

Circuit Trip
To Study Western Watersheds.
No. 2

Stenographic
Notes

No.

DATE

From July 23 [^{Total} Ephraim] 1935

To August 4 [Yampa, Colo.] 1935

No. G426

Ephraim - July 28.

Mail from M^cLaughlin, Clyde, Duten, Marr
Goldman, and phone call from Clyde at Lander
Wyoming.

We are now to meet Clyde at Old Faithful,
Yellowstone for a conference. "Call him at Casley,
Wyoming, Thursday evening from Yellowstone".
A conference on policies and plans before going
in Colorado seems necessary.

Marr and Clyde are laying out snow courses -
Back together in the Blackfoot and now
Marr in Idaho and Oregon, and Clyde in
Wyoming and Colorado.

Marr desires me to "spread the gospel" and
Duten that the "good will" work will be
directly valuable. M^cLaughlin suggests a nice
key plan that will produce results and win
the insistent backing of the water users.

Goldman suggests that the total expense
of the trip do not exceed \$600 if possible.
Need vouchers returned to get further allowance.
Carl's luck has been good in cashing his personal
checks. Trip not half done and stretching
out because of detours. But will turn back
whenever necessary. Thoroughness is essential.

Have written to all. Suggest that
we continue seeking "general and special

also only chance to meet Larry
and Ray South of Astoria, Ore.

information about all watersheds for use at our general conference on larger phases of the work and (2) establish cordial relations with all agencies engaged in the use of water.

Revised Plan -

Go up Bear Lake watershed and Snake to Yellowstone. Then study Yellowstone drainage, then down the Green to Uinta Mts, up Grand, and south to San Juan and Rio Grande. Meet Clyde and Parrshall at Fort Collins August 12(?) for conference on Colorado.

Then quickly into Montana and British Columbia, and home. Arrive September first?

All correspondence now out of way. But Journal of daily trip will require time.

Arizona Problems -

1. Yuma Project will require forecasts, especially if the places receive border for the Colorado.
2. The Gila depends upon the relative capacity of Roosevelt and Coolidge Reservoirs to watershed supply. On other hand, does the land under cultivation require more water than the watershed produces? Annually? by trends? But one can not forecast a season ahead, so would

be inclined to use entire reservoir if any hangover, as in 1934.

3. Flood forecasting on the lower Colorado, i.e. below San Juan.

Manti National Forest.

We are being guided fortunately.

Lieut. Willard Douglas, Nevada 1932, a friend of Carl's suggested we meet Mr Humphreys, Supervisor of Manti Forest. We accepted.

→ Mr Humphreys knew Mr Fleming as a boy at Logan. Fleming's father was a banker there.

The range problem depends upon the people. The people of Manti were badly flooded and silted in 1910(?) and now complain if an extra cow is put on the range. But the people of Ephraim who do not fear floods (they haven't had one since 1909) want more and earlier water and urge that the aspens be cleared off to produce it.

Their small crop i.e. vegetable canning industry like peas call for early water.

The Ephraim Forest and Range Experiment Station was established on the Manti to study range problems. Probably first of its kind. I should see it. I then recalled that—

Have must be have alpha did
his own off studies.

the ~~first~~ early experiments in evaporation of snow were made here.

He cleared up other facts about Sonoran Basin as noted in final statement.

I decided to crowd this by jumping in.
Wednesday, July 24. "Pioneer Day." We climbed the range to Great Basin Branch. Intermountain Forest and Range Experiment Station.

8860 FT near top of Wasatch Plateau. Valley 5000 ft. Desert Zone, Scrub Oak Zone, Aspen and Conifer zone, Grass Zone. The station site among the aspens and reaches all.

Today the State Pioneer Holiday, but became our guide.

Arthur W. Sampson was original Director, 1910. (Query: Did the Hants flood bring him?).

He planned the evaporation studies, long since gone.

→ Forcing continued the work. Runoff and Erosion his specialty. "A Study of the Influence of Herbaceous Plant Cover on Surface Runoff and Soil Erosion in Relation to Grazing on the Wasatch Plateau in Utah." Is now in North Carolina in charge of forest culture - Why change specialists?

Reed W. Bailey, Geologist, is now Director of the Intermountain work, the natural expansion of the another station. Offices in Ogden.

He is primarily interested in erosion, the great destroyer of all range life.

→ Met Dr. E.C.M. Carty, Professor at Riverside

Collage, who is a devotee of plant ecology.
Riper, chewing, stumped, responsive, a practical-
scientist. His story of the grass sounded
like the epic of the bees. Plants pop forth leaves
even before the snow has left the ground.
→ He has promised reprints. We have promised
to send ones (Erap. + Geog. Review). Address
3520 Ramona Drive, Riverside.

In Kailash, aspen the climax plant. On
the Wasatch Plateau grass is climax. Now
slowly grass is giving way to weeds, and
edible weeds to those less attractive.

Grass has wider root system, so protects
soil from erosion as compared with tap-root
plants that fall out. The planting of grass
has caused minor erosion cuts to heal.
The first evidence of erosion seems to be
the sheeting marks, noticed in road cuts
and on bare hillsides.

On Wasatch cattle range lower down. Sheep
prefer the crests.

→ James M. Hackaday persuaded us to go
with him to the erosion plate, where he
was to mind the clocks. The opportunity yielded
richly.

The plate were at approximately 10,000 ft. -
in the grazing zone, and were well selected.
However, the split opinion prevailing on the

subject caused criticism because the gully system in the two was not identical. and the denuded area might apparently deliver more water and debris. However, this does not seem probable.

But since the plots were not compared physically for a few seasons to determine their differences, doubt has continued to attach to the experiment.

Two obvious things came from it. The planting of grass to increase the foliage cover in the denuded plot has actually reduced the debris, and caused the healing of incipient erosion cuts.

To check the results, the operations on the plots is being reversed. The denuded plot will continue to be built up while the foliage plot will be heavily grazed. Grazing has been done thus far only one season and the cover has returned with little injury. Only continued grazing will wear it down.

→ The weakness of the system is possibly that only the surface drainage is caught. There is no way of intercepting the deeper ^{or at Sandinas.} flow. However, the measurement of this would only be of value in determining the effect of cover on total flow, for the debris of erosion is a surface product.

The precipitation measurements are well provided. Two precipitation gages in each plot with a tipping bucket gage between the plots to show intensity of rainfall. Sunshine and temperature graphs are also obtained.

→ The snow cover is determined by surveying at stakes permanently placed. Three measurements were made at each stake for accuracy. Upon surveying suggestion was made that only one sampling, if apparently satisfactory, be made at each stake but at least one sampling be made midway between the stakes to give a better average and so good accuracy.

* → A Merrim shielded ^{weighing} rain and snow gage had had a dubious career. Erected at first upon the crest of the Plateau directly above the plots, it had failed to catch sufficiently because of the violence of the wind. Now erected on a flat below, it was buried in the snow cover within about 3 feet of the orifice, thus subjecting it to possible effects of spindrift. Tho already set fully 6 feet high, it should be set higher if used. It is an open can with a saline solution to melt the snow and is read once monthly by the Forest Service.

This was the temperature station that Clyde used in connection with experiments in moff in boundary class - where they went to the CCC camp 25 mi. west of Fairbanks.

Ranger throughout the winter. The Experiment Station staff is closed during this period.

→ The effect of snow and summer rains upon runoff can perhaps be determined in connection with this experiment, for the runoff from the snow is carefully determined and tanks are cleared. Then measurements are continued of the rain. Water stage recorders on each plot give the effect of each rain and the tipping bucket records its intensity.

* Ask for data obtained. Forsling's report also contains some.

Three new plots in the scrub oak area(?) have now been laid out to parallel the project being continued at the crest. They are closely comparable and are being observed for 3 years to determine their differences before denudation is begun.

Rodent Control.

The rodents fairly plough up the soil in winter. So one plot has been enclosed above and below to keep rodents out in order to observe improvement if any.

Water Diversion.

an interesting method has been employed by the water users at Ephraim to

→ increases their water supply - Mention has been made by Clyde in one of his papers a ditch was dug on the east ^{or opposite} face of the crest of the Plateau and the melting cornices were led over a convenient pass to the drainage on the west. However, this did not furnish early water but merely increased total seasonal supply, for the slope being topped toward the east and north and lay at the highest part of the plateau.

The CCC labor has enabled a much larger development of this project. An interception canal ~~has~~ is now being dug lower down the slope and extended a total of 5 miles. A tunnel will be driven under the pass. An entire drainage slope will be added to the north by diverting its creek also into the tunnel.

The diversion is made possible by the fact that this water drains into the Colorado and the water users on this Seely Creek waterched here more water than they need.

This is possibly also an old diversion tho not in its present quantity.

* It is interesting that in Utah, the pioneer in irrigation, the State Engineer is empowered to set aside court decisions. Thus in the Sevier Basin the State Engineer took from the water users as a defacto of the

stream water granted by the court and assigned it farther up. So now the downstream users rest water from those above.

Rim Drive.

We were taken for a distance along a Rim Drive made by the Forest Service and County(?) for perhaps 25^{miles} along the crest of the plateau. To the west one looks down upon the settled Utah valley, to the east upon a region of range and forest, dropping toward valleys with lesser settlements toward the Colorado.

Some snow drifts were still lingering. We filled two tubs with snow for holiday icecream.

To Salt Lake City.

Rural towns every seven miles. One continuous ribbon of cultivated fields with pleasing green mountains. It might well be a scene in Vermont.

Canning factories for vegetables. Old settled towns. Did the ranchers line originally in towns as the German peasants do? a few farm houses. Social instinct? or policy of club? or camaraderie?

Towns seem somewhat somewhat. Depression? Brick houses frequent - red, many yellow. Some adobe. Many pretentious buildings of 1870's. Spirit of success? with my present acquaintance,

I could not tell one town from another if dropped down into it. They seem as alive as Greenland towns.

The agricultural ribbon grows wider and industry more active as Salt Lake center is approached. However, today's celebration seemed quiet tho flags were prevalent. The one activity was in the local baseball field. America's national sport.

Water Supply Papers.

Fortunately, Mr. Benton U.S.G.S. was in town and had been in the office and now returned to aid us.

To select the best stream gages for snow survey courses it seemed best to obtain a complete set of Water Supply Papers for all of the watersheds we might visit. We were given the most essential. The others will be sent to us at Green River, Wyoming. Benton suggested a post office that we would not pass on Saturday afternoon or Sunday.

He also furnished us the following list of District Engineers who could aid us.

* → He cares not who directs the Snow Surveys providing the money can be obtained and the U.S.G.S. be given same for accompanying stream gaging.

Chart of Green River and Council Plans

Butts also furnished us the following chart of the Green River Basin with routes into the San Juan.

We have now rerouted our trip. After thoroughly seeing the upper Snake and Yellowstone, we shall follow the Green down to the Uinta Mts. Then ascend the "Grand" Colorado, returning to Grand Junction and thence into the San Juan and on to the Rio Grande.

Thus we can proceed east to Denver and Fort Collins and then north without further return into Utah. This may save us what seemed to be lost in the detour to Yellowstone Park.

The Humboldt, Nevada

Rain was finally brought down the river to Lovelock, the ~~stream~~ at July exceeding that at Pelisade when Mr. Purton was there.

→ How much was lost in the process? Should the Lila method be used?

The July flow at Pelisade probably did not exceed 10,000 acreft. No rain since we were there, thus a long rain would be a success instead of failure.

Mr. Purton plans to return to Nevada in September after we are well returned and settled.

On to Brigham

Thursday, July 25. ~~42~~

Progress toward Old Faithful, Yellowstone being slowed up. The journey from Ephraim will far exceed 400 miles from Ephraim. We planned to overnight at Logan. Then at Ogden. But auto counts there had no vacancies. The celebration had centered there. It was surely "large family" day. Children are numerous in Utah and happy. Autos have faces peering from every outlook. Trucks were loaded where they appeared.

So on to Brigham ^{here} for sleep. A beautiful drive in the early night with Salt Lake like a ribbon of silver against the western mountains still luminous with sunset color.

Auto camps were more expensive and less desirable than at least one hotel. We chose the hotel.

Thursday, July 25.

Brigham

"Gateway to the World's Greatest
Gamebird Sanctuary."

It sounded like Reno's slogan, but much
lies behind it. We must pass thru the
gateway some day and visit the south^{ern} end of
Great Salt Lake which has now been set aside
and is being developed for game food. Dikes
have already been put in and the birds are
settling. It is Federal emergency work again.

Is there fresh water available. Gulls and others.
But fish and plant food? Are they not necessary?
It is novel but apparently successful.

To Logan.

→ Like Kanti and Ephraim, Brigham has its
own power plant from its adjacent canyon.
Apparently they tie in with some perennial system
and sell and purchase power as necessary.
Thus Ephraim and Kanti tie in with Telluride
Power Co. that has the priority to southern
Utah. And probably Brigham and Logan
with the Utah Power and Light Co.

* One all these local canyons there may be
opportunity for snow-surveys in case the
towns desire to keep a budget and
determine whether they must purchase
power ^{and how much} from the outside.

Mountain valleys seem far more domestic than those in Nevada. An Iowa girl teaching in Utah and selling in the art store at Bryce Canyon desired particularly to teach in Nevada for its solitude and desolate places appealed to her. The opportunities might also be better because the environment was less attractive. Her abasement seems more and more correct.

Cache Valley very attractive - brush, green, well settled.

Utah Agricultural College - The Gaulds -

I failed to see it, for I found Harry and Peg Gauld. Dr. Gauld the visiting lecturer in Zoology and Geography and my companion in Greenland.

By merest coincidence, I was journeying north to Yellowstone partly in hope of meeting them on a class tour of the Park. They had returned the night before and were leaving the next morning for Bryce and Lian Parks. On the only interesting day we found them.

They will go to Europe next summer and attend the International Association at Edinburgh. They plan to be at Tokyo the second week in August, but agree to use the Tree House without my returning as direct host. This makes it possible to continue the trip until September 1. Write Herz to him: "Doctor Church says he will be back in early August. But you

know Church.

"Yellowstone represents Earth's better than elsewhere".
I had mentioned the nothing in the Panamint.
"The chemical action, the primal life forms".

"Point Sublime is the grandest view in
Grand Canyon". He had not yet seen South Rim.

" — — — — —, in his geological report on Grand
Canyon bursts forth in praise of the view,
with no connections with the geology.

He was fortunate. In those days science
did not demand the elimination of the
humble or the beautiful because it was
not "scientific". His article on the Antarctic
has been greatly edited in this respect
by the Geological Society of America.

"Furthermore, scientific foundations often
place heavy restrictions on expenditures they
help to finance".

He is anxious to visit Aquarius Plateau
above Bryce Canyon to visit glacial evidence
on the plateau. Entry still only by horseback.

Personally, he feels that Utah people are
gluttons for lectures. Their three fine
traits are singing, debating, and talking.
So maxse for social unity.

Since Fred Herz is taking Dr. Gould up
Mt Whitney, I am sending Herz's sleeping bag
back by him. However, we have not used
the bag thus far and may not need one

the remainder of the trip.

Utah Agricultural College is geologically ideally situated - on a plain of the Wasatch.

→ From Logan, the Journal of our trip was returned. Registered to Director Peterson and the moccasins loaned \$5.00 to Emily.

To Bear Lake and Watersheds

To trip to Yellowstone would be easily 400 if we made any detours. We pledge Peg not to attempt it and decided to stop at Pacatello and call Clyde from there.

The Goulds considered Bear Lake more exquisite in color than even Tahoe.

We had already decided to visit Bear Lake for its unusual water system and were delighted to be reminded again of its beauty.

Directly up Logan Canyon with its power plant over the plateau to gaze upon another Pyramid Lake 23 miles long and 7 miles wide. Barren i.e. unforested shores but waters of deep blue fading to lighter where the beach was shallow in the north. No other lake like this except Crater Lake, which is almost a purple.

Rural towns deep set in trees along the shore but beach was

wide and desolate.

A Near Wreck

Along the lone road, where being improved, a rock was thrown up by the wheel crashing the bottom of the car three times. It sounded as if we had struck a bedded stone. The pan was dented and oil was running from the crank case. However, the gears still ran without grinding. I had visions of staying by the lake two or more days until parts could be obtained or we be dragged back to Salt Lake City.

Fortunately we decided to return slowly to "Garden City" - a mile away - where was a filling station. There was no other adequate station within 20 miles.

The drain plug had been broken off in the hole. A boy discovered that a cork could be forced into the hole and held there by being wired in. He had a gear grease pump and a pit over which to run the car for filling. In 20 miles we were on paved roads. The bill was grease 50¢, work 50¢. Whose leave? The oil did not run out. We lost possibly 2 hours.

Lucky Carl got out to look for damage.

Utah Power Company

a combination of the tri-state river and a storage basin, and good topography, at 6,000 ft. Eagle Lake is much like Tahoe except that water can be run into it. It also is a

two-state lake (Utah and Idaho). The Bear River rises in Wyoming-Utah boundary country, then flows into Idaho and after flowing well north toward Pocatello turns south into Great Salt Lake.

The ground was so level for 10 miles at the foot of Bear Lake that it was possible to turn Bear River into Bear Lake for storage and by means of a ^{7 mile} canal to draw it by gravity again to the river. Without the storage power would be impossible in the late part of the season, for the Bear would flow out only 125 sec. ft. (a), as on the Truckee without Tahoe.

Thus irrigation and power were both secured, the irrigators receiving 800 sec. ft. (b).
at present.

But the dry cycle began about 1918 and the draft became more than the inflow, the previously the lake had frequently overflowed the roads. Then an immense ^{with capacity of 3000 cu. ft.} pumping plant of 5 turbines was installed, an intake canal from the lake has been gradually deepened until the present lift is 18 feet. a small ~~but~~ suction dredge is always available. The north end is shallow but the lake is deep for out.

It is a Tahoe with only half its problem, for the resorts object only to high water. They are too few to overcome to call for

for irrigation and power. So the lake will be drawn down until the cycle changes. Full storage can be made for an indefinite time. The lake rises normally about 4ft., frequently more. The present use is 4ft.

→ However, these figures must be carefully checked. They were not taken down and were heard in the confusion and noise of the pumping. The employee was a wonderful source of information introduced by the operator in charge.

→ Problem — Study runoff into lake from its own rather narrow watershed and from Bear and determine length of down land possible.

are there lake basin snowmelt?

Third Lake

Should be called Tale or Reed Lake. Really the submerged land between Bear Lake and Bear River. The river is brought thru this slough 10 miles to Bear Lake and is used for re-delivery by means of the 7 mile canal.

Against the wall of the pump house where the water is churned up from the pumps, fish are swirling as thick as sardines in a can. In their midst are large bass, carp, and

trout seeking to "run up stream". "No fish ladder is possible" and only when the pumps cease can the fish get thru.

These large fish leaped a maximum of 6 feet into the air and some struck violently against the wall.

So that looks a bird refuge? Waterfowl, water ducks and their babies sat on lakes or swans about near the road until we stopped and pointed our fingers at them. Even then they moved but a little distance.

To Pacatello -

80 mile detour to visit Bear Lake. It had been the desire of years.

The Utah verdure continued all the way down the Bear until we left it at its southern turn down into Utah and Cache Valley again. The stream was utilized all the way. At the north nose of the Bear River Range around which the latter loops was a forest of ~~large~~ fir rising like a screen.

A railway descended the Bear with us to this point and with us passed over into the Post Newf River watershed - along the old Oregon Trail.

Snow fences were frequent here and
→ snow double, so snow must be a factor here.

The elevation down from Bear Lake is approximately 6,000 feet.

Pocatello - 18,000. Auto camps fewer and more expensive. Hotels are cheaper for one or two. The camp ~~is~~ or camp ~~it~~ is for the larger family that can crowd in and camp if necessary.

By courtesy of Hotel St Marie called Clyde at Cowley. He had beaten his schedule and was at Cody. Arranged to meet at Yellowstone Canyon Lodge sometime Saturday.

Friday July 26 -

Valley of the Snake -

Nevada, Utah, Idaho. Each more populous. Range, intensified farming, much water. The Snake valley reminded me of the Sacramento. Water standing in fields. No swampy land in Utah. No waste.

→ U.S.G.S. at Idaho Falls.

led by Purton into rich information.

and He sent us to Lynn Crandall, District Engineer
reprints to obtain additional Water Supply Papers.

We found him to be also State Water Master for Idaho for the Snake River (upper part or all, I did not learn). I have the U.S.G.S. in Idaho is forecasting and distributing water as in Montana for the upper Missouri. This is the work the Division of Irrigation now seems to do.

* Clyde met only a few days at American Falls.

→ Crandall doubts the value of snow surveying for large basins - Too much detail. Favors it for small watersheds. The heavy April precipitation of 50 percent above normal added much to supply expected.

Snow surveys in Jackson Lake country by U.S. Reclamation Service since 1919. I recalled making the sampler set, for an observer who lived alone and preferred to carry the entire sampler set himself. Sections 3 ft. long - all in compact pack.

→ Complete records can be obtained from B. B. Hill, Supt Jackson Lake Reservoir
U.S. Bureau of Reclamation
Moran, Wyoming.

Exactly what we want. Work there up in a complete report and comparison of snow and rainfall and runoff.

Wansham died after 10 years of surveying.

→ Visit his snow sources if possible.

→ On subject of effect of rainfall during runoff, Crandall states that April-May are the months of heaviest precipitation during the year. Furthermore, that the rocky watershed upstream causes a higher proportion of direct runoff from rains, which is not true of rains lower in

the basin, Hence complexity of forecasting
for the Snake. Study this.

Storage is good

850 000 acreft in Jackson Lake,
1 250 000(?) acreft at American Falls,
Snake flows a mean of 30 000 acreft. (?)

Water lost by seepage.

1,700,000 acreft enters lake but
reappears 150 miles farther down toward
Boise at Melade and other large springs
which return 5000 acreft. To the Snake,
*But for year this would be 3,600,000 acreft.
Thus full recovery. Springs used for power.

"The Columbia Basin flows more water
than all other basins west of the Mississippi
combined."

"Forecasts are made to indicate to the
water user the general character of the
season ahead". Can we do even better.

Crandall sat at the phone rendering
decisions like an executive-judge,
friendly broad decisions. Water not desperate
here.

- He gladly offered to set me right on
any further matters I might wish to know.
We shall spend a day at Jackson Lake.
- Tree Rings - A cross section badly labeled of
a cedar hanging on the office wall. It was
about 2 ft. diameter. The first ring was

The Melade flows 1,000 acreft.

labeled 310 A.D. and cycles were charted
throughout. He was too busy to be questioned.
We can enquire about this later.

