantage of its silts in
the Bay.

Use the fresh water marshes
advance the birds living in
them encounter water in the shallow
rendered saline & alkaline by leaching
out the deposited matter. I am
I am beginning to believe
here arises the trouble. Apparently
the deep water birds are not
affected by the trouble all occurring in
shallow water - inches. Water analyses
should show this.

Sept. 12 Saturday

Last night the wind (NW) - Trade ran
 the north and then suddenly changed
 north and came roaring down the
 the plate rattling and banging and
 things loose around the clubhouse. A
 cold rain started pouring in bright
 October into a breeze from the
 came down obscuring the mountains
 while the snow melted under the
 sudden cold about as it cleared
 off and I could see that the
 was a bit above with brown fat
 was white white. One showed in
 from the mountains. I found the
 work table around on the south
 side of the club. And though the
 sun was warm the air had a
 sting to it and the wind was
 cold. When I first got up some
 swallows were circling low over the
 flats. I have nothing with me
 but summer clothing.
 was out with the walking net
 after insects and some were found
 them. I found one that there was
 no difficulty in sitting down into
 the killing bottle. Many others
 especially blue-billed and a long
 winged fly were present in the
 I found three good long tailed
 with Borey. Wind from the south
 was and cold though the

seen above intermittently. We went
to see Jones #2 to the experimental
pens and found my old channel
still fairly open. All of water
violently filled in branch No. 2.
old is indicated merely by a mark on
passage when it strikes Span #2.
The other young winged stay in it.
but two chicks dead in pen 8
but shot from the disease. See notes
on that experiment.

Found that Pen #5 in which I
had placed thirteen sick teal near the
bottle of alk #1 in channel had the
clops open and all the birds escaped
but two. They had however become so
active that there is no doubt but
that they recovered there. Will repeat this
experiment now.

Went out No. 2 and across into
East Pass. There were twenty or more
sick birds in #2 when it strikes on
the field but all were very active and
able to get out of our way. Some were
found hiding in the patches of willow
etc. that grow and fly straight
away on a shock of wheat birds as
my last visit and apparently they
started early in the week but not
strike here much. In the rush
delands on East Pass were a good
many sick birds. The larger number of
them Pin tails and very active.

The following were brought in

Pintail 32

Green-winged teal 10

Mallard 5

Spoonbill 2

47

~~When~~ the outbreaks of the male
violently come at intervals (when it
rains or when the wind blowing
drives the water into flats or conversely
leaves them bare). The Green-winged teal
succumb almost & need not then
die in numbers leaving the troughs
ducks, Pintails & a few Mallards & Shovellers
~~which~~ most of which take a day or more
longer to die still living & a good
many of these live for some time
a week perhaps and eventually recover.

Others I am to believe that the
above statements are true is shown by
the relative numbers of teal & Pintails
gathered. When the outbreaks first
come the teal are really in the majority.

Some of the ducks when I pick them
up have a red color which characterizes
the later stages of the disease and
strong smell of excrement.

I think that a small number
of birds are affected continually and
become unable to fly. These wander
off to hiding places and will yield
their bodies day after day. The farthest one
out in Pintail neck has so far gathered

twenty or more at each visit.

Toward dark I got down on a small island. The birds began to fly and shot two green winged teal in Malheur and a Shorelark. We were not shooting well and missed a number. The birds were all flying from South to North.

There are comparatively few birds here still to what they have been. But this cold weather should bring them in.

When it come up to these rush islands the birds go out on the opposite side in considerable numbers. They active me flying just above the surface and those farther advanced splashing off across the surface. Some of these are some exhausted and may be captured while the others make their way to other islands.

Very cold tonight.

For past numbers of birds shot today see Unsworth's notes.

Sept. 13. Sunday.

Cold this morning with thermometer standing at 33° . Cloudy and threatening all day - wind shifting - occasional sunning. About ten a light snow squall with spitting flakes came and I moved my laboratory outfit in the barn. As I was carrying over some trays in the light snow an Egretta flew over an unusual sight in a snow storm.

Terminated two experiments in pens 3+4 and for postmortems see notes on experiments 6+7. Begun two other experiments in the same pens using in one a weak solution of H_2SO_4 and in the other a weak solution of $MgCl_2$, it may be that weak solutions will produce different results by cumulative action. I think solutions may be too deadly in their action and may kill without the usual symptoms. Believe that the acid solution used $\frac{1}{4}$ oz to 10 qts water is too strong yet.

I spent the whole forenoon and the afternoon up to 3:30 in making careful descriptive notes on which follow

The four birds shot last night all showed slight irritation of the gut. Must get some more for examination to determine the extent of such infection.

Toward evening I walked out
along the narrow band of willows
marking the river boundary. Many
of the barrens covered with water
when I came in July are now grown
densely with salt grass while others
still saltaline free bare of all vegetation.
Must gather some plants I here at
once so that I may have them
determined.

It was a cold day and I saw in the
wind and found few birds.
While watching the dusky crown of
kinglet a night hawk came sailing
overhead and I shot it a female.
This seems to me to be a new one. This
is the first one seen here. Shot a
Wood Pewee and a Pileolated
Warbler. A Marsh Hawk responded
to my whistle.

The bridge across the river
is fixed now so that I can get
across readily and investigate
the willows at the north side of
the river. These short walks along
the band of the river have a deep
interest to me as so much of
my work is done in boats on the
extensive flats. By contrast the
willows ~~stimulate~~ with their
scattered migrants surging through the
dense growth stimulate and rest me
and after hours spent with the dead
dying ducks on the flats.

Sept. 14, Monday.

Still cold this morning with a shifting wind. But weather moderating somewhat. The river is very numerous here so early in the season. I am told.

The seal in #6 had been beginning in the night and a number had escaped.

Inspected in Corinne this morning that had died in #6 and found it suffering from the rabies.

Packed up two shell boxes full of salted skins, a shipment of tomch and one of Koolak skin and insects and did a thousand & one other things.

At noon left for Corinne in the little launch. Rather a cold ride. A good many snowy herons along the river.

Opposite the Chesapeake I noted three or four sick Pintails, a Mallard or two and three or four seals in the river. They should recover here.

J. Knudsen of Brigham called me up Saturday night and reported several thousand sick & dead birds in deep slough on the Willard Spur. He found none at Shafter's near Little Mountain.

Left Corinne at 4:25 a.m. Salt Lake
7:10

Sept. 15, Tuesday.

Spent the forenoon in Salt Lake in making various purchases. Found a telegram from Nelson at noon saying that appropriate I wanted for a trip to the San Joaquin Lakes.

Bought a heavy flannel-hat, a hunting coat and various other necessities.

Ordered Mandel Handbook of Biochemistry, was reported as permanently out of print.

The wind blew a gale all day and much dust blowing enough to cloud the sun.

Left for Corinne at 4:15 and wrote a letter nearly the whole distance to Brigham. Kimball Parkin took to Wood Cross and said that there no more sick birds at the new State than on my last visit. The birds in captivity had been released.

Mr. Chambers got off in Ogden and we talked for a full minute. He says that the Canal companies have promised him water enough to raise the river ten inches but it was only come up four. Considerable pressure has been brought to bear on him in this matter and he is doing all that he can.

Reached Corinne at 6:27 cold, windy and threatening rain. Cook did not want to try the river so spent

the night in Corvallis and began
to rain about 10:30 and rained
nearly all night quite hard. Was
cold and windy. The
wind was in the evening and
very fair. Clear and calm. In the notes
heard today that this are a good
many sick furs in the Chesapeake
Bay which will explain the sick birds
in the river opposite. The Chesapeake
Bay is said to be a large body of
sea water fed by tributaries of
the Chesapeake. Formerly a branch from
Wood Creek would enter it but it is
said that this has been cut out.

Sept. 16, Wednesday.

This morning it was sharp but
clear. When I got up about 6:30
there was a heavy bank of mist
east of town but gradually this
went off toward the southwest. The
Wasatch mountains were white with
a light fall of snow and this was
the northern portion of the Promontory
range was found also. I noticed
that a low line of demarcation between
the snow and the bare slopes below rose
in an even slope toward the south
on the Wasatch while on the Promontory
range there was no snow at all in the
southern end. This I attribute to the
proximity of the lake. Radiation of heat
from the lake would cause precipitation

of moisture in the form of rain
at a comparatively high altitude
near the lake while above the
line it would fall as snow. As the
distance from the lake increased
the effect of this radiation would
be correspondingly less and the
line of snow fall lower. The lower
part of precipitous having water
on both sides was covered only by
rain.

Waxed about Corning and
found it rather a lumpy place as
it could not get into a store until
eight. There were two main grocery
stores, a road man, two postoffice
poolhall and a straggling array
of houses. Every one here knows me
as the duck doctor now.

Finally got off for duckwalk at
ten but almost at once the pump on
the motor refused to work and had
to be replaced by an oilcan with
a hose running from the bottom of the
can into the water jacket. Water
was bailed into the can constantly
and so the engine was cooled.

I stopped at Petersens for water
at Numbuck's bend. To my surprise
found a slough extending back
of the house with the show line
at least 4 feet above the water surface
of the river. This is evidently an old

river channel but must be quite
Ancient. The river opposite here is
in the process of forming a horse shoe
beach into an oval loop.

It was rather hot today and
I was glad of a general wind.
Perhaps the boat probably right
were the great flocks of pelicans
circling about in the air.

At Newville I found that
the captive birds had been digging
steadily and had the bottom
of the cages dug out for the
whole length nearly a foot deep.

In the afternoon banded 100
and set them go. It was amusing
to note their actions. Birds chopped
to the ground walked into the water,
swam for and tried to join the
birds inside, poking their heads
through the wire and seemed
as anxious to get in as the others
were to get out. Some banded banded
and thrown into the air flew off
north across the river, and then
usually circled to the west
sometimes high in the air and sometimes
barely clearing the ground. The males
almost all got a good start and
then with feet hanging out
and spread tail dropped into the
river across from the fence. Some
after a few minutes rose and flew

strongly way and other birds
down stream the Mallards early
all went in the river these birds
were with five or six exceptions
really able to fly but did not
seem to know what to do with
their freedom. I was greatly dis-
appointed in the first few feet
up as I feared that after all
the birds were helpless and soon
arrived at the very end of affairs.
It so happened that the first
Greenwing released it dropped upon
the river until a willow tree
the next began starting out to fly
strongly speed the birds then and
with slanting wings dropped in
beside them. I started we frightened
off by whooping and yelling and
they went out across the flats.
An amusing thing I put them
in my hands with wings held
in position at the sides of the feet
in the palm of the hand and then
threw them up as high as I
could with their feet they got a
spring that gave them their balance
I shot 3 hoppers to band 100 birds.
Yesterday the wind blew very hard
all day and laid right in wind
hard so that the ground is
wet & muddy. river up four inches

September 17, Thursday.

His morning started the experimental
fine low overflow and made the
sound of the others before breakfast. A
cool day with an overcast sky part
of the time and clear the rest.

Mr. Mast & I went of the Bear River
Duck Club and went over to Brown's Overflow
and reported conditions very good
there. So for breakfast and of
course with Bosley.

Brown's Overflow leaves the river a
quarter of a mile below the Bear
River Duck Club and runs in a
general way to the north empties into
North Bay a short distance from the
east end after a course of about
three fourths of a mile. At its lower
end it divides into two large channels
and they split into two smaller
ones each for entering the bay. The
main left hand channel is most
practicable. This overflow was found
to be six feet deep and fifty feet broad
carrying a considerable body of water
coming next to No. 3 in that respect
but with a more moderate current. The
banks were willow lined along to where
the channel went out on the flats.
Sedge grew thickly along the banks
and to the west was an extensive
barren with scattered growth of
sedge.

North Bay was a narrow stretch of water a mile across with two mud bars lying off the mouth of the overflow. To the north the country appeared much different than South Bay. Little Mountain rose a short distance, about a hour's ride and east of it just beyond the a hour's ride there was some low hills and beyond them Corinne.

The flats here have been flooded by the high water coming in from the river. Prior is six inches higher now than when I went to Corinne last. On the mud flats pools were common covered with a brownish scum of bubbles and grey mud which had risen from the bottom and was floating on the surface. I took a water sample from ~~the~~ one of these and also collected 75 of a pint of the floating mud.

Below the main jake birds able to swim & dive were common and from there to the mouth I estimated that there about 75 in this condition. Dead birds were shown all along in the lower part of the overflow and a considerable number, nearly all Green-winged teal were floating in the water.

On the banks of the overflow, along the shore of a small bay to the east and on a series of mud bars to the north

and I estimated the number of dead
 birds at 800 and considered that
 a liberal number. In addition there
 were about 250 sick birds, still alive
~~these~~ - fourths of the dead birds were
 birds that had died within three
 days; in other words the great
 number had come since the water
 has raised and since this last
 storm on Tuesday. The great number
 of dead seals ^{probably} had I would point to
 a recent trouble. While the preponderance
 of big ducks brought in would show
 that it was now on the decline
 again.

We brought in the following alive -

Mallard	20
Wooet	7
Green-winged Seal	49
Spoonbill	4
Pintail	65
Cinnamon Seal	2
Gadwall	3
	<hr/>
	150.

The entire bottom of the boat was
 covered with these and the heavy load
 made it ride low in the water. A
 point of high land, running out behind
 the mud bars mentioned above, was
 covered with cockle bars and saltgrass
 and many green-winged seal and
 Pintail were hidden in this and were
 largely birds which were apparently

slightly inflected and had crawled
out here and were in good
condition. Most were very active
and all nimbly got up & flew
when approached. Many were on
willow bushes and were hard to find
Others lay on the water. One
showed when the bank was too steep
for them to climb it and
these were birds of a variety weak
enough to make feeble backward
& forward movements of the head
and neck and attempts at opening
the wings and swimming.
Ordinarily they were unable to
leave the bank. In the water these
made feeble attempts at diving to
escape. With wings spread and
flapping and kicking with their
feet they would attempt to live
but not strong enough to overcome
their own buoyancy. I would swim
along with the feet sticking out
of water for some distance. Others
still weaker made weak attempts
at the same method of escape but
were unable to bend the neck under
to immerse the head and ~~move~~ stay
the surface with weakly flapping
wings progressing slowly by ~~the~~
means of the feet. In most of
the *Haemorrhoides* I found in this
condition the eyes were somewhat

protruded with puffed ribs and
the eye ball rather beady.

On one Mallard, 5 green winged

Seal and one spoonbill and of about

fifteen common birds which

were freshly sick and found that

the anus was distended and

the interior slightly protruded,

by loosening of the sphincter muscle

being present, perhaps through

an intense effort of ~~the~~ or through

a sustained series of efforts

the cloaca to evacuate. In these

there was evident some white ex-

cretion. I have noted others in

the same condition that in

handled this condition frequently ceases.

In one Mykkaud it was seen in winged

Seal with ~~some~~ seal there was

no distension. On one green winged

Seal which was entirely helpless

the anus was distended and

there was a slow spasmodic

effort to extrude excrement with

nothing coming.

I found one green winged seal

and one widgen which showed

shot marks.

Six widgen (two) were seen and

half a dozen dead ones.

Booby filled in the pens this

afternoon and we placed the birds

in them. Most of them were able

to swim in fair conditions. ~~it is~~
at least three fourths of the
birds seen today were females.
and this has been the passage
all through the season so far
it cannot consider conditions
at all bad here so far.

We had a ~~run~~ with us today
and did not return to the club until
nearly four. The cool day was in
our favor and only five or six birds
of those on the boat died.

September 17, Friday.

This morning after making the
round of my experimental pens I walked
out along the line of willows along the
river east. It was windy coming from
the north and few migrants moving
A Audubon's Warblers. Some Cassin's Vireo and
a Flicker were about the only things of note.

Returning at nine the rest of the
forenoon was spent largely in the dissection
of four avocets which had died in no 6
last night. In microscopic examination
I found that they undoubtedly were suffering
from the malady so that my first decision
laying their death to parasites must be
reversed. It still seems however that in
those infested with the beaklike animals
in the coelomic cavity that they must have
exerted a weakening influence at least.
The difference in shape and size of
the villi of the small intestine about

me as being remarkable when compared
to the ducks which I have been dissecting.
It might or will be a section series
from different birds and compare them.
This work was continued in the
afternoon and then about two with
Booby went out No. 1

The water has come up on the
flats on Pintail neck for a considerable
distance so that it is higher now than it
has been for a week past. Lakes No 1 & 2
and filled with water again. In the
flats of Pintail neck small shallow pools
stood and further back water stood
in the cracks (when the sun had baked
the dirt hard) as I walked water
pressed out of the saturated ground
as though from a sponge. Experiment
13 on Lake 2 was terminated result
negative and this pen was moved
over onto the flats of Pintail neck and
four Greenings recovered birds placed
in it (in anguishing). Experiment 18.
In addition to this I stated out
5 Seal & 2 Pintails on land & the same
in the water to determine the rapidity
with which they break down through
decay (see Experiment 17)

Many Rabbits are finding a hole
H 2 are unusual occurrence and there
was a large flock on Pintail neck.
Many shore birds on the flats but
comparatively few ducks.

The water in Channel 3 was six inches deeper than a week ago.

Fred Hanson brought me a live Snowy Plover today. The bird could rise to the tarsal joint by aid of the wings but seemed partly paralyzed exactly as the dove did. One was found dead yesterday.

Sept. 19, Saturday

This morning was up early and made a good morning in a rowing team. Then after breakfast went up to Hansen in the big boat. Cook was going to Corinne after coal and pushed the barge ahead of the launch.

Bill + Ed Hansen, Mithy, his white horse and we drove out across the flats to the Willard Spur. Here Ed Hansen's + others found that there was an island of higher ground on which was a low scattered growth of Carotatus and Chrysothamnus. There was no sage. Evidently this has been above the sea for a long time. Beyond the boat flats extended for miles. In many places they were grown up with salt grass and in a few places with foxtail. In other parts inland or toward in country now after under water they were entirely bare. A large slough now dry was covered with dried sedge.

We drove across to what is known as the east channel, a stream 35 ft wide and followed it down to the Willard Spur on a firm extending in from Bear River Bay bordered by large areas of mud flats. The channel had built up up the banks somewhat when it had overflowed but otherwise there was a great expanse of mud flat. There was a current of water running in the

channel but I was told that two
years ago it had been stagnant. The
present supply of water flowing again
across what is known as the Kinder
reservoir.

Willard Creek is said to be the
only source of water for the spur
to the east channel. I will bear investigation.
Great numbers of ducks had been
reported as dead here but on ground
conditions not at all bad. The largest
share of the dead birds lay near the
mouth of east channel. The birds lay
in three main areas. Approximately
120,000 sq. ft. contained 200 birds, another
area of about 100,000 sq. ft. contained 110 birds
and a peninsula of approximately
120,000 sq. ft. another 146 birds a total
of 456. In a distance of two thirds of a
mile along the western shore of the east
channel yielded 185 dead birds, while on
the eastern shore there were not so many
making about 300 in all. In the great
area remaining on the spur birds
were few and scattered, and for the whole
northern half of the Willard Spur including
the east channel 1200 birds dead
would be a good estimate. While about 40
sick birds were still alive. Two thirds of
the birds seen had been dead for more
than two weeks.

Three fourths of the birds seen were
green-winged teal and most of the others

5 were Pintails. I noted 1 Snowy Plover
5 Avocets, 8 Mallards and two widgeon.
We walked across, more than a mile
to a line of cattle tracks which in the
dancing heat waves looked deceptively
like a huge bank of ducks thrown up
by the recent storm. A Coyote run across
from an island to the main - one
appeared as large as a man.

The water in the channel as
stated above had a steady current
and was above my knee in the center.
It was a dark greenish brown in color
and at a depth of benches was
sufficiently opaque to conceal the bottom.
Water tasted alkaline and had some
odor.

By the flats the water had
been blown in and was now receding.
I found it strongly saline. Some of the
channels where water was flowing
the bottom was firm and showed
cracks when it had been baked in the sun.
A sample was taken on the shallows
and another ^{in the} channel. Many
bulbs of ~~Cl~~ ^{Estimogiton} were washed up in a long
windrow.

One western grebe was seen dead
and beyond I found a California Gull
sick.

Now this is an apparently isolated
Bay and yet sick ducks occur here.
There is no sugar factory draining
into the creek so that the only chance

for injected water would seem to be through the east channel. However the Bay extends east for nearly two miles (perhaps more) east of the mouth of this channel and the current sets from the mouth of the channel southwest so that waste water from the channel does not get into this bay east except as it is blown in by storms. The water in the bay was very salty. If there were western Sandpipers affected by the bill encrusted with a saline deposit. Will investigate this bay more thoroughly later.

We looked here until the middle of the afternoon and then started back. Fred knew of an old Indian encampment here so we drove out by it. The first site found was small. a few broad stones seen were used as grinding boards and a few rough slabs used for implements lay about. Next year in lifting one stone Hansen had found a number of human teeth and going there today he dug up a few fragments of a skeleton in a state of decay. Bones split broken and many of them almost dissolved. Beyond here was the site of a larger ~~site~~ camp with bits of stone scattered all about. a few sufficient to mark the sites of these

Camps as they are no stones on
these flats. I picked up several
rounded implements. Bits of obsidian
were scattered about but most of the
rock was granitic. In working over the
ground I saw a fragment of bone
protruding from the ground and
pushing it out found that it was
a human femur. On digging a skeleton
practically complete save for the skull
was discovered. It lay buried just
more than six inches depth at the
most in a little depression in the
old sandy lake bottom which was filled
with black loamy soil. Many of the bones
were badly decayed and of the real
value was able to discover one tooth
alone. A little to one side a dozen bones
were buried in together as though put there
by human hands. Each one was closed
both halves together and in some I
found a moderate amount of earth of
rather a greasy appearance as though
from the decay of the animal. Beneath the
skeleton at one side were the bones of
one or possibly two birds and the skull
and one half the pelvis of a muskrat.

The skeleton was reburied after keeping
out a foot & some other bits of bones.
Preserved the bird & the muskrat carefully.

From the appearance of the country
it could be seen that an old river
channel certainly filled up now had
run down through here and an old

marked by fragments of stone along its
course followed it down. The trail was
still in use ~~but~~ cattle now. Fifty or
sixty years the lake came much
farther inland than now but at
the time of a peak of was very low.
The Indians came down here ^{then}
and followed the channel down as
far as firm ground extended and
then camped. After the fall they undoubtedly
gathered to hunt wild fowl while the
women gathered the seeds of the edge
and grasses for flowers. Excursions
were undoubtedly made in the
spring after eggs but then the water
was high and was doubtful if they
were able to camp for long at a time.

Returned to Hansen's and which
western for the launch he showed me
a great number of Indian implements
which he had obtained when another
set a campment located on Hansen's
Island west of Kaitit's.

Reached the club house at eight just
ahead of a heavy electrical storm
Mr. Bigelow called me up and wanted me
to come to the bar to go down in the veh.
much electrical disturbances which were
talking.

Wrote vol 12:35

Sept. 20 Sunday.

Was up this morning at your thirty
had breakfast left at 4 in thirty in the launch
for Corinne. A fine clear morning but cold.
The sun got out about six through a
a long time its rays were cut off from
the valley by the Wasatch mountains. The
Fronton Range showed clear in the
sunlight for some time before the obscurity
faded from the broad delta of the
Bear. Every ridge and valley on its
irregular surface stood out sharply defined
by the bright light. Then on almost
an instant the sunlight spread over
the river and it was broad light.

From Corinne after getting mail
I took the 8:50 train for Ogden reaching
Ogden at 10:40. Had an hour to
wait between trains on Brigham but
met Mr. Vince Davis and put in the
time in talking to him. He says that
the Bear River Duck Club is going to
put a force of men at work cleaning
up North Bay and has promised a count
of the birds to me. He told me that
work in shipping ducks and selling
them that it was necessary to call
many more than previously and I
believe that the ~~these~~ birds are
recovered birds.

Coming up the river he following
struck me.

The capillaries in the intestinal villi

are distended and irritated due to absorption
of irritant from the elementary canal, so
that they may be considered undoubted
evidence of poison, and this absorbed matter
is that which the kidneys endeavor to
throw off. The fact that the Snowy Plover
and Western Sandpiper are affected would
point to an alkaline irritant as both frequent
places where and brackish marshes in other
localities.

Along the river going up there was
much wild rose growing above Woods
Creek while a little grows as far as down
as here in the among the willows. Saw
some of the high *Cryzopsis* up at Woods
Creek also. Below it is abundant.

Met W. F. Belnap & John Stoddard met
me at the station and we went out in
Stoddard's auto to Belnap's place. Had
some trout in getting started.

It had been warm and clear until
about ten o'clock when a sudden heavy
rain storm swept up along the Wasatch
range and after that it was quite cold.

After getting dinner at Belnap's
we had a dinner in company with Bill Simpson
& Stoddard drove down to the Weber
River.

Since the 16th the water in
the river had raised steadily and
now large areas of the flats along the
North Channel were flooded. The north
Channel though low and almost
dry a month or two ago is the main
channel of the stream. The South Channel

is fed entirely by surface water returned from the footed canal by the irrigated fields. This canal takes its water from a down-slope of 18 inches and runs off to the south of the main stream.

The sugar factory here started up somewhere near the tenth and on the 17th great numbers of fish killed by the plainage water from the factory came down. At first they were merely helpless and rolled up on the surface. The farmers picked up considerable numbers of carp and put them in their ponds. Now considerable numbers lay dead along the stream. Those most in evidence were suckers with numbers of chub and a few carp. The carp were said to have shown more vitality and to have been swept down still living toward salt water. In one small trough filled by back water from the main channel I figured 1600 dead fish in a distance of 60 yards. The great share of them were suckers with a few chub and carp. They ranged from an inch to two or 18 inches long and the majority were about six or eight inches long. However, they were scattered sparingly along the course and great numbers were said to have been swept into salt water. I saw several carp that other would weigh from 15 to 18 pounds. The only fish seen alive was one sucker four inches long

great numbers of this and Puccins
California and (Riley) billed gulls had gathered
to feed on this host of fish and were
spread about every where. The sickness
among the birds however had stopped
entirely. I saw no sick green-winged teal
during the day and one Pintail that
had died recently and that is all. The
great flood of water had overflowed
the north channel in both ditches and
Ducks, shore birds, herons, gulls and
Puccins were feeding both in the
channel and on the flooded flats.
But all were healthy birds.

The flood of water coming down
had washed out about one third
of the dead birds which we have here
on one small edge island I counted
40 dead birds in an area of 100 square
feet. In the locality where they had
lain thickest a count for a linear
distance of 500 yards showed 850 dead
birds remaining - while on the opposite
bank in the same distance were about
500 more. Mr. Belnap placed his
estimate of the number dead here at
from 8000 to 10,000. My own on a
previous visit was 12,000. A large
number of the birds had been eaten
by predators (amongst, coyotes, gulls,
fish etc.) so that in a majority
of cases the body skeleton was bare of
flesh & feathers with the wings and

sick were more or less found. In this condition many of the birds lying on shore dry out and become very light while in the water they become waterlogged and sink to the bottom where they slowly disappear into the soft mud. The violent winds which occur sporadically during storms pick up the dried birds on shore and spread them over the country for long distances so that they too disappear. In this way the dead birds vanish after a short period.

Though the pond of the but factory has killed the fish the great flood of fresh water coming down here from turning the water used for irrigation into the ~~creek~~ river has terminated its quick trouble for the time being at least. I saw two sick Green-winged Teal and one newly dead Pintail and nothing more. Irrigation for this year is practically at an end so that the water will remain high. The matter in the water killing the fish was strong enough to color the water brown in sloughes & by channels yet the birds remained in it with impunity.

I tried all night to get a couple of cans of water from the Belting pond at the but factory but for several reasons was unable to do so. The location of the pond was uncertain, the men who

its position but not care to take
there it was dark and as I
was' going to abandon this where
we had to be thro' brains coming
from the factory & leading to the pond
One came from the silo and
the other two from the parts of the
silo. Upon due reflection however
I am convinced that the water coming
from here now has nothing to do
with the malady as on a
warm weather deposits from it might
form ptomaines which would be
poisonous but now apparently in
its pure state it has no effect
upon the birds. The factory has
been running about 12 days
in the south channel toward
its mouth was in numerous flock
of Green-winged Teal 10,000 at least
and they rose and circled about
sometimes in a long line and then
forming a revolving ball. Perhaps
thought that they had been here for
a month but from looking at their
wings it should say ten days. Perhaps
cited this as absolute proof that the
sugar factory was to be blamed for
the malady. These Teal are frequenting
the south channel fed by water from
the irrigation canals and remain well
while the sick birds are found

in the main north channel into
which drains the sugar factory settling
pond. as the ducks roads closed
lying now with fresh water coming
and cleaning the stagnant ponds
I cannot agree with this. The
material from the sugar factory is
undoubtedly its worst now.
and does not trouble the birds
not even the dead fish killed by the water.

The storms have been blowing
the salt water here again and
I could see where it had struck
in high up on the salt grass as
the grass was bent over.

Belnap drove me to Copan in
the evening and I went to the
Hotel Marion. Wrote for a time and
went to bed.

September 21, Monday

Up this morning, I served real
breakfast and then bought a
few needed supplies. Tried to see
Mr. Bigelow but he was not in.

I chop started here this morning
and I watched the high school
students with their books on their
way to begin this year of work.
The gym is small but I like it
much better than I do the
the air is free from smoke for one
thing. Saw a number of Weathers
a long tailed Chickadee in the yard
of one residence.

I left ~~at~~ Ogden at 1:15 on the Oregon
Shot him and reached Corinne at 10:30.
No ~~one~~ came to meet me until about
twelve and then Bosby showed up.
He had a charming boy with him.
Had dinner in Corinne and left for
Duckville about one.

Wind keen but sun warm.
Found a party of six or eight
just leaving Duckville in the big
Coach.

Cool and sharp in the evening.
Things at the experimental mine
in fair shape. Bosby does not
seem to have done a great
deal since I left however. Too
much company.

September 22, Tuesday

Warm and pleasant this morning
cool at daylight.

With Booby ^{ascended} the
river in the boat to Sackett's and
went out Overflow 4 into North Bay.
In the willows at Sackett's there
were several Pileolated and Audubon
Warblers.

The mud boat had come
through this channel breaking
along the rushes so that in
some places it was difficult
to get through. A great deal of
water was going through here
and the mud bar was crossed
easily. The current was so swift
that the return was laborious.

The river is a great deal
now. Water had spread over
the flats on North Bay and
without much trouble we went
out of the mouth of No. 4 and
around Mallard Point which
I have now run over in a
boat. The water on the
flats was three inches deep in
the deepest places.

No sick birds and only three
or four fresh had seen since
my No 4 and North Bay
was almost clear. The heavy
storm of a week ago had

I secured the dead birds from
the open bay and throated them
up in the rushes. Up to Mallard
Point no wet birds, with the
exception of half a dozen on the
road to Secorby and very few
were seen.

Crossed through the rushes
bordering the bay onto Hansin's
Island and walked down through
the center of it for a long distance.
There were extensive open
barrens and equally large
growths of sedge bracing up
immense amount of sedge, a
great duck post. The surface
was almost at a uniform level.
The old channel made when
the main channel came out
here instead of No. 3 was found.
At first a depression was merely
indicated and on one bank
were dense clumps of willow
stumps now all broken off
within a foot of the ground. Sherry
about were numerous trunks and
limbs. Some of the stumps were
six eight and ten inches through.
A few showed unmistakable signs
of beaver cutting. These willows
had been killed by the rising
of the lake and were forty or

or fifty years old. Farther along
the channel will persist
filled with water and a bottom
of soft mud nearly knee deep.
Great holes had been worked
out by the ducks in feeding.
This channel led into the bay
but was lower so that the
water rushed out from the bay
as through a millrace. There were
a good many ducks here and
from the soft bottom of an certain
that it has been filled with
water all summer. Recently the
water level has raised as certain
pools had the bottom still
hard and cracked. A small
number of old duck carcasses
were noted.

I found the site of two
old Indian encampments and
picked up a bison horn. Found
a mound near the old channel
in the willows & three feet high and
eight feet across the base. No
depression showed where the earth
had been taken to form it and
I believe it to be of Indian
origin and old.

Saw where some animal
presumably skunk had turned
over clods of earth on the
sun cracked barrens after the

batter found them. Coyote tracks
 were numerous along the muddy
 shore where they had travelled
 hunting for sick ducks.

Returning to the boat we
 walked through the heavy mud
 bordering the bay and ran
 across fifty or six to sick birds
 in one small area. Returning
 with the boat we gathered a
 number.

Within two weeks the snowy
 Hens had suffered considerable
 loss here. I saw about fifty
 dead from the disease and a dozen
 birds in the bay were affected.
 The dead birds lay in the bushes
 where they had fallen.

Brought in a few

Pintail	25
Green-winged teal	2
Mallard	6
Spoonbill	1
Coot	1
Widgeon	1
	<hr/>
	36

The snowy Hen whose feathers
 had failed to grow properly after the
 molt was captured. The ends of
 the pin feathers, especially on the
 wings were dry & twisted; the
 bird was unable to fly and
 looked very ragged. This bird was
 skinned.

I found two mounds of dead
ducks which had been gathered up
the previous year and covered with
earth and rushes. These had hardened
and remained almost intact. Each
mound was two feet high and
three by four feet wide, a vegetable
usually the feathers still remained
or nearly and the bodies remained
intact. After taking some photographs
I brought in several for specimens.

September 23. Wednesday

Today I put in most of the
day at the gun club making
various classifying notes in which
follow fine and clear today and
warm.

In the afternoon I went down to
the experimental pens on Channel
no. 1. I found everything in good
shape. A small pool where
rain water had gathered on the
flats was conspicuously saline.
I banded and released forty air
birds this afternoon, all were in fair
condition. These birds were brought
in a week ago exactly. Those which
I kept over were nearly all strong
though not quite ready to fly.
Three Avocets were released and
all alighted in the river together swimming
well.

The great majority of the birds
released were fat and in good
shape. here than half a dozen
out of the forty five were thin.
They become thin as they recover and
then when they begin to put gain
weight rapidly.

September 24, Thursday

This morning it was clear and warm. Went out of Cloufloo 2 and straight to the heart of it. Low East Pass

The number of sick birds has greatly lessened. In all twenty fresh islands were visited and few live birds secured there. It formerly found the first three islands.

No bird found in the old channel east of No. 2 found two sick Green winged Teal and a Snowy Heron which I captured. Eight sick ducks were noted at the mouth of channel 2. In the first bunch of rushes on the flats were two sick Pintails only and none in the second smaller clump. 80 dead birds lay on the flats immediately east of the mouth of No. 2.

The Green winged Teal freshly dead was seen on No. 2 but the others were all old.

The water is running over the flats here in good shape and no difficulty was experienced in getting across Pintail Neck.

Seventeen birds lay dead at the mouth of the channel and a few birds were scattered over Pintail Neck

The islands (looking to western
shore of East Pass) are from 1/2
to 1/4 of a mile long and are
ordinarily covered with grass
though a few have dense growths
of Cat tail. The former seem more
attractive to gull birds. The birds
gather in to these from all sides
when they become affected and
these islands serve as a reliable
index as to the status of the malady.
When formerly they have gathered
boldly with green winged seal
I knew that a new outbreak was
coming and after that in a day
and a half or two days the
Pintails and few Mallards
would be found. The Seal being
water the affected first while the
larger ducks held out longer.
I find this true that size &
strength comment to a great
deal in the malady. The domestic
ducks in the experimental pens
show surprising vitality. Should
another series of experiments be
inaugurated at which the
Green winged seal would prove the
most available to work with as they
are susceptible and succumb readily.
The larger ducks hang in surprisingly
The mixing species in the experimental
pens was a mistake as this

larger stronger birds bite and
trample the smaller ones.
The birds on the islands today
showed as follows.

Island No.	head	chick
1	40	1
" 2	4	2
" 3	3	-
" 4	13	6
" 5	30	12
" 6	13	2
" 7	11	2
" 8	20	5
" 9	2	-
" 10	2	-
" 11	5	-
" 12	13	-
" 13	24	-
" 14	57	2
" 15	18	-
" 16	19	1
" 17	17	-
" 18	21	-
" 19	6	-
" 20	 	
	<u>330</u>	<u>37</u>

In going down East Pass
I counted 473 dead birds in the
water. With the exception of about
a dozen the birds found dead were
all old, a week at least. The Pintails
during putrefaction swell up much
more than the other birds - frequently
they become larger than the largest Mallards.

The following were brought in

Pintail	17
Greenwinged Seal	3
Snowy Plover	1
Black Necked Stilt	1
Pectoral Sandpiper	1
Gadwall	1
Spoonbill	1
Mallard	1

26.

The water this morning was smooth as glass in numerous places (Ephedra) were resting on the surface film being bent and this trapping insect the water was covered with them as far as could make them out with the binoculars.

Banded and trace (40 birds) this afternoon a Snowy Plover recovered in fresh water and was released in California just died.

Pintail no 519 was captured tonight also Greenwinged Seal no 652. This bird was very thin so I returned it to pen no 6. A banded Seal flew up from vehicle pen # 3 when I visited it this morning.

September 25, Friday.

This day was spent mainly at the gun club in making dissections and caring for specimens.

A cold north wind blowing out the wind was warm. Made a short trip on foot along the river and found quite a number of migrants in the fringe of willows. These willows though forming only a narrow band, are good shelter and it is difficult to see small birds in them. There was considerable movement among the small birds and a few kept passing the gun club in the brush.

Brought Pen #2 up by the boat house and began a new experiment using the white scale from the flats.

A few birds are attracted by the captives in the pens on the overflow. Ray brought me a lot this afternoon. Numbers of carp three or four inches long have come into the bottom of pen #1 doubtless attracted by the wharf. Intended to open one or two but forgot it.

One Pintail released on the 10th returns every night for food and is not at all wild. Banded and released 16 more ducks today.

September 26, Saturday

This morning with Bosley rowed up the river to the Bear River Club and then out the canal which has been dug into north bay. The men from this club who have been gathering ~~sick~~ birds have seen very few sick ones. This canal is twenty feet wide and carries a considerable volume of water at present with quite a swift current.

I found a great thicket of a cane grass ^{Phragmites} (*Utricularia*?) and which were numerous of muskrat paths.

In the mouth of the canal were about a dozen Sable Seals and Pintails but that was all. We searched through the rushes and across the bays to a point opposite the Duckhills Gun Club but able to find only three Pintails one Widgeon and one Cinnamon Teal. I picked up one Green-winged Teal which had just died and another sick bird which died within an hour though it was fairly active when captured. Both were adult males almost in full plumage. Not more than half a dozen fresh dead birds were seen.

The heavy storm of ten days ago swept the bay clean and

all the dead birds which previously
were out in the water are now
washed into the rushes. I found
the dead body of a Black swan
and a ~~to~~ Lesser Yellowlegs gull.
The latter one has a size of
four inches at least.

It was warm and pleasant
today and after eating lunch I
spent a little time in watching
the birds.

At the Bear River Club all activity
now. The guides are down and
are repairing boats and cleaning
things up in general. Six or eight
men were engaged in cleaning
up the dead birds near the birds
and along the banks. Last year
there was considerable complaint
among the members because of the
dead birds. The sickness continued
then until about October 10 and
a few sick birds were about down
until November 1. From all
appearances now I should say
that it was all over.

~~Hard from the Fisher yesterday and~~
I shot a pelican on the river that
seemed to be somewhat affected.
Post modern follows.

September 27, Sunday.

Worked on my notes this morning nearly continually. It was clear but cool.

At noon Mr. Meaf Stewart of the Bear River Club called me up and invited me to come up for luncheon. Mr. Bigelow and a party of club members were out. Went up in the little launch and found to my surprise that this was a party of twenty-two half of whom were ladies. The club house has a much different appearance than it had in the summer. ~~This~~ With the furniture rearranged and all the rubbish cleared out it had a very pleasant appearance inside. One large room a square forty feet square with a great high ceiling occupies the center. A two cases contains a small collection of mounted birds, a large table occupying the center and easy chairs stand about. One wing is taken up by a large dining room and kitchen, another by the bar, gunroom, baths and toilet. While the other two were divided into sleeping rooms.

After looking over the marsh from atop the house all wind but see some interesting operations.

Three boats were towed out by the little launch, one trailing behind and the other two attached to it side by side. A guide showed Johnson sitting in the stern of the first boat held the last two together. The rowboats used by the Bear River Club are thirty feet long, three oars and half bow flaring sides in addition to the flat bottom. Do not believe that they would be serviceable in any sort of a sea & the waves would soon wash them full.

While the first made a mistake in the place at first we took us down Brown's overflow. After landing and walking about we located Neal and Vince Davis to the east. Returning to the River through Knudsen no. 1 channel we went out Knudsen No 2 and came to the scene of operations. Holes were bored in the mud with a stick with a crossbar as a handle. Shells of Dynamite were placed in these two feet in the ground and a foot apart for a distance of seventy five feet. A fuse was attached to one in the center and this in exploding set off the others. A great geyser of mud was hurled into the air for a hundred feet

The falling clouds and mud penetrated the surface. It's hailstones. The resulting ditch was three feet deep by six wide and clean. As could be well straight banks, a beautiful piece of work. We saw three shelds before leaving.

It saw about twenty sick dead and a number of Pintails in the water these overflows. Two Spoonbills were picked up helpless.

The ducks and pelicans on the water leaped into the air as though thrown by springs almost at the instant of concussion. The shock on the water must be great and I wondered how it affected those who happened to have their heads under the surface. That the birds at half a mile felt the shock was shown by the fact that they rose instantly before the sound of the explosion reached them. The ground on which we were standing shook violently but the sound was not excessive.

Mr Cook tells me that one spring in an earthquake shock which took place at the clubhouse the ducks all rose at the first vibration with a great roar of wings. After another incident I returned to Duckville on the big launch.

September 28, Monday.

I put the day in working at the gun club. Clear and fine today with some wind. I work at the bar at table and use the river to wash my preparations in etc. The river is up nearly two feet now.

Mr Chamberlain called me up at noon. The phone was very poor but I managed to make out that he had a telegram from Dr Fisher asking if I wished to go to California. It is he had written that there were no sick ducks there. Considered work here more important. Prepared a telegram but found that it could not raise central though I tried during the afternoon and evening.

Walked out along the river and found a fair number of birds in. Saw several Hermit Thrushes and juncos - these small land birds surely straggle through here. I believe that the main flight was along the base of the mountains. The birds that get here follow the river down perhaps. That is many species at least.

Some of the quacks have arrived here at the gun club and there is considerably - bustle - about the club house. Field Manager P. McPinnis is a good man.

September 29, Tuesday,
Today at Duckville I
terminated part of the experiments
and began to get things in
shape for my departure. The pens
were piled up on the flat
east of the clubhouse each one
marked government property.

Released the last of the birds
from Pen # 6 yesterday and
removed it from the water.

No 1 was removed today
some of the birds banded were
weak but with the great rush
of fresh water coming down
the river believe that they
will be all right.

I spent most of the day
in making inspection notes
in which will be found
under the various experiments
to which they belong. Several
experiments were terminated
yesterday.

The warm weather now has
brought out many mosquitoes
and as soon as it begins to
grow dark I am driven into the
house. The nights are very
cool now but the days pleasant.
Things are all in readiness
here for the club of
Rain off and on today!

September 30, Wednesday.

Had intended to go to Corning this morning but wished to watch one of my experiments a couple of days longer & remained over.

The boat went up early and was back with the members come down for the opening of the hunting season by the middle of the afternoon.

Warm and pleasant today & was busy finishing up my work until the members arrived and then was kept talking until bedtime. They are all a very pleasant bunch of men.

I have practically everything cleaned up around here now.

Around the clubhouse this evening things were in quite a bustle. The men were busy getting their guns together and things in readiness for tomorrow.

A board in the lounging room has the names of the guides in slots of paint which are the names of the members. There are only six guides now and the ten members ^{who leave me today} will have two men. Dosty will act as a guide tomorrow.

From the top of the house I saw two rigs driving down towards Pondike and quite a party on at Sackett's.

October 1, Thursday.

This morning everyone was up at four and I got up to see the others start out. Three of the guides are camped on this side of the river and three across and at four thirty they had their carts ready at the wharf. And as fast as the hunters appeared I pushed off. The Bear River Club members were already out and I saw their long boats slipping past in the darkness each with two guides to the man. The hunters in each sat in a chair in the stem, a muffled figure staring straight ahead in the darkness. For an instant I could make them out and then they were lost in the darkness.

About twenty minutes to six Mr. Kimmis and I walked down in No. 1 to try for a few ducks. Shooting was supposed to begin at six twenty five. According to a fifth guide card issued by Mr. Chamberlain; But the first guide was fired up well out while it was still too dark to see much and by six the bombardment was well under way. Everyone had elected to shoot in South Bay this morning

and such a bombardment of
have never heard. It was a continual
bang bang in all directions. ~~Many~~
in many was ~~and~~ hooting in North
Bay and all were gathered in
a small area.

As yet the ducks have no
established line of flight but
merely circled around back and
forth apparently glazed. I shot
eight Pintails and Seal on a
little channel and then returned
home satisfied.

The first hunter returned to
the clubhouse about ~~one~~ ten and
the last about two. All had
secured the limit almost without
exception. Each man is allowed
twenty-five birds a day. In
addition he shoots as many
for his guide so that the Deer
River Club members can bring in
seventy-five. Five hundred ducks
were brought in to the Duckwell
Gun Club, mainly Green-winged
Teal and Pintails with a
sprinkling of Mallard, a few Gadwall,
Widgeons, Cinnamon Teal and Spontills
& only two Redheads. These are
held in disfavor as they are so hard
to pick.

Each man who came in soon
that every one else began shooting

at a quarter of six but that
he personally waited until 6:25!
I have an idea that some get
now than the limit as I
saw one make a couple of
trips out in the afternoon apparently
for nothing. The birds began at
once and we had fifty
cooked for chimneys in the evening.
The pickers pull off the tertials
and the tail feathers first and
a ring around the neck. Then
working down the body feathers
are stripped off mainly with the
thumb and the bird thrown into
a tub. Later the wings feet and
neck are clipped off with shears.
The body feathers are saved
and sold.

October 2, Friday.

This morning was up at five. The hunters were not preparing for leaving for the north this morning as they went yesterday. The men going with the wolf ate at six and at 6:15 we were off. A very bad morning snow and I make to go on Monday, Wednesday, Friday to meet the morning train and on Saturday for the afternoon train. The trip up the river was a bond and usual. Saw a few crippled seals on the river.

At Corinne the buff was hauled on to the depot and I got my mail. I forwarded address to the Hotel Makin. I had lunch in paid ticket, a bushel of wheat. This wheat was a lower grade and he sold it to me for a dollar, previously I paid \$1.20.

Two of the club members Mr. Sturgis and Mr. Malcolm Keyser were here with me. The men seemed pleased at the abolishment of a spring hooping and considered it a good thing. Men who have shot here for years have told me that they have

They saw such a light
of ducks near the marsh.
In all his experience another
argument in favor of the abolition
of the
Spent.

Stingers told me a few weeks
ago that which had cost him
between \$1200 & \$1400 or about forty
a day.

We had with us a few boxes
of ducks sent out by Greenberg
and in Corinne I saw a shipment
from the Bear River Club. Most of
these were consigned to private
parties but I saw one that
was marked to a dealer. The
clubs pay ninety cents for Seal,
fifty for large ducks and
two dollars for Mallards. Ducks
are graded as large - small
and Mallards. A large per cent
of the Pintails are as mallards,
Spoonbills and Seal are classed
as small, while Gadwall, Widgeon
and Pintails constitute the large
ducks.

Left Corinne at 8:50 and in
Salt Lake at 12:15.

Clambed up and had dinner
at Finch cafe. Roast mallard
and Seal at the will of fare
price 60 cents. For this I got
half a pintail and part of the

creast of a Mallard. I understand that several jims in salt lake handle ducks.

Called on Mr Chambus and son of Mr. Byrnes with him. Neither had much to say and after a few minutes Byrnes left. Mr. Chambus told me that twenty-five men had been arrested the previous day for shooting without licenses or for shooting before the official hour set for purchase.

We figured out victory as the number of birds shot yesterday.

Mouth of Bear River	2000
Mouth of Weber River	2000
below " "	700
Davis county	1000
Fall Lake vicinity (100 club members)	2500
" " (100 other hunters)	800
Utah Lake	<u>1200</u>
Total for Fall Lake Valley.	10,200

The average shot of yesterday one bird out of three. We estimated that in 9 shots three birds are killed, two crippled and four missed clean a conservation estimate. Then saying that 30,000 shells were fired we have

Killed	10,200
crippled	6,800
Total destroyed	<u>17,000</u>

at least 10,000 birds eliminated
in this one days shoot. Friday
the south will probably about
equal this and then the shooting
will drop off somewhat. I
believe that soon the limit
will be put down to 15 birds.
Certainly the duck migration
can have made no great
inroads on the numbers of
ducks.

Met Mr. Watson & Provo
was invited to visit him
later.

Spent the evening in reading
and writing.

October 3, Saturday

Woke up this morning to
find a steady downpour of
rain, which lasted until
about three P. M.

Packed up my things in
salt hake and sent my trunk
to the Bangor station.

Found that the thermometer
for wind temperatures which I
have been trying to secure for
a month was not yet in.

Went on to see Mr. Chambers
for a few minutes regarding the
matter of spring shooting in
certain counties but he told
me it had been abandoned.

and seemed surprised when
I told him the clause in
the back of license when a
consist of the game lamp is
given and considered or said
it was an error. The clause
reads as follows

"Open season for ducks, geese and
snipe October 10 to December 31
except that this season closes on
March 15 in Washington, Kane, San
Juan, Grand and Uintah Counties,
and in Sanpete, Beaver, Emery,
Garfield, Wasatch, Crook, Millard
and Juab Counties there is no
further open season from Feb. 15
to March 15."

This will lead to spring
shooting however it is almost
certain.

Went to Odessa. The electric
line reaching there 2 noon.
Registered at the Hotel Marine
getting a good room & bath for
\$1.50.

Mr Chambers told me today that
two years ago he declared an open
season on ducks in the spring in order
to drive the birds out of the marshes
that they might not remain and die
from the malarial.

The paper tonight has me
embarked for California.

STUDY CALIFORNIA DUCKS.

Completing his investigation of the duck malady at the mouths of the Jordan and Bear rivers Alexander

Eden
Standard
and 3

Wetmore, federal biological expert, left yesterday for California where he will make comparative studies of ducks there suffering with a peculiar disease. Until this study is completed public reports will not be issued on the local duck situation.

put in afternoon & evening in writing.

Forecast was clear this afternoon and then rained again this evening ended by being clear and cold.

October 4, Sunday.

This morning it was quite cold. Thermometer at about 45. The mountains concealed in the clouds and much snow showing below them. A strong south wind was blowing cold making my ears ache. Occasionally slight rain storms or slight sleet storms passed down.

Followed the trolley line out until it crossed the south branch of the Weber and then followed this stream out beyond Roy. It was a swift stream about fifty feet across with numerous side channels. The stream bed was sandy and strewn with stones. The true flood plain was covered by a growth of Populus

bakamifera and scattered through
it were Cottonwoods and acer
regundo. The latter bore a very
heavy crop of seeds. Wild
currant was plentiful and
black willows abundant. Some
of the trees averaged about thirty
feet and most of them were
about twenty feet tall. Two benches
rose one above the other on
either side.

Birds were not very common.
7 flocks of Chickadees and small
bands of Audubon Warblers and
Kinglets through the poplars and
a few Pine Siskins were seen. Robins
were abundant in the fields
and 7 flickers & magpies common.
I found a Red-tailed Hawk that
had been shot still alive.

Good collecting ground here.
I surprised a muskrat at the
border of an alfalfa field where he
had been feeding. He had a well
marked trail from the water.

I found over many stones but
found no beetles under them and
very few ants. Collected a few insects
by sweepings.

Atriplex still in bloom. some
sage in open localities.
Chambus told me yesterday
that formerly great numbers of

ducks. bred on Utah hats but that
as the marshes increased in
area at the mouth of the Jordan
by the Bear River they moved
north.

As a matter of fact I thought of the following
at the New & East Bay Club when
water is plentiful there will be no
sickness as long as here is a
good current in the channels.
I would like the water to stagnate
it should be drained off in the
and the ground allowed to bathe
This would leave only the lake
front which the birds could
reach.

At the mouth of the Jordan
the north channel could be
ditched straight out to collect
all the water in a single ditch
without being spread into pools
and then this drained so
far as possible into the south
channel. The trouble here might
easily come from the rise of the
lake. In winter it would reach
back in here as it really does.

At Bear River a dam should
be thrown across it Davis or
slaughter islands to raise the
level of the water above.

October 5, Monday.

This morning, was up at 6:40
had breakfast and caught a seven
thirty car for the Brigham line. Went
out to a stop called Woodlawn
and went down into the Willard
Spr. The sky was overcast all
the forenoon, and a cold south
west wind blew harshly. Not quite
so cold as yesterday but still severe
enough. The higher parts of the
mountains were covered by clouds
in the early morning, but
later showed snow above 7000
feet. A few spruces were seen on
the summit of Willard mountain
the upper ones with their branches
whitened as though in ice. The
slope here to the west of Willard
Spr. is very noticeable.

I found migratory niches and
a few varbergs, I think a couple
of willows and rose along
the railroad tracks. Have never
seen rose bushes with so many
hips as those I showed. Every branch
was tipped with frost six to a
dozen and they creckled the
white bush.

I travelled along the greater
part of the south and east shores
of the Willard Spr. It was not
so muddy as farther out on

The flats as much sand was
been washed out in the flats.
A sprinkling of dead geese were
scattered the shores and all were
old, most of them, tired up.
The only wet birds seen were
two pintails, one which was
captured and examined. Several
birds of the following species were
noted - Pintail, Mallard, Green-winged
and Cinnamon Teal, Avocet, Silt,
Plover, Western Sandpiper, Northern
Phalarope, Baird Sandpiper, Wilson
Phalarope, Widgeon and Western
Gull.

The steady wind was
forcing the water up in the
flats and it came creeping
at a fair speed over the marsh
mud. This water was strongly
saline. Great numbers of ducks
were feeding or resting off shore
and Coots were very common.
A few were following the water
as it covered new territory.
Certainly not enough fresh water
has come into this spur to
affect it in any way. Two creeks
are shown on the map as
draining into it but the water
from them is entirely diverted
into irrigating ditches and
comes down only through sumpago

It can't be present, see why
 the birds should not continue to
 be here. The water is certainly
 strong enough with salin
 matter.

Found a Northern Phalarope
 dead where it had apparently
 come to, & boy as the sick larks
 fly and had pretty bad the
 post mortem I found that the
 stomach contained a single
 bulb of ~~chama~~ ^{Potamogeton} the intestines
 was reddened and firm and
 was like split it and started
 to wash it but unfortunately
 lost it down the drain pipe.
 Am however sure that this was
 a sick bird.

The power line that stretches
 across these flats, as boys many
 birds. Huge towers carry right
 wires and standing ~~beside~~
 them it can hear the current
 snap as it passes a log.
 The following were found I had
 underneath in a mile.

- | | | | |
|----------------|------------------|------------------|----|
| Sora | 1 | Pheasant | 2 |
| Baird's Puffin | 1 | Great Blue Heron | 2 |
| Pintail | many perhaps 100 | Willet | 1 |
| Coot | 15 | Cris | 1 |
| Cinnamon teal | 10 | No. Phalarope | 50 |
| Brown Sparrow | 1 | Redhead | 1 |
| Avocet | 12 | Mallard | 3 |

Bittern	1	green-winged teal	2
Night Heron	4	A godwit	1
Catbird	1	Bronzy Duck	1
Pied-billed Grebe	1	2 young Heron	1.

Most of these were old but a number of waterfowl were still fresh whose skin is all very nicely preserved. The liver and other organs were also well preserved. I was free to handle them as I pleased.

Missed the car in Willard and at times there. Man was very curious about me and inferred that I was watching the power line. Said that a government man sent out here to investigate the duck disease had discovered that it was due to cyanide. When a bird fell sick the others ate it alive and this bird disease common then!

Collected quite a number of insects today. Found 1000 beetle larvae in the mouths of their burrows and caught 11. A curious mantis on an alder tree looked at a casual glance like a pair of P. bicolor. It was of the same size and had the same general color. In addition the wings were held at an angle from the body and the general attitude was that of a wasp. I dropped it into the net before discovering what it was.

October 6, Tuesday.

This morning was up early and packed my things - left my trunk and microscope in storage at the Hotel Marion. Caught a train at 8.30 for Brigham where I transferred to the Kellon local a combination that runs Tuesday, Thursday, and Saturday out on the old S.P. track to Kellon. Now that the main cut off has been built there is no traffic this way. On Tuesday the train runs through to Escalante but on the other days stops at Kellon.

When I got into Brigham I found that two cars of the local were off the track on a siding which delayed us an hour. At Blue Creek I've picked up a Union Work car and this was stuck on the grade over the drainage range the engine cut off part of the train leaving it behind and went into Pomona with a car back for the passengers. All that it was to do when we reached Kellon and just 11 miles from Ogden. The train consists of one passenger coach, a caboose and a varying number of freight cars. Freight is piled up in the caboose

From Corium a level plain as
a north as could be extended
across past little mountain round
in places with sage but mainly
with greasewood and yucca
& yucca flats. This is, without doubt,
the old ~~lake~~ ^{lake} bed extending north
towards the Malad mountains. In
those days little mountain rose as
an island. On this mountain
there were no trees, visible on
the south slope and the whole
appeared of volcanic origin.

West of here we passed what
appeared to be a series of old
river channels two to six hundred
feet wide with cut banks fifteen
feet high. No water was standing
in pools but occasionally they were
dry.

I saw one cottontail here.

From Blue Creek to Promontory the
country was rolling and steadily
upgrade. As we climbed the
summits of the Promontory range
and North Bay. Some peaks
showed on high north slopes and
very where where we first growled
of sage.

When we were stuck on the
grade I did some swamping and
collected a number of insects. Pale
grey species of hemiptera corresponding

in color with the plants, in which
they rested was predominant
1 mi. P. montana. The road
descended to Monument on the
lake shore and skirted the lake
for some distance. I saw extensive
flats bare of vegetation or some
of which I water stood. The
ground was grayish and appeared
2 in. The remains of the
salt works stood at Monument
and it has been that a man living
there puts up a couple hundred
sacks of salt a year. This
salt contains much alkali
and is not so valuable as the
Kansas product.

From here we left the lake
and ran inland a few miles. About
the year 1881 Pitton was a great
center of freight was carried
from here over wagon roads into Idaho
and Montana. The old barn
like depot still stands. The
town boasts the Pitton Hotel and
a smaller place, one store and a
couple of dwellings. It was told
that they were erecting a school
house and at first the landlady
thought that it had come for
that purpose. They have sixteen
pupils here. 7 flats are necessary
to support a school.

A stage runs from Kettle to
Yost about forty five miles. They
pass the night at Rosette 25
miles out. A few bare flats
here in front of the hotel are
strongly encrusted with a
white saline deposit. An one is
a depth of calcium 18 inches
thick the largest that I have noted.

Skies lowering all days with
only an occasional mountain
peak showing sunshine in the
distance rather odd.

October 7. Wednesday.

This morning was properly left
Kettle about 7:30 and a crowd of
locomotive & prairie the road led out
for ten miles and then crossed
south the railroad track for three
or four more. We rounded around
a good as the driver advised
Cassidell was not sure of his way
and hay roads led in all directions
across the flats. The whole region
traversed was level & growing up
to Sarcobatus which in some places
was large and in others small
to open spaces covered with
Atriplex. The Raft River mountains lay
to the northwest and east of them I
saw snow covered peak called Black Pine
to the southwest was a mountain
known as Hog-p which was said.

A good sheep and horse range
though it had only a few cattle
springs. The half-breed mounts
are as it were well supplied with
springs

Coyotes were said to be common
here and I saw six this morning
and much sign of their peculiar
in the marshes. Jack rabbits were
abundant on the flats, growing
of mesquewood, and were hopping
but continually. In winter they are
said to gather in great bands. Last
winter over 1,000 were killed in one
drive.

The weather today was miserable.
In the morning it was cold with
an overcast sky. The air was
heavy and windless. Distance
deceptive. I found it hard to make
out birds though this may have
been partly due to quinine
having taken to relieve the bad cold.
At noon it began to rain and I
continued to walk through the
afternoon. The flats became very
slippery and being grey
and sticky. The beds of large
washes were with rain above
like water. In summing up the
barrenness of the scene Crandall
remarked that the red lands in
California were the most desolate

Of any that we know
- of five or six large springs
- thickly set across which ribs
- in the open flats there is four
- miles back from the lake here.
- the cover and area of five
- miles running into what is
- known as spring bay, the one
- which I examined but the water
- coming up clear as could be
- from rock openings which
- appeared volcanic their formation.
- The spring appeared to be four
- or five feet deep and contained
- great growths of *Polamogeton*. The
- spring was drained by a
- stream thirty feet wide and
- four or five feet deep. The water
- from this spring was alkaline and
- tasted as such. A road led out in
- a wide channel and just had then
- spread out into grassy marshes. At
- this point in fact we saw very
- pale but beautiful in it was
- luxuriant. There were no bulrushes
- but growths of sedge were dense.
- The open reaches were covered with
- a dense mat of chara. The patches
- which were richly crusted with
- whitish deposit. The channel
- through each could be traced
- by a growth of *Polamogeton*.
- *Planorbis trivalvis* var. common.

A. WETMORE
OCT 10 1931

Executive Order

Locomotive Springs Migratory Bird Refuge

Utah

It is hereby ordered that the following-described area in Box Elder County, Utah, be, and the same is hereby, reserved and set apart for the use of the Department of Agriculture as a refuge and breeding ground for birds and wild animals, subject to existing valid rights:

SALT LAKE MERIDIAN

T. 11 N., R. 10 W., sec. 4, lots 1, 2, 3, 4, 5, SE. $\frac{1}{4}$ NE. $\frac{1}{4}$, and E. $\frac{1}{2}$ SE. $\frac{1}{4}$; and
sec. 10, lots 1, 2, and SW. $\frac{1}{4}$ NW. $\frac{1}{4}$;
T. 12 N., R. 10 W., sec. 34, all.

It is unlawful within this reservation (a) to hunt, trap, capture, willfully disturb, or kill any wild animal or bird of any kind whatever, to take or destroy the nests or eggs of any wild bird, to occupy or use any part of the reservation, or to enter thereon for any purpose, except under such rules and regulations as may be prescribed by the Secretary of Agriculture; (b) to cut, burn, or destroy any timber, underbrush, grass, or other natural growth; (c) willfully to leave fire or to suffer it to burn unattended near any forest, timber, or other inflammable material; (d) after building a fire in or near any forest, timber, or other inflammable material, to leave it without totally extinguishing it; and (e) willfully to injure, molest, or destroy any property of the United States.

Warning is given to all persons not to commit any of the acts herein enumerated, under the penalties prescribed by sections 106, 107, and 145 of chapter 4, title 18, United States Code (35 Stat. 1098 and 43 Stat. 98), or by section 10 of the Migratory Bird Conservation Act of February 18, 1929 (U. S. Code, Supp. IV, title 16, ch. 7a, sec. 715i, 45 Stat. 1224).

This refuge shall be known as the Locomotive Springs Migratory Bird Refuge.

HERBERT HOOVER

THE WHITE HOUSE,

September 29, 1931.

not firm and care was necessary
in walking. In some places I
found a resilient mass of matted
roots and silt which would
barely support me and which
would give through under my
soft mud. As we moved toward the lake
above the marshes became more
shallow in vegetation & eventually
finally the marshes were replaced
by bare mud flats of grey deposits
which were damp from the
rain but firm. The water
was not far a mile beyond here
but with the south wind in
waves would be in this way.
The beach was strewn with
ends of timber and waste from the
cut-off there was very little
shift of sand. This beach line was slightly elevated
ducks, Mallard, Pintail, and
green winged teal were common in bloom
through them but nowhere did I
find any trace of sickness. The only
dead bird seen in the marshes
was a widgen which had just
been eaten by a coyote. Two or three
were noted on the flats, all of them
old. There are none of the great
areas of mud flats here as in
the other rivers but this takes
more the character of a grassy marsh.

The fact that the water in these
marshes is as strong saline as
it is would point to some alkali
as the cause of the duck malady.
From the fact that it occurs
only in the river systems it
would seem to be something
brought down by the streams
and deposited on the mudflats.
Perhaps some alkali leached out
of the soil by irrigation. The
water in all of the streams is
at some point all taken out in
canals for irrigation and the water
in the lower courses comes in
only by seepage. The alkali
leached out in combination with
some saline matter may form
a poisonous alkaloid.

Lage & parrows were fairly
common in the grease woods and
horned larks common.
Ducks are not to be found much
down here but one or two parties
had been in here, in looking this
fall and found the birds
wild. This is a great cattle
range here in the winter and
quantities of hay had been put
up for winter, etc.
Reached Kilton at 7:10 in
the evening.

October 8, Thursday.

This morning I walked out
across the grass wood flats north
of town found an old dry wash
here where the growth was
abundant. Jack rabbits were very
common. I did not see much
Coyote sign. There were
many Howlingos. The flats were
not sticky from the rain
yesterday. The old lake bed
extended inland all through here
and it will be many years
before the saline water works
out of the soil here. In front of the
house at Ketter is an open area
in which all I encountered for
some four miles. I saw
grows here luxuriantly and I
saw some yellow pine trees tall.
I saw a few arrows and some
out through here and collected
several.
The soil is a fine fine flat
are covered with water. The
The town is on a high elevation
so that it escapes the general
inundation. I suppose it was
a very place at one time. There
were said to be some
a certain index to early frost.
At one time the sun came out
and I attempted to look

few insects ... region of
Apr. 18 ... insects found
your researches. I have confined mainly
to forming ... of
dead sheep. A small Charabard
was found in pairs. The insects
found about ... of an inch
long and ... bits ...
found ... movement, walk in
which to deposit their eggs
I saw several pairs rolling them
along on the ground. (*Aphodius iniquatus*)
I
about this
last
not except that
with this. It
road
the pass across the Promontory
... ..
cotton-tail but in the
jack rabbits were seen. The
get all
had been taken up

Reached Ogden at five and
went to the hotel Marion
October 9, Friday.
Have had a severe cold for several
days and staid inside today
writing up my notes and making
up a few skins of the Sage Sparrow
brought back from Kellin. It
rained nearly all day.

October 10, Saturday

Cold somewhat this morning
Started in on my expense account.
This morning I had worked steadily
on it until about five. Then I
had it and the comparative state-
ment completed.

Received a new clinical thermometer
today from Durbin & Co. of Salt Lake City.
that registers from 95° to 115° . I think
that it was made for me as the
date of inspection was October 3.

I saw Mr. Becham this evening
and talked matters over with him
regarding the locks at the mouth
of the Weber River. He said that a
few sick birds occurred, but not
many. Made an appointment with
him for Monday evening at five.

Had my account certified by
the Assistant Postmaster.

The joint service here has a
modest dock building on the
north of the Marion Hotel.

Dr. Fisher arrived at seven and
we dined together spending the
evening in talking over the
duck situation. He told me that
the arrangement now was to have
the work taken over by the Bureau
of Animal Industry on
July.

October 11, Sunday

in morning Dr. Fisher & I
were together discussing the
situation until then Mr. & Mrs.
A. B. Bigelow came with Mr.
Shepherd & Logan a banker
at which point I terminated the
other two giving Dr. Fisher opportunity
for a talk with Mr. Bigelow
regarding the future status of the
garrison. Then we were taken in
Mr. Bigelow's big Winton machine
up Lyden canyon. The roads were
very bad at first but the way soon
led to a fine macadamized road
running up through the canyon
to a rich farming country beyond.
The scenery through the
canyon was rugged and passing.
The mountain maples had lost
their leaves while pine & balsam
poplars were just turning.

Saw one chipmunk.
Upper River a swift flowing
narrow stream led left here.
Returning we lunched at the
Bigelow's and they returned to
the hotel. Completed plans whereby
I am to visit the San Joaquin Valley
lakes and return via Lewis lake. Call
San Francisco, Mills Building 7th floor Mr.
Schaeffle will give permit such as I
want for collecting.

Returning to Salt Lake City and to go
Denver via Dr. R. stop a day or so
and visit Fort Collins for the purpose
of investigating the report of sick chicks
there. Mr. Piper will write me when to
see there. From there I will go to have a
staying, 16 days have wish to spend a
good share of my time there in continuing
some investigations.

October 12, Monday.

This morning with Mr. Fisher
called on Mr. U. P. Bigelow in. I talked
for time regarding the tick trouble
I spent the remainder of the forenoon
with Mr. Fisher. He left for Salt
Lake City at noon.

Packed up the skin of a 'owen
to mail in. Also some stomachs
collected at Kettow which I was
unable to put in formalin.

Visited the public library this
afternoon but found very little of
interest. Tried to look up some books
on alkaloids but found so little on
chemistry that I finally gave it up
in disgust. Found quite an array
of books on Biology.

Mr. Bulnap came in in the
evening at five and took out to
his farm where I spent the
night. cool and sharp in
the evening.

October 13, Tuesday.

This morning, Mr. Belnap & I drove down to the mouth of the Weber into the flats. It was a fine clear day with a slight haze obscuring the mountains. The mountains above 7500 were white with snow.

The flats here have the water spread out over them a little more than on my visit of twentieth, and across nearly the whole flats was a good current of water sweeping toward the lake. The water was clear cold and perfectly fresh to the taste. In some places small isolated pools had formed from the rains and I found these to be highly saline. One of the borders of some was a brownish scum, filled with slight bubbles of gas as I have noticed all summer. Lower down a broad body of water was going into the lake. Just at the Clubhouse I noticed one small pool that was milky in appearance and strongly saline. The mud in the bottom was black and strongly sulphurous, undoubtedly a sulphide of iron. The following bill at the Clubhouse might explain this as it is strong with sulphur and runs constantly. I took a sample of water.

from his pool in two beer bottles.
Before I disturbed it the pool had
the appearance of a strong soap
solution which has been used in
washing.

Met Mr. E. E. Olson of Cooper
Utah B. N. #1 who was down for
a shoot & he seemed thoroughly
reliable and has a reputation as
such. He told me that he
would not duct here every fall
beginning with 1904. All have been
greenwinged teal and were found
getting about in patches of
cocksbur and in the bayonet
grass. All were fat. They were found
usually in November before the freeze up.
Until 1909 however they were not
bad but in that year large numbers
appeared.

During the first year (after
1909) it was believed here that the
trouble was contagious. In 1911 the
members of the North Shore Gun Club
made an effort to clean up those
that lay in the water and picked
up 40,000 by count leaving the
birds that were on dry land & the
others were hauled off and buried.
During one year I believe that it was
1911 the water on the flats was said
to be almost as high as it is at
present.

As I have noted before the sugar
factory was established in 1898. For
three years they did only a small
amount of grinding and then
the capacity was doubled. Since then
the capacity has increased greatly
according to Belnap. I might
say 7 stacks indicating as many boilers.
Belnap says at first there got more
than three and he thought two.

about 1904 the South Channel
did not go dry at all in the summer
time and had water from the
main north channel. No more or more
water was taken out about now
there was less and less given off
to the south channel. No sick birds
amount to anything, none was been
noticed in the south channel.

The zone of sick birds here extends
inland about two and one half
miles from the lake, running no
farther back and the large number
are found at least a mile inland
from Salt water, ^{from} about where
the salt water begins to make its
effect.

There were a number of
dead pelicans lying about. I saw
eight of them. Belnap says that
he and Simpson found one that
was absolutely helpless as are the
sick ducks. Three out of four that

A crabs had been shot and the fourth one was injured. They are considered here as enemies of the fish and I am inclined to believe that they were "sick" from lead though a number of sick ones have been reported.

Most of the lead bullets here have disappeared. I found just a number of lead bullets in a bar opposite the clubhouse. I saw two freshly lead about and one faint several days old. But they might well have been crabs. Sick crabs have been reported here during the past few days, but after careful search we found only one green-winged teal. This bird was fat and heavy and about the size of a whistling lark. I shot it about the same time I brought in alive and killed it with the shot. But the intestines were carefully preserved in 70% alcohol. Also the kidneys.

The hunters very pull out the intestines and said feathers and got their birds immediately on shooting them. I picked up the intestine of a mallard near Olsen's blind that showed quite serious irritation when I slit it. The great flow of fresh water now however would

- Check my sanctimony toward the
poisoning. The seal that I found
was an ~~town~~ ^{town} ~~opposite~~ ^{opposite} the
Ch. House where the saline matter
would be stronger
A few old willow tufts
a foot ^{thorough} here on the barrens
~~when~~ along an old channel which
could be barely traced. No willows
grow ^{any} here at all now. Mr.
Belmap tells me that his grandfather
was among the first white men
in this valley. According to a
story told by the Indians to this
grandfather, a long time previous
a waist deep snow had filled the
whole valley in the winter killing
all the buffalo and most of the
Indians starved. At this time the
old channel extended far out beyond
the shore line and large trees
hind it, willows and cottonwoods.
The stumps of these are over a
mile out in the present lake bed
and are covered by water up to
a man's hips. Among these are
fish bones and these are supposed
to date from the time of this snow.
The lake now is rising steadily
and has come up at least six
feet since 1905. ~~July~~ After the
old channel ~~was~~ existence is mentioned
above the lake became very high so

The steamer City of Corinne came up
below Belnap's place to a point
above which the ducks do not
go. Then it receded far out and
now is creeping back.

I have thought this today.
These flats here are all near the
level of the lake or slightly
slightly elevated. As they once formed
part of the old lake ~~area~~ bottom they
are thoroughly impregnated with
salts and alkalis. As the water
in the lake rises the ground water
percolates back and stands at a
higher level and as it comes up
in the soil it brings certain of these
salts with it in solution which
might cause some of the trouble.

It is noticeable that sick
ducks here extend only $2\frac{1}{2}$ miles
inland. While there is a long stretch
above influenced by the water from
the sugar factory.

Drove into town in the
evening with Belnap. I put the
coming in caring for my
specimens & writing up my
notes.

Last night I met a Mr. Cooper
who had heard I wished to see me.
He wanted to know what could be done
in the matter of the fish which have
been dying in the Weber River. I told

that if the state law did not
make the necessary provision for selling
pounds that a new law would be
necessary. They were all rather bitter
against Chamberlain saying that he is
afraid to do anything before election
against the corporations. I told them
that while it is not our business
in their politics that it seemed
to me that a petition might have
some effect.

October 14, Wednesday.

This morning I went to Promontory
Point on the Southern Pacific at
7:30. This station is at the southern
end of the Promontory Range. The day
was clear and fine and not
too warm.

Bear River Bay lies to the
east of this Promontory Range and
I wished to investigate conditions
here. From the shore here
was in places rocky with on
the points were sand and gravel
beaches. The water was fairly
deep immediately and there were
none of the mud flats found above
and on the east side where the
chicks sicken. The crest of the
divide was too near the lake
shore to allow much sedimentation.
The slopes were so steep that
gravel was carried down right

on to the beach. The water in the bay was strongly saline and in the drift was great numbers of carp 1 1/2 to four inches long which had been killed by the salty water and thrown up by the waves.

When the sickness among the ducks is great large numbers of dead birds were said to drift down and lodge against the hucin cut-off which closes the south end of the bay save for a narrow opening. Not many live birds were found however. The man working in the fields said that several times he had seen birds fall from flocks when passing but admitted that this was always in the hunting season and I have no doubt that they were cripples. Heads, stems, humeri and even entire birds were common in the drift cast up on shore but in many cases I found shot marks showing on the bones.

The building of the cut-off here has shut off the salt water from the lake while the water from Bear River has freshened the entire bay. Only in prolonged southerly storms is the heavy salt water driven through the cut into the bay.

Hunters told me that the ducks
here are mainly deep water ducks
Redhead, Bluebills, Buffleheads,
Canvasback etc. late in the season
when it freezes over above, pen-
winged Geat are very abundant.
Six miles north of Promontory Point
a point projects into the bay
known as six mile point over which
there is a constant line of flight.
The man said that in his hunting
he always shot his birds so that
they fell on land. It is possible here
to get twenty five ducks in an
hour or two. It was struck by
the fact that in crossing the
cut-off, the work of man the
birds rose out of range but
across the natural point they
came at their usual height. This
would show habit which has
become hereditary through
many years.

Along the shore was a long
windrow of cast larval shells
of *Ephedra* - 3 inches deep and
from two to thirty feet wide.
This band in places double
extended along as far as I
could see and was composed
of an incalculable number of
individuals. a say cast-off skins
but numbers of pupae were

present end of the track was
noticeable and their decay. I found
a few larval *Arctostaphylos* among
them but could find no beetles.

It might be that careful sifting
would disclose peculiar species
developed in fact in these. The
flies themselves were abundant on
the damp rocks where they were
moistened by the spray and wash
of the waves.

Chrysothamnus was in bloom
all along here and I collected
a good many insects. About nine
when the sun was high small
bees, rather inactive were common.
I saw numbers of large flies
which kept the *Arctostaphylos* working.
Not many butterflies and small
hoppers were not common. I saw
two species of grasshoppers one with
yellow and red with blue wings the
other eluded me. A few large beetles
of two species, which

After following along the lake
shore for some distance I went
inland up a steep dry gulch
into the mountains. Great growths
of sage were here and at about
five thousand feet cedars appeared
above this point the gulches were
rather moist and mountain
maple now nearly bare though

a few retained their leaves, were common. Toward the summits of the hills the cedar made a dense growth of considerable size, some were fifteen feet tall. ^{as good many} had been cut for posts though the trunks were gnarled and twisted. I saw half a dozen which had been cut many years ago.

One gulch was spring piped into a trough for cattle. Springs are common along on the eastern slope. Most of them are good water on the slopes but near the lake shore are some that are warm and saline.

Near this spring I ran into a flock of Evening Grosbeaks, juncos & Pine siskin were common. Also the cedars were the characteristic bird of that belt. The Pinyon & Woodhouse Jays, & grey titmouse. Almost looked for *Saltator*.

I on one high slope I could see over the hills of Bear River and with the glasses could make out the bays and the club houses on the river itself. Practically all of the flats are on the eastern side.

Returning to Promontory Point I found the lake shore here rocky - the peculiar crustacean[†] with black protruded eyes and slender almost

[†] *Artemia fertilis* varil

transparent body was very abundant about rocky point. They swam about continually - sometimes attached in pairs. Many of the females had large sacs of eggs developed with a projecting tube through which they were expelled. Collected a number. An alga was common and specimens of it were common. Fremont island lay right off shore here and stood out plainly. I wondered if General Fremont crossed from this point perhaps on a raft of cedar logs.

Saw one *Callospermophilus* today and numerous signs of others. Coyotes tracks were abundant and the animals are said to be destructive. Two Jack rabbits were seen.

Reached Salt Lake at seven and was busy gathering for insects etc until about eleven.

October 15, Thursday.

This morning I was busy until noon with the specimens secured yesterday at Promontory Point. Put in part of the afternoon writing up my notes and saw Mr. Bigelow regarding duck matters in the afternoon. Rode with him & Mrs Bigelow up Golden Canyon in the evening and had dinner at Miss Kiezel's. The colors in the canyon were beautiful this evening and the

air 2 harp, not cold. Defelt no need of
an overcoat however. Found a jolly
crowd at Miss Kizel's cabin and had
a pleasant evening. The cabin was
~~desolated~~ furnished with knickknacks
and curios from all over the world.

Returning to Ogden at dawn I did a
little packing and then becoming
interested in a paper on Potash salts
& salms in the Great Basin Region by
G. I. Young worked with it until
half past three.

October 16, Friday.

This morning was up at seven
finished packing my things and then
had breakfast. I find that after spending
several days in one place it takes
me an hour or so to get my stuff
packed properly. Clear and sharp this
morning. Sent my baggage over to the
depot and left for Corinne at 7:12.

Noticed in travelling along that
the change in color in the lower
rude a great difference in the
landscape. Clumps of trees that before
have passed unnoticed as they merged
into the general grey of the landscape
now stood out with startling distinctness
that their leaves have turned yellow.

At Brigham I found that Mr. Burgess
and Mr. Keyser were going up to the Out
too well as Mr. Hart mayor of Salt Lake
City and Mr. Pardee a lieutenant

in the army. Mr. Pardee had known
Dr. Mearns at Zamboanga in the Philippines.
He had returned from a long trip
and I found that his studies matched
up very well with mine as we walked
down the levee to the wharf. The large
launch the "Lark" made very good
time going down though we had a
little trouble with some spark plug.
Very few birds in sight also. The
river now was supposed to see me
Snowy Plover.

The water in the river was very
high and from the launch I could
see out across the river to the side
which I have not been able to do before.
Instead of merely a view of the
bank on either side I could see
clear across country and then
some one asked me what a vista
in sight. cross the flats was I
had to look twice before recognizing
it as Pennsylvania State.

at Duckville we had dinner
and then I straightened out some
of my things. Had a few specimens
to be done and toward that
walked up along the willows on
the south bank of the river to the
quail house at the Bear River Club.
Caught quite a few insects in the
salt grass. Found that mosquitoes
were quite bad still.

They have been getting many
chicks here. Wooden decoys are used
but the birds are scarce. It is some
in to them well as they show 1 or
an experiment they have painted
them with a camp black mixture.
Says Mr. Davis and he promised some
data again on the sick duck which
was picked up and cured.

Don's engine brought out a motor
known as the Aero Trust which
operates on a large aluminum fan at
the stem of the boat. His was
supposed to act as the propeller, but
we found it not very successful.

October 17, Saturday

This morning, with Lou
Went for guide I went out onto
the north shore of North Bay going
out of buoy 4. The sky was
was lightly overcast during most
of the day and until ten a
strong wind blew from the south.
At this hour the wind changed
and came from the north west.
There was plenty of water in No. 4
now and North Bay was well
filled. The water in the bay was
cloudy with mud as in the river
showing that it was fresh water
which had come in. In the summer
it was clear. Toward the north
shore it became shallow and for

a short distance we had to
push the boat sidewise onto the
shore. The water here was
clear, unpushed by new flow
from the river and was quite
saline to the taste.

We built a blind here of
grass supported by willows
hauling the boat into the grass
and crouched it and sat down
to watch the birds. Muds as they
are called are used as decoys.
With a shovel the mud is
thrown up in lumps 8 to 10 feet
apart far enough to that space
shows between them at a distance
as birds are shot they are
placed in front of the mounds
each one with a stick in its
mouth holding the head well up
in the air.

Birds came along in small
numbers and I had some
but was not shooting well today.
Secured 20 Pintails and a Sperm
the Pintails were all large and
fat.

I walked along the shore
here for some distance and saw
a large number of dead birds
drift up but no sick ones. Coyote
tracks were very abundant all
along here and most of the

dead birds showed signs of
having been eaten - all of the
birds shot were very fat.

Kyser below me was shooting
from my sink box and his gun
roared loudly at every discharge
the noise being noticeably louder
than that of game shot from a
blind.

About three or four flights of
Pintails set in from the north
and all passed over me out
of range. The wing sound and
sight in the middle of the bay
occasionally a single bird
usually a female returned to
swing in to my decoys. Later
many Mallards were mixed
in with the Pintails. Hundreds
of them passed over.

Pelicans and Cormorants have
left now that shooting has begun.
Returned to the clubhouse about
six and spent the evening in
listening to the talk. As most of
it was about the day's shoot
it did not profit me much.

Found a male Pintail in the
duck house which had retained un-
mottled the pattern on the head.
They were bleached to cream color
and in the crown was square
patch of dark brown showing new growth.

October 18, Sunday.

Today was warm and clear with a moderate north wind blowing.

Yesterday I brought in a wing-tipped Pintail female alive and placed her in a dry land pen east of the boat house. This morning I gave her a solution of the alkaline scale scraped up from the flats. In the afternoon Mr. Russell gave me a wing-tipped Green-wing which he had brought in to me and I placed it in the cage also.

Gathered a hundred duck stomachs in the duck house and put them up in formalin. Was busy with various odd jobs nearly all day. Was out along the river for a time but did not learn much of importance.

The Hunters are bringing in two hundred or more ducks a day now. Each man is allowed to shoot 25 birds under the law but as he has a guide with him he shoots 25 for the guide also. So that the "limit" is commonly spoken of as fifty birds.

The aeromotor engine was tried out again today and made fair speed but could not compete with the Edmunds.

October 19, Monday.

Could get no guide today for a long trip so spent half the day in the duckhouse collecting starwacks. The ducks brought in are in very good condition, but and heavy. There is the reason I suppose. Pintails were called because of pin feathers. The females especially but they are in better condition.

Unusually shooting is good for the first time in some days of the season and this is a fact until about the middle when a flock from the north sets in. This year however the shooting has been good straight through and there are great numbers of ducks here. Water is high and food abundant.

Last year the water was much lower at this time and sick ducks were still common at this date. The men used them frequently for decoys. Now however they have entirely disappeared. Mr. Kysel reported a sick Hovitch to me today but otherwise I have heard nothing of them. The River is running full now of fresh water.

River water is used by the guides as drinking water and some say that it gives them a diarrhoea especially when they first start using it.

October 20, Tuesday

This morning I went with Walt
Hansen as guide down to Slaughter
Point. We went down the river out
overflow 3 and then ~~out~~ Ben's
overflow and down the bay.
A very swift current was running
out of #3 and a plentiful
supply of fresh water spread over
the flats. There were quite a few
dead birds along but I could
find no fresh ones and no sick
birds were observed. A few seen
helpless on the flats were cripples
from shooting.

I spent part of the day in
a blind on Slaughter point in
watching the birds and in
doing some shooting. There was
quite a flight down the center
of the bay but only occasional birds
decoyed in to our mounds. There
was a good many Spermills
about but most of the birds that
came in were green-winged teal.
The day was warm and clear
with a north east wind. I
shot three Spermills, 2 Mallards
and 14 teal. A number of godwits
were seen on the flats and three
were shot.

On returning we crossed
the flats on the mud to the

Months of no ice and were able to row all the way. The area here in September was entirely dry.

On coming into the overflow after the long row across the pond for ten minutes it was difficult to row in the water. No accustomed were our muscles to the heavy pull across the shallow.

A shot fairly well today.

October 21, Wednesday

This morning I spent in making skins. It was cold and draughty in the barn so moved out on the south side in the sun. The birds were all very fat. The 2 pombills in particular were exceedingly plump and all look considerable taken in preparation.

After dinner I went up and visited since I have met the Bear River club who gave me data from his diaries on the water situation in previous years.

In 1910 the club was not found at all.

On July 30, 1911 the first sick birds were noted. None were buried this year.

The first entry for 1912 is that of Aug. 22 when 1st were buried.

an entry made on Aug. 23 states that according to Mr. J. P. Bigelow 5000 birds had been gathered at the mouth of the Weber river the previous day. It was decided to clean up Bear River as the dead birds were believed to infect this. Davis was placed in charge of this. Following is summary of the birds burred. Helpless birds were killed.

Aug 22, 1912			61
Aug 29	buried by Joe Cook & men	to this d. to	250
"	"	Jonathan "	4464
Aug. 31,	9 men between #1 and Mud Point		478
Sept. 1, 15	" #2	Seal Pass	4183
" 2, 11	"	Seal Pass & Ladies Island	4331
" 3,	several	East End North Bay to #4	2216
" 4,	11 men	between Canal ^{navigation} & Sulphur Creek Can.	2443
" 5,	13	" #3 to Bigelows Point	3831
" 6,	11	" Bigelows Point & Lighthouse Id.	5161
" 7,	9	North Shore North Bay	400
" 8,	6	North Bay between Canal & Long Pt.	500
" 9,	8	Inland Neck & East Pass	1500
" 10,	6	Kendalls Bay & Swyfoots Pt.	1386
" 11,	6	in East Pass	993
" 12,	6	between Mud Point & Davis Id.	1540
" 13,	6	North Bay east of Bronn's overflow	850
" 14,	7 men	Kendalls Bay to Long Point	900
" 15,	7	Mud Point to Ladies Id.	2340
" 16,	8	#3 to Lighthouse Id.	1665
" 17,	5,	East End N. Bay to Spombell Id.	545
" 18,	6,	Bronn's overflow to Kendall's Bay	547
" 19,	4,	Kendalls Bay to Swyfoots Pt.	250

	brought forward	43834
Sept 20	2 men E. end N. Bay & Kendall's Bay	368
" 21	" " Kendall's Bay to Surfords Pt.	260
	Total for 1912.	44462

On Sept. 4 Mr. Davis notes that there was talk of opening the season on the 15th in order to drive the birds out but this was not done.

On the 6th he says that never has he seen so many sick and dead water birds & plenty of fuel. At least 150,000 dead birds on marsh and 1,000,000 in clucks.

On the 7th in North Bay he notes clucks in much better condition & not many sick. Water higher in North Bay than for years because of Sulphur Creek Canal.

The birds collected on the 13th were mainly old birds.

No assistance was received from the state in this work in 1912.

In 1909 Mr. Davis said the shooting was fine with plenty of water. He thinks that he could have killed 200 a day through the season. The shoot for the Bear River Club for 1913 was 12,000.

On fall days averaged 105+ a fraction for every day that he shot killing 12,000 for the season. Another year his average was 84.

Following is the record for 1913.

several sets were noted in August. On Sept. 4 Joe Cook reported over 600 out of # 3 when the water had recently flooded the flats. 3 men were furnished the state for part of the time to help pick up the birds.

Sept 7, 2 men	intail neck	195
" 8 5 "		400
" 10, 10 "		1750
" 11, " "		2500
" 12, " "		3540
" 13, " "		2311
" 14, " "		3100
" 15, " "		3417
" 16, " "		3388
" 18, " "	east end No. Bay	800
" 19, " "		2370
" 20, " "		4000
" 21, " "		2180
" 22, " "		3000
" 23, " "		6000
" 24 " "		4000
" 25 " "		2880
" 26 " "		1700
		<u>46723</u>

Mr. Davis had said that he would give me later in the number of birds shot at the club in previous years but said that Mr. Bigelow could not

find the book containing the information. Mr. Davis is willing enough to give it but I believe that the others do not care to have us know this as the kill was too great. In the early years the club members would not permit such a record to be kept as the kill was too great. From one book I saw records that in 1913

in 11 days shooting J. C. Neely killed 644
 " " " E. H. Hurlburt 450
 " " " (in 1914) The following dead birds were gathered in North Bay.

Sept 23	700
" 24	1700
" 25	2100
" 26	2800
" 27	600
	<hr/>
	11900

This figures I do not consider absolutely accurate. After leaving Davis I went up to the Bear Run Club and met Mr. Neal joyfully. He was greatly disappointed that we were not to have a shoot together October 22, Thursday.

Today I spent in cleaning out my chest and getting rid of superfluous weight as much as I could. Packed a shell case with duck stomachs to

send in by express and
had a yummy sack full of
small packages.

Clear and bright all
day. The shooting remains
here about the same.

Burned off the grass
around my pens on the flats
as best I could but was
not able to clean it all off as
it was green.

Went up and down the
river this afternoon a few times
with an Evinrude motor. This
would be a fine thing in
future work here as it would
save much time & labor. The
motor could be used to the
mouth of the overflow and
then taken off and the same
boat taken across the flats.

October 23, Friday.

Cold and windy this morning.
Strong wind from the northeast.
Was up at five fifteen & brought out
out a few things and left for
Corinne on the launch at 10.
Made the trip in an hour & fifty
minutes. It was somewhat warmer
when the sun came up. Got some
Many birds were seen along the river
with the exception of a few ducks
and Night Herons. The only notable
thing was a single Snowy Plover
sitting in the sun under the
shelter of a high bank.

I saw Ray Bosley in Corinne and
rode with him as far as Brigham.
He has begun High School here.

Andrew Jensen guide at Dixville
has told me several times about a
duck - that he has with a bill like
a duck and long legs like a snipe.
I tried to see it but was not in
hour between trains in Brigham but
could find no one at home. I suspect
that it is *Dendrocygna fulva*.

Met Mr. Benson in Brigham &
he introduced me to Judge Taylor.
The former told me that Chambers
had a telegram for me saying that
there were 25000 dead ducks in
Julian Lake.

Also met Mr. Kilby from the Bear River Club.

He arrived in St. Louis 8:00 and
in the evening 10:40. Registered at the
Hotel Morrison and left 12:00 for
Bamberg Electric arriving at one
o'clock at the Finch Cafe and
Mr. Finch confirmed Benson's statement
regarding the sick birds on Salt
Lake. Called at Chamber's office
but he was out. S. Anagnostis claims
to know nothing of the telegram.
Fifteen minutes I found him in
and he gave the message and
a mailed copy of it. Both were
dated October 6 and I have been held
up all this while. His first excuse
was that he did not know why
I was which was not so. And
later he said that he had read in
the paper that I had gone to California.
Dr. Fisher saw him the twelfth
and later he said that he saw both
of us in U. S. on the tenth. I plainly
he has held the message up. Perhaps
with the idea of keeping me here
until there were no more sick birds.
He gave me band no. 736 and
reported two bands of his own record
of 13 birds released.
Benson reported low water
condition 2 two years ago at
the time birds were sick.
Left Salt Lake at 7:00 & reached

again at 8⁰⁰

Saw Mr M^c Cormick in Upton
also & discussed B. & A. situation
He arranged for me to visit
the new state tomorrow
& killed a Cinnamon teal
and wrote until twelve thirty
took a bath & went to bed.

October 24, Saturday

Was called this morning at
six at breakfast and took the
7:00 a.m. car on the Bamburg electric
line to Bountiful. The day was clear
with a strong northwest wind.
Cold in the morning and cool all
day. A very heavy wind blew
last night.

One of the Parkin boys met me
at Bountiful and we drove to
Wood Cross where we waited until
Mr. Griffin arrived on the 8:12 from
Salt Lake. He gave all the things
wanted... little personal inside
information regarding the duck
club but was given no satisfaction
at the New State Gun Club & I
took a boat from M^c Cormick's place
and went down the east bay
to the second levee. The water was
high and as the moss was gone
I could get along rapidly.
There were a good many birds
resting in the Mallards. Indeed

Seal etc and quite a flock
on the lake front below. With the
latter were some Snow Geese.

A large part of the marshes now
burned off now and the open
was still burning today. I wondered
if this did not kill many marsh
birds. I watched along the
front of the fire as it worked
slowly through some cattails
but saw no sign of life.

I could find no sick birds
on the marsh at all though
several jingles from a hooting were
observed. One jerdwail with a
broken wing I caught & examined
and then released it. Saw an Arpat
that had died within a few days
and could find no spot marks
on it. It may have died from
the poisoning.

The water in the channels
ran swiftly and was much
clearer and fresher in appearance
than on previous visits. Water in
some shallow standing pools away
from the channels was however
very saline.

The air was very clear today
and the mountains stood out
prominently. There is no snow in
sight today except on a high
peak above Salt Lake.

On returning to the clubhouse
I found a long message call
from Chambus. He had me a
telegram from the California fish &
game commission as follows. The
account open season for ducks have
disappeared. Useless for you to come.
Will write full particulars. I

Started for ~~four~~ ^{four} beautiful after two
and caught a this Steer car for
Edwin. I found a letter from Mr.
Henshaw waiting me asking
for more details before authorizing
the California trip. Wrote him
fully and sent the coming
in writing official letters. Had
expected to leave for San Francisco
in the morning.

Ureland is roast Mallard in
the Ruel Hotel cafe and the waiter
brought me a set fin merganser
americanus.

Bought two second hand
books in St. all hair yesterday.
Origin of a hand & foot by Butler
and the evolution of mammalian
molar teeth by Osborn. The two
cost me \$4.50

at the New State Theater I came
across a number of large New
Muskat houses and took one down
to observe its structure. This house
was thrown up six feet from the

bank of one of the main channels
 and was eight feet in diameter,
 at the base of 3 1/2 feet high. It
 was composed of cut brush
 large with some sedge interspersed
 with small lumps of mud about
 as much in a mass as the
 animal could carry in its mouth.
 The outside was dry & rough
 the material was wet. I finally
 came to the nest located near
 the bottom south of the center. Two
 channels led along and out from
 it. The lower course being filled
 with water. The nest was of lumps
 and was lined with wet mud
 leaves. One was new & fresh
 while the other appeared old.
 each was joined inches in
 diameter or so. but not
 appeared small beside the huge piles
 of material.



book 14
 inches on line.

October 25, Sunday.

I left Salt Lake this morning
found the following clipping in
the morning paper.

SAYS UTAH DUCKS ARE NOW HEALTHY

Government Expert and State Game
Commissioner Find One Sick
Bird on Long Trip.

The strange malady that has played
havoc among the ducks in Salt Lake,
Weber and Rich counties during the
last few years has practically disap-
peared from Utah, according to Alex
Wetmore, government expert of the de-
partment of biological survey, who has
been investigating the disease.

Mr. Wetmore and Fred W. Chambers,
state fish and game commissioner, have
just finished a thorough inspection of
the marshes that were formerly affect-
ed and but one sick duck was found.
This lone survivor of the pestilent pe-
riod was found in Weber county.

The Utah marshes are in better con-
dition for birds than any other in the
country, according to Mr. Wetmore.
The disappearance of the disease is at-
tributed by Mr. Chambers to the heavy
spring rains, the flooding of the marshes
and the minimizing of the poisons.

Mr. Wetmore left yesterday for Lake
Tulare, California, where it is reported
that a duck disease similar to that
formerly in Utah is prevalent.

Watching The Tribune Want Ads
means finding opportunities.

Mr. Chambers
in first press
sent

I spent this day
mainly in
teaching, writing
some letters
and working
up some back
notes.

The map of
California, which
I asked was
sent out by mistake
to be a map of
Utah. Returned
it to the survey
office in

regarding the California trip in
the evening saying that it regarded
it important to both local conditions
there.

by letter
Mr. Chambers to forward letter
from California game commission to
 Ogden.

October 26, Monday.

Fair & clear today. Air was fine. I put the journal in working form for my notes.

After lunch I saw Mr. A. P. Bigelow for a few minutes. He gave me a tracing of a map covering the area from Remonton south to the main cutoff, a map measuring 84 x 72 inches & his I took to an architect and had a blue print made. Price \$1.70. Mr. Bigelow said the great effect I thought that a low dam across North Bay at about Swyford's Point would have, whether or not it would increase sedimentation & tend to fill in the bay more than under present conditions. The idea was to either make a head gate returning the water to the river at a point somewhere opposite the Duckbill Gun Club or to provide a broad spillway around the end of the dam to allow the water to run on again into North Bay. This is a matter requiring considerable thought. Personally I believe that it would fill in rapidly. They are endeavoring now to raise the water level in North Bay by bringing in water from the Malden River. I told him that I thought that eventually

North Bay would be practically filled
in. I had now the river had
worked across its flood plain
to the north & west about to
the limit and that this area
had been filled in until now
it was higher by considerably than
the southern & eastern portion. I had
now the tendency would be for
the main stream to break through
the east channel into the
Willard spur again. At the extreme
east. This could be cut off
by head gates but would give trouble.
Also told him that I considered
Klondike as the future hunting ground.
He told me that he had made
the trip around hand's End in
his mud boat and had found quite
an area of rushes killed by the
salt water within a year. A heavy
east wind blowing for two days
had eaten much of the water
from North Bay.

On a later visit when I
returned to tracing he asked what
effect it thought sink box shooting
would have on the birds. I told
him that in Bear River if the men
stuck to the limit that it would
have none as the birds would
change the line of flight after
two or three days of pouring

and that it would be necessary
to move the pint boxes to
follow them. Hitherto the line of
flight up the center of Vays has
been left entirely open. I said
that unless pint boxes were too
numerous that it would make
no difference. The birds rest
lower down and are bound to
come up for food & water. In
areas as at the mouth of the
Webb & Jordan pint boxes on the
front would make a great difference.
The birds bank then on the lake
front and then establish a flight
upland if disturbed on the
front they leave.

We also discussed the duck
food problem. I considered that there
is a great abundance of food
in the Bear River country. The
Polamotigms being among the most
important. Carp may eat a large
quantity of this. The ducks dig
for this so vigorously that only the
Glycer bulbs can escape to propagate
the plants in the following year.
In summer the water is filled
with the growth but now it is
entirely gone. He asked concerning
wild celery but I could say
nothing definite. The soil &
water here are strongly impreg-

nated with Katis & calls - 0
that it is difficult to say what
would grow here.

Also went to the Southern
Pacific office to get information
concerning the rise & fall of the
lake. Was referred to Mr. Utio,
West coast. Superintendent and
found that for another purpose
he had had two graphs prepared
illustrating exactly what I wanted.
He ordered a blue print of these
made for me and I found him
a very pleasant gentleman, a
graduate of Nebraska in 1895.
We discussed the agricultural
school problem for some time.

The graph illustrates the lake
level since 1850 which shows
the same trend is shown the
yearly precipitation for the Salt Lake
Basin for the same period. I re-
second about the rise & fall of
the lake level during the twelve
months from 1905 to 1913 inclusive.

On examining these it noted
one peculiar thing. I have been
a steady rise in the lake level
since 1905. The highest point
reached previous to 1914 was in
1910 when the water stood six
feet above the middle gauge which
is taken as zero. On the same

year the rainfall was far below what it was in preceding years and is equalled only in 1899-1900 in recent years. During 1910 too I found that the average temperature was high a trifle above the average so that evaporation would be rapid. A very peculiar state of affairs leading perhaps to the hypothesis of a shift in level in the lake bed itself. 1910 was the worst year of the duck trouble. Then because of small precipitation the water in the rivers was small in amount. The rise in the lake would force saline water above its normal and there would be no great flow of fresh water from the rivers to force it back. Therefore it would extend farther inward ~~than~~ landward than normal. Perhaps the rise in level of salt water might raise salts held in the soil back away from the water itself through the action of ground water. 1910 then must have been a period of salinity in the bays. The ducks accustomed to food & about here were subject to this new condition & were affected. Went to bed at eleven.

October 27, Tuesday

Was up this morning at six
and breakfast and then drove out
to Belnaps place at the mouth
of the Weber with a single
horse & buggy. It was sharp
and frosty at first but after
sun when the sun came out
it warmed up in good shape.

Western Meadowlarks were in full
song along the road.

Farmers were busy mainly in
hauling cuts to the sugar factory
and cat tomatoes to the cannery.

Arrived at Belnaps shortly
after eight and we put my pony
in the barn and drove one of
his horses down to the North
Shore Gun Club.

Not much change in the
trip across the flats. The
water is a trifle lower than before.
Shooting has been poor along here
for several days though I saw
considerable areas where ducks
had been feeding. There was very
little flight today. A few Mallards
were up in the afternoon & a few
Pintails were flying.

I hear that Jim Belnaps shot
a banded Pintail here & sent the
band in.

A flock or rather several

small flocks of least & snow geese
came down and a man flushed
one down at over 50 yards. I
secured its skull. They make a
great noise in flight. This gentleman
Mr. Justin H. Garner said that he
had known of a ~~good~~ few sick birds
for a number of years and finally
placed the first date on which they
were observed as 15 years ago -
a few only were observed in the
patches of Bayonet grass.

Mr. Belnap says now that
he personally remembers seeing them
ten years ago. Then the lake was
down and they found a few
in a patch of Bayonet grass far
beyond the present limit of vegetation.
These birds were very fat.

I collected a shell case full
of ooze & mud from about the
roots of Potamogeton small patches
of which were still growing. This
is to be examined for Nematodes.
In collecting it I rolled up the
water plants and kept as much
ooze as I could as possible. Also
collected three pint jars filled with
ooze from different localities squeezed
from the roots of the Potamogeton.
This to be preserved and examined
for Nematodes likewise.
After considerable search

We found a sick Pintail and a sick Ruddy in a patch of Bayonet grass opposite the club bordering a channel two feet deep. This is the same place that I secured the green wing on my last trip and I make no doubt that stragglers will be found here unless it freezes. The water here is near the level of salt water, and is found to be more alkaline or saline than that above. The hunters here complain that the birds here are not so fat as formerly due undoubtedly to the effects of this water. The water from the Web at its mouth can now furnish so much as that of the Grand Bear ^{area} is different in topography. The Ruddy I think is recently affected: it voids excrement 5 times each time of a greenish color with much white renal matter. The last time the faeces were almost wholly white. The Pintail voided once only & then in the evening. With each of these birds at the hotel I opened a small vein near the distal end of the ulna and made a smear of the blood. This was examined by good reflector light ^{microscope} for larval Nematodes but none was found.

I could make out the copulas
clearly. The birds were kept alive
during the night.

It was not during the drive
in to town. Work until 9:30
then went to bed. Sleepy.

October 28, Wednesday.

This morning I spent over two
hours in preparing a solution in
which to preserve the ooge collected
yesterday used
Richmond Mercury

231 gms
2000 c.c.

to this I added Picric acid,
glacial acetic acid & formalin.
It stained my hands considerably for with
the Picric acid. The Richmond
refused to go into solution more than
half of it remaining in dissolved.
When I poured it over the ooge
a large amount of gas was
generated and I let the whole
stand for half a day before closing
it. Boxed the two jars containing
the solution up and shipped them
in by express marked N. W. H. in the
evening.

In the afternoon I examined
the blood of the two birds brought
in alive for *Nematodes*. Diagrams
follow

Had dinner with the Bigelows
in the evening and met Mr. Clarence
Admy of Corinne an old N. Y. Man.
We talked quite a bit about the
creek.

In 1910 he lost a number of
cattle from anthrax and has
learned since that 16 years
ago was another outbreak in
Corinne. He had held the opinion
that the ticks were suffering
from this trouble but did not know
it is not.

October 29 Thursday

Worked this morning on my notes
Called up Chambers in Salt Lake
and asked regarding the letter supposed
to come from the Game Commission in
California but he knew nothing of it.
He had some California Quail which
had died under peculiar circumstances
and sent me three by express for
examination. Thirty-two birds had
been found in a small area somewhere
in Utah County. Two had been dead
for several days, some were fresh
and five or six were alive but seem
stupid and died. All were along
a little spring run in a farming
area. He suggested that they had
eaten poisoned grain put out for rabbits.
The birds came at two and
I spent the afternoon with them. They
were all males in fine plumage -
Externally they showed no signs of
violence. I skinned one & ~~skinned~~ the
skin, one of the others was skinned
and the other picked. Could find
no marks on them anywhere. The
crops were nearly empty. Two contained
quite a few clover leaves, and the other
the leaf only. There were present seeds
of Amaranth, a grass and a Chenopod.
Nothing out of the ordinary. A mucus
ran from the mouth.
Dissection showed that the

limbs were congested with blood
and the vein that gathers blood
from the walls of the heart was
distended. The liver along the
ribs was abraded suggesting
that the birds had been killed
by squeezing. All the organs were
softened & brown so the birds
were dead at least two days.
No sign showed of poisoned grain.

Chambers was in in the evening
discussing the matter - I could
suggest only that he investigate
the water supply.

October 30, Friday.

Worked part of the forenoon on my
notes and then wrote out my expense
account for October. Will not be large
this time.

Received a letter from Dr Fisher asking
me to collect a pair of Western Meadowlark
and of Brewer's Blackbirds to be mounted
for the exhibit at the exposition.

Got six telegrams came authorizing
work at various points in California
with instructions to start at once.
Packed my stuff and got things in
shape. Got out at 12:30 and slept
well.

October 31, Saturday.

Left Ogden this morning at 6:30
on the Southern Pacific. Had been trying to
reduce my outfit but find that I shall

have two pounds; 50 lbs excess to
Bakerfield cost me \$3.00. The railroad
fare was \$35.75 and the Pullman to
San Francisco \$5.00. For these I used
transportation requests.

It was clear & pleasant all day
cool enough to feel comfortable to me
though I saw many of the passengers
wearing overcoats. The strain was well
filled as today marks the expiration
of many round trip tickets. I pleased
lots of passengers all around. I met
one I doth know who turned out to
be Dr. J. W. Blankinship, a botanist who
is a specialist in smoke injury to
vegetation. I found him an interesting
talker. He came from some agricultural
school believe just but held position at
the University of California. Then was
attached to the faculty at the Montana
Agricultural College. A lawsuit in which
he was called as a witness opened his
eyes to the possibilities of the smoke injury
question and he spent a year in
study in Germany and claims to have
systematized the study as a science of
which he is the sole exponent. He had
been working all summer in Utah in
Coele Valley for the smelters. He says that
in ten years he will be able to return with
and take up systematic work again. He
is small, wiry and rather nervous
so that he cannot sit still. He 5 years

years' old has grey hair (no sign of
baldness) and the grey van. light, bright
ken blue eyes.

As far as Promontory Point I saw
little of interest. Beyond here the train
ran on the trestle cut off on a trestle.
The water was not clearly clear here.
Along the way were many ring-billed
gulls sitting on the water or flying.
To my surprise I found that
cared grebe common here along the
line of the cut-off from there to the trestle.
I saw several hundred of them.
They sat very high on the water and
I noticed that in dives they did not
get under quickly and bobbed up to the
surface almost immediately only six or
eight feet away. Several frightened by
the train went off over the surface
using legs & wings. Cannot imagine
what attracts them here unless it is
the little *Artemia gracilis*, the crustacean.
They cannot travel the water here and
in birds of their habits it seems
most strange that they should occur.
I watched carefully for dead birds but
saw none. One can imagine the surprise
of a young migrant on scaling
down out of the air and striking this
solid water.

A few greater Scaup Ducks were
seen also.

On the western side low level areas
were white with crystallized salt
and as their elevation was slight
steady winds undoubtedly come from
~~with~~ intervals with the heavily
impregnated saline water. These flats
though they were level had a
different appearance than the
alkaline flats of the river. Leltas the
white was clearer, the surface
apparently smoother and the deposit
heavier and of a different character.
Rocky points projected at intervals,
islands in course of high water.
As the land became elevated more
& the growths of *Sarcobatus* appeared
and only the hollows showed salt
deposits. The general character of
the country resembled that around Kilton.

In passing it had a view of the
Hogup mountains from the south they
appeared dry & arid with some
cedar growth on the upper slopes.

Near Elko the train entered the
Valley of the Humboldt river and
followed down its course until it
became too dark to see. The slopes
above were rolling in places covered
with cedar which at times were
interspersed with Digger Pines. The
river itself was narrow shallow
with considerable fall. The Benet's
were cut straight from 4 to 210 feet

just deep. A dense growth of willows
grow entirely leafless round the
flood plain all along.

Many of the benches and slopes
were covered with dense growths of
sage. If one could graft some small
fruit onto this sage and make a
success of it thousands could be made
in arid regions of the west. Dr.

Blanchard said that sage has
been likened to a tree with only the
tip projecting above ground. The roots
run greatly below the surface.

All present grafts are made
successfully only with closely allied
forms. With increased knowledge
of the saps and juices round
it seems that one might
grow successfully upon some
hardy root.

~~During the~~ The night it
was fairly light and coming
through the snow beds below
traces of rock and had a
glimpse of bare points and
steep slopes. It was cold
coming down here.

A few Magpies were seen along the
Humboldt. Ravens were noted in
this together on the high slopes and
Western Meadowlarks were common.
Outside of these I noted only one
Sparrow which I did not recognize.

into a ferry and we crossed to
Port Costa. Herring gulls were
common. From Port Costa the
trail followed near the water
edge into Oakland. High rounded
hills brown and bare ran up
from the water. A few slopes contained
dark thickets.

The warship was anchored
immediately in the straits of
Carinez. At Oakland I left the
train and crossed in the
ferry to San Francisco landing at
the foot of Market Street. Herring gulls
largely I believe were common
again and followed the boats
for refuse.

Checked my baggage at the
L.P. Ferry and walked up town.
Tried to call the game commission
by phone but could not reach them
so knew that I would have to
remain until tomorrow.

10:30 Arrived in San Francisco at
one hour late.

Took a car on Market Street and
rode out to Golden Gate Park. San Francisco
is hilly. The business part of town is
entirely new but otherwise there is little
sign of the fire. An occasional fire escape
shows on blackened foundations.
The park is large and extensive
with many fine growths of trees and

shrubby. noted *Veronica ciliolata*
as not characteristic. Many, I suppose
has been seen. In ~~the~~ place was
a little colony of eastern Fox squirrels.
I saw five.

Zoological garden contained
a herd of ostriches, an ewe and
several large mammals (Ungulates).
The male Ostriches had the front
of the tarsus with the large scales
colored a bright red, thing which
I have not noted before.

Bushlets were very common and
I saw Pygmy Nuthatches, Chickadees
& a number of others.

Returning to view at three I
visited the California Academy of
Sciences located now at 343 Sansome
Street was fortunate in finding
Dr. Evermann in. He gave me some
grapes that Nelson had sent up to
him from his ranch down below. The
collection of birds skins was stored in
quarter units cases made of zinc &
impregnated. Evermann estimated the
cost at about \$43 each but I think
that is too low. The skins were
all finely prepared and of those
represented there were large series.
Primarily sea birds were especially
well represented. I saw one California
specimen of *Mareca penelope*. Most of
the series were of Beck's make.

late registered of the Alamo
and spent dinner with Dr. Evermann
spending the evening with him.

He is now director of the Academy.
The Academy have their journals
invested in the building of the
Commercial on Market Street which
brings them in \$70,000 yearly in
rentals. The whole building is
rented to one man who sublets
it. In Golden Gate Park they
have under construction a new Museum
the wing the cost \$100,000 has
been donated and is nearly completed
and they hope to build the others soon.
A large number of groups are
now ready to be placed in
exhibition at once. Mr. Rowley is
working steadily on them.

The mammal collection was
rather small. The Galapagos turtles
were present in great series the
whole being stacked up in racks.
These were all skinned out &
dried with the heads attached
to the shell. Van Dyburgh's report
is just being mailed though I note
that it was dated September 30, 1914.

The society at present is interested
in the Valley or Lake Park of Southern
California. About 500 of these animals
were found on the Miller & Lux ranch
near Buttonwillow when they are

said to be 10,000 worth of damage
a year. Miller & his have asked that
the herd be reduced in & have offered
to capture the animals & deliver them
free on board cars at Buttonwillow.
About 150 were captured but many
escaped. and others will be later.
This is the only locality from which
they are known now. In order to keep
the matter out of politics the
Academy is to distribute them instead
of the Fish Commission.

November 2, Monday.

Was up and shaved this morning
at seven. Had breakfast and then
went down to the California Academy
for an hour where I spent most of
the time in examining the geospizae
of which they have a beautiful series.
The species *Coccyzus agassizii* was
well represented. It is like geospizae but
has a long slender bill with more
curvature.

Mr. Hoopes was not in and
I missed seeing him. Was introduced
to Mr. Sargent apparently an executive
assistant.

The storage cases have a
catch that does not require a key.

with hinges
The hinges
... rest just raise out and up to open.
one catch at each end of case.

Mr. Evermann outlined to me
some future plans of the Academy.
It is hoped to raise a fund
of somewhere around a million dollars
which should yield an income of
100,000 yearly to be devoted to
field work. It is hoped to make a
complete survey of the South Pacific
island, zoological, ethnological,
botanical, etc., a great piece of work.
I would rather like to get in on
it myself. Besides this the
Academy hopes to establish a childrens
room similar to that at the Brooklyn
Museum, to have loan cases
containing little groups of birds
that may be put out to the
schools and to give weekly
lectures adapted to different ages
of children. The library too needs
funds.

Mr. Evermann took me down
to room 734 Mills Building about
nine and introduced me to Mr.
J. S. Hunter, assistant to Mr.
Ernest Schauffle Executive secretary.
had a met Mr. Schauffle. 20,000
sick & dead ducks were reported to
the commission on October 16 by
G. E. Schindler, Vice president of the
Kern Co. Land & Development Co. We tried
to locate this gentleman but found
that he was out of town. Two
warblers were sent around the

South shore of the lake to investigate & reported finding very little. Mr. Hynes reported that when the hunting season opened on October 15 the sick birds disappeared as they were shot & sold by the market hunters. In 1913 this district was quarantined against hunters on the pretext that it was dangerous to beat the sick birds.

She had intended to complete the work on the malady begun in 1913 but had not heard of the trouble in time. Mr. Clark who carried on the work is now in business with his father & has dropped science temporarily.

Mr. Hynes called up the Fresno office to get information but learned very little.

Mr. Hynes was quarantined with Merrif Cary and given on the sea-going expedition to the Galapagos. He characterized albin Stewart as a shirk & told various stories regarding him which I have heard before. Mr. Evermann told me that Stewart wanted his expenses while working the botanical report. Mr. Hynes promised to try and get this for him but was unable to do so. In his report he changed his Catalog numbers about 20 that

it is difficult to coordinate his published work with the specimens. When asked for the date he says that he will send it when he receives the money for his expenses. Evermann threatened to send a copy of the whole correspondence to President Van Hise of Wisconsin, when Stewart is now of the faculty.

Had lunch with Hunter & was introduced to Pres. Finch.

As soon as I could I went across to Oakland and took the car to Berkeley. The Northern Pacific Company operates the Colby system and gives rapid service. The University of California is up a short distance from the station and has a beautiful campus & crossed two small streams and everywhere were great clumps of live oaks and other trees casting a dense shade. Buildings all rather moderate in size were scattered about huddled by the trees and winding roads and walks led to them. After several inquiries I found the Museum of Vertebrate Zoology a building of sheet iron of good size. I found that Joseph Grinnell & Walter P. Taylor were in San Francisco as I had feared. However in the office upstairs I found Tracy & Steyer and also met Lee Dice formally.

with, the fish commission whom I
never know in Washington. A
reference collection of bird skins
was raised in parts in cases
similar to those in the California
Academy. The catch was different
being a steel bar that moved into
a hook. In series of Californian birds
were represented but not many
extra state forms. The skins were
all very uniform.

Observations the large mammals from
the foxes to the bears were in two
large rooms hermetically sealed all were
tanned and hung by hooks from the
racks which extended out from the
walls leaving an aisle in the center.
The skins were hung on S-shaped
hooks which were supported on
the eye holes. Another room similar
in being hermetically sealed had shelves
arranged along it and in here were
the skulls. They had a fair collection
of bird skeletons - a few species in each
group. I did not have time to examine
them closely but noted that they
were entirely disarticulated. They
were all in small boxes or bottles and
stood on shelves with letters tags
below them. This is not a bad
arrangement but I should think that
in time they would get very dirty.
Had to leave hurriedly to get

a car for Oakland. Mr. ... is
curator of birds here ... He
a young man with dark eyes & hair
of medium age and very pleasant
to talk to.

Coming across on the way
I noted four or five that may
have been *Colaptes auratus* flying
in the air. Herring Gulls were abundant
and I watched them soaring &
gliding. I noted several times
that when their momentum was
checked in sailing that the feet were
lowered until new momentum was
gained by flapping their wings. This
would throw the center of
gravity low and would give
more stability as the birds
tend to sink. Acting as the

weighted keel in a boat or better
as the weight used in mechanical
toys to hold them upright.

Caught the Owl on the S. P. which
leaves San Francisco at 6:00 P.M. and
the Oakland pier at 6:25. Had dinner
and went to bed shortly after eight.
Reached Bakersfield at 2:10 so that
I was up by a quarter of two.

Registered at the New Southern
Hotel. Received two letters from
Fray but no other mail.

November 3, Tuesday.

This morning was clear & bright. Was up at seven. After breakfast called Sipton Matthews deputy warden at Wasco. Had to pay for a messenger to get him to the phone. He said that he considered Mamoon as the best place to go. It is north of the lake and twelve or fifteen miles away. At Concoran the roads are bad toward the lake making it difficult to cross. He said that conditions were the same all around the lake so that it made no difference when it visited.

A few minutes later Mr. A. D. Ferguson in charge of the office in Fresno called me and said that he had directed Mr. Matthews to join me in Mamoon and to help me in any way that he could. Also to call up the Fresno office provided it needed the assistance.

I tried to get some information regarding the check trouble in Redlands but as today was election day I could learn nothing. Could not even cash a check as the banks were all closed.

Wrote on notes for part of the time.

Left Redlands at 3:05 on the Southern

Pacific. Changed at Goshen Junction
and crossed through Norfolk
to Reno arriving at 6:15.

Saw a good many Meadowlarks
and Red Wings, one Sparrow hawk
but nothing else.

The country along was
level and open rather dry &
clusty. A winery located at
Norfolk gave off a strong
musty odor.

Registered at Hotel Erey in
Reno.

November 4, Wednesday.

This morning about mid

Mr. Siplon, Matthew, warden of
Kern County came in and we
spent some time in talking. We
expected to find Mr. E. W. Smalley
warden for this district here
but he did not show up.

I sent off my expense
account for October this morning
about twelve when Mr. S
& Smalley did not appear we
left for the lake in Mr. Matthews
Machine. Drove west for a
mile or so and then straight
south into Stratford a small
settlement on a branch of the
Southern Pacific. Formerly the lake
came up to a point below
Stratford as it is shown in the

but the water has been steadily
diked back year by year until it was
receded 10 or 12 miles on this north
side in as many years. In the past
two years it has gone down two
miles. As fast as the land is dry
it is put under cultivation, mainly
into Raffer corn & alfalfa. The water
from the lake is being steadily pumped
out for irrigating purposes which
tends to lower it still. An addition
the King River has been diverted to the
San Joaquin directly & does not flow
into the lake. The lake formerly
drained north into the San Joaquin
but now has no outlet. It has been
thirty years at least since it has
been high enough to go out through
its outlet so that the lake has
been gradually drying up for years,
a short time before 1907 it was entirely
dry and the whole bottom was farmed.
Now boats running on the surface sometimes
pass over farm machinery which has
been left in the fields. The area of the
lake was greatly reduced last year but
the winter water helped fill it again.

At first I low dykes were thrown
up but now they have been raised to
12 x 15 feet high on a broad base. The
black soil however the old lake bottom
melts right down when it becomes
saturated with water. As the lake
is near the top of these

By the good roadways and we
went out one for nearly three miles.
The ditch on either side was in
places filled with water & in
places dry. A dredger was busy
out in the lake throwing up another
embankment to cut off another
section of the lake. Hearing the car
finally we got out and I walked
out for some distance along the ditch.
Its surface kept getting lower & lower
and until finally it was level
with the surface of the water.
Large flats extended on either side
covered by from one to three inches
of water. The mud was soft on
top but the bottom was firm. I
sank in to my ankles but no
farther. It was not bad walking
though the mud was very sticky.
~~The~~ It is black in color and almost
mucilaginous in its tenacity, a true
gumbo. On my boots it stuck
fast and I was five minutes in
washing them off in preparing to
start home and it absolutely
refused to brush from my clothes.

The water was brownish in color
clearer as I advanced into the
lake but greenish around near the
shore in the shallows. Its temperature
in the shallows was near 75°
as nearly as I could judge.

In the shallows it appeared
my spool and was covered with
a ~~green~~ brownish scum filled with
bubbles. The plants had a strong
odor in the sun. The water to the
taste was distinctly saline
with a strong tinge of alkali.
A slight current set to the westward
due probably to the light northeast
wind that was blowing.
A strip five hundred feet wide
bordering the lake shore was soft
black mud scarcely above the
surface and this would be
covered with the wind in the
proper direction as the water
would shift.

It was hot in the sun
the sky was clear and it
perspired freely. A heavy mirage
or wave of dancing heat
hung over the lake so that I
could not see far. Matthews said
that at a mile distant it passed
out of his sight and I could
make out birds only a short
distance away with the field glasses.
As we came out onto the levee
we saw a sick Pintail & a Spoonbill
in a ditch along with the spoonbill
swam freely but the pintail
was helpless and I walked around
and caught it. It sat in the water.

just at the shore and as it approached, tried vainly to move in order to escape but was unable to stir its body. The feet were white with renal matter; chalky in its texture. The wings hung loose from the sides and the birds could barely move the legs. One foot had a bifurcated web due to an injury in early life. The eyes were somewhat watery & the lower lids were glued to the ball.

going on down the levee I picked up four more all pintails two males and two females. Of the birds captured none were able to stand. They act exactly as do the birds found affected in Utah. The birds lie prostrate on the breast. When approached the head & neck are moved about as the bird tries to make off but in many cases the body was helpless and could not be raised. All had control of the tail muscles yet. The wings were loose at the sides and in two which could swim the ~~shoulder~~ carpal joint dragged in the water throwing the tip of the wing up. One female was found lie in the mud on the shore where it was seen.

in for in, neck and a half
and stuck fast under it down
green & white pieces. Considerably
amount. It saw one
Gymnamm seal which was affected
the male was blind from the
formation of matter in the eyes.
rotas on it follow in the post-
mortems.

Sandpipers, Western & least, Brown
Common along the levee in the
mud and saw a few Bairds
& Red-backed. Four Western Sandpipers
were captured affected, all could
run rapidly but could not fly
though the wings could be
extended. One least Sandpiper
was captured in the same condition.
I saw three dead Red-backed Sandpipers
one of them fresh enough to prove
that it was affected. One was
seen on the mudflats daily
able to rise. Many of the sandpipers
were affected as when a flock
rose usually there were two or
three laggards that fell behind the
others. I believe that they come
down rapidly, also going out the
levee I captured two. On coming
back I secured three more and the
space was too narrow to make
it possible for them to have been
overlooked on the outward trip.

about four quarters of an hour
passed between the two journeys.
We returned to town about
five and put the car in the garage & ~~and~~
killed the ducks they with other.
Worked on them at night.

Mr. Matthews told me that
he has known of sick birds on
Goose lake & at Brown's Knolls where
the widgeon gun club is located for
twenty years and that they were
affected as these birds are. There
were others who noted it too
notably Geo. McCutchen of Bakerfield.
Goose lake sometimes got very low
and the water alkaline while at
Brown's Knolls were a number of
alkaline pools. Now they are kept
fresh by artesian water. The
birds were helpless so that they
could be picked up.

Went to bed at eleven o'clock.

November 5, Thursday.

This morning I had some work to do on my notes of yesterday and then Mr. Matthews drove me out to Julian Lake again south of Stratford, according to the Spedometer ~~the~~ distance to the lake is 16 miles. This morning we went one mile ~~west~~ east. From Stratford to the lake is now about four miles. A huge dredge is at work throwing up another levee on the east side enclosing a new section of water which will be pumped dry & given over to agricultural pursuits. At present the lake is about 4 miles across north and south and 8 miles east & west a mere remnant of the great spread of waters once occupying this level valley. I had this plan of cutting off the water will work I do not believe. In next years the water is bound to collect here. One thing only can save it in my estimation and that is a series of broad canals leading to the San Joaquin river to the north. At stated intervals the water will have to be raised by pumps to a higher level in order to enable it to run northward. So cut a gravity drainage canal to the

north would not be feasible as
there would be danger of
back drainage from the San
Joaquin. The levees in the lake
are thrown up fifteen feet high
but as the water rises they
soften up the base and flatten
out until they are five feet or
less above water level.

This morning a southerly
wind had driven the water in
over the stretch of mud flat noted
as seen yesterday. The water
anywhere is a peculiar brown
with a yellowish tinge. I took
three water samples today.

On the levee I noted a
whitish scale from the evaporation
of the water. This had an alkaline
and a faintly saline taste.

We drove this time on a
side levee a mile west of where
we were yesterday. Dried carcasses
of ducks were scattered all
along here. The birds had died
I think, along in August and
September. Many had been eaten
by coyotes and others were so
broken down by maggots etc., that
they were hardly recognizable.

Outside of insect life I can
see no sign of food for ducks
in the lake with the exception:

of a few scattered plants on the
higher parts of the levee.
There was a large bank of
chucks out in the lake but they
were not moving much. The line
must have been at least two
miles long and was composed
mainly of pintails as nearly as
I could tell. The hunters here
take ~~out~~ iron cylinders & sink things
chipping out the mud inside and
use these for sink boxes. There
is no regular flight here. The
chucks leave in the evening to
go inland but rise high in the
air directly from the water.

Shooting is very poor. One man
that I saw had merely one pintail
to show for his clay shot.
Mr. Matthews says that now it
is almost impossible to get a limit.

We drove a mile west on
a levee from the point where
we were yesterday & then
walked south for a mile on
a north & south levee that
was barely above the water
and finally disappeared beneath
the surface. The levees here are
all laid out on section lines and
run north & south & east &
west. On this levee we made
a count of the dead birds seen

in a distance of one mile.
 About one-eighth of the birds were
 fresh and the others ranged
 back apparently to August.

<i>Dafila acuta</i>	93
<i>Neltin carolinensis</i>	10
<i>Enimatura jamaicensis</i>	4
<i>Epatura clypeata</i>	11
<i>Adas platyrhynchos</i>	2
<i>Mareca americana</i>	1
<i>Larus franklini</i>	1
<i>Ereunetes mauri</i>	4
<i>Phalacrocorax</i> sp. (very old)	1
<i>Pelidna a. pacifica</i>	4
<i>Hedya americana</i>	3

Total. 134

There is a possibility of a few
 of the recent birds being crippled but
 I believe that most were sick birds
 I saw the following live birds
 which were sick & helpless.

<i>Dafila acuta</i>	8
<i>Neltin carolinensis</i>	2
<i>Pelidna a. pacifica</i>	2

In addition a dozen or

more pintails swimming near the
 levee were undoubtedly affected.
 I saw two among them that
 tried to fly but could not. When
 they begin to get helpless they
 come in to land at the levee. Some
 can scramble onto dry land. Others
 merely reach the shore and die.

There after a time. I can see
no hope for the birds here unless
a rain sweetens the water.
Of course many are sustained
by good water obtained at night
on their feeding grounds and
this would tend to neutralize
the alkali.

Just near the end of this levee
a dozen carp were seen swimming
in the water so that all of the
fish have not been killed. I
saw a number of dead ones on the
levee. Carp were common in
some ditches a mile inland where
the water was fairly fresh.

A number of live toads were
seen on the levee and I noted several
dead ones.

One or two little Knoll Cicindela
were abundant. All were in acta
copula and separated with diffi-
culty. They were not as active
as usual and I caught a number.

The water near the end of
the levee was clear but was
still alkaline & somewhat salty.

One Pintail was watched
as it tried to dive and was
barely able to stick the bill under
water. Others acted as those seen
yesterday. The men here are aware
that birds recover in fresh water.

November 6, Friday.

This morning was up at six thirty. Had breakfast & a rotten little hole and then wrote for a few minutes. Packed up the water samples taken yesterday and forwarded them to Washington by express.

In the morning the sky was overcast though more by haze than clouds. It soon cleared however and was rather hazy at times all day. Mr. Matthews was looking for rain. It was very cool this morning and not warm all day. The first day it was here it was very hot.

We drove west & south to Stratford and then west across Kings River formerly the main inlet of Solare Lake. Now however the water is low and there is no current nor has there been all summer. The banks were washed up to hold the water in in case of high water but very little comes down this way now.

Beyond here we went south and drove for miles across what was formerly the level bed of the lake. Enormous wheat fields some plowed & sowed & some still in stubble stretched to either side. The soil in many places where it had been plowed was full of clam shells.

Men were still engaged in hauling
the wheat. The sacks were piled up
in racks where they had been filled
and were covered over with straw.
Eight or ten horse teams hauled a
wagon & a train loaded with the
sacks. At one place I saw the
sacks being placed in a blue vitriol
bath to prevent smut. They were
soaked thoroughly & then drained.
The wheat grains were very full
and symmetrical and had a
beautiful light color.

These great stubble fields form
a fine ground for the water-
fowl here and are the main source
of supply for the ducks. I saw
one flock of 500 Sandhill Cranes feeding
in the evening and a small
flock of Canada geese.

We drove out one levee about
~~two-thirds of the way~~ the middle of
the west side and found dried
carcasses scattered along on the
sides. A duck hunter said that
he saw a few sick birds and ob-
served one dead Sandpiper that
was affected. This man said that
he thought the trouble lessened
because the water ran in from
King's River while big suction pumps
drew it across to the south
making a current so that the

water was well fertilized" as
he put it. The only trouble with
that is that no water has
come in from King's River.

The Duck trouble however does
cease to a considerable extent when
the weather cools. The birds must
undoubtedly establish an immunity
to the poison otherwise I cannot
see what they do not all die.
Mr. Matthews & Mrs. Smally were
down here on October 10, and saw no
sick birds and half a dozen fresh
dead ones perhaps. ~~Since the Ducks~~
were common. Since then migrants
have dropped in from the north
and unaccustomed to the water
are dropping off. I think that
when birds get out onto the levees
you away from the water that
the poison works out of their systems
and they recover and may then
be all right. Those that are too
weak to get ashore lie in the water
& continue to drink until they die.
I notice that the birds on the
levees when it is dry are more active
than the others & the fresh dead
ones lie in the water not on shore.
On going out to feed at night the
birds, some at least would secure
fresh water which would neutralize
the poison and aid in their immunity.

Others however judging in the
grainfields would not have this
affected birds are always reaching
fast.

7 am here we drove south
again skirting a levee and then
east south of the lake. The same
level stretch of wheat fields continued
us smoothly as a floor. Outside of
the levee there was absolutely not
a break in the continuity of the
lake floor, not a deep depression nor a
hillock. The soil softened by the
water to a mortar had sunk to
an absolute level. Some fields had
not been plowed last year and
covered with great growths of humble
weeds. Other fields near the lake
had been overflowed in July & August
before the levee had formed & were
destroyed. About the middle of
the south side we turned north
again and went in to the lake.
Crossing a dike we were within
a mile of the mud that marks
the present water line. All along
had been great patches of white
alkali deposit but here ~~there~~
flats were entirely covered with it.
The soil is entirely different in
character than on Bear River.
The surface is light loose almost
flocculent. The alkali raises in

masses that are almost fluffy.
I filled a two quart jar by
raking up the loose surface
with my hands. In the jar
I packed it down repeatedly with
my hands compressing it each
time to an appreciable amount.
Along this water level the
water had evidently come in to
great extent in August. All along
was a great winchrow. Pupal
cases of Ephydra gracilis and
cast up were numbers of dead
birds which had come up at the
same time. The waves must have
been strong as grain outside was
beaten down with the straws all
lying toward the shore. The water
had come in a second time a
week or two later as an old
line marking the old level which
had almost sunk down to the
original level of the fields held
a second line of dead birds
and many were caught in the
grain. If these had come in with
the first rush they would
have been deposited on the high
bank with the others. The two
lines were about fifty yards apart.
We counted the birds in a certain
distances on both sides and they
measuring it with the spectrometer

on the cruts found it to be
two tenths of a mile or approximately
350 yards. On this distance on
the first high levee were the following

<i>Dafila acuta</i>	201
<i>Nettion carolinense</i>	31
<i>Spatula clypeata</i>	14
<i>Eristambura jamaicensis</i>	1
<i>Numantopus mexicanus</i>	33
<i>Recurvirostra americana</i>	2
<i>Hydrochelidon n. surinamensis</i>	10
<i>Larus californicus</i>	1
<i>Limosa fedoa</i>	1
<i>Fulica americana</i>	1
<i>Ereunetes mauri</i>	1
<i>Uroscoptes alpestris</i>	1
<i>Sturnella neglecta</i>	1
	<hr/>
	298

One dead toad was seen and
great numbers of a water butte
see specimen were cast up. (Cybister, sp.)
On the continuation of this levee
I noted many more Ereunetes, *Pelecanus*
nummilla, & several Horned Larks.
6 dead godwits were seen.

The second levee (the low one) yielded
the following in the same distance

<i>Dafila acuta</i>	101
<i>Spatula clypeata</i>	5
<i>Nettion carolinense</i>	7
<i>Limosa fedoa</i>	3
<i>Numantopus mexicanus</i>	7
<i>Larus delawarensis</i>	1
	<hr/>
	124

several Blackbellied plover were
noted & one mountain plover also
a Pectoral Sandpiper.

Between the levee & the lake
here were at least three sections
of land on which dead birds
lay dotted about at intervals.
Taking an area a rod wide
and half a mile long as we
were there were two birds to
the acre over this area outside
of those lying on the levee. This
would give 3840 birds for the
total a very conservative estimate
as near the water they lay
thickly. It could form no idea
of how far the birds extended
along the levee.

The man whom we asked
gave the lake as ten miles square
another six or eight wide by twelve
long. 4 miles south & south &
eight east & west is correct in
my estimation & Mr. Matthews
agrees with me. We arrived at this
by watching the section lines.
A narrow neck extends to the
south on both east & west. Dredges
you at work to the east banking
by more levees.

A hunter told me that now
they received \$3⁵⁰ a dozen for Spring.
Great rafts of them were seen on the

lake. Many were fishing on the shallows.

In travelling with the ants I noted that I took in ordinary flight going parallel with us. Made (28 miles an hour). While a Horned Lark made 23 miles an hr.

November 7, Saturday.

This morning we went in the machine a mile west of Lemore & then south and then followed around the east side of the lake. Crossed the southern end and came back on the west side returning to Lemore at dark. Traveled about 70 miles.

The country crossed was all flat and level as could be. The lake water was held back from all of it by huge levees. Grain was being planted in several places.

Along the east side we could not get in to the water at all as the levees cut us off and held us back. To get around the south side we had to make a long detour to the south to get around a huge levee that had been thrown up.

Formerly of course the mouth of the Dub River which comes in on the east side was far inland at

The shore of the lake. Now with the recession of the water the channel had been cut for it out to the lake itself and two dredgers were at work upon this cutting out the channel deeper and building up the levees on each side. The mud taken out by them was clay of a stiff consistency overlaid by black gyms. The channel was entirely dry now.

In two places channels were cut to cross the water inland to pumping stations. One of these was in operation and was working a ten or twelve inch stream. The water was clear green in color and had a dirty repulsive appearance. Below here was a huge station where two thirty inch pumps were operated by an enormous gas engine. This was not running. From this a great canal ran eastward toward Corcoran the banks being formed by 10 foot levees. A plowing outfit here consisted of five drills attached to each side by side and drawn by a traction engine with a caterpillar tire. As Matthews expressed it this type of engine could run where a handpump

could not go or know how.

The plan here seems to be to run up the lake and hold it back forming a reservoir with great piles for banks. Whether these would hold in a wet season or not is questionable. Sule River is to be led in here by a channel. Most of Kings River flows now through another channel into the San Joaquin. In case the levee break of course the water will spread onto the flats. Great sums of money are being spent to reclaim this land.

As stated above we could not get in to the water at all on this eastern side nor could we see the water except faintly because of the mists that hang over the country. Every thing at a distance appears to be water and the barns & other building float as though in a mist.

In various cuts along a road that the gravel was run in the lake bottom stood at three feet below the surface. In five foot channels smaller pools of green unhealthy looking water stood. As crossed the south side we ran across a somewhat sandy area covered with short

dry grass and then for two
miles passed through a great
mass of growth of timber which
that stretched as far as I could
see. Beyond here was wheat
stubble & freshly planted furrows.
Some of the great inside a retaining
levee had been destroyed by
having the water blow out of it
while it was just heading out.

I saw a jack rabbit pen which
had been built around a water
well. a circle of woven wire
surrounded the well with two
sloping runways leading inside
the inner ends of which were
18 inches above ground & projected
in six feet. Several dead jacks were
inside which had evidently starved
to death so that the pen was
not being watched now. We pulled
up one side to allow my other poor
fortunates to escape. There were
great numbers of tracks across the
flats leading to water in some
places forming regular trails. We
did not see a single animal.

The flats here on the south
shore of the lake seem to have much
more alkali in sight than elsewhere
great areas were covered with the
fluffy white alkali drawn out of
the soil. Wheat was planted directly in it.

We ran in toward the water a mile west of where we found the windrow of ducks yesterday and found the same windrow present and extending a mile to the west of where we were. This made three miles that we had been able to follow it. Here however it formed a single line when the ducks were deposited quite regularly ~~along~~ along the slight projection of an old levee. In one or two places they had broken over for a short distance three hundred yard intervals were counted here with the following result.

First hundred yards.

<i>Dafila acuta</i>	57
<i>Spatula clypeata</i>	1
<i>Necton carolinense</i>	3
<i>Himantopus mexicanus</i>	8
<i>Hydrochelidon n. surinamensis</i>	2
<i>Totanus melanoleucus</i>	1
<i>Otocoris alpestris</i>	1
Total	73

Total ducks 60

second hundred yards.

<i>Dafila acuta</i>	67
<i>Spatula clypeata</i>	3
<i>Necton carolinense</i>	8
<i>Himantopus mexicanus</i>	11
<i>Pleurvirostra americana</i>	1
<i>Otocoris alpestris</i>	1

Total ducks 78 total 91

Third hundred yards	
<i>Dafila acuta</i>	70
<i>Nettion carolinense</i>	5
<i>Spatula clypeata</i>	4
<i>Anas platyrhynchos mexicanus</i>	6
<i>Squatarola squatarola</i>	1
	<hr/>
	Total 86
	Total ducks. 77

Yesterday on this same windrow we counted ~~247~~ 247 ducks in three hundred + 50 yards. This would give an average of about 70.5 ducks per hundred yards. Averaging then $70.5 + 70.5 + 70.5 + 60 + 78 + 79 = 428.5$ for 600 yards or an average of 71.4 + ducks per hundred yards.

This seems to me a fair average as it was taken at two different points. This windrow extended for three miles to our certain knowledge or 5280 yards. Multiplying 52.8×71.4 we have 3770 ducks found in this habitat found on the levee.

In addition we looked across 5 sections of land where birds lay two to three acres at a conservative estimate. In getting the number to the acre, a strip a foot wide & half a mile long was taken as an acre. Five sections would equal 3200 acres - making 6400 ducks on this area forming with those on the levee a total of 10,170 birds.

How far to the eastward these conditions held we could not tell. This estimate was made for five miles on the western side of the south shore. After going around the lake we placed its present dimensions at 4 x 8 miles.

If the birds in the levee the greater number were pintails in the counts made the pintails number as follows per hundred yards. In the first the average was taken from 201 birds found in 350 yards.

$57.5 + 57.5 + 57.5 + 70 + 67 + 59 = 366.5$
divided by 6 gives 61.1 Pintails Per hundred yards. This again multiplied by 52.8 gives 3226 birds out of the 3770 found in the levee or 85.6 of the total number of birds.

I would say from what I have seen that at least 15000 ducks perished here this summer.

After giving the matter a great deal of thought and considering alkali poison as the cause of the mortality I can see no hope for the birds in this lake. Under present conditions there is no chance of a supply of fresh water & apparently there is no hope of driving the birds from the lake. I should have for centuries been accustomed to see it as a nesting place in

The winter season and cannot
under present conditions be forced to
leave. It is a wonder in view of
the small number of great winged
Seal as compared to the Pintails
if the former have not been largely
destroyed in previous years.

As very fat birds are always
those affected it may be that the
intense summer & fall heat may
assist in prostrating them. As it
cools in the fall they are better able
to resist the poison.

Perhaps ~~too~~ as the flats
dry off after being covered the
alkali rises to the surface through
surface film tension & is deposited.
When these flats are covered again
the alkali is taken into solution
in great amount. This might account
for the mortality among birds
when flats are first covered by rain
or wind.

Today in travelling I noted
the following speeds which birds
attained as indicated by the
speedometer of the auto.

	per hour
Great Blue Heron (2 individuals)	28 miles
Horned Lark	28 "
" " (several)	26 "

One Horned Lark flying parallel was passed
with the car at 30 miles an hour.
worked until 12 & went to bed

November 8, Sunday.

This morning left Lemgo at 8:45 and with Mr. Matthews drove south to Bakersfield. Went east through Armona to Hanford and then south through Corcoran & Guernsey to Angula where we had a good chicken dinner. Then crossed over through Allpauk to Fowler House south through the semitropic country to Hart Station and down to Shokern where we turned & went in through Bowerbank, Rio Bravo and Roadside. Reached Bakersfield at 6:30 P.M. Distance 120 miles. It was cool in the morning and refreshing but down in the Semitropic country became quite hot.

Through to Hanford the road lay through a district that has been settled for many years with little seen worthy of remark. Turning south we drove along over the old lake bed west of my railroad. The whole region of Clear to Angula was good pie floor and was in the wheat and alfalfa. The lake had covered all this as late as 1870. We noted clamshell fragments in fields a mile west of Corcoran and also along the road just south of that place showing that the lake bed had come in here recently.

Toward the borders of this old lake the soil was sandy & quite different from the black earth toward its center. These sand deposits were brought down by the rivers and because of the flat coasts were not carried far out into the lake. Near Corcoran and again at Angiola this was noticeable.

The Sule River was entirely dry. Here along this road was the old mouth of the stream where it debouched into the lake. Great willows formed a pleasant grove along its banks while the bed was so hollowed out dry arroyos with rounded banks so when I was apparently little fear of freshets here as no high levees had been built.

Clam shells were noted commonly in the fields right up to the town of Angiola toward the north & west but below none were seen. Allpough lies on a slight elevation known in the old days as Stowell's Island when it was surrounded by water and cattle & hogs were kept on it. Now

the whole region is absolutely dry. Old Solita lake ~~formerly~~ ^{now} dry lay south of here and was formed by the water from Ken River backing up in a depression and held in by

a sand ridge running across
from the Lost hills to Atwells Island.
Only when the water was very high
would it flow around allpauget to
the east and reach Tulare Lake.
Very probably Solita Lake will not
contain water again except from
local run-off. A channel has been
cut south of the Hacienda ran-
cho estate west of Fowler House which
will carry the water into Tulare
Lake and Kern River ~~runway~~
and the water which formerly
formed a great swamp here will
be carried off in a great channel
20 yards wide with levee 25 feet
high on either side which is
being thrown up by Miller & Lux.
The dredger doing this work
moves five yards of earth at a time.
The channel through the sand
ridge was cut by the Hacienda
people and Miller & Lux are going
to connect with it. This will
dry off the entire swamp region
between Buena Vista & allpauget.
As we came through everything
was dry & dusty. But of course
in the winter all depressions would
fill. Matthews told that three years
ago it was all full.
At Fowler House in 1910 sick
ducks were found and it was

supposed that they came from Dulare
Lake. A man by the name of
Murphy was caught here by the
Wardens with 167 and confessed
to having marketed 800 birds. Some
artesian wells here made pools
and the birds coming in became helpless
and they recovered in a day or
so so that they could fly. It was
supposed that he was poisoning the
birds and he was arrested a second
time on this charge a second time
but was released.

East of Swan Wells the soil was
sandy again and contained many
mussels. Deep channels cut through
the flats here. - and from one we jumped
a coyote. The swamp was followed
straight on down to the Old Hart Road
house on the road from Wises to Cutters
in Lost Hills. The country here became
slightly rolling modifying the dead
level across which we had been
travelling. A great amount of Thomomys
sign showed here for half a mile
more than I have ever seen.

We followed down here as far as
Loken then turned & went into
Bakersfield across the level country.
In watching the birds today
I noticed that bird made the following
speeds as I hour on the speedometer
of the car.

7 Sicks	made 25 miles an hour
Horned Lark (2)	" 22 " " "
Horned Lark (3)	" 24 " " "

Now *angiola*, were a few
greasewoods and lower down
below semitropic - was half a mile
or so of them that grew three
feet high in these I found
Amphispiza & shot two.

Below *angiola* I saw four
orioles nests in a small tree not
more than twenty feet high.

Much of the semitropic country
was covered with a small
cactus. It was not cultivated but
many cattle were run here.

November 9, Monday.

This morning we drove out around
Ken & Buena Vista Lakes. The bed
of Ken Lake is now entirely dry and
has been drained off so that it
will remain so. The country here
was flat but not so level as
in the Sulare Lake bed. The entire
country had a different appearance.
Though great fields & patches of
cotton & other sick things were green,
the growth more abundant and
birds noticeably common compared
with the region of had come from
Men were irrigating some of the
streams.

Buena Vista lake was a broad
sheet of water with the ordinary
appearance of a western lake in the
low country. Great Beds of lutes
grew in the water and other marsh
growth was common. Last year the
water was very low and this year
the lake is full. It was told that it
had gone down a foot and one half.
A great levee has been thrown
across the eastern side and
the lake has been turned into a
huge reservoir by Miller & Lux from
which water is drawn for irrigation.
A railroad runs along the levee so
that it may be readily strengthened
if necessary. The water is
greenish in appearance but entirely
fresh. No sick birds have
occurred here this year though
last year they were common.

An island in the lake containing
about one & one half acres is used
as a breeding place by white
pelicans when there is plenty of
water. Great numbers of ducks
were present mainly pintails and
a few numbers of white geese,
pelicans & cormorants.

We crossed a dry flat to
the inlet of the lake. Both inlet
& outlet are led in by narrow
channels running side by side.

controlled by head gates. They
were full but were not running
now. Ducks are said to bug in
them. The flat here is covered by
water when the lake is high.
Many willows were growing here.

From here we turned and
went south for some distance
along the Elk hills a series of
rounded hills rising from one
to three hundred feet above the
level, dry sandy and sparsely
covered with vegetation.

The outlet was grown with
an abundant marsh flora
and tules were growing in large
clumps in the lake. Several
market hunters had their camps
here.

About one we turned and
went ~~west~~ stopping at Ellis'
Ranch one of Miller's best men
where we had dinner. His
elder daughter widowed after
two months marriage was
a very handsome young lady.
Beyond here we stopped in
a dry arroyo and tried to find
some quail but failed. Mr. Ellis
said that there had been some
but that they had all been killed
off and we were unable to
find any. No tracks were seen.

From here we went out to
the last Chance Ranch where John
Rowley was camped. We found
that he was preparing to break
camp in the morning and
had things pretty well packed. He
had put up sixteen elk for
exchange purposes mainly. He said
that the animals were a sorry
lot. a few years ago there were
only fifty and now the ~~stock~~
herd numbers 500. The animals
however have degenerated through
inbreeding. The horns on the bulls
were imperfect, soft and poorly
developed. Many were broken and
one animal had a horn growing
from the middle of the forehead.
Others were broken down in the
pelvic region and some even had
deformed pelvises. Mr. Rowley said
that he is certain that formerly
they were not a true elk at all as
he has records for them in various
parts of the coast range. and formerly
they were a larger handsomer animal.
He described the efforts of capturing
them as laughable. He had outlined
a plan three years ago when
collecting and studying them whereby
the herd might be captured, namely
to set posts for a corral ~~and~~ with
broad wings and plant the whole

to alfalfa and Egyptian corn. When
the animals were accustomed to
judging there wire could be string
+ the whole herd captured and
confined. He recommended that
they be left alone until all the food
was gone and then by judging
them they could be tamed & handled
readily. This plan was followed
in part but now they had built
a new corral & were trying to drive
the animals in at night by the
aid of lanterns.

Rowley had a small series of
Jack rabbits & cottontails, also a
Buzzard & a fine Ferruginous
roughleg. He fills his specimens
now with cork molding them
readily into shape.

He found him a small man
with sandy hair, very pleasant
and agreeable to talk to. He
had Mr. Herring with him as
assistant.

Near here I shot some Killdeers
wanted for the Expository exhibit
but failed to find quail. Black
Phoebe were common about
the ranch house.

Drove into Bakersfield reaching
there about six. Had quite a
number of birds to care for
tonight.

November 10, Tuesday.
Last night I forgot to raise
my windows on going to bed.
And when I woke felt a little
tough for a few minutes but was
soon all right. We left town
at a quarter to eight and
drove up to Heber in Sejon Pass.

Passing the shore of old Kum
happ I noted that much white
alkali was present in the soil.
Large growths of greasewoods were
present here.

We drove across a broad
flat some of which was in to what
and the rest uncultivated until
the foothills were reached in
a gradual slope. Here we
turned up Sejon Pass Creek finding
a road with a ten percent grade
Small flats were covered with
scattered oaks. We passed the
site of old Fort Sejon, marked
now by two adobe brick walls
and I took several pictures of
them on our return. These were
standing on a broad flat with
many great oaks about. I am
not mistaken. Dr. Cooper did early
work here. I collected a vine
two here a California woodpecker
among others.

Heber was merely a post office

and a hotel. Before dinner I climbed up a dry draw back of the hotel through the mesquite scrub, and found a few juncos, a California jay & a greatcatcher. After eating I went down to Lake Castor. The water in this lake was cold but highly mineralized, seemed to contain much soda. There were many Gulls & Ruddy Ducks on its surface but none appeared to be affected by the water. I looked along but could find no clean meat and none I know here. The lake is a mile & a half to two miles long and three fourths of a mile wide and is surrounded by hills. I took a water sample. Small tree toads were common in the grass and I collected several.

The return to Bakersfield was uneventful. Mr. Matthews left for Wasco after we had supper together.

Noted today the following speeds.

\$ Sparrowhawk	made	22 miles an hour	
			(for some distance)
another \$ Sparrowhawk	made	25 miles an hour	
Redtail	(flying easily)	" 22 "	" " "
Raven	"	" 24 "	" " "
several Horned Larks	made	27 ..	" " "

November 11, Wednesday.

This morning I packed up a bunch of stuff to send in. Sent in two Killdeer & two Brewin's Blackbirds and a Valley Quail in mounting braces some other (Salted skins). Also a box containing several collections of insects. I went out to hunt up a box to pack a water sample taken at Lake at Heber and a jar of alkali. As I was going along the street a man hit me for a quarter for something to eat. I got down the water sample and the jar broke so that it was lost. I offered to hit him over the head with the other one. He remarked that he couldn't help doing it. Packed the other jar and sent it in by parcel post.

Packed up my things and left for Mojave at noon. The ticket to Heber amounted to \$10.05. Rode over in a parlor car and met Mr. John B. Fernald, a geologist from the University of California who is doing work toward a doctor's degree at present. He was going to Death Valley to spend five or six weeks spending the Tertiary formations. Their main attempt is to correlate them with

Went further east. He was a young man about my age of medium size, dark and smooth shaven, a friendly man I should judge and a good mixer. He knew Mark Shaffer in school. I thought of taking the geological survey Civil Service next Spring. I told him that I would verify a few references for him sometime in Washington if he wished.

From Bakersfield the track lay across the plains to the foothills where it entered a broad valley with sharp cut sides and fairly level bottom which had at one time evidently thrown considerable water into the level valley at Bakersfield and may have been an important inlet to the large lake once found here. This broad valley narrowed as it rose and finally split into two and became the dry bed of a wet water stream. I noted a few ~~things~~ ^{things} along.

The rock was all granite up to 4000 feet and the sand was decomposed granite. At four thousand feet there was some sedimentary rocks and a deposit of volcanic ash which Mr. Burbanks said was

loose & friable. It was pointed
out by lawyer M. Bernalda said the
granite offered nothing at
all but that there were fossils
in the other rocks. He finds
a fair percentage of bird bones.
The bones were picked up last
~~fall in the~~ to summer in the
course of ordinary collecting. These
with numerous cave deposits
were turned over to Hoge Holmes
Miller who is now working for
a doctor's degree.

John C. Merriam now has about
forty tons of the Rancho de la Brea
material at hand. More than he
can ever work out.

Caliente was a small place
(hotel) and was in sight
several times as the track wound
back & forth above it going up
Sachapi pass. The pass is
owned by the Southern Pacific but
the Santa Fe pays for the privilege
of running its trains across.

The pass is just above
the sea. Sachapi is a small
town. The right on top of the
range is a broad ~~valley~~ evidently
an ancient valley. The land is
all cultivated. Rounded hills rise
on either side.

At monolith the track began

to descend. Coming up on the
north & west there were considerable
growths of cottonwood willow & some
pine but on the desert side this
was entirely wanting. About
five hundred feet below Monticello the
Oryzopsis appeared rising above
a scattered bush growth. The
yuccas grew at intervals and
continued almost down to Mojave.
A few Ravens, Sparrow hawks
and an occasional Hawk were
seen from Bakerfield down to Mojave.
Mojave is merely a railroad
junction with a Hotel Parry House.
A row of saloons and lodging houses
and a few dwellings. The hotel row
is famous. I checked my suitcase
& microscope and getting out an
insect net and collecting first
walked across the flats to the
west. For a mile was a stretch
of bare sand & gravel. A few grass
stubs marked old vegetation which
had long since dried up and
disappeared. A few *Chrysothamnus* of
green along a hollow cut arroyos
and from them I collected insects very
similar to those taken on Rabbit
Brush in Wyoming. I think that most
of them are other species belonging
to the same genera and some of
them may be identical. A few

new ones were noted. As I came onto a small rising in top which swung around the amphitheatre of the flat a scattered bush growth (specimen) was common. The leaves were small angular and hard as though varnished. The twigs were very stiff and gave off a pungent odor. A few cactus stems scattered through a rounded variety with cylindrical lobes & many long spines closely set.

On half a mile more I came to the first tree yucca and they gradually became more numerous. At a distance they gave the appearance of a forest. They rose from ten to fifteen feet high some consisting of a single stalk with a rough head of leaves but more often each tree had from two to a dozen branches. Several large trees were noted with many short stout limbs each with its head of stiff radiating adjacent leaves. The bark on these was deeply cut & corrugated sometimes very roughly and again smooth. In appearance it was much like that of an elm. The small branches were nearly smooth.

I sited a number growing potato.
The wood was ~~poor~~ like that
of a palm but hard & resistant.
Very few birds were seen. Quite
a few ~~small~~ 7 inches were scattered
about through the bush. As
dark they were going to roost in
the low bushes. I saw two or
three & egg Sparrows and a Killdeer
was heard calling about a water
hole made byepage from the
railroad track & two shrikes were
seen on a huge tree yucca. I
shot one and it hung dangling
from the top spike. I threw
everything available at it, clods
stones sticks etc. and nearly
all lodged and stuck in the
stiff leaves. Finally I hit it
knocking it part way down
when it caught again ~~in~~ firmly
so that I gave up entirely.

A moderate wind blew and
the sky was clear. As dusk
fell it turned very cool. I had
to wait until seven thirty for
a train to Cienega. Was very hungry
and might have had a great
dinner to the surprise of the
waitress.

The depot was light by small
oil lights high up on the wall
giving scant illumination.

put in most of the time in the
lunch room.

When the train finally pulled
in I found it to be two coaches
& a baggage car. Only half a dozen
passengers were on board.

I saw a great deal of
Kangaroo rat sign on the flats
and one Jack rabbit.

November 12, Thursday.

During the night I slept as best
I could on two seats and managed
quite well. Took my coat off and
spread it over me as it was quite
cold. You can keep much warmer
in this way than by keeping the coat on.
Shortly after daylight the train
pulled in to Lone Pine and I got out
for a few minutes. The air was very
sharp and on a small area of
damp ground - ice had formed.

Beyond here we passed along
the west shore of the flats and I
was glad to see that it at least
had not been drained for irrigation.
It was a beautiful body of water
lying here in the valley. I am
of the opinion that each range here the Sierra
Nevada on the west & the Inyo &
Coso range on the east mark a
fault plane and that a square
block, the present valley had sunk

down to its present level. The mountain slopes are all steep & precipitous.

The water of the lake seemed blue & ~~precipitous~~ clear from a distance. It could not be many water birds swimming on its surface but could not make out what it was.

Uwings, just north of the lake marks the end of the standard gauge track - arrived about 7:45. Ate breakfast in a little dining room in a made over box car still standing on its trucks on a side track. A porch had been built onto one end.

I had four hours to wait for a train and so went out southeast of town toward a line of willows. The train had passed near Uwings River and I found willows growing commonly and a fair amount of water in the stream. Lone Pine has a population of about 250 and is as large as Independence the capital of the county. Independence has been rebuilt after being destroyed by fire.

I crossed a sandy flat at first with scattered bush growth. The surface of this was firm & crusty so that I broke through as though walking on frozen mud. I found this due however to mineral matter hardened on the surface.

after a rain. ~~At~~ other places the sand was loose and difficult to walk in.

I found that the willows grew along a small irrigation ditch. Two or three jack rabbits were seen. For over a mile I followed the willows down without seeing a sign of a bird though apparently conditions were favorable enough for them. Then coming to an old ranch site where lines of willows and a slender leaved tree (^{Tamarix gallica} 319) grew along lateral ditches I found birds fairly common.

Song Sparrows appeared and then Sparrow Doves. As the sun rose birds became more active a flock of juncos came through the bushes and I saw some Bewick's Wren. Small tracks were seen and by good luck I flushed a flock and following them up shot a fine pair on the wing with my pistol. Collected several birds here. The mountains slopes here were rock covered and without bare of vegetation. Mount Whitney lay across from me but could barely be distinguished from the huge mountain mass that rose rampart like from the valley with it.

I found small hoppers common in the willows and collected a

number by swapping. Very few battles were seen.

Returned to Uvingo at twelve ate dinner (meals 50 cents each) and then after a time left on a freight on the narrow gauge for Kuler. The depot at Uvingo was merely a box car at the back of the track.

The ride to Kuler was very lumpy. I sat in the top of the caboose when I could see over the country but saw little of note. The country was similar to that described at Uvingo.

Kuler is a town of a hundred inhabitants or better barely a quarter of a mile from the lake shore. The streets are deep ~~and~~ in sand and when I landed it had rather a sleepy appearance. I went to the Kuler Hotel across from the depot and engaged a room though one was not assigned to me until about dark. Arrived at 2:30 P.M. I spent the afternoon in writing on my notes.

Clear & warm all day. Weather very pleasant.

At nightfall a passenger pulled in and men appeared as though by magic so that the hotel was a busy place with the pool table going full force. Kuler is a dry town. Though there is lack of water

Made up some skins after supper
and went to bed a little before
ten.

It was decidedly cool in the
evening.

At Uvenyo this morning I
found a mouse nest in a little cottonwood
on the flat that was about a foot
in diameter and was up & had
built of sticks. I could think only
that it belonged to *Cynomys* 27-
frontalis. Was am surprised at it
in such a locality. I shot me Jay
in a grove beyond here however.

November 13, Friday.

This morning it was very cool
and crisp. I was up & dressed at
seven. Ate breakfast. (all meals 50 cents)
and then went down to the lake
shore. Large vats were dug up
here and the water from the lake
pumped into them. Close water is
kept as it evaporates. The soda deposits
first and then the water must
be drawn off at once or in a few
hours the salt will crystallize and
the batch be ruined. As the water
evaporates the residue has a pink
color. These vats can be dug here
only as it requires a blue clay
subsoil and elsewhere it is sandy
allowing the water to run out.

I found a broad strip two or three hundred feet to five hundred feet wide at the border of the lake which was devoid of vegetation. In many places salt & soda were crystallized on this forming a roughened surface. In many places this still contained water. The mud was firm and I could wade through and wick of water without getting in deep.

All along was a great windrow of the pupal cases of ~~the~~ the alkali flies thrown up by the waves. In places where the salt-soda formation was damp the adults *Ephydra* clustered in enormous numbers rising in swarms as I came by. These patches were from one to six or ten feet long and a foot wide and contained an untold number of individuals.

Great numbers of feathers were cast up in this windrow largely from ducks. In walking for some time over four miles along the beach to the south I found the following dead birds.

<i>Columbus v. californicus</i>	40
<i>Pisobia minutella</i>	1
<i>Steganopus tricolor</i>	1
<i>Recurvirostra americana</i>	1
<i>Spatula clypeata</i>	1
	<hr/>
	44

Most of these were all old & tired
and had I died a month ago or more.
The grebes all seemed thin & emaciated.
Many had been destroyed by gulls who
picked a hole in the side of the breast &
threw out the entrails. Others were torn
entirely in pieces by coyotes whose tracks
were numerous. I found two spoonbills
and two grebes however that were fresh
and one of the latter was untouched.
This bird I dissected but could
not tell much about, as the viscera
were broken down. It was extremely
thin and emaciated and light as
a feather. The stomach contained a
ball of feathers but nothing else. The
intestines contained a yellowish
mucus. I saw several grebes in
the water some of them were diving
while others sitting very high swam
about with the head under water
merely. These shook the head
violently on withdrawing it as
though troubled by the salinity of
the water. These might have been
weak birds searching for food but
I do not know.

There were large numbers of
Spoonbills swimming in the
water & landing at shore but
I could not kill any though I
had two long shots. All seemed
well & healthy.

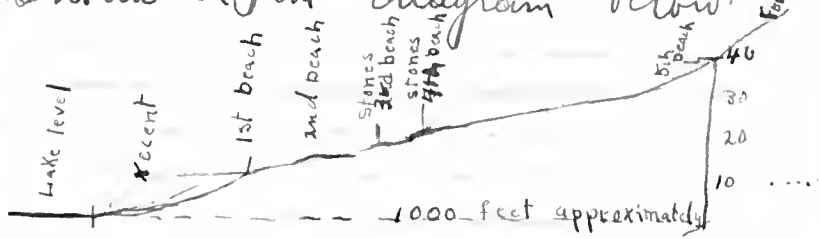
The water to the taste was exactly
saline and preserved things as
though in a pickle.

It was clear and warm all
day long and not too hot. At
noon a few clouds spread over the
sky and men began talking of
cold weather coming. They say however
that zero weather is exceptional
and that ordinarily it seldom goes
below 20° + Fahrenheit.

There were quite a number of
beavers about town and I made
several notes on their colors. The greater
number were a mouse grey in color
varying to black. Ordinarily there was
a black median line from ears to tail
and in front of the shoulder a stripe
running down and ending as a
narrow line. Some were marked in
addition with a black bar in front
of the knee. The ears were black at the
base & tip with a light center. One
animal was seen with several black
bands on all four legs below the knee.
A youngster was almost a fawn color
with the markings blocked in in
light chestnut brown.

On following along the shore
of the lake we had a beach line
at the base of the foothills about
forty feet above present water level
was well marked. On many

places intervening lines were obliterated by sand but on points they were obtained by pits of stones as shown in the diagram below.



Four miles south of town I came to some warm springs around which was considerable fresh water marsh growth and spring water fish was common all along so that the birds can secure water to drink.

Horned larks were the abundant birds all across the flats which in semi fresh lagoons were least Sandpipers, a few Sanderlings and Avocets. I saw a number of Marsh Wrens in the fresh water marshes.

Had a number of specimens to care for in the afternoon and did quite a bit of writing in the afternoon. Evening met the school teacher, Miss McCoy from Saranac New York and at the earnest solicitation of Mrs. Mads proprietress of the hotel attended a movie show.

Came home & wrote until after eleven. This went to bed. Quite cold at night so that plenty of cover felt good.

November 14, Saturday.

This morning was just early cool & crisp & clear all day with a light south wind. A party of Southern Pacific officials was in town and I met Mr. Ellis West Engineer who gave me data on the rise & fall of the lake at Ogden.

At 7:15 I was out in the country and walked north along the lake shore eight miles to the mouth of the river. The area was similar to that traversed yesterday. A broad belt of encrusted sand from 200 to 1000 feet wide entirely bare extended from the water inland and marked the overflow of the lake in high water. Its inner margin was elevated about 12 inches. I walked through this were small dunes from 10 to 30 feet high of decomposed granite grown with salt grass and showing small mammal burrows whose owners I did not see. On the open flats three lines of drift marked successive high water marks. The highest about ten inches above the present level undoubtedly marked the high water of late spring & early summer. In the great mass of Ephydra pupal cases were a number of dried ~~cat~~ chukers, chubs and a few small catfish. I found no trout.

All of these were white & bleached from the soda and hardened & preserved absolutely. They were undoubtedly swept out of the river into the heavy water of the lake during freshets. Several pine cones were noted and drift wood was common (small pieces only).

Below this line were two others probably marking places where the wind had blown the water in.

Eared gulls, dry & desiccated, were strewn full along and I found an occasional sparrow on all three lines. Besides these, there were a few fresh birds along the beach which had drifted in. One was picked up still in the water & was very fresh. I scanned the water closely with the binoculars for floating birds off shore but failed to see any.

The following dead were counted

<i>Columbus n. californicus</i>	134
<i>Spatula dyspretha</i>	11
<i>Agelus vociferans</i>	1
harus (see specimen)	1
<i>Eriamatra jamaicensis</i>	1

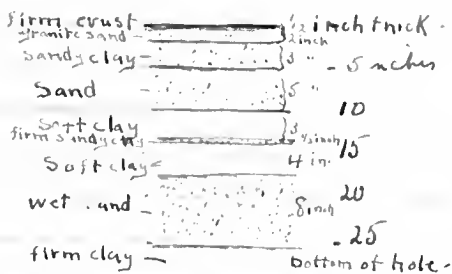
The coyotes travel the shore line constantly and keep the fresh birds picked up closely. I found four that I brought in for dissection and found all much emaciated. The pectoral muscles were reduced to mere membranous fibers covering the sides of the sternum.

In two of these the intestines were
in fair conditions. I found the faeces
thick with abundant renal matter
and colored a pale pink but the
great amount of water thrown off.
In two instances the gut was well
preserved and in each case I found
it firm, hardened and redolent.
On splitting it I could still make
out a few distended capillaries in
the lumen of the gut though most
of them had been torn. Undoubtedly
death resulted from a poisoning due
to the mineralized water. They
must have on for a long time to be
so thin and evidently the poison
is slow in its action.

All through the level that was
bits of stones resting on the surface
of the ground, instead of imbedded
as one would expect. On examining
them however I found them to be
bits of volcanic ash so light that
they floated in the heavy water.
The shore line is not smooth but
is full of small indentations along.
The flats were mainly coarse decomposed
granite sand. Along the water this
was moist immediately under the surface
but farther inland it was hard
and firm cemented by the deposited
mineral matter from the water.
The ground was thrown up

into irregular ridges, two to three inches tall caused, I think by the thrust of the crystals of salt & soda as they form. This crust was half an inch thick.

At the north end of the lake 500 feet from the water I dug a hole with my knife and hands & found the following strata.



Below the firm upper crust the soil was all clump while the last 8 inch layer of sand was saturated with water held in by the firm clay below. This last ran rapidly so that the hole caved in on all sides for several inches. This last layer of sand represents the old fresh water lake bed and from it I took several snails. The majority were whorled species which without comparison resemble those found at the mouth of the Weber. The dust outer whorl was always thickened & roughened toward the operculum as though deformed as in that species.

* *Physa sparsibrata* and © *Planorbis trivalvis* var.

two others were found of a spiral shape like the species found floating on the surface in fresh & slightly brackish water about Great Salt Lake. This layer here may represent the time when the lake was beginning to form & become brackish. I would like to examine a large amount of this sand for bird bones.

Working with the material that I have this summer has brought the following hypothesis to mind. The west especially in western Kansas are great deposits of fossils laid down in inland seas. Might not the fish birds & aquatic reptiles found have been killed in great numbers as the water ~~was~~ became alkaline & saline as these forms are around Great Salt Lake, Sulphur & Kuler Lakes are today. I can see no reason why many of the birds found today might not become fossil. This matter opening a fascinating line of thought and will bear further scrutiny. The chemical composition of the matrix around the fossils in the various formation might throw some light on the subject.

I noticed great number of Ephydra clustering where damp sand was exposed forming great black patches. In some fresh Thomson's workings they were two

inches beneath the surface. In
one place I noted a number thrusting
the proboscis down through a slender
skin of water to the sand beneath
apparently to feed. The insects are
so light that they can rest on the
surface of the water and only by
an effort plainly discernible could
they thrust the proboscis through
the surface film.

On talking with Mr. Upton Tracy
who has spent 8 years - more or less
here he told me that in digging a
well on the bench on which the
town rests that at 16 feet he struck
a layer of snail-shells two inches
thick and that in the clay below
were clams. He saw no bones.

He said that the lake level varies
a foot or more during the year but
that in recent times it has remained
about the same. He claimed that
there were 52 inches of evaporation
yearly from its surface. Water is
fed in by the Urono River & by springs
around the shore.

He told me that birds were common
on the lake only during the winter.
He thought that the larger number
died in ~~at~~ February & March. *Sporobilia*
were observed which were unable to
fly & sometimes came ashore unable
to move. All were very thin. He has

seen grebes floating about on the surface of the water. The birds are all bright & when they first come down but later begin to sicken.

In the evening packed up a shipment of stuff and got rid of some things that I no longer needed. This will be my last collecting point here in California. Wrote up my notes and went to bed.

November 15, Sunday.

This morning I got my funds over to the depot and then at breakfast yesterday I inquired concerning this Sunday morning train and the agent told me that it went through this morning however. When I bought my ticket he informed me that it would be only two hours and that I would have to go to Mina and stay overnight and go to Mazza the next morning. Decided to go to Hava anyway as a road over outfit all packed and ready. Left Kuler at 7:30 A.M. The trip up the valley to Hava was rather uneventful. Past Levinga the valley continued about as usual though in about twenty feet

miles it became more rolling
in the center. On the west
side a fertile region lay along the
Crows River and it was told
that it was a great apple country.
Mount Whitney was passed and
I saw considerable snow on the
high tops.

The Valley above here was
well settled and more fertile
arrived at home at 11:00 a.m. Had
dinner, roast turkey, and then
went out along the Crows River
to a small place. The
railroad point for Bishop is
miles inland. The country
here was not so sandy and
grass grew in open places in
front of the hotel quite a contrast
to the hills.

Clear & warm all day but
cool in the shade. The Crows
here here was fifteen to twenty
feet wide with a swift current.
It was fairly deep, six feet at
least in places and had but a
channel with walls three or
four feet above the water. The
water was stained brownish.

In the lowland flats were
many springy places. Great deposits
of salt & soda were present
on the surface of the ground, but
salt grass grew in most places

erupt up through them. This point is about the northern limit of the old lake bed. Across the valley above extends an escarpment forty feet high or more cut on the east side by the river valley. The flooded plain of the river was well pitted in trough on the banks above was much sand.

Birds were fairly common but not in much variety. I saw a magpie (*P. phoeniceus*) below here and found a nest in a cottonwood. There were a few ducks and muskrats on the river.

By sweeping I collected a few leaf hoppers and ground beetles and a few *Staphylinids* were seen under stones in company with many colonies of ants.

There were quite a few rose bushes along the stream. Willows still retained their leaves though they were beginning to yellow.

The sun sank behind the hills at 4:15 and at five it was dark. Cold in the evening.

November 16, Monday.

It was very cold last night and in fact froze ice. It had rained many times over me as I have had in the coldest weather and still was only comfortable.

After breakfast I went down along the Green's River north of town for two hours or more. I found considerable growths of willows around and some tufts. Birds were not very common. I saw several Ring-necked Pheasants and two or three Magpies. Song Sparrows were fairly common in the brush.

Insects were not moving much this morning as it was too cold and the sky was overcast. A wasp was fairly common about the *Chrysothamnus* heads but was very active and apparently on the lookout for food.

There were great growths of rose among the willows.

The hypothesis of the laying down of fossils in old lake beds may be outlined as follows. In the old Cretaceous seas and lakes primarily the water was fresh and was inhabited by fish, amphibians, aquatic reptiles and birds. Clays, shales and seas flowed streams of fresh water. As the

climate changed becoming drier
this mass ~~water~~ decreased in
area and became strongly impregnated
with salts & alkalis - through evapora-
tion. This change was gradual the
animals living therein or many at
least insensibly accustomed themselves
to the new conditions and continued
to flourish. Cycles of dry and wet
periods undoubtedly existed then
as they do today. In prolonged
droughts the fresh water flowing in
from the streams would be greatly
decreased and the mineral content
of the water through resulting high
evaporation is greatly increased in
a comparatively short time. As a
result large numbers of the
organisms of these lakes increased
perished through the absorption
of the increased amount of mineral
matter by the elementary plants as
to the waterbirds & amphibians of
great Salt Lake, Inland & Owens lakes
today. With the fishes death
probably resulted through the breathing
apparatus. These flowing ashore
into the mud flats might become
imbedded and would be preserved
as fossils. Some opening this
deposits found today. There is
no doubt in my mind that
great deposits are covered in the
beds of dry lakes through the

went today. Such deposits should
be worked for not a long rock
back time but rather in the
huge jaws of alluvial matter
formed by the streams feeding
the ancient lake.

It is not believe that migrating
exists to any marked degree (until
after the glacial period) in other words
migrating is there been in its origin
and post pleistocene in its development.
So that birds accustomed to saline
water did not come to winter in large
numbers on these bodies of water.
However there was undoubtedly much
wandering in search of food on the
part of strong winged forms which
had developed. I am undoubtedly
many of these present.

The elevation of the station at
Laws is given as 4450. I left Laws
at 11:30 and followed north through
the valley. Immediately north of
Laws is mesa marking the
north shore of the lake in former
times swings more than half way
across the valley as remarked
yesterday. The river has cut down
through on the western side while
on the east a broad arm of the
lake formerly extended for miles as
far as Chalfont deposits of salt
and soda given abundant whitening
the flats in all directions. White above

Chalfont was a road - sandy, later
grown with sycamores, etc.
After nearly a mile of this there
was a sudden change and rock
and gravel replaced the sand.
In a mile and a half farther the
bench lines, the east and west
came together in a gradual curve
marking the old position & looking
up a point about two miles below
& nearly.

Above here the valley was
irregular and rolling and level
as below.

At Hammit a U. S. G. S. Benchmark
showed an elevation of 4598 feet.
I saw four Oriole's nests there in
a grove of Cottonwoods.

Above here the valley was broad
and level again and may
possibly have marked an old
extension of the lake. At the head
of the valley the road climbed up
over a pass by a very good
piece of engineering. I understand
that the road was completed to
Kuler in June 1883.

Going over the mountain here
an elevation of 7100 feet was reached.
Pine and Cedars were common.
I bought some of the largest
pino nuts of an old Indian
woman that I have ever seen.

 as shown here.

Descending on the other side
we soon came to a sage brush
area again with rolling hills
and mountains all about. I
saw a ~~water~~ lake from a distance
but it lay in the shadow so that
I could not see much of it. It
was a broad sheet of water
lying near a line of mountains.
The country here was barren
with no tree growth. Near Sonofah
Junction was a large area of
irregular sand dunes with greasewoods
growing on them.

Just outside Mina an old
salt marsh was crossed. Reached
Mina at 5:30 and registered at
the Mina hotel. Very cold & sharp
frost. I opened my ~~trunk~~ and
took out a flannel shirt.

November 17, Tuesday

This morning I found that
it had frozen hard during the
night and I judged that the
thermometer stood at about 25°
up to ten o'clock. The sky was
overcast with light hazy clouds.

I caught a load on the
narrow gauge and rode over
to Sodaville three & one half miles.
left at 7:30. Fare twenty cents.
From Sodaville which stood on
a slight rolling eminence I
walked down over two miles

The marsh mentioned yesterday.
On nearing it however I could
see that it was almost entirely
dry with nothing of interest
about it so turned off and
made a circuit back to Delaville
and walked on back to Ming.
The country here was absolutely
dry. Scattered greasewoods &
another shrub were spread over the
flats and rolling hills but none
of the growth was large. Over
all lay an absolute silence
except for an occasional note
from a small ground squirrel
that I could not catch sight
of and even this was heard
only a few times. I saw two
skrabbles and found their
tracks numerous. One hopped
slowly away and stopped several
times when it squeaked as if
to rise on its hunches and
look back. In small hillocks
held by the roots of greasewood
were numerous burrows that I
attributed to longhorns. Larger ones
harbored colonies of little squirrels
of some sort whose notes I
allude to above. At one place
I came to a dozen or more
wind blown dunes from six
to twenty feet across and six

just high level in place by greasewoods
these were honey combed with the
squirrel holes and it saw where
they had been digging in the
sand.

A small moth was common
through here and was fluttering
about in spite of the cold
through my ears and fingers
were tingling. They seemed sluggish
at times but were able to fly.
They were pairing and when
coupled the female flew up
into the air then to travel fast
and went off across the country.
I cannot remember having seen
these before but can recollect
seeing moths in Wisconsin while
it was still cold with snow
on the ground.

Not a bird was seen going
out - but returning. I found a
little flock of Amphispiza in the
straw at Coolville when they
flew up from the sand to perch
on a twig just from the ground in the
bare trees. The Prairie Falcon came
down across the flats and perched
for a minute on a telegraph pole.
I had a saw on Horned Lark.

On either side of the
valley barren ranges rose
showing no tree growth.
Returned to Menz shaved and

had dinner. left for the north
on the standard gauge at 12:20 P.M.

The country remained of
much the same character than
to Hazen. Barren ranges of
mountains on either sides of
the valleys followed each other
in rugged succession. A few showed
lines of cedars near their
summits and I judged their
altitude as from ~~6000~~ 6000 to 8000
feet above sea level. The valley
ran along from 4500 to 5000
feet. The vegetation was sage
grease wood & a triplex meta
of the shrubby growths none large in
size. The soil contained many
stones.

The road lay along
Walker's lake beginning at Thom
a small town. In many places
the track was only two hundred feet
from the water. The lake was
nearly thirty miles long, not in
places six or eight miles wide
or possibly more. It was long
by the mountains on the side
and the shores were steep and
gravelly. I noted old ~~water~~
bench lines twenty or thirty feet
above the present water level.
The lake apparently was only
deep right at the edge. At the
north end it was a real flat

with a small amount of soda
deposit. For half a mile there was
an expanse of sandy flat that
had formerly been overflowed.
That is recently. As a matter of
fact this whole region was
formerly included in Lake
Bahontah. Walker's lake did not
exhibit the great expanse of
surrounding flats noted elsewhere
and has either a deep bed
or has not diminished in size
as much as Lewis' lake.

Coots were very abundant all
along usually in flocks of
twenty-five or fifty. A number
of Buffleheads were seen and
four Pelicans with a gull that
may have been the King-billed.

North of the lake we crossed
Walker's River about fifty feet wide
with many large cottonwoods
along it. Further north was
another river. Walker or Imely?

Two Magpies were seen on at
the north end of Walker's lake
and one at Wabaska.

Arrived at Hazen at 5:20.
Had an exchange order and
secured my ticket with it.
Also Pullman to Salt Lake City.
price \$3.00
left Hazen at 10:35 P.M.

November 18 Wednesday.

This morning I was up and dressed before we reached Cobreville, was cold in the night and I noticed ice along where there was water. There was little of interest until the cut off was reached. This region is higher and somewhat less level than that below.

On the lake there has been a heavy north storm apparently yesterday. The silt was encrusted on the rails and embankment on the north side and great drifts of foam lay on the water. I watched carefully for lead birds all the way across but saw none. There were only few grebes west of Promontory Point this time. On Bear River Bay however, near Little Mountains were large numbers, as well as a great many spoonbills and a few scaup. Ducks. The grebes were swimming in little flocks. Some seemed to have difficulty in diving.

Today was clear but cold until noon. It has been freezing hard here and all ponds along the track were covered with ice. Near Ogden I saw a single glossy ibis, a flock of Ring-billed Gulls and Mergansers were common. Three large gulls seen on the Bear River Bay may have been *L. argentatus*. On Ogden we had a wind

of fifteen minutes and I tried to
Call Mr. A. P. Bigelow and found
that he was out of town.

Arrived at Salt Lake City at 1:20 P.M.
I hustled around & got a ticket to
Lawrence reached my baggage and
caught the same train and at
1:35. Fare \$9.46 Pullman to Denver 3.00

Below Springville I saw bunch lines
along the hills marking the old
water level.

November 19 Thursday

Crossed through the Royal gorge
today. Saw several Lewis Woodpecker
in Richards near Canyon City.

Reached Denver at 6:20 and
was met by Rockwell who took me
home with him for the night.

November 20, Friday

This morning went to Fort Collins
at 8:00 arriving at 10:15. Noted
a number of Crows along and two
pheasants. Great quantities of
Silyfia are grown up through here.
and Fort Collins I caught a car for
the Agricultural College. Found the campus
in that edge of town and well laid
out. Found the Director Prof. Gillette
and he directed me to Will Burnett
for the information desired. Mr.
Burnett was very courteous and
was with me until I left in
the afternoon.

~~April 19.~~

I was not successful however in finding out much concerning sick ducks here in this neighborhood as no one seemed to know anything about it. Four birds were sent in here in 1912 for examination but the Pathologist Dr. Kampa who had examined them had gone from the institution without apparently leaving any notes. None of the men on the Veterinary staff had heard anything about it.

Local inquiry among hunters revealed no knowledge of the trouble. Mr. Charles Sheldon - Cashier of the Poudre Valley Bank knew nothing of them.

Mr. H. M. Balmor - undertaker a great hunter knew nothing of them.

Mr. W. Shields - tailor had not heard of them.

Mr. Fred Alfred knew nothing about them.

Mr. Sheldon & Mr. Alfred were together & questioned me concerning Spring shooting. I told them emphatically that it would not be allowed. They wanted to know why and I told them. They claim that the Spring shooting here is the best shooting and that they practically get none in the fall. I heard of some fair bags however.

In the afternoon I talked with

Mr. Joe Jay, game warden and he had not heard of the trouble either. He assured me however that in 10 years experience that he had seen a sick bird such as I had described, on various occasions but that ordinarily they disappeared in a day or two and he thought that they were carried off by coyotes. He showed me a reference to the duck disease in a book by Huntington entitled "Our wild fowl & waders". I thought that perhaps Leslie De Remer of Denver might give me desired information.

Mr. Burned was in the clothing business here for twenty years and knew nearly every one in town so that his assistance was invaluable.

Returned to Denver at 3:15 P.M. through Mr. Tom Morgan called by Rockwell over the telephone I learned that in 1912 sick ducks were found at Riverside near Fort Morgan in Colorado. A large reservoir there in the sandhills had filled & overflowed and then receded again leaving standing pools or mudholes cut off from the main body of water. Many Mallard & gadwall were found in these seemingly paralyzed. It was

noted that the birds were
helpless on land. Four were sent
in to the Agricultural Experiment
Station in Fort Collins and a
diagnosis returned of a severe
enteric inflammation affecting
the liver returned. It may
be possible to develop more
information through correspondents.
Rockwell has a very pleasant
home at 535 Clark and is
enjoying life. Looked over of him
in the evening and left for
Lawrence Kansas via U. P. at
5:30 P. M.

November 21, Saturday.
On awaking this morning
I found that I was well over
my hour at. Very little life was
observed along through the
prairie country.
Noted that many willows
still retained their leaves in
protected hollows though all
had been yellowed by frost.
Reached Lawrence, Ind 5:00
when was met by Fay.