

# DESERT CALENDAR

The Desert Calendar keeps readers informed of the important events scheduled to be held in the desert country. Civic groups and committees are invited to send dates and pertinent information about state conventions, fairs, rodeos, fiestas—in fact, anything of civic, cultural or commercial nature which has more than local interest. There is no charge, but listings must be in by the first of the month preceding date of publication.

- Oct. 31—Celebration of the passage of the Gila project bill, with programs at Wellton and Yuma, Arizona.
- Nov. 1-2—Annual rodeo and parade, Blythe, California.
- Nov. 6-7—New Mexico farm bureau convention, Roswell, New Mexico.
- Nov. 7-16—Arizona state fair, fair grounds, Phoenix, Arizona. Includes first competitive mineral exhibits.
- Nov. 12—St. James' day annual fiesta and dances. Jemez pueblo, New Mexico.
- Nov. 12—St. James' day fiesta and dances, Tesuque pueblo, New Mexico.
- Nov. 14-16—Second annual Greenlee county rodeo, Apache Grove, between Clifton and Duncan, Arizona.
- Nov. 15-16—Old Tucson Days, dances, fiddling contest, Tucson mountain park, Tucson, Arizona.
- Nov. 16-21—Ogden Livestock show, Ogden, Utah.
- Nov. 23-26—Convention, New Mexico Educational association, Albuquerque, New Mexico.
- Nov. 28-30—Desert Peaks section of Sierra club to climb Picacho peak in Southern California and Castle Dome in Arizona. Niles Werner, leader.
- Nov.-Dec.—Exhibition, paintings of the Southwest by the late Edgar Alwin Payne, Southwest Museum, Los Angeles, California.

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**THE Desert MAGAZINE**  
El Centro, California



Volume 11	NOVEMBER, 1947	Number 1
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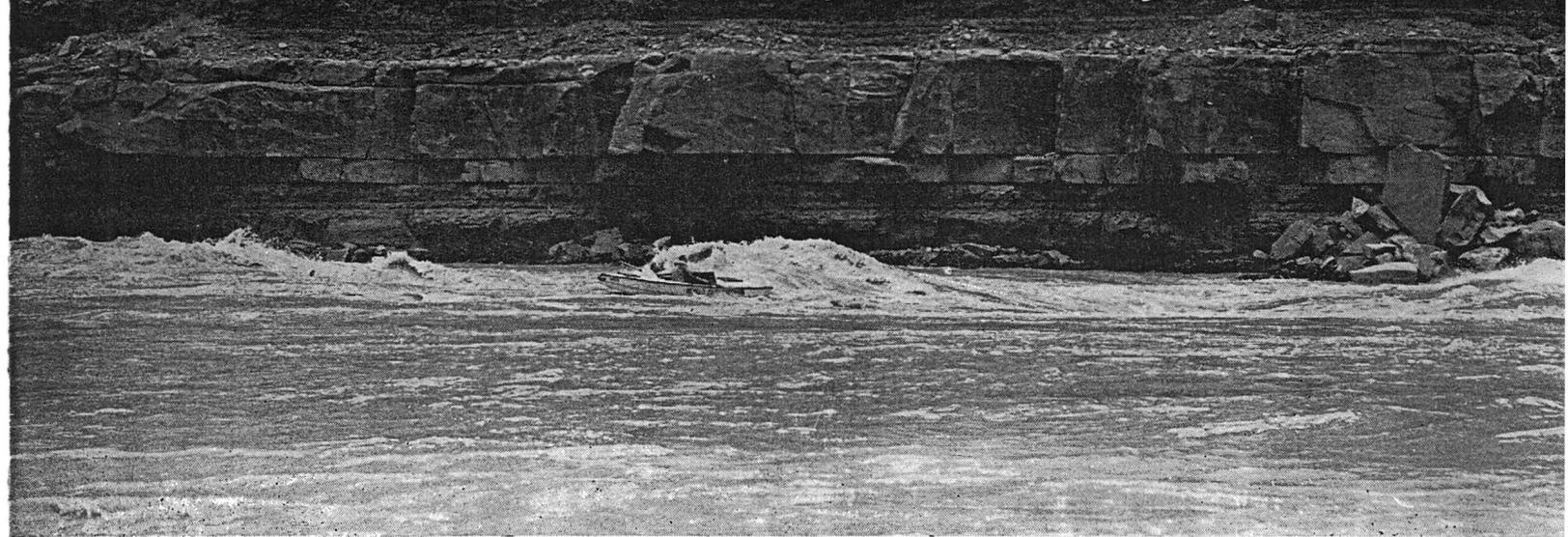
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# Grand Canyon Voyage



*Norman Nevills running North Canyon rapids with Margaret Marston as passenger.*

With Norman Nevills as skipper, Randall Henderson and 10 other companions spent three weeks last summer running the Marble and Grand Canyon rapids from Lee's ferry to Lake Mead. The trip was made in four cataract boats designed and built by Nevills. The story of how this river party faced and surmounted the treacherous cascades which have claimed many lives since Major John Wesley Powell made the first voyage through the gorge in 1869, will appear in four consecutive issues of *Desert*, beginning with this November number.

By RANDALL HENDERSON

OUR RENDEZVOUS for Norman Nevills' 1947 boat run through Grand Canyon was Art Green's Marble Canyon lodge, situated on the bluff where Highway 89 crosses the Colorado river on Navajo bridge. Lee's ferry, where our boats were moored for the start, is seven miles away.

Twelve of us were scheduled for the trip—four boatmen and eight passengers. Our start was scheduled for July 12. But there was to be one cool refreshing night's sleep in the comfortable cabins of Art Green's lodge before we began our 20-day adventure in the sultry depths of Marble and Grand Canyons, for the party had assembled for preliminary briefing the previous day.

There was no confusion in the final hours before the start, for Norman and Doris Nevills had been planning this expedition a year in advance. They are a good team, those Nevills. They are frontier people. Most of their mature lives have been spent at Mexican Hat, Utah, where Norman is a hydraulic engineer employed by the U. S. geological survey to take daily water readings on the San Juan river.

Norman engineered and built the special type of cataract boats which were to be our safeguards against the powerful

waves and rocks and holes and eddies in the gorge that lay ahead of us. And Norman had trained the boatmen who were to pilot the craft. Doris' part of the preliminary planning was less spectacular perhaps, but not less important than that of her husband. She planned the commissary, and bought the provisions. This was no simple task for an expedition that would have only one contact with the outside world in three weeks. Weight and bulk must be kept to a minimum. And since mid-day temperatures in the bottom of the gorge range from 102 to 130 degrees at this time of the year, it was necessary to plan three meals a day for 12 people for 20 days practically without perishables. You do not realize the extent to which we Americans depend on fresh meats and vegetables and fruits in our daily menu until you attempt to schedule 60 consecutive meals without them.

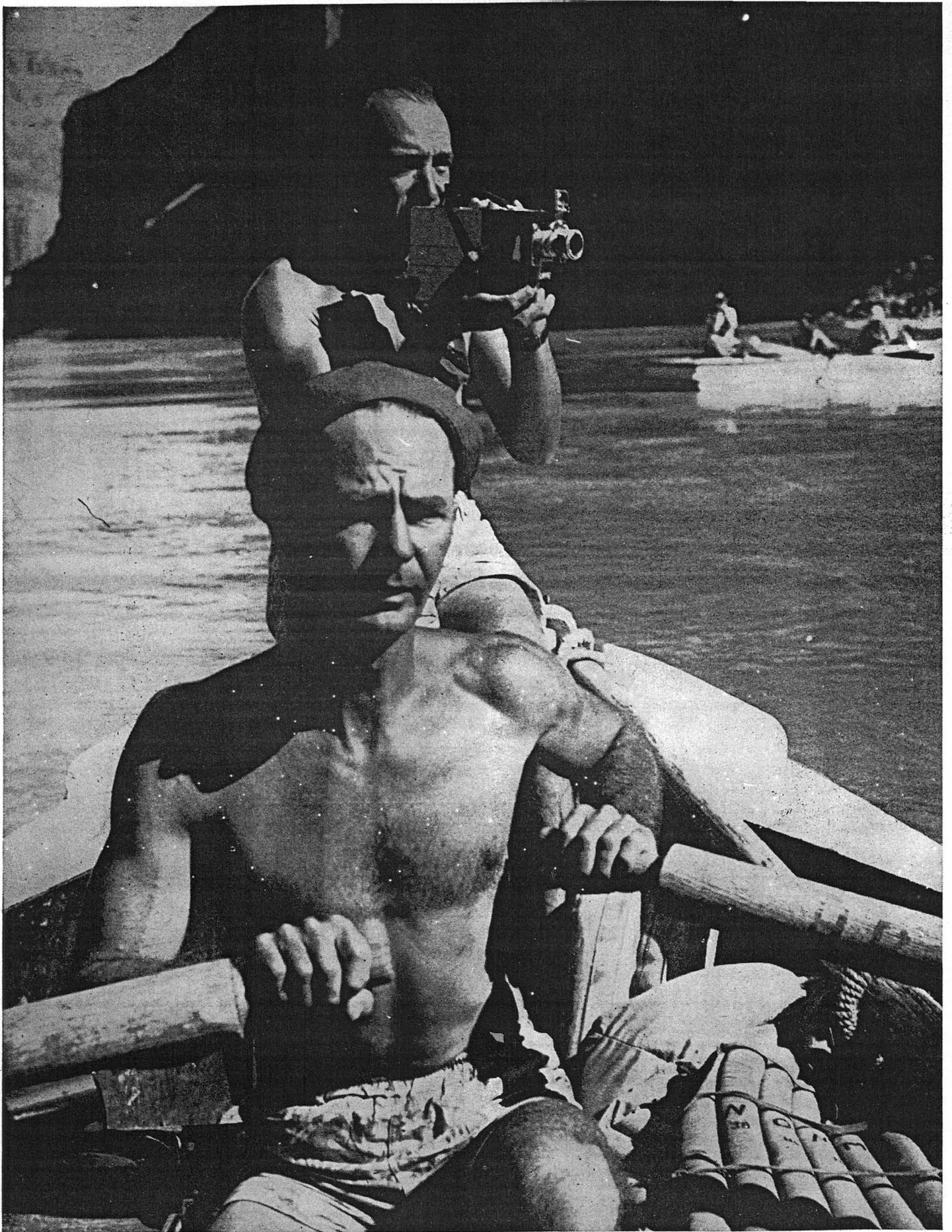
We were eager to be on our way—but knowing that the days ahead would be spent under a sizzling desert sun without shade, and the nights on sandbars and rock ledges with the roar of a great cascading river nearly always in our ears, we were doubly appreciative of the luxury which Mr. and Mrs. Green and their family provided at the lodge. Three daughters with

their husbands—to be joined later by a G.I. son who now is in school—have created out here on the northern Arizona desert one of the most delightful hostelries it will ever be your privilege to visit. Art developed his water supply from a little spring up under the Vermilion cliffs. Most of the cabins are built of native rock. There is air-cooling in every room. The place is kept spotless—and always there is a friendly smile and a cooling drink for the wayfarer who rolls in off the hot paved highway.

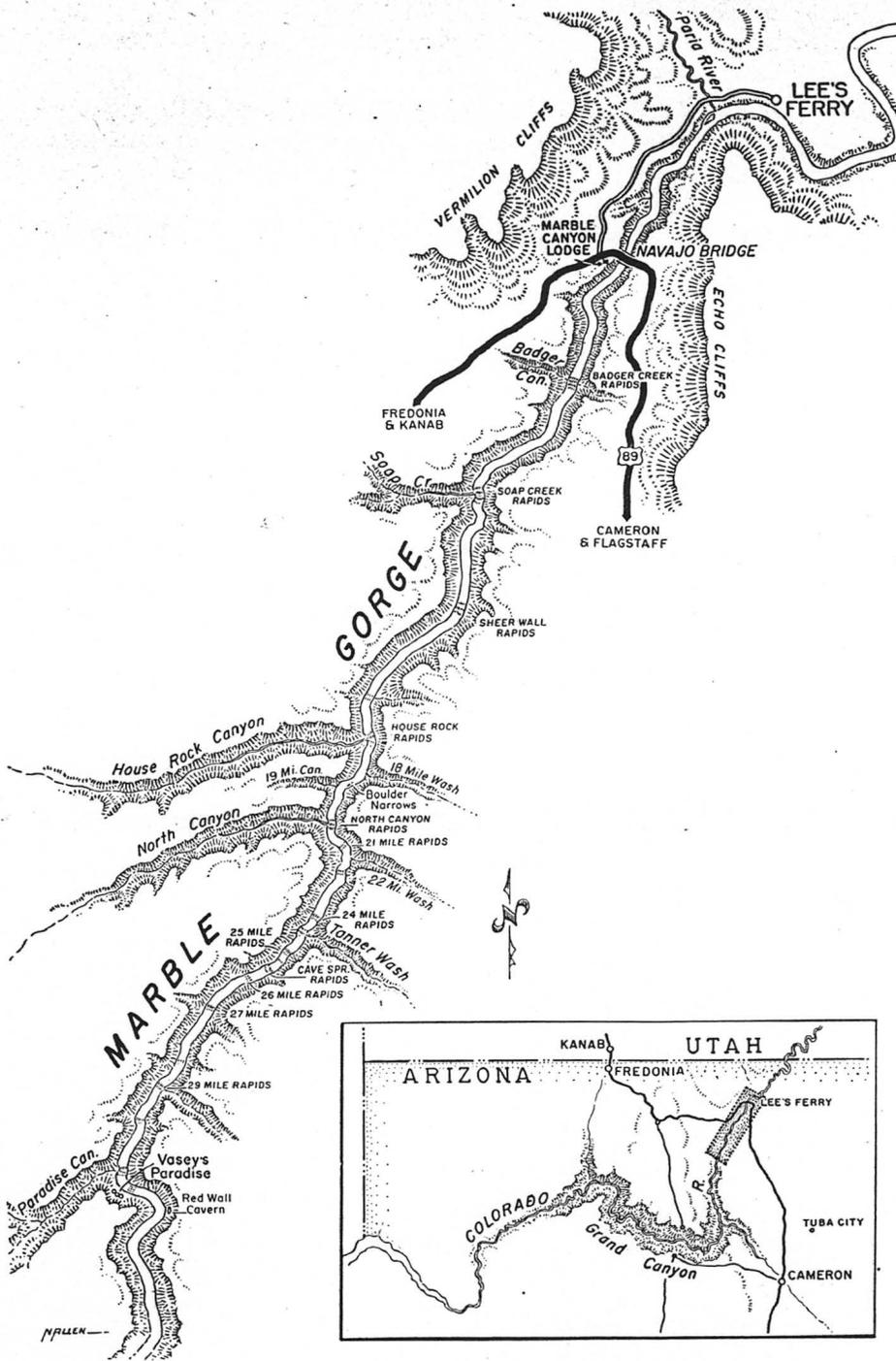
Recently a landing strip was installed for planes—and when the last members of our party arrived the evening before departure in a 3-motored plane—the first big plane to land on the new runway—Art felt amply repaid for the months of hard work he and the boys have done to prepare this landing strip.

Three members of our party had been through the canyon before. For the others it was to be a thrilling adventure on waters which have claimed many lives since Major John Wesley Powell and his half-starved boatmen first ventured through what was then, in 1869, an unknown canyon.

Norman announced the boat assignments. He would pilot the flagship *Wen*,



*Norman Nevills, skipper of the Colorado river expedition, and Al Milotte, with the camera, were the author's companions in the veteran cataract boat Wen on the trip through Grand Canyon.*



named in honor of his father, William Eugene Nevills, mining man whose interest in oil seepages near Mexican Hat had brought Norman to that remote Utah region just after he had finished high school at Oakland in 1925. The elder Nevills passed away many years ago, but it was his interest and encouragement which started Norman on a hobby and eventually to recognition as the top-ranking white water boatman of America, perhaps of the world. For Norman now has completed 13,400 miles of navigation on the San Juan, Green, Snake, Salmon and Colorado rivers without losing a boat or passenger. Actually he never has capsized a boat in his long career on the toughest rapids to be found in North America. Riding with the skipper in the *Wen* were Al Milotte of

Hollywood, free lance photographer whose best films are purchased by the Walt Disney studios, and the editor of *Desert Magazine*.

Number two position in the little 4-boat fleet was assigned to Kent Frost in the *Mexican Hat II*, young bean farmer of Monticello, Utah, and veteran of the navy. If Kent Frost had lived 100 years ago, he would have been a Mountain Man. He is a woodsman at heart, and when work is light on the ranch he shoulders his rifle and heads into the southeastern Utah wilderness where he lives off the land for days at a time. This was Kent's first trip through the Grand Canyon, but he has served with Norman on the San Juan and Green rivers and knows what to do when the 10-foot waves are breaking ahead. He

has all of a woodsman's reticence—and also the sterling qualities of a true outdoor man. Riding with Kent were Elma Milotte, wife of the photographer, and Pauline Saylor, elementary school teacher in Covina, California.

Garth Marston, 22-year-old G.I. student at the University of California was boatman in the *Sandra*, third in line. Garth went through the canyon as a passenger with Nevills in 1942. Big, strong Garth not only proved a capable boatman, but his good-natured clowning was at its best when the going was toughest. Riding with Garth were Marjorie Farquhar, top-ranking mountaineer of the Sierra club, and wife of Francis Farquhar, who rode in boat No. 4, and Rosalind Johnson, noted riding instructor and steeplechase expert of Pasadena, California.

The *Joan*, No. 4 in the line, was piloted by Garth's father, Otis R. (Doc) Marston, investment counsellor of Berkeley, whose life-long hobby has been swimming and boating. He was a passenger with Nevills on the 1942 canyon expedition, and this year became a full-fledged boatman, and a top hand in any kind of water. His passengers were his wife Margaret, and Francis Farquhar of Berkeley, past-president of the Sierra club of California, who divides his time between his public accountant business in San Francisco and his many hobbies which include wildlife conservation, writing, mountaineering, travel and photography.

Five women and seven men! Some of them good swimmers and others only mediocre, but all of them lured to this rendezvous by the same impulse that causes humans to climb difficult mountains and visit cannibal islands and explore the unknown wilderness. And if you ask why people go out of their way to achieve difficult and hazardous feats, I cannot tell you the answer. But I am sure that if the time ever comes when human beings are content to follow only the beaten paths and do things the easy way, this will be a dismal and decadent world in which to live.

Zero hour for departure was 10 o'clock the morning of July 12. Norman and Kent Frost had brought the boats down from Mexican Hat in trailers earlier in the week. The provisions had been stowed away in the watertight compartments, so distributed that if a boat was wrecked and lost we still would have balanced rations, even if the loss would leave them somewhat skimpy.

This was to be the *Sandra's* maiden voyage. The boat was built at Mexican Hat this year, modeled after the other three which already had proved their stability in rough water. Six-year-old Sandra, youngest daughter of the Nevills, was at the Lee's ferry landing with her mother for the christening. A bottle was filled with river water, and since there is little metal on these river boats, a stone was placed



*As the boats shoved off at the historic old landing at Lee's ferry.*

on the bow for breaking the bottle. And while everyone took pictures Sandra smacked the bottle on the rock—and broke the rock instead of the bottle. So it had to be done all over again. But the little ship *Sandra* was too young to be superstitious about the miscue in the dedication ritual, and performed beautifully throughout the trip which followed.

An hour before we were to leave, Barry Goldwater of Phoenix arrived in his plane. Barry was on the Nevills' 1940 expedition and flew in to bid us bon voyage. He was accompanied by his friend Bill Saufley. Norman invited them to ride with us as

far as the Badger creek rapids, where there was a trail by which they could climb out. Doris Nevills also accompanied us to Badger, the first major rapid we would encounter that day.

James E. Klohr, hydraulic engineer for the geological survey at Lee's ferry, told us the Colorado was running 37,000 second-feet. Our start was at an elevation of 3170, and the temperature was 86 degrees.

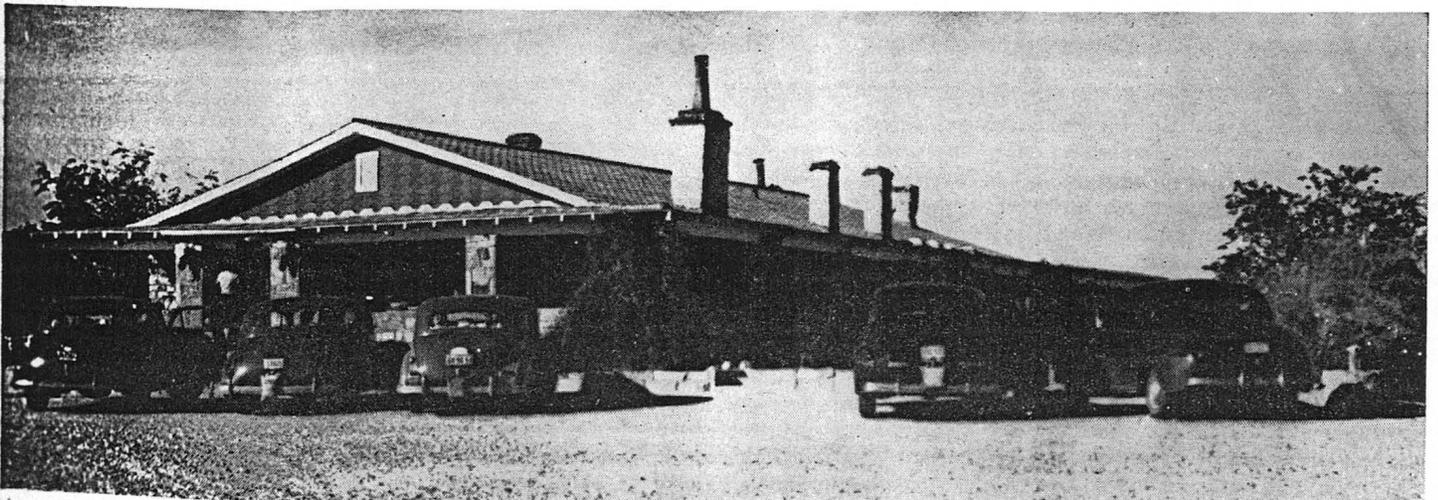
Dr. Harold Bryant, superintendent of the Grand Canyon national park, and Mrs. Bryant had driven the Farquhars from Grand Canyon to Lee's ferry, and remained for our departure. Being a very

active outdoor man I think Dr. Bryant would gladly have changed places with any of those in the boats.

Everything was in readiness at 9:40—20 minutes ahead of schedule—and Norman gave the starting signal by shoving the *Wen* off the little beach and heading out into the stream. Below Lee's ferry there were three riffles—miniatures of the big rapids which lay ahead, and in 45 minutes we passed under the Navajo bridge where the personnel and guests of the lodge could be seen along the rail 467 feet above us.

Here the old Arizona-Utah feud which

*Marble Canyon lodge—where Art Green and his family maintain friendly roadside hospitality for desert travelers.*



Norman and Barry Goldwater carry on incessantly when they are together flared up. "I understand the Arizonans built this bridge," Norman shouted across to his old antagonist, "so the dry Arizonans could go to Utah, the land of milk and honey." Barry's reply was equally sarcastic.

Twenty minutes later we reached the riffle at Six-Mile canyon where there were two huge piles of driftwood piled on the rocks at the mouth of the dry creek. We pulled to shore long enough for Norman and Barry to touch a match to the wood. Years ago reclamation bureau officials suggested to Norman it would simplify their operations at Hoover dam if, whenever convenient, he would burn the drift along the Colorado. Later, when we reached Lake Mead, I saw the reason for this request. Driftwood on the lake is a constant threat to the propellers of the hundreds of small craft on the lake, and the removal of the drift before it gets into the penstocks at the power plant is an expensive chore for the reclamation service.

Distance from Lee's ferry to the headwaters of Lake Mead is 243 miles. While this gorge is referred to in general terms as the Grand Canyon, actually it is divided into two major canyon systems. From Lee's ferry to the mouth of the Little Colorado river is Marble canyon, and from the Little Colorado to Grand wash at Lake Mead is Grand Canyon.

We were hardly beyond the noise of the Six-Mile riffle when a deeper-toned rumble of falling water became audible. "Sounds like Ol' Man River talking to himself down there," Norman remarked as we drifted along on the 6-mile current. Then we rounded a bend and the rumble became a roar. The boat was on smooth water, but less than a quarter-mile below us the river dropped out of sight. We could see the spray of water dashing against rocks below the rim of smooth water where the river disappeared. But at Badger creek the river drops 20 feet in less than 300—and from an upstream boat it is impossible to see the rapids until one is on the brink of the cascade.

"Badger creek rapids," Norman shouted. "Landing on the right." Kent, in the next boat, passed the order back to Garth who in turn relayed it to his father in the *Joan*. This was a procedure repeated many times as we continued through the canyon. At every major rapid the boats landed above and the boatmen assembled on a high point overlooking the cataract to study the tumbling torrent for rocks, eddies, whirlpools. Norman made the final decisions—first, if the boats should run the rapid, second, who should take them through, and third, whether passengers should ride or detour the falls on foot.

There were several variations in this procedure. At some of the lesser rapids Norman's order would be, "Stand by for possible landing." Then he would stand up in the boat as it floated along the placid

waters always found above a cataract, and if he could see the falling water below and spotted no serious obstacle, his command would be, "Let's go!" and the boats would plunge ahead.

Norman was eager to reach Badger and Soap creek rapids. "When I get the feel of the water in those rapids I'll know what Ol' Man River has in store for us ahead," he said. Every stage of the river creates a different set of problems. At low water the rocks are exposed and the current is more sluggish. At high water more of the rocks are submerged, but the waves are higher and the current faster and more powerful. On his 1940 expedition the discharge at Lee's ferry on zero day was 3000 second-feet. In 1941 it was 25,900 feet, in 1942 the reading was 19,400. With 37,000 feet, this was the highest river Norman had faced in his cataract boats. Badger and Soap creeks would reveal the pattern for navigation at this stage.

Badger was rough. A long tongue of smooth water in the center of the stream ended in a series of six and eight-foot waves. On both sides of the tongue and below, great boulders were piled in the stream. With 37,000 second-feet this was a high water stage, and most of the rocks were submerged, but the maelstrom of breakers around them, and the hole immediately below where the water poured in to fill the vacuum created by the rock, made it easy to spot them.

But Norman saw a way through, where skillful work at the oars would miss the pitfalls. He ran the *Wen*, *Joan* and *Sandra* through himself, taking his wife Doris as passenger on the first run, Barry Goldwater on the second, and Pauline Saylor on the third. Kent Frost ran his own boat through. The rest of us climbed over the rocks and driftwood that lined the shore, and met the boats below.

It was 12:30 when the boats were all through Badger, and we ate lunch on a sand bar—rye bread and pressed meat sandwiches and grapefruit juice.

At 2:20 we arrived at the second major rapid—Soap creek. With few exceptions the rapids in the Colorado river occur at the mouths of side canyons, where cloud-burst torrents on the rim above have brought an avalanche of rocky debris down from the plateau and deposited it in the river. When such debris includes boulders as big as a house, the result is a sort of weir that partially dams the stream. The water pours over and around and through these great deposits of loose rock—and therein lies the baffling problem of Grand Canyon navigation.

In the books written about previous expeditions through the canyon, the most widely circulated being the reports of Powell, Stanton, Dellenbaugh, Stone, Kolb, Freeman, Eddy and Goldwater, there has been some difference of opinion as to the most favorable stage for running the rapids. Norman has tried them all, from 3000

to 37,000 feet. His first choice is a 25,000 foot river. The dates for his canyon runs are set months in advance when it is impossible to predict what the run-off will be. But the odds favor July. In June, which often is the peak month in the annual run-off from melting snows in the Rocky mountain watershed, the discharge may be 50,000 or 75,000 second-feet, even higher. In August, the odds are it will be under 25,000. In 1940 when the Nevills' party left Lee's ferry August 4, the flow was only 3000 feet. It was a hard trip. The rapids were strewn with projecting boulders, and in the intervals between rapids the current was so sluggish it was necessary to row almost continually to maintain the schedule. The schedule is important, for there are no grocery stores along the way to replenish the food supply if progress is delayed.

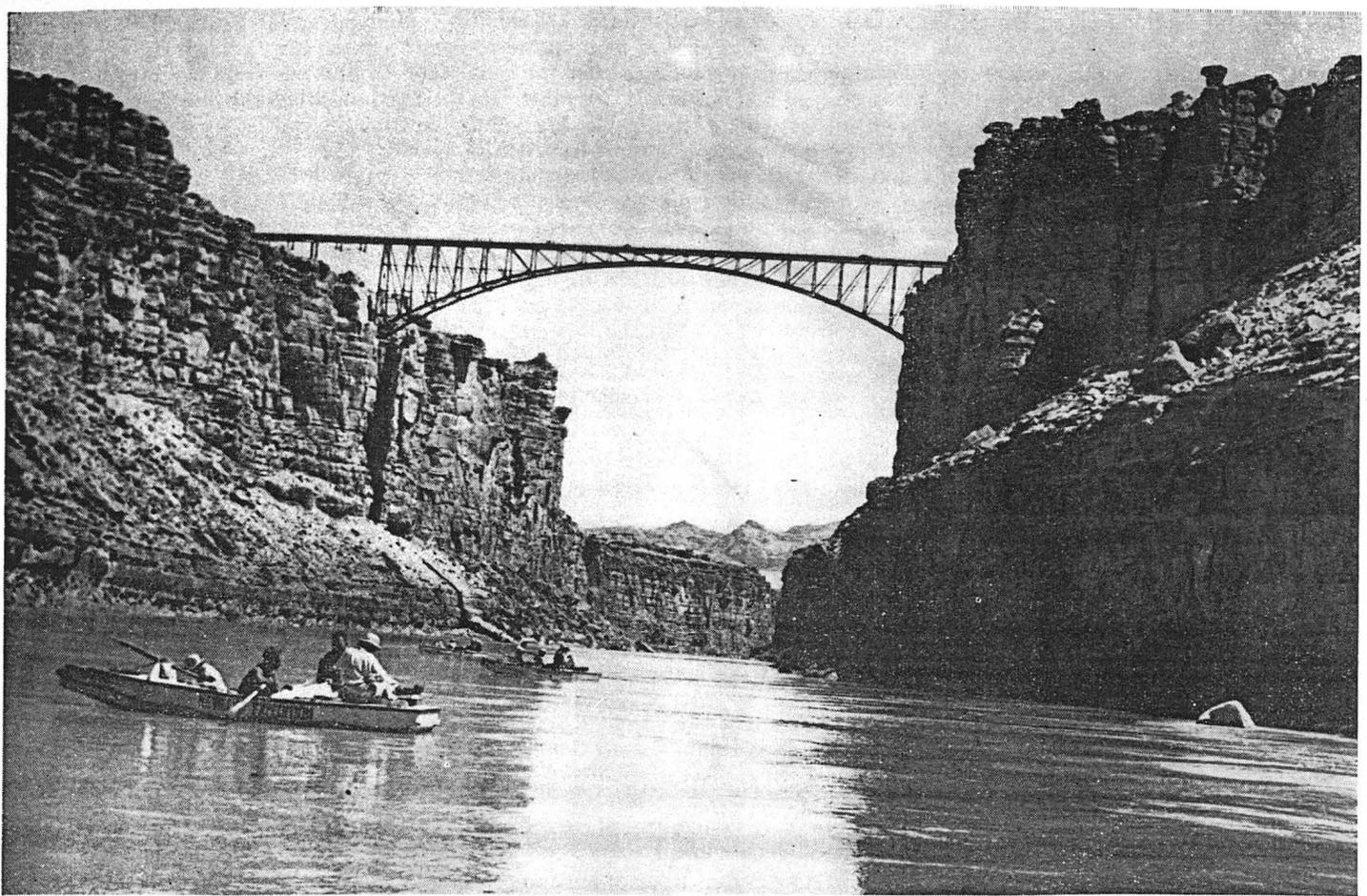
Jacob Hamblin, the Mormon missionary, camped along the Colorado river at this point in the 1850's. According to Mormon folklore he killed a badger along the creek which now bears that name. That night he camped downstream two miles on another tributary creek. The badger was put in the pot to boil. Next morning the badger stew was crusted with soap, due to the combination of animal fat and alkali water. I'll not vouch for the chemistry of this incident, but anyway that is how Soap creek got its name.

Landing for inspection of a rapid always is on the side of the stream where it is easiest for the passengers to make their way along the shore. At Soap creek this was on the right side where the creek had poured a great avalanche of rocks into the Colorado. On July 10, 1889, Frank M. Brown of the Brown-Stanton party, engaged in surveying a possible railroad line through the Grand Canyon, was caught in an eddy and his boat upset. His companion, Harry McDonald, swam out, but Brown was sucked into the vortex of the whirlpool, and never seen again.

On this 12th day of July, 58 years later, Norman entered in his notes: "Soap creek—rough but not difficult." He invited me to ride through as passenger, and I did not get as wet as I did two years ago when I rode with him through 13-foot rapids on the San Juan river. The other boats ran through without passengers.

A mile and a half below Soap creek we landed on a bar on the left for night camp. We carried perishables for the first two days, and that night had a steak dinner with mashed potatoes and gravy. For dessert, canned apricots. Kent Frost served in the double role of boatman and camp cook. We liked Kent's steak dinner—and subsequent meals confirmed the high opinion we formed of his cooking skill that first evening.

He follows the traditional camp style of the woodsman and cowboy. He doesn't bother with Coleman stoves and stone fireplaces. He simply builds a roaring fire of



*Seven miles after leaving Lee's ferry the boats passed under Navajo bridge, 467 feet overhead. Six miles below this point the voyagers encountered their first bad water at Badger Creek rapids.*

driftwood, and after it has burned to red-hot coals, rakes them out and puts the cooking vessels on the coals. With a big frying pan, a couple of stew pans, a coffee pot and a pair of pliers to manipulate them, Kent would have the meal ready by the time the boats were unloaded and the bedrolls spread out for the night.

Then, when the meal was over Garth Marston would take over. Garth was the happiest dishwasher I have ever known. Also he proved that a laugh and a song pay dividends, even on a rapid-shooting expedition. For somehow, when he tackled that big pile of cooking utensils and aluminum plates, he always had two or three volunteers from among the women members of the party to give him a hand. For the morning and night meals, water was heated to wash plates and cups. The heavy utensils and all the kitchenware used for the cold lunch at noon were washed in the sand and rinsed in river water.

That evening I established a precedent which was continued at each night camp during the entire trip. I had my portable typewriter in the boat, and prepared a typewritten summary of the day's progress, put it in a bottle, and built a cairn for it on a bench above the high water mark.

That night the canyon walls around us

were lighted by the flames of a huge bonfire when Kent touched a match to a great pile of driftwood on the bar above us.

Norman announced that rising time would be when the sun touched the rim of the 1500-foot canyon wall opposite camp. When morning came the sky was overcast—but that did not give us any extra sleep. At 5:45 Kent whanged a reveille on the bottom of his frying pan—an instrument somewhat less musical than a cowbell, but very effective.

I carried an altimeter—one of those inexpensive automobile instruments—to keep a record of our daily loss in elevation. At the end of the first day it showed we were 80 feet higher than when we left Lee's ferry. When it played the same trick the second day I chucked it overboard. I have no doubt that on an automobile it is a trustworthy instrument. But obviously it had not been able to readjust itself to travel on the rough water of that river.

The river came up an estimated 500 second-feet during the night. At 7:50 we shoved off for the second day's run. At 8:15 we ran Sheer Wall rapid without even putting on our life belts. This is believed to be the place where Peter Hausbrough and Henry Richards of the Brown-Stanton expedition capsized and were

drowned in 1889. The big waves tossed their boat against the canyon wall, and when they shoved it off a whirlpool turned it over. Hausbrough was never seen again. Richards, one of the two Negro members of the expedition, came up, but the current carried him downstream and he was unable to make shore. Following this second tragedy in five days, Stanton decided to abandon the project. Several months later he returned with a reorganized party and completed the railroad survey. Backers of the project looked over the reports and decided a railroad in Grand Canyon was not practicable.

We ran a heavy riffle and then came to House Rock rapid. There are three types of rapids in the canyon—the straight away, the S-shape and the C-shape. The shape of the rapid, however, gives no indication of its ferocity. It is the number and size and location of the big rocks in and under the water which make the difference between a bad cataract and an easy one. House Rock was an S-rapid, but in high water it presented no serious problems and we ran through without landing.

At 18½ miles from Lee's ferry we passed Boulder Narrows where a great block of stone sits in mid-channel. There was plenty of water to go around it on

either side, and Norman chose the right side.

At 9:15 we came to North Canyon rapids, the meanest looking S-rapid we had encountered. We landed above while Norman and his brain trust, the boatmen, looked it over. It had some tricky-looking holes where water eddied around huge submerged boulders, and the decision was that the boatmen would ride, the passengers walk. The ¾-mile detour was rough going for the hikers and it was necessary to do some hand-and-toe climbing to work down from a ledge to the point where the boats were landed below.

Twenty-One mile rapid proved to be no more than a heavy riffle at this stage of the river and we ran it without stopping. At 11:15 we arrived at 25-Mile rapid, the third of the 17 major cataracts we were to encounter on this expedition. This was a long C-rapid extending around a bend in the river. Before running it Norman wanted to walk around the bend to look at the lower end, so he and I worked our way over the boulders and along a series of shelves a quarter-mile downstream. And that was where I stumbled into one of the prettiest fields of agate, jasper, banded onyx, carnelian and chalcedony I have ever seen. While Norman looked the river over, I was exclaiming over the rare coloring of the rocks that lay underfoot and all around me.

I had seen much fine jasper and onyx along the way, but here was an area with enough of it to build a castle, ranging from tiny round nodules to great blocks as big as a freight car.

I showed some of the specimens to Norman. "I wouldn't dare bring an expedition of rockhounds down this river," he remarked. "They'd throw all the grub away and load the boats with rocks."

That is one prize mineral field I can dream about with the assurance that no one is going to disturb it.

Norman decided to run the boats through while the passengers took a walk. When the boats were through at 12:45 we spread lunch on a ledge. Temperature in the shade was 96 degrees.

Below 25-Mile rapid we ran Cave Spring rapid, 26-Mile rapid, 27-Mile rapid, 29-Mile rapid and four heavy riffles without stopping and at 3:30 landed on a bar above Vasey's Paradise for night camp. We traveled 20½ miles that day, ran two major rapids, six minor rapids and 12 heavy riffles. The passengers walked around two rapids and had to do some bailing in six of those we ran. Bailing water became a regular daily chore—often many times a day. Every boat was equipped with two buckets and a supply of empty cans—and it was part of the unwritten code of the river that passengers should help the boatman bail out the boat when one of those big waves piled into the cockpit. Margaret Marston, who undoubtedly is a fastidious housekeeper at home,

even kept one of Doc's discarded shirts in the bottom of the *Joan* to mop up the remaining drops of moisture after the cans had scraped bottom. In the *Wen* there are two places where the paint has been scraped off the floor—proof that Al Milotte and I did our duty as bailer-outers.

Before writing about the lovely campsite we found at Vasey's Paradise, I want to clear up certain discrepancies regarding the number of rapids in Grand Canyon. Julius Stone reported his party ran 318 rapids between Lee's ferry and the present site of Hoover dam. Dellenbaugh reported 204 rapids between Lee's ferry and Kanab canyon. Clyde Eddy said his party ran 245 bad rapids in Grand Canyon. The U. S. geological map based on the survey made in 1923 lists 70 rapids by name and indicates rough water at many other points. One of the Grand Canyon park rangers in his daily lecture at Yavapai Point announces "there are said to be 365 rapids in the Canyon—one for every day in the year."

I started on this expedition with a fine resolution. I was going to count those rapids very carefully—and settle that dispute once and for all time. I took along a mechanical counter—one of those gadgets that add one every time you press a lever. I would have a mechanical record that could not be questioned.

And now I want to offer my apologies to all my rapid-counting predecessors. Their figures vary from 70 to 365 rapids—and as far as I am concerned every one of them is telling the truth, even including the park ranger who admitted he had never been on the river in his life.

There are several reasons why the figures do not agree—and why they will never be reconciled. In the first place the character of the rapids changes with every variation in the flow of the stream. A 35,000 second-foot river may flow over a rocky obstacle with only a big ripple on the surface, and at 5000 feet that obstacle may be a nightmare to boatmen. The changing character of the river is one factor—and the Colorado never carries exactly the same volume of water two days in succession. During the 19 years from 1902 to 1920, the records at Yuma, Arizona, show a discharge varying from 1800 second-feet in January, 1919, to 240,000 second-feet in January, 1916. The average annual maximum flow is 108,464 feet, and the average annual minimum is 3849. The flow at Yuma of course has been stabilized since Hoover dam was built.

Then, who is to define a rapid? Counting rapids in Grand Canyon is like counting the branches on a tree. Who is to decide whether a 3-inch sprout is to be classified as a twig or a limb? That's the way it is on the Colorado. The rapids, at every stage of the river, vary from a tiny riffle that barely rocks the boat, to a roaring cataract that puts goose-flesh on a seasoned boatman.

Norman and I discussed this question many times as we rode along in the *Wen*. For the purposes of my own records I classed the white-caps in the Colorado under three categories—major rapids, minor rapids, and riffles—and I did not count the riffles unless the waves were at least 2½ feet high.

When I totalled up my figures after we reached Lake Mead my records showed 17 major rapids, 51 minor rapids, and 178 riffles. There were at least 150 smaller riffles I did not count—some of which at lower stages might give a boatman considerable trouble. These figures are offered merely for this stage of the water—37,000 second-feet at the start and 16,000 second-feet when we reached Lake Mead.

Like everything else in Nature, the Colorado is a changing stream. There always is the possibility that a cloudburst torrent on one of the rims may send down a new avalanche of rock which will change a riffle into a troublesome rapid. Norman says this has happened at the mouth of Clear creek in Marble canyon since his last trip through in 1942.

And after all else is said, Norman suggests that "the hazard of running the Colorado is largely a state of mind. When the day is bright and spirits are high and everything is going well, none of the rapids frighten you. And by the same token, when things have been going badly and you're feeling a little low, a minor rapid may scare the daylight out of you."

*(Randall Henderson's story of his voyage through Marble and Grand canyons will be continued in the December issue of Desert.)*

## MANY NAVAJO CHILDREN WILL HAVE NO SCHOOLS

By train and bus, 1000 Navajo children left their desert homeland during