Idaho Falls. has storage only for power.
The dam is low and aids the falls,
a park is just being developed about it.

Direct →

Up the Snake.

The valley gradually narrows. The
South fork is many times larger than the
"main stream". In its direction rise the
Tetons rising like slender pyramids,
a railroad ascends the main stream
evidently to reach Yellowstone Park.

The highway gradually climbs thru lodgepole
pine to 6000 ft. to great mountain meadows
and gentle streams to the Continental Divide
and state lines, where Idaho, Montana,
and Wyoming meet.

The Yellowstone.

Oldest and largest park. Not tremendous
but wholesome.

Crosses large and humble. "Cabins and
camps thronged. Paths mostly nature's own
and worn. One family this year sowed
their ponies and brought a sack of 98 lbs
to pay their way.

a wonderful wild animal refuge. Bears,
moose, elk, deer, mountain sheep, cranes,

Rainfall during Runoff - 1/2 in. of rain raises the
Snake considerably. Where the measurement? In the
mountain or at Idaho Falls? In the
The upper Humboldt? In the
at the Park. Crandall calls it rough.

Bears born in January. Weigh less than
one pound. Mother bears and nurse them
in hibernation. Does she do it in her sleep?
Mother takes them with her to nest winter. (This time)
Geysers interesting in forest setting as
much as in themselves. Old Faithful powerful
near by and graceful at a distance.
Its regularity is its reputation.

Fortunate in hearing a talk on Winter
into Yellowstone Park. As always, winter
is more wonderful than summer.
My year-long plan come true in pictures.
Can I not yet come some Christmas?

Saturday, July 27 -

Spill -

At Phoenix, a tire expert knew one drove
fast from the looks of the tires, yesterday a
big expert would have known it from the extract
of logs on our windshield. The impact was a
good repairman.

Porcupines. are valued for easy food. In the
Naibab Forest they were protected for their service
in thinning clumps of trees by girdling a few.
In the Grand Canyon pack rats and gophers
are assisted by losing fallen logs for them to bury
under, at Flagstaff they are being poisoned.

White lines.

No white guide line noticed in ^{Idaho} Idaho. They
reappeared immediately in Montana. Why?

Why Yellowstone Popular?

The oldest. Traditional. More spectacular,
more honey, more movement, more

wild animals. It is a march rather than a symphony.

But in Yosemite at all times this summer there were 7000 visitors. It must be a competitor or superior.

To Yellowstone Camp -

Wax! "Italians clamoring for war". Here in this quiet solitude and peace war must be a passing spasm.

a Hick Town -

Carl calls "Old Faithful" center a hick town. "You must not start your car before 6:30 am for fear of waking your neighbor". "You must be out by 9 am."

At camp, the rising bell rings. Then a knock at each cabin door: "Shall I build your fire?" Then the maids: "Have you any soiled linens?" Answer: "Not yet".

a patient but persistent voice "I'll be back".

a Southern lad retorted "I want to sleep". Later his shoulders were out the window.

I: "Waiting for your clothes?" He "No, I'm looking for someone to fetch me out".

Carl sleeps late because he must keep awake driving while I can sleep. However, he was out by 9:10 am.

Old Faithful

It spouted for us again this morning. 1,500,000 gallons each time! 3 acre-ft?

an old lady doubted its automatic power and finally charged the Rangers with heating it up after she saw the large wood pile behind the lodge.

When the electric lights happened to be turned on at the moment Old Faithful spouted a suspicious misbegotten CCC boy from New York City, who knew more about electricity than card wood, exclaimed "There, I knew it was a fake."

- One engineer wished to know if the cold in winter froze up the geyser.
The Ranger said "No, but last year's drought dried it up, and it took six weeks' pouring this summer to start it."
→ Really, how far can a drought affect it?
"All trails start from Old Faithful." That is praise enough for the old geyser.

To Yellowstone Canyon -

a one-way road. Fishermen on the forks, 6 beams joining them for the catch or lost in the parked autos.

A canyon finally. So fretted Carl. He just must pass every car he overtakes. Only when ahead will he start humming again.

→ Weather Bureau Stations

One at Old Faithful Lodge - another at the Ranger Station at foot of Yellowstone Lake.

Yellowstone Lake. We crossed the
Continental Divide twice on the way
to Yellowstone Lake. The Divide is
really a plateau.

Yellowstone lake is forest surrounded,
normal in color, with sandy shores,
and a coastline longer than Tahoe's.
Elev. 7500 ft. Boats - row, slow
motor boats, and speed boats. Is the
lake rough? No high mountain rim
except at a distance on the east.

Fishermen along the shore, a "Fisherman's
Bridge" at the outlet. I overlooked this
until later.

Conference with Clyde and Parrish.

Clyde and Parrish had arrived
at Canyon at 9 a.m. We after 1 p.m.
We were covering 200 miles a day, they
500.

Their method in laying out courses
is not to visit the field but to
contact the Forest Supervisors and
Rangers and thru their experience
determine what the course should be.

Add →

Later it was learned
that they are actually
locating courses in
the field, placing
temporary markers,
and mapping them
for blueprinting.

locations as the location for the snow courses. However, the courses are being laid out by zones: near line of melting, then one or two above.

If local help is available near the course, it will be employed under supervision of the Ranger who must be responsible for the accuracy of the work.

→ To save them time, we are to obtain the location of all snowstakes in the Park from the Superintendent ~~of~~ the Park large scale map.

We shall also learn the location of Weather Bureau stations.

→ Owing to shallowness of the snow and nearness of the course to obsecur, few shelter cabins have been found necessary.

- They are now proceeding down Green River and then proceed to Colorado.

Interpretation of Cooperative Agreement.

The U.S. Weather Bureau evidently is unwilling to yield the direction of Snow Surveying to the U.S. Bureau of Agricultural Engineering. and a cooperative agreement has been drawn

copy of which Clyde has a copy. We also should have one.

Evidently the U.S.A.E. is merely to be a cooperating agency working under the direction of the U.S.W.B.

The U.S.W.B. is to lay out the snow courses and provide equipment. It is also to make general forecasts. No change in methods shall be made without the Weather Bureau's permission, or duplication made.

There shall be no research, ^{by the U.S.A.E.} in which meteorology is involved. [This also would have ^{independent} research by U.S. Forest Service.]

The Bureau of Agricultural Engineering can make local and detailed forecasts on streams where irrigation is practised and must furnish data to Weather Bureau in forecasting floods, and river stages.

Plainly Nevada has a large independent field still in research in forecasting streamflow. For progress may be slow. Too many restrictions and barriers from tradition and lack of adaptation.

→ Shall write Mr. McLaughlin regarding his understanding of the agreement.

→ Clyde fears that the snowstake method may be retained against the snow course method.

This seems improbable, for the Water Planning Committee had evidently approved the latter.

He also fears that the U.S.W.B. tin sampler will be used.

Plans.

I am to consult Sherman, U.S.W.B. Denver regarding substitution of courses for stakes.

I may confer if I please with Col. Peck of Forest Service, Denver, regarding avalanche risk and propose safe courses.

Mr. Walters of Reclamation Service is evidently more in favor of snowsweeping than is Mr. Decker and will help underwrite the Colorado River Snow Survey.

My plan of studying peculiarities of various watersheds is acceptable. Clyde and Carl have laid out an itinerary to bring us to Denver and Fort Collins by August 12.

→ Mr. Parrish is arranging a conference for me with Dr. Long and Director Sansome. I am to drop a line to Mr. Parrish 4 days early regarding date of arrival.

Regarding new courses Mr. Parrish suggests many courses with later eliminations. This hasty and summer selection may prove faulty. However, Clyde proposes summer

Clyde wants that I have
determined much
of the

#

To winter selection and believe this
the only feasible method where organizers
are few.

→ a conference will be held at
Fort Collins August 12 to pass upon
the selections.

Meantime, I should confer with the
Weather Bureau - Mr Gregg or Mr Hayes.

Yuma Project.

Mr Parshall still doubts its success.
Pumping must be employed. 400 feet lift
to cover area planned.

Parshall Flume.

a narrow deep flume being developed
to measure 600 cfs. (?) diversion from

→ Colorado into Arkansas Basin. Visit this.

L. B. Carpenter.

An old pioneer in streamflow is in
a Denver hospital paralyzed from waist down.
I must call on him. I delight to honor
such men.

Shoshone Project.

Parshall says that the Shoshone Dam
impounds more water than is needed
below. Hence snow surveying has ~~not~~
no value whatever to them. Only last year
was water supply below requirements.

→ I should like to see the dam. This is in

the Missouri River drainage.

There is also no need of Yellowstone Lake as a reservoir? At least there is no dam at its outlet so far as I noticed in the distance. The lake does not appear to fluctuate greatly.

The Yellowstone Falls.

I did not realize our proximity. Somehow I expected to come face to face with them when traveling down the canyon, an Irish bull of course.

Yellowstone Lodge is so near that the eddies of the water sounds like strong wind in the trees, but without its sharpness. Just above the falls, is a cable for water metering and a gaging station. The latter stands just where the water starts to accelerate.

Gorge 1500ft wide - 750ft deep.

Height of Upper Fall 109ft.; Lower Fall 308ft.

493 steps lead to top of latter. Much worn. So deep to descend but easier to reascend. Wash it.

Artist's Point.

But we chanced to go to Artist's Point first. Much richer and intense than Inspiration Point which gave a longer stretch of the canyon but a more distant and an partial view of the upper fall.

From Artist's Point the canyon over a glow of yellow in the sunshine with cameo effects over opposite - whites, reds, yellows. The canyon was symmetrical and sharply V-shaped. The water ran green. Trees descended in strings where footing was possible. An occasional fir appeared

an account of my picture in the middle of the page. The water is so deep and so wide.

No more collecting. Parrot
in furtherance of the trail
take - in opinion but effective.

beneath. Up stream a falls like Nouada
Falls in Yosemite, spray rocks, movement.

A 3-year old bear joined our party and
surrounded the auto. He smelled a bag
of candy and found it beneath the rug.
Carl closed our car. He found a girl with
a creeper and scratched it so quickly for
her that he pierced her hand. We left
him trying to tear the tarpaulin from
a trailer. Tough tarpaulin, strong bear.
Other bears more timid we passed
about the camps. All meet on an
equality here.

Lower
Upper Falls -

Trails cut or rather worn on both
sides of the canyon were long or rather
deep but intriguing. They were rustic and
frail in the extreme. People were parted
at the falls brow by merely the gorge.
Could we leap over and ascend the other
side. Birds were doing it without
concern.

The Upper Falls were stubby but their
descent to the brink fascinated me.

oobloo

So curious, so unexpected, so driving.

Water } what is the difference? Speech?
Ice }
Falls, glaciers } the Paris' town
Volcanoes, geyser } attractions.

And the insect-flyers. Starting from the rocks, flying broadly over the face of the falls, sinking deeper but steadily in the chasms, wet by the spray, finally engulfed — food for waiting fish where the water passes finally to gush at the ripples down streams a few yards back from the spray to the cliff.

I thought of the evolution of hang-gliding and similar adventuring. The one who remained was the hero, I wonder.

But the dampness and the spray and the moss far up the walls at the falls were the setting.

I can now understand the name "Yellowstone" — an eye of colour. An artist? or an explorer?

Sunday, July 28-

An earlier letter from Director Jeter was delivered by Clyde. He is as enthusiastic as me. Our 2 lbs extra weight has now fallen to 1 lb below normal maximum, but we are feeling better. Yes, pity Hardman could not have been with us. This move will be his some day.

→ Carl's Chance.

We have will probably take charge of Snow Surveying. Clyde tells Carl that he has had but little experience and may need an assistant. The development in the Weather Survey

Yellowstone is for
Wagner, Smith, Liff, Langman
with me

is too problematical. I'll refer the matter to
Director Joten.

Fishing. Men at the Lodge are boasting
of the catch of fine fish made in an hour.
Carl is getting interested. He has time extra
while I keep up my notes.

→ Silt. Water crystal clear here. The
muddy Missouri is below. Parshall agrees
with me that the silt in the Colorado
will continue as long as the canyons
are eroding. "It is shale" said he, and
I, "certainly not the range lands which
are precarious but not yet attacked.

"The problem is to desilt the water
at the point of withdrawal from the
river, providing there are CCC booms
enough to catch it off," referring to
Parshall's device. He laughed. "and
another problem, ^{for you} is to extract the red
from the soda water at soft drink stands
in Imperial Valley and so obviate the
need of shipping in special water," I
concluded.

6 To 9 -

I allowed Carl to sleep while I wrote.
He arose at 7:30. The dining room
closed at 8. We went to the Cafeteria.

at the entrance 6 AM - 9 PM. I suggested that
he was too late there also. He laughed. "It
isn't 9 p.m. yet." I had failed to notice the p.m.
As usual he was observant. That makes
him a good driver. I want him clear headed.

→ A Colorado Cooperative Snow Survey -

It occurs to me that this should
be organized while we are in Colorado.
I may wire to Mr. Gregg about it and write
to Mr. Langhans.

Financial -

account just rendered by Carl.

Expended \$458.63 including possibly \$15 for pictures

Was refunded

Time elapsed 5 weeks.

Miles covered 5500 miles

"Do not send more money now," but shall
we turn back from Fort Collins?

Must go up and down Colorado. Must confer
at Fort Collins. Then home or on?

To Dinosaur Pass and Mt. Washburn (10,317 Ft).

If only we had a typewriting secretary!
The entire log has been spent writing this

Turned out the letters and cause
essential to continuing the trip.

More illustrative material also was gathered
for the new course in Beauty in Nature.

The evening was spent driving 50 miles to
Mammoth Hot Springs at the Gardiner or North
Entrance.

Up Mount Washburn.

a road can scarcely be built to the top
of Mt. Rose, but the peak would be changed
for the all adventures.

The trip up suggests that up Tomalpais.
A one-way road - up one side and down the other
The spread was more fearsome for it traversed
fiss and scalded rocks. The wind was strong.

A 3000 ft view over the great park, grassland,
forests, Yellowstone Lake, hazy but impressive.
A jumble of formidable mountains east where
Yellowstone Canyon starts toward the Missouri,

Farewell Yellowstone.

The final view of Yellowstone Canyon is impressive
because of the basalt strata that make up the
walls. Vertical prisms that suggest the
Giant's Causeway and Fingal's Cave in Island-Scotland.
Only in the canyon is it visible, for a few
feet of soil and trees cover it about.

a Cleopatra's Needle rising from the canyon
will give a sense of inaccessibility. On the

a level of buffalo! Over 50,000,000
on the plains. Remains of Indian culture.
Long time estimate of the buffalo and left
the Indian standard, a cutting of buffalo supplies.


whole, the last ones of the yellowstone suggests
the Columbia - but on a far smaller scale.

The Petrified Tree.

Erect on a steep hillside. Iron-ore-in.
Good. These chiselers! 5 ft. diam. 30 ft high (?).

Other stumps level with the ground badly
morn. Diameters: 6 ft, 18 ft, 2 ft, 4 ft, 6 ft,
2 ft. In the heart of the latter were white crystals,
deposited in a hollow. This was the only yellow
tree when petrified.

a giant forest overwhelmed standing and
buried in silica and backed by silica.

The 18 ft. stump was only partial 

The clearing of soil from the hillside would
doubtless reveal more. A zigzag trail
leads to each.

Wassermoth Hot Springs.

Indeed mammoth. Titans' springs
or Caucasus Landau Basin of chemical water
terraced on the mountainside.

Mammoth a hillside town.

Quarters more commodious. Carl finds
that the lodging is \$1.⁵⁰ irrespective of single bed
or double double, single cabin or double cabin.
So we have a double cabin with double beds,
double washbowls, double chairs, double
only curtains - but only one stove. We need
only a fireplace to be much at home.

Everyone is up and in every
no prompt that 7:30 near
The deep mountain begins.

But meals have now coming to Oysteria.
Table d'hôte meals with no choice —
especially with hams and yams were
too much.

Monday, July 29-

→ Obtain

Topographic Map of Yellowstone
National Park

U. S. Geological Survey.

Oh, Ranger!

A Book about National Parks

Albright and Taylor

\$2.00

Dodd Mead

Cubby in Wonderland

\$1.00

Frances Joyce Townsend

Abingdon Press

Sequel to above.

Cubby Returns

The Yellowstone National Park

\$3.00

Chittenden

"No better book is possible"

Haynes, St. Paul, Minn.

Bears in the Yellowstone

\$1.25

M. P. Silliman

W. C. Clegg

My Winter in Lapland

Paul Brown

By Paul Brown

15¢

→ [See below]

→ See next sheet
below

The Kingly
Evan Miller

Commonplace.

Mans



Picturesque America

John Francis Kane

Union Library Assoc

New York.

367 Front Ave.

The National Parks Portfolio

by Robert Sterling Yard

6th Ed.

Government Printing Office

Yellowstone National Park
in Map and Picture

[Pictures inserted in map]

"See America" Denver & Rio
Grande Western

→ See next sheet
below

Manned



1 day later
M. A. Peterson
93

4 Pacific
Yards named

Shore 382 ft.

67 South Cove
at Canyon

Call Canyon
Plan Cove

average depth
about 100 feet

North Bay Cross

Our Wilderness
Neighbors

Dave G. Yeager

125 W. Chug

attain Natl Park Service

Grand Teton National
Park

at Trail Program Dept

Office Chief Engineer
San Francisco
California

Morse
→

W. A. Jackson
#3

1 day later

#3
pinto horse

Sum 3 1/2 H.

at London
67

19 sec to 19 sec.
35 sec in 5 hrs.
Sum 3 1/2 H.

Board of Hill
Pawnee
Saginaw
1920 + Morse used
Keep Mr. Deerington
4 sec

Plan 3

about the
average
range

→ Roger Tall, Superintendent of Yellowstone.

After sending accumulated mail to Peter, McLaughlin, home (but air mail must start from West Entrance or from Butte), we called at Park Headquarters.

Mr Tall had just left for Glacier National Park & he gone 3 days. He is successor to Albright, now Director of Park Service. Sorry I have missed him, when recommended by Purton.

→ Write him of our purpose and regret and success with his subordinates.

U. S. Weather Bureau.

An impressive station building and local equipment. Section center but cooperates with Wyoming.

8 Cooperative stations, but Mr Lathrop sensitive about inspection. Park Service dominates. Available snow depth data available only in Wyoming Section Report. Not recorded at Mammoth.

Mr Lathrop formerly section director of Montana. Father one of first to suggest streamflow forecasting back in Cincinnati in '90. Recognizes inevitable future of snow surveying but must remain neutral until decision is reached.

at Washington. No interest at present
in streamflow forecasting in Montana.

There will be no protest ^{on his part} to making
snow surveys in the Park.

A very intimate and delightful visit.
Inquiries about alpha and Salzer. Had
long followed the Nevada snow work.

→ Send him reprints - broadcasts, etc.

Cooperation with Park Service

Was referred by ^{Asst} Superintendent's secretary
to Chief Ranger's office and met

→ Albert E. Elliott [Asst Chief Ranger?]
who was intimately concerned with
snow measurements.

Give us exact location of snow stakes -
on maps for Clyde and ourselves - 8 stations.
Depths taken daily for U.S.W.S. Not so
essential for themselves. Other occasional
measurements made in connection with
plant life.

→ Letter already received from Wenson
of Montana regarding a snow course
at approximately 8,000 ft. to study effect
of snow cover on summer precipitation.
Note on letter states the Park Service will
be willing to make survey if no expense _{is}

for equipment is involved.

Similarly the Park Service will be very willing to conduct snow surveys but wishes to avoid duplication with Manson.

Assured Elliott that there will be but one system and that Manson, Clyde, and me will form one unified plan.

→ Write or visit Manson. He has ordered 4 samplers from Clyde. Clyde has sent still orders to Montana(?). So ask Fred Herz to ship his model to Clyde before others are made.

Snow stakes will not be considered as duplication, for they are at Ranger headquarters and are read daily when Ranger is not on circuit.

A system of 8 courses suggested. Will tie in with courses in southern end of Park maintained by Jackson Lake Reservoir. Two zones agreed upon.

One probably 7,500-8,500 ft.; the other above 8,500 ft. but region above timberline will be avoided because of drifts. Level of Yellowstone Lake is 7,735 ft. Mount Washburn is 10,317 ft.

Equipment is to be furnished, and some one should come to select courses and instruct in sampling

Yellowstone is ideal for snow surveys.
Protecting forests
esp. Yellowstone
Region 50 x 60 mi.
level of great river systems
and since all practically done.

→ Game Elliott Geog. Rev. and Snow Survey Conf.
Send him Woodcock, etc.
auto road from Mammoth to Gardiner or
Livingston open all winter. Stage routes.

Mammoth Hot Springs.

Wonderfully impressive from a distance.

Triassic terraces soft and rapidly
built up in Roman Garden fountain style.
Highly colored by algae where water is
flowing. Exquisite colors - lemon to purple.

But Mammoth is dying. Why?
and where water has ceased flowing the
formation is white. Paths are carefully chosen
for the formation easily crumbles.

→ These hot springs are the givest of
all types, and so dying. Surely not the
present water deficiency alone.

Back to Old Faithful over open uplands with
distant, gradually rising peaks.

Obsidian Cliffs

The west side of the Park is obviously
volcanic - at least actively. But the Obsidian
Cliffs are here. Rare - so ^{rare} that one
wonders how Jim Bridger ever invented
the story of shooting at a deer thru it.
Here Indians came long distances to
obtain obsidian for arrowheads.

No paper fossils at Mammoth.
The formation does not merge
a solid mass of limestone the same

Beaver Ponds - Pursuit of the beaver led to
the discovery of the Park.
One stream 1100 feet long. Beaver igloos
project but beavers out of sight.

But a bear-beggar joined the caravan.
Every point educational with charts and
pictures. I would like to dwell here.
Perhaps I can visit my back in environment
like this. Saw a mouse track here (?). Woods abundant
Norris Basin

Hot springs here are becoming
incipient ^{superheated} glycers. * Hot trees and
geysers live together like boils on a
handsome face.

at museum here the life history
of yellowstone Park was shown from
earliest ocean sediments to faulting,
volcanism, ^{glaciation,} and drying thermal action.
High volcanoes have been worn down.
The present mesa is quietly extended
lava that flowed like a lake around
older peaks.

The heat of the "magma" or earth's
molten interior coupled with acid action
is causing the present depositions.

On the outside of the museum, a baby
bear was walking along the ledge forming
the base of the building and was forced
to back out. His mother didn't mind

* At Tumbledown line there is Adams
Chemical laboratory with the
roof off.

One geyser was boiling
fiercely. Expected the hottest.
But it was rising gas. I
touched my finger to its edge.
Got it off in about 10 seconds.

She had two cubs - a brown and a black.
"Black" Bears - may be black, brown, or
cinnamon.

Lassen Geysers Basin

Algae. Hot water algae, mild water
algae, cold water algae. All the same color.
Are they the same identical algae?
Are they then adjustable like the universal
crow? Sometimes the hot water floods
the cold but the algae do not seem to
be affected. Only lack of water destroys
them.

Here then is Larry's "origin of the world,"
being enacted before us. The dying molten
earth, the rising growing organic life. This
is the Geologist's laboratory and classroom.

a high terrace of unusual geysers.
you must cross the river to see them -
but you are irresistibly drawn by the
torrent of thermal waters running down
in a torrent to the river.

"Eckstein". A Mauna Loa of seething,
boiling water. A "Crater Lake". Had blown
just ^(in 1870) under to height of 300ft. This had blown
the neck out and ended the spouting.

Its wall has the colour seen in the
Petrified Forest - made by the deposition
of silica.

Grand Prismatic Spring.

Shallow, and very gradually, sloping mound. One must splutter thru a film of descending water to view it. But the whole mound is slope covered, of nearly all the colors in the prism. Sometimes the steam reflects the colors.

I am growing young again and enthusiastic and eager to tramp. The seat of my pants is thinner than threadbare. Too much sitting especially on friction auto seats. I must use the soles of my shoes.

at Old Faithful again.

The thronging place of the park. Geysers do attract. From Mammoth to Old Faithful, we have the evolution of the water volcano. Cooling at Mammoth still hot at Old Faithful. At Mammoth lime deposit, at Old Faithful silica.

Fermentation soft at Mammoth, hard lime glass and slowly building at Old Faithful. No need of glass to make geysers at Mammoth. Colder also there and water ceasing to rise. When water no greater than evaporation mud or paint pots gradually form.

Some day the geysers will cease. The forests will overtake. Organic

life will prevail.

Yellowstone Park has rightfully been set aside as a museum of earth's great origin and a place for life - both human and animal & invertebrate.

Bears Again.

"600 black bears, and 250 grizzly bears in the Park" a boy's definition: "Rangers just arrange things in the Park."

Black bear confused with Ballbeaver by Smelt from Minnesota.

"67 grizzly bears fed one night at the Canyon". We missed something. Five times more than we saw tonight. Bears must hibernate. Could not obtain food. Snow 3 to 12 ft. deep in Park.

Fort Peck

"Fort Peck fossils assumed" is item in newspaper. Then we must go north.

Evening Lecture.

By W. H. Jackson, 43 years old. with Hayden Survey in 1872. Used net plates. Later dry glass plates 1882 & 4 in.

and Mount of the Holy Cross in Colorado.

First pictures of Mesa Verde - all purchased a most interesting series of lantern slides of old days. First boat in Yellowstone Lake. Made original soundings of depth of lake.

A fair voice and strength at such an age to lecture so well. It was in the open air amphitheatre under the stars. Pictures blended so well with the setting.

Costs - We've eaten too expensively today. Caffeeteria too allowing. I order more than I can eat. Tomatoes too much.

Tuesday, July 30.

Glad we are not with Clyde. We would see too little in the forced driving and feel better at the more leisurely pace.

Can also write more.

To Yellowstone Lake and Arroyo.

Our taxgatherer been by the road on the Firestone, another lying by the road like a dog and drawing in his paws lost the wheel pinch them, and a mother bear with her cub seeing a hand out from parked car where we were viewing an Osprey's (Fish Hawk's) nest on the top of a dead stub. A boy had climbed a neighboring spruce to photo the parents as they alighted. But they swooped down

At bridge over the Firestone:
"Stop, drive no further in that direction if you expect to return to all right". We drove on.

and away refusing to alight until he descended and the 3 young crested in the nest until we could see only their heads. One parent had a fish in its claws.

We saw one alight and call the other with the fish while the little ones stood upright. But like the White Jay and the Prairie, it did not respond while we could wait.

Thus we took leave of Yellowstone.

The Continental Divide

Quite uniform in height in the Park:

First Crossing 8262 ft. -

Second Crossing 8366 ft.

Third Crossing ?

Pass into Jackson Hole (Basin)

Jackson Lake, the Tetons. A glacier dug the first and rounded the second. A high-thrust ragged sky line.

A Thunder Shower.

Thunderstorms do occur in Wyoming as in Arizona in summer. The Tetons were soft the entire afternoon in severe effects. As a rule, says Mr. Hill, they occur in June-July. But this is near to driest summer season on record. Scarcely any rain since June 1. In June 1.17 in., but 0.96 in. in first two days. In July 0.14. Today it was only a trace.

Real Snow Surveyors.

at Moran we found the equivalent of Lava Tabor and Arthur Smith except with more reliability. Welcomed warmly, for he had just mentioned me in a letter.

Marxham (my supposed hermit) was a man in his 40+ at death. No bad habits at all except that chocolate cake was as good at breakfast as at supper and he accepted freely at the homes he stayed on his trips. Stomach trouble caused his death.

Bennett B. Hill, present Reservoir Superintendent
Moran, Wyoming

is a splendid specimen of physical strength and early married with fine wife and children.

Has made only 19 mi. in 19 hours, but has also made 35 mi. in 5 hours.

The Park Rangers travel after storms. Because of his need of snow surveying on schedule, he travels in blizzards across

Jackson Lake by Compass when he cannot see his companions 50 feet away or even call to him. He quite surpasses the Rangers and would be the leader in "busying horses of the Snow Survey".

150 miles & more round of his snow courses above Jackson Lake. Temp. -55° F.

Jackson Reservoir.
Is still maintained and regulated

written in answer to an inquiry regarding methods by Mr. Polington at Enley, Idaho. Cause of call from Clyde and Maria.

Some Hill keep Co. Proceedings. Send them

Hill has partners but partners travel separate. The greater need of having men and fixed cameras

uses strips of film higher not for use in the field. When used on snow surveying

by the U.S. Reclamation Service ~~the~~
the along with American Falls Reservoir
as a basic part of the Menadota(?) Project.

→ E. B. Darlington, Superintendent
Menadota Project
Burley, Idaho. (between American
and Twin Falls.)

The control of the Project has been turned
over to the water users but the ownership
and regulation of the Jackson and
→ American Falls dams have been retained
by the Reclamation Service.

Jackson Storage 847,000 acrefeet,
American Falls Storage 1,700,000 acrefeet.

Dam gives 39 ft rise above level
of original lake.
at present 26 1/2 ft. above original level,
area 25000 acres. Old lake area
17000 acres.

Problems -

Owing to a slide between Moran
and Jackson, too great a flow must
not be released from Jackson Reservoir
at a time or ranchers will be flooded.
Letter demand that Reclamation Service
enlarge the channel.

at Idaho Falls 26000 sea. feet is about
all that can be passed without injury.
So floods must be foreseen.

Methods -

Courses laid out in stations with
3 meas. at points not varying 2 in. in
depth to avoid drifting. These courses
where chief sources of water are known
to be. Suggested the name of "fixed" courses
in case others should act as substitutes

Measurements made 15-20 of Jan., Feb.,
March, and April. Suggested that they be
advanced to Feb 1, March 1, Apr. 1, May 1.

Jan 1 seemed too early. ~~In~~ June 1 the
snow is so rotten that travel would

be practically impossible. In May the
mass break thru snow and suffer
most. ^{Early} In April ~~over~~ Hill travel in
the night when the snow is frozen
and sleeps days.

→ To save the mileage early in the
season when the snow is soft, suggested
that only key courses be measured
February 1 and March 1 and the
entire series April 1 and possibly May 1.

→ Satisfactory to Hill if Mr. Darlington
approves. Proposed to write to Mr. Darlington

→ The June 1 measurements could

Originally Washburn had wintered
many stations but Hill by careful
examination had eliminated all but 80 -
all are better he found to be very close
to the average of all the best. [This same station]

be made by the Park Rangers who
live near by.

However, Hill prefers to measure his
own courses in the Park because the
Rangers do not follow exact schedules.

→ Write Darlington in praise of Hill.
Send him full reports. Suggest key courses -
also extra sets of samples to keep at
various centers. Get aluminum samplers
made.

(
in
both
copies
)
Have Fred send aluminum model
to Clyde for his possible use.

Value.

"Twin Falls would not be without
it" - Hill. Did he mean American Falls?

"Rangers by snow stacc method never
get the same depths he does,
because of drifting and of courses
do not get the water content."

Lynn Crandall at Idaho Falls
desires forecasts as early as
March 15. Hill takes his basic
survey April 15. for snow does
not start to melt until then.

Forecast for Jackson Lake very close
this year. Possibly 400000 acre feet in

→ 7
700000. Write Hill for exact figures.

→ Because of preceding dryness used an Humboldt method of comparing selecting comparable seasons.

→ Carl copied complete snowsurvey record since 1919 for marking up. Precipitation records can be obtained from Wyoming Climatological Record, Cheyenne. Ice runoff records from Burley, Idaho.

Precipitation and Temperature Stations

1. South Gate of Park by Park Service.
2. Moran (6700ft.) by U.S. Reclamation Service.
3. Jackson, Wyoming.

access in winter by sled only to Jackson -

Moose and Elk -

100 moose in Jackson Hole. 5000 elk come down. Roadside numerous with them in autumn. Some go to the lower lands toward Livingston. Remain in Jackson Hole all winter.

Success so numerous in Snake River that they pane the floor of the spillways of the dam when the gates are closed. Geo Biological Survey not interested in their extermination.

Snow Surveys below Jackson Lake.

Hill takes a course about 35 or 45 mi. east of Moran and will continue.

Two streams above Jackson flow
5000 feet. They may be worth while.

Teton Pass (8,800 ft. approx.) would also
be a possible site at south end of
Teton Range and along highway from
Jackson to Victor.

Suggested that we see

A.C. Mc Cain, Forest Supervisor
Teton National Forest
Jackson.

→ for maps of region.

Teton National Park

A young park but has eager
officials. ^{Superintendent fighting fire near Jackson, but}
_{into Chief Ranger, Mr. Baker.}
Have long been wanting a weather
station.

Eagerly came from supper to see us.
Will make snow surveys toward
south of Park if we decide the
courses useful. We are to furnish equipment.

Tetons lie between the two forces
of the Snow and have elevations from
7,000 to 13,000 feet.

Obtained topographic sheet. Now one
with trails nearing completion.

→ Send for National Park Service
; Grand Teton National Park
Trail Program Map
Office Chief Engineer
San Francisco, California.

Note from Church to write Guy Edwards, to
notabook #1

→ Estimate the run-off from
the Teton. Carl says "yes"
from the Ruby, Nevada, etc.

Plainly the Park Service will freely
cooperate irrespective of Weather Bureau.
Official up the park sent as to Headquarters
because he was sure the office was interested.
Partington was familiar with snowmelt
because of detail at Yosemite Park. There
the romance and hardship were the theme.

To Jackson

Jackson Hall a beautiful shut-in

basin with sagebrush, grass ranges
and ^{over} Berkeley hills. Dude Ranches abound
a rangaude rendezvous in old days.
Furtrappers named it. The "Virginian"
glorified it. The tetons make it
incomparable.

We are in a house-hotel of our
mothers' days. Little changed. Clean.
The auto cabins too up to date - \$4.00.
Here we pay \$2.00 This must be the
hotel to which the Virginian brought
his teacher-bride.

Out the cafe window, a car

19 California 35
HM 51 02
Hollywood, California

Where was that? Had we ever been there?
It seemed an age and infinity.

Our car is being reloaded for further
adventure. The Green River heads near
by.

Wednesday, July 31 - Down the Green River
Teton National Forest, Teton

Mr. Mc Cain was out but Mr. Smith
Executive Assistant gave us visual

demonstration of entire forest and
snow survey possibilities ^{from a relief model of area}. Recently from
Payette National Forest, Idaho,

→ almost no measurements of weather
in Teton Forest. Need them for game
supervision and for fire patrol.

→ Will gladly cooperate and if funds
are lacking may be able to contribute.

Practically no snow stakes. Random
measurements brought in by Rangers.
So snow survey courses can be laid
out irrespective of snow stakes.
Will act whenever we are ready.

→ Shelter cabins desirable. Rangers
make game patrols thruout winter. So
snow surveys can be readily made.

→ Send reports and reports.

Suggested Drainages:

1. Buffalo at Two-gro-tee Pass
35 mi. east of Moran (where Hill pass?)
Ranger station 15 mi. from Moran. 20 mi.
farther to Pass. But a road station
just below the pass. Snow deep and level.
Wind River tributary of Platte across
the pass.

2. On Gros Ventre

Reached from Kelley or higher up
from Upper Slide Lake. But courses

Teton Pass also can be included.
lies to west. Traffic passes
daily. There is a ranchman
there.

must be on north slopes where forested. South slopes windblown, hence natural ~~Elk~~ winter range,

3. Upper Hoback Basin. 7,000 ft. elev. near Rim Station. Snow lies on level for long periods.

→ Directly beyond Continental Divide lies the Green Mountains, more broken even than the Tetons and forest covered and set with lakes. Much water comes from them. They are the source of the Green River.

Site in the Wyoming National Forest. Headquarters at Kammerer, 160 mi. from headwaters of Green, but Jackson also is fully as far away. The two forests will make a common ground for snow surveys. "Two Ocean Pass" is well named; Snake, Windriver, Green, yes, even Yellowstone. It is the Cupola or roof of the United States.

Game Animals

Could have sizeable herds of beaver, deer, elc, moose, mountain sheep if Wyoming did not commercialize them so much. Forest is starting to give

LIST of "Bridging"
TO follow!

→ See a Topog. Sheet of Teton Forest.

them still greater protections, "Three cub bears petr about Jackson quickly disappeared to game in the open season."

22000 elk in Forest last season, thrive as well as range stock. They can not browse on spruce and willow as can the moose and find even hay too coarse.

Furthermore, their stomachs are small. So they must be fed frequently - not every 3 days or more like cattle - and on the range must feed almost constantly.

The deer, elk, moose, mountain sheep here each their winter range in the Tetons Forest, and constant patrol is made by the Rangers to aid them.

Clyde - Parrish -

They seem not to have stopped either at Reclamation Headquarters or at Forest Service at Jackson. Possibly moving larger units. But these local units are so far our best possibilities.

Heavy Thunder Storm

Auto thoroughly washed and cleaned with hail. $\frac{1}{2}$ in.? Are Wyoming. Hail common here at Jackson. Thunderstorm naturally spotted.

This thunderstorm roared about the course of our travels along the Green the rest of the afternoon and touched us

slightly at intervals.

A Glance at The Snake.

Out of Jackson to the west toward the Teton Pass. 5 spans bridge. River spreads into channels. Several rock jetties built out from east side to force river back toward its center. Floods could do damage.

→ Beyond the Teton Pass, abundant forest on slopes for cause there.
The Hoback Basin
Down the Snake to the tributary Hoback, then up it to divide. Snow fences.

→ At crest very good sites for snow survey courses.

Down the ^{Green} ~~Sawtooth~~ to Kennecook,
The Green Mountain Range.

From Hoback Crest could be seen the long Green Mountain Range, as tumultuous as the Tetons but not as high apparently a good water source. A few small patches of snow still remained. We paralleled the range far off from

the Warren Bridge near Daniel to East Fork beyond Boulder. The Green at Warren Bridge seemed to carry about $\frac{1}{3}$ of the total flow of all the feeders, by looks of present flow and records from Water

Pine Crest and East Fork
quite similar in present volume.

Supply Paper, but the entire upper Green
carried only $\frac{1}{3}$ of the entire flow at
Green River, Utah near its mouth. Thus
the Uinta were twice as potent a
→ water source as the Green Mountains.

About 4 canals distributed evenly
along the Green Range should be
amply sufficient, providing they can
be reached.

Wetter still they will serve for
the Platte River also.

West Forks

Lalanga and Fontanelle seemed
slight and ^{not} furnished about half of
any one of the floods from the Green Mountains.

La Grande Country

The Green seems well confined.
Valley is narrow. Trees in river bottom
but only subirrigated land. "Painted"
rock walls as in Arizona.

Mesa seems barren. Soil poor?
yet where side streams enter, are
fields with mild grass and even
alfalfa.

→ Is it too difficult to canal the water
from the main river? Mr. Parrish suggests
that they do not need any more hay

to supplant the range.

Water slightly silty, but fish occur.
But even in the "thick" Colorado, Kelt
caught a very large trout.

At one point - we called it "Erosion
Bluffs", shattered rocks were ready to
slide down, and a warning sign
"Look" was posted.

The Mesa

Elevation at Tuba 6,600 ft.
Snow fences frequent and arranged
to suit the slope, the road, and the wind.



Kennerley

(by detour from the Green
We came to Kennerley - 230 miles for
the day - to see the Wyoming Forest Supervisor
whose headquarters are far from the
Green Mountains. A coal town, on
Oregon Short Line. The Green will be
sought again tomorrow and followed
to Vernal.

Clyde and ^{Parrhall,}
~~Man~~


Surprised at Kennerley Hotel in
the evening by Mr. Parrhall - quite decorated up.

They had arrived at 4pm., we at 7pm.
Clyde had continued driving on to Logan.
Parshell would take the night train for
Denver.

I had been mistaken. Clyde was actually
staking snow courses and mapping them
after leaving Old Faithful they had gone
east again into the Wyoming forest and
laid out courses in the Green Mountains.
They had spent a night at Pinedale
[Cheapest on the trip. Bed \$1.00 Meals 50¢]
and laid out courses near the east fork.
They had then come to Tulsa on the
west and laid out a course on
Labarge Creek. The Forest Commissioner
had been with them.

Thus at this point our plans and
work are almost identical. We have
laid larger plans for the Snake.

Mr Parshell would avoid the hazard of
snow sweeping by inventing some
seasonal device to record snowfall and
transmit the record by electrically.

It would here be some form of the
seasonal snow gage, tho he would
make his unit a triple one in the
form of a  to offset wind effect.

How would a robot do?

Mr Parshell must not
have anticipated for
the accurate study of
the ground here. Division.

He told us much of his special
deloading device for stretched load.
and of diversion projects in the
Rocky Mountains. The Gunnison
diversion would require a tunnel
24 miles long. He will be our guide
thru the hydrology laboratories at
Fort Collins, Dues the center of original
investigation in evaporation, dams,
and silt removal.

Mr. Dietrich is really an old man -
70 years old - but active and eager about
snow. Owing to lack of funds, he has even
gone out and made trips himself. "I
must meet him".

Thursday, August 1

Clyde 2000 mi. in 2 weeks. "500 mi. a day?"
200 mi. + 300 mi. for emphasis.

We 6,000 mi. in 6 weeks.

a robot might serve Parshall's purpose for
making snow surveys if it didn't freeze up.

at Kammerer:

"No. 1 J.C. Penney Co. Mother Store".

The Wyoming National Forest.

It is in 2 sections: East and West.

This accounts for our long journey to Kammerer
that was chosen as most central for both.

Washburn admits that he intends to play the shilly.
that release my internal pressure. The world's
pressure too possibly. He is now in the open, with the world opens?

Newspaper clipping
"WAKE DIVISION" TO
Foster

Had a long conference with H. G. Cheesman,
Executive Assistant:

Snow survey of little value to Wyoming Forest.
Wild game on its ranges but it stays
permanently there and needs little supervision.
Some patrol made when desirable.

No snow staves in the forest. Years ago
a long line of them in the Eastern Forest.
Mr Cheesman, as ranger, made a messenger
team to read them one year. Difficult
because attempt to cache provisions was
frustrated by deep snow - up to skirts of saddle.
Later a few were read. Now none. Only
occasional and random reports made of
depth.

Earlier there were several rangers
employed, now only 2, throughout the winter
in the forest. Others are withdrawn to
headquarters.

Professor Clyde had outlined several
courses. One on the boundary of Teton and
Wyoming Forests feasible, where elk winter
the sale is at present conducted, and a
sawmill is situated.

→ There are guards - part-time men - probably
available for pay. One is resident within
the forest, another lives outside but near.
One Ranger is headquartered at Pinedale
but it is questionable whether he should
leave his regular duties for too long a
trip, as, for example, to the south end

where could have
left in trip some time

of the forest. The highway is open through
the winter. Saddle horses can be used to make
a closer approach. The snowshoes.
Ranger Stations may be used as
shelter cabins.

Area is very high. Highest mountains in
state. Also very rugged. Difficult to traverse
it by horse. Better to enter from the
highway at various points. Elevation can
easily be gained within a few miles.
Forested. Easy to locate courses.

Professor Clyde gives permission to
make arrangements with local Rangers.
He evidently has located a few courses.

The course offered by Teton National Forest
on the Rim above Hoback is near the
one proposed at the north end of Wyoming forest
near the saw mill and tie sale.

Wyoming NATIONAL FOREST
Kammerer, Wyoming.

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Designation or Subject

MEMORANDUM FOR

Send all reports to:

C. E. Farris - Forest Supervisor - Wyoming Nat
H. O. Churman - Executive Ass.

To Green River (City), Wyoming.

A coal country. Prospect holes for coal seen.

Oregon Short Line traverses this region to Geary to connect with Union Pacific. We saw it nearing Pacatollo.

Muddy Creek rises in same range as the Bear River. Has almost as ^{wide} bottom lands as the Green. Becomes Green River at Geary.

→ Some silt in all streams in southern Wyoming. Parshall says that some silt is desirable to prevent growth of algae in the irrigation ditches.

"a long way between places in Wyoming," says Parshall. We even pass by map places that do not appear.

→ The view of Green River above Green River City indicated no vegetation of consequence in stream bed. Stream also closely confined except in Jackson Hole. Seems to be mainly a conduit and apparently loses little water.

To and Over the Linta Mountains.

Wind! Windy Wyoming.

The state line is recognizable by the greener river bottoms. ~~The~~ Wyoming prefers range lands, Utah prefers ranches. The family unit? Now an Aunt fence.

Enter Ashley Forest thru Red Canyon, remarkably like Bryce-Zion Canyons.

5 miles to the Green River bearing
no indication of the canyon.

Up and up and windingly up.
Green ranges, cedar, trees. Water here!

→ Compare precipitation in Green Mts and
Uints.

From summit 8500 ft. Wyoming looks
like an eroded mesa. As the near
mountains bush, thick sagebrush and
bunch grass. No erosion here. The ranges
are mainly forested with some bald peaks.
The ranges in contour suggest the
Sierra Nevada. Tiny snow banks in distance.

Rained here yesterday as in Jackson
Hole country - Puddles numerous. Storm
widespread?

Carl: "you approve of larger and heavier
rains?" Yes, ~~as~~ they cut down the speed
and wash the car. "yes, perhaps not."

"Utah Highline Trail"

Pat Creek 5 mi. →

← Leidy Peak 22 mi.

← Dead Man Lake 27 mi.

← White rocks Lake 29 mi.

← Kings Peak 55 mi. "

A large forest but made accessible.
But a via is a one-way road thru dense
forests and many meadows with
"Turn Out" every 5 miles. How pass? He didn't
know.

Far in the depths to the east is
hidden the Green River in a country

becoming increasingly like the Grand
→ Canyon. Wyoming does not care
to use its waters and now Utah can not.
The cost for power would probably be too
great the power sites are available.

Vernal. (5331 ft.)

Down in farming land watered by
the streams from out the Uinta and
the Wasatch, 200 mi. to a train but the
Denver stage gives quick and cheap service.
Is a small town like all other Utah towns.
But had rather loud vocal music from
a roving group in the night. Loud and
persistent but pleasant.

Friday, Aug. 2.

Spent last night and this morning in
analyzing the runoff of the Colorado Basin
& determine where snow-survey courses
should preferably be centered.

To see is to believe. We can now understand
better. Conferences with Mr. Stewart of Forest Service
and Mr. Christensen, County Surveyor have greatly
aided thru the use of

U. S. G. S. (Water Supply Paper No 618

→ Request this. Green River Basin

Showing Utilization of Water Resources
with maps.

By Ralph Hooley
Salt Lake City.

In connection with Utah Power & Light Co.

Carl's experience on the Yampa this spring when returning home centered our attention on this as a water source. He found from the above papers that it is a most important supply to the Green ^{1,000,000} acre-ft. average for years. A lucky trip and a lucky hint to call on Christensen and a lucky inquisitiveness regarding a map of Green River on his wall and where to obtain it. Thus the entire trip. Sent from man to man and circumstance to circumstance.

The analysis is here included:

→ He also showed us and Side Streams
Profile Survey of Green River in
Utah and Wyoming
By U.S. G.S. in connection with Utah Power & Light. Co.
Not so essential but a good topographic survey of channel.

Ashley National Forest.

Met J.O. Stewart, Supervisor Lucky. He leaves for Yellowstone tomorrow.

→ Was ~~also~~ college acquaintance of George Handman and Marshall Orr. He wondered where Marshall was. Should be about 36 years old now. Knows Judge Orr. Mr Stewart was raised on a cattle ranch in the solitary east side of Klamath County.

He is interested in snow surveying. Has only one snow stake near north side of Ashley Forest from which report of snow depth is made to the Weather Bureau.

→ Would gladly substitute a snow course for it.

No rangers resident in Ashley Forest in winter, but no difficulty in reaching a ranger cabin for a night stay and then proceed to the course.

- Four or more courses already maintained for Professor Clyde. Their location and approach were marked on the map forms.
- Reprints ^{reports} should be sent in return. Address Denal, Utah.

The Strawberry site also of Clyde's course is in the Wasatch Mts. and in ~~within~~ the Uinta National Forest as is the Duchene.

- Forecasting for the Yampa and the White Rivers must be done in connection with the Grand or upper Colorado. They have little available irrigable bottom land and are chiefly of value as feeders for the Green and lower Colorado.

Met the Principal of Logan High School. He knew Clyde and "matter man" and Dr. Gould (long). "Clyde was far off this season, for spring rains were very heavy". As elsewhere.

To Green River Bridge.

at 3pm. after a ~~day~~ ^{day} of quieting notes and patient visiting by Carl we are on the way once more, 14 mi. to the Green.

The Green is crossed by a broad

I cut with white Carl is driving and Carl cut down while I am writing - So I write with me and finished.

3 open

and massive gray steel bridge built in anticipation of what this road will once become.

The river is tranquil and impressive for width. Sandbars but no floodlands. The valley is wide ^{and green} but short. Gorges above and below. Many trees widely scattered. The farms lands are watered by the crossstreams from the Uinta.

Dinosaur National Monument

6 mi. upstream in the mouth of the gorge. Fossil bones had been found by the early farmers and Dr. Douglass had traced them to their "mother lode".

Carnegie men quarried the greatest known dinosaur ^(50 feet) here. Here also was found the tiniest, not much over a foot long. It was mature.

With transient relief labor wall of quarry is being laid bare with its pattern of bones. Over this will be built an amphitheatre with glass roof. On this ledge people can sit and have world life explained in its burial bed.

Below them will lie the winding river and around them colored

winding rocks which one day had been tropical shores.

The creatures had died their natural death. Torrents had swept their bones with debris of sand and gravel into the depression which had become their confused burial place. Silica had petrified them as it had the forest trees elsewhere.

Some of the creatures had only pincer like teeth with which to tear the foliage which was the ground in a gizzard by means of rocks. Some had only flippers - conservative folds - who never could come ashore. Some had sharp teeth and tore flesh. Tooth marks could evidently be seen on a fossil bone where the creature had tried to gnaw it. One creature weighed 15 tons but had a brain weight of $2\frac{1}{2}$ ozs. Good, honest brains.

H. L. Hix, our guide, showed us all. He was more enthusiastic even than a scientist and gave all honor to his instructor Dr. Boyle. Hix must be an Englishman because of his learning, his interest, and his taste.

Excursion Confirmed

Brain marks were conspicuous

here. Six stated that a rainstorm would immediately send a torrent down the tiny ravine, for the soil shed all the water that fell on it, a stone channel had been built to save the camp from flooding.

Silt The softer sandstone between the harder strata he called silt deposits. They were very soft and crumbly; so much so that the harder strata were becoming undermined. And when the strata were much tilted the softer portions seemed almost to be sifting out.

→ The silt problem will not end as long as the landscape is being eroded. The Southwestern national parks have become parks thru erosion. The process is out of geological ages.

We had been led to this monument by seeing the name on the maps. No markers have yet been set up because the monument is still being prepared. This will require an estimated 4 years.

Backfired across the Wasatch.

We determined to become acquainted with the several streams flowing ^{east} from the Uinta and neighboring Wasatch and ascend the Strawberry Creek and view Strawberry Reservoir. Then cross directly south by a two-line road to the Lincoln Highway leading to Green River, Wyo. 9³⁰ P.M. found us at Spanish Fork, near Drow.

The backtrip was well worth while, for it gave us another sectional view across the Wasatch.

The following are random notes enroute.

1. A large agricultural section lies from the Uinta-Wasatch all the way to Green → River. It is watered entirely by side streams. This is a site of some of Clyde's snow-survey courses.

at Duchesne, the valley seems to expand from the Sacramento but soon found limits. In this valley lies Ft. Duchesne, with barracks quite natural in the distance. It is a historical companion of Ft. Bridger in Wyoming.

2. The Strawberry reached far up into the summits and formed a U.S. Wildlife Refuge. Nature's span lay

before us once more: the fern lands,
the juniper slopes, the firs and aspens,
the summit ranges.

The night breeze, the rapid ascent,
the uniqueness of it all made me feel
like a butterfly having its day. My work
was long but it seemed to be composed
readily in one life's span.

3. Strawberry Reservoir continued
shining as we climbed turn after
turn up the ravine. But at
sunset we came upon the rim of a
mountain valley just below the crest
and miles long.

an engineer's opportunity and dream.
A low dam - not long - fed the Strawberry
springly and long. The storage of water
behind it seemed immense. By means
of a second low dam to prevent the
water from running into a neighbor
creek and a canal that conducted
this same neighbor creek into the
reservoir, the ~~same~~ summit snow
over a widely expanded area was
→ conserved for late summer. Aspens and
a small clump of fir made snowmays
very simple. The area is in the
limits National Forest, Provo, there

may be a caretaker at the dam during the winter. At least there is a Fisherman's Lodge on the south side close to the site of snow surveys. The Victory Highway leading from Salt Lake to Denver along the north side of the reservoir may possibly be open during the winter or early in the spring.

4. The road marked on the map as leading southward was nonexistent. But a road was pointed out that would lead us over the crest to Spanish Fork Canyon and much further west and lower down to the ~~the~~ thru highway we sought.

5. Game ^{in cases from a halfpence to a} ~~by~~ ^{hundred} were flushed by our auto from the road around the reservoir. The babies were slow and were given time. All flew only far enough to get out of the way. Carl believed that the sagebrush must be as full. We are becoming accustomed to unclaimed wild game. A further extension of the peace idea, Carl says they aid much in eating the weevil.

→ 6. In forecasting the Colorado, the western tributaries in Utah must be forecast from the Uinta-Wasatch, and the eastern feeds the Yampa

and White must be forecasted from the Rocky Mountains in a land Colorado. Indeed, the national forests and the U.S. Forest Service are the key to forecasting most of the Great Basin and Rocky Mountain Streams. This applies also largely to the Sierra Nevada and Cascades. The National Parks and Park Service are fully as essential for their areas.

7. The crest of Strawberry Divide was 5289 ft. To the west rose mountain ranges with the first crescent moon and its accompanying stars close overhead.

For 35 miles we descended, ^{as the} various types of vegetation rose to meet us until we passed large trees and campfires glowing in the darkness.

Our only bed was in Spanish Fork down the valley. Here we arrived for a 10 o'clock dinner after ~~was~~ a late afternoon journey of 230 miles.

Saturday, Aug. 3. Jumping to Grand Junction.

Only by this by car I keep track of time and days. One tube of toothpaste is gone. I have only one other. So our journey

should be half over.

But a paved road today. We can recover our loss of yesterday and make Grand Junction 350 mi. east. Glenwood Springs is too far.

Up Spanish Four Canyon paralleling the Rio Grande Western. Watch slopes green all the way up from base to summit.

Castle Gate is still a castle gate the cluttered with mines and loading structures. Helper locomotives still push from Helper up. No sign at Detour of the road he sought yesterday.

Far down the eastern side beyond Price and its Creek stretched the endless desert and our road to the Green at Green River, Utah. On the way we saw the sign of the road directly south from Duchesne (some 100 miles) that we might have taken yesterday. But our 7000 mi. trip to Denver is the shortest line to our purpose.

Here the 6th. car passed us on our trip - one for each noon or 1000 mi., a Chevrolet going 70 mi., and with its sales tag still on the windshield. How far has it been driven at 35 mi. an hour? Chevrolets blow up when driven too hard.

Green River.

Evidence of our approach was

the sky line of castellated rocks seen
in Green Canyon pictures. Thus,



Also

"Metropole Hotel
Homecooking"

Name belongs to London or New York.

But what city-ites would understand

"Home cooking"? Do would rather make
himself shy.

The desert continued as sparse
as in the lower hills Colorado.

The Green River was a page with
silt of grayish brown. A ~~the~~ 3-span bridge
transversed it. A fringe of trees lined
its banks.

The Rio Grande Western had "Scenic
Route" painted on its bridge. Why not
oftener?

Up and Down

Spanish Fork 4500 ft

Summit 7000 "

Green River 4000 "

Now up again.

Car Service?

Beyond Green River passed again.

"Seventh car". "No fair", said Carl, it is the same car but stopped at Green River while we passed thru. Evidently being "broken in," like Willis'?

A Second Thought Detour and One of Our Best.

I had planned yesterday to detour to Moab and see the Colorado and La Sal Mts nearer at hand, but had forgotten it in our rebound, and was enjoying the latter ^{much at a distance.} The sign board in the desert and a 2-line road ^{on the map} back along the Colorado saved us to turn back even after we had gone considerably past. But miles are minutes with an auto.

So down into the land of Moab, Larry's Chosen land which he had urged us to visit.

The buttes were red as so often but with soft green strata intermingled, a new hue in the pastels we had previously seen.

The National Arches Monument appeared in the distance with very clearly there a series of arches. In the shade of a tree and a rock, CCC boys were getting ready to build a camp. Lunches was stacked in the open desert. The map indicated that the monument lay in on the apex of the road and the Colorado.

Down thru red pedisades, red
erosion, red sand drifts into green.
We entered a ^{beautiful} bay in the ~~mesa~~ ^{red hills}
made green by water from La Sal Mts.
Even too much water, for some of the
green was most dark.

The Colorado passes thru gorge
gates along the west or nearer side.
It enters and leaves both modestly and yet
impressively. A 3-span bridge, placid
as the green but decidedly deeper and
G-4 more water-solid. Fortunate again
this descent into the Land of Moab, Larry's
Chosen Land, shall we now do the
limit and visit "The Point Common to
Four States" - the only such point in the
United States? Should a national monument
be erected to the only point of symmetry in
America? Does this also belong to "See America
First"? We have circled much in our journey
about this tourist magnetic pole.

a scenic trip thru Colorado Canyon.

But we gained more than Larry intended.
"There was indeed a 2-lane road born along
the river. It was ungraded but we could
go right along," said a native. Some day
it will inevitably become the scenic river
route to La Sal National Park.

No longer on the mesa with rare
views down but it entered the gorge near

The river level at Hoab Bridge and
traversed the canyon to the Cisco Bridge, a
distance of approximately 30 miles. The entire
length of the main desert road to Grand
Junction at Cisco was 451 miles. Carl's
back was wet with dirt driving.

The road was a ledge cut in the
cliff. No chance of missing the road.
Cliffs - crowding and sometimes overhanging -
on one side and the river directly
below on the other. The wheel tracks
pointed ever onward.

No turn outs, ^{for miles.} No signal system. Sometimes
the car ducked when going under overhangs.
One road builder appeared with pruning hooks
to keep the brush from intruding too much.
No time or place yet for the Sightsseeing Bus.
Width, length, roof would make it an early victim.
Bathing suits would be no security. To pass
you must needs lift one car over the other.

and the sharp and blind turns and
steep dips. Little Jeff Boardman would
have to stand on the roof of his Hudson
to see into the sudden descents. Standing
up on the floor would not aid him.
"Even a horse would drop out of sight
beneath the dashboard" declared Carl.
"And AAA would go broke if they attempted
to signboard the road properly."

But we were reviewing our papers

Even Carl's neck is stretched
and sore. No chance it must
be longer. Not perhaps ten
it nearly doubling the number.

all in one — Grand Canyon, Lion and Bryce. We were having the trip into the depths of Grand Canyon we had missed. Bright Angel Trail was little narrower and Carl says "not as steep". Hereafter, the walls were less high.

Vertical and red and smooth. Potholes everywhere cut by the waters into small ^a caverns and bird refuges.

Then the river had widened into a Petra. Solitary houses — trees, a camp patch. The Marmon home thrust.

Architecture — massive, square. Gothic and European rather than spires and domes. Hindu.



The presence of thinnest crumbling strata — the geologist might call them "varves" — gave a satin effect to some structures.

Then the wide portals of this Petra could be seen the sharp pyramids of the La Sal Mountains that seemed to be the upward continuation of our Canyon walls and adjoining mesa.

And an ascending road indicated a means of approach or an exit after entering from West.

Excursion! We were now convinced that the Colorado had come this way

Our La Sal seemed in landscape at least like a duplicate of San Francisco Peaks and Grand Canyon.

for it was easier than any other.
The rocks seemed fairly to crumble of
their own accord.

Finally, a one way suspension bridge
with wooden girders led us across the
Colorado and up a side canyon just
where the canyon walls were beginning
to become low.

The bridge was rickety "Maximum load
5 tons". The nails were loose, the boards
rattled, and the wheels of the auto had to
straddle to keep over the stronger girders,
but this was not difficult for the bridge
was so narrow and the restraining fences so
high - it was built evidently for cattle - that
we felt as if we were in a chute.

Just above the bridge were two canyon
mouths converging. Evidently one was the
Delores and the point of gaging the Colorado
"near Cisco" must be at our bridge.

On the way to the main road at a
dry wash was the warning:

"No Bridge. Dangerous when in flood."

We thought of the stories of the Little Colorado
undermining and burying autos.

Utah - Colorado State Line.

Out of the wide desert and into
the uplands.

Our 4th. car came speeding by. An Olds

The fluctuation in water
level seems to be 25 to 30 ft
depending on the amount of minimum water in the canyon.

but Carl still kept arms steadily at 60.

The mystic "Soft Shoulders" appeared again and "Dip 300 Ft." We had seen little of it since Arizona.

Grand Junction (4600 ft.)

310 mi. for the day.

Weights? We are puzzled.

Carl 180, 188 and 186 by 3 scales.

~~The last two after dinner.~~
all after dinner. Normal 186. He was morose.

My weight 153½ before dinner and 156 after, but by two scales.

Did I drink so much ice-tee?

Normal (or max.) 155.

It is sultry these days.

Sunday, Aug. 4.

Plans broadening

→ a forecast worth while for La Sal Forest not only for local use but as supplementary for the Dolores and San Juan which circle it.

→ a traverse should be made of the Yampa and White. We should look at Raining Fork while traversing the Colorado, Gunnison, Aricaos and San Juan, Rio Grande.

The Aricaos and South Platte can readily be seen when going to Denver.

Carl hesitates but thinks that we can still keep within present time limit.

avalanches can easily be prevented
by mining and ropes and avoided
by making detours.

Mesa
Mesa National Forest

This must be the Mesa referred to as
Kaibab, "a Handland of Texas and Kansas".

Conference with Roy Beck, Supervisor:

- 1. 8 snow stakes. Not very satisfactory. Drifting snow. Take average around stakes. Weather Bureau does not want stakes moved, for it might break the continuity of the records.

Percentage estimate of snow accepted
by Weather Bureau.

- 2. Slide rock in forest catches and holds
→ snow until released by springs for later
irrigation. Quite a feature of the Mesa.
Last year water was so scarce that
ranchers cut the beaver dams.

- 3. Can readily take snow surveys. Ranger
cabins available. The snow stakes will
→ not present. Possibly some Skelton Cabins needed.
The Mesa ascends to 10,300 feet. So not
too low.

- 4. Lave us several maps of National Forests.
Promised to send him reprints.

- 5. Showed us aerial prints of Mesa Forest.
Linnison Forest has the same. They can
→ be used for laying out trails or laying
out snow survey courses.

- 5. Showed us U.S.G.S. Topographic Maps

of Colorado entire. Probably must order
it from Washington, like our map of
Arizona.

Circuit Trip across White and Yampa.

North from Rifle to Craig back from
Steamboat Springs to Walcott.

Grand Junction.

→ The U.S. Reclamation Service is maintaining
Grand Valley Diversion Dam on the Colorado
for 50,000 acres. A relatively inexpensive
dam for diversion purposes only.

The Colorado below seems to rise 3-4 ft
and not more than 10 ft. which is the
present height of the railroad track above
the river.

Rifle 5240 ft. Summit to White Basin
7300 ft. Scrub. Not much timber for snow
survey courses. Meeker 6240 ft. (Hally in 1880).

White River

an open valley and long, 60 mi. to head
Fair flow still. Scrub pine. Courses possible
here in mountains

across to Yampa.

aspen at summit. Rim rock
continuous. Coal tunnels along the road.
Craig 6200 ft. Soaks like Wyoming.

Rim rock all around are
the characteristic walls of the
Colorado and Green Rivers

Large town, "Try our Cheesaburger" not hamburgers
Up Yampa Valley.

Yampa Canyon near the Colorado and
locally famous and inaccessible to autos.
Upper Yampa quite a farming area.

Traversed by D. V.S.L. Ry. - (the Moffat road?)
Mt. Harris 6470 ft. Coal town.

Herders and some timber now on mountains.
Steamboat Springs 6762 ft. Mountains
covered with scrub and partial forests.

Route National Forest.

The Supervisor was not in, but
Charles E. Seymour, District Ranger for
adjoining Gore District gave us valuable
insights. Sent him the Supervisor's reports.

1. About 240 snowstakes in Colorado.
See Snowfall Bulletin of U.S. Weather Bureau.
Stakes are insisted on by Weather Bureau
tho 2 stakes were set out when
lumbering was being done nearby and
now must be maintained by forced trip
of 20 mi.

→ Gave us map of forest with several
of the snowstakes indicated.

2. Would be willing to substitute snow
snoopy courses for snow stakes providing
the courses could be reached on
horsesback.

Hint the end of each
winter month. Want the
end of March and April.
They have a snow sampler, but it is too heavy to carry in the field.

→ But the hardship of skiing after a winter in the office is too wearing - especially when a man is 40.

3. There are no guards in his section, so such part-time assistance is not available.

→ There is a ski club at Steamboat Springs. Many of the boys ski over the summit to North Park.

But they are students and could not get away for prolonged snow survey trips.

Few permanent winter residents in the forests. Officials are centered in the towns where more available to the public.

4. Suggests snow surveys every 20 mi. along the Continental Divide for snow in Routt Forest is spotted and inharmonious. Also the Snake River near the Wyoming boundary flows into the Green and seems even better than the Yampa.

5. Agreed that the bonus might solve the difficulty. Then substitutes could be hired but supervised by the District Ranger.

Snow surveying could probably be put over but it means an additional burden when overworked or in "soft" physical condition because of prolonged winter office work. The young men can stand it but the older men are temporarily weakened by the strains. With financial means he would gladly supervise the work. Can not influence it otherwise.

Question: What is the weather forecast for the survey? Daily? And the sky might not seem so well done - steam.

ask
43.68
or 46.85

South to Yampa 7885 Ft.

Snow surveys quite feasible in this section. Thick brush, oak, aspens. Some pines. Mountains rise steeply to east with straggling pines on upper slopes.

The Yampa seems here to fade into the meadows and fern lands continues.
→ I still feel doubtful about the Yampa's 1,000,000 acre ft. capacity. The White is far less from appearance.

Snow Courses.

The snow cover at Steamboat Springs April 1 may vary in the plate from 6 to 18 in. Accumulated snowfall 100 in. or 20 in. water.

→ This would be the place for the low level snow course on the Yampa.

Higher level courses here at Yampa and on range higher up. Will serve the White also which heads near here.

Colorado Headwaters.

Far up the range encircling the Yampa and the White, I just must trace it up.

We are spending the night at Yampa - rain and darkness bound. But push on early in the morning.

Over warm last night at Grand Junction. None is cold here tonight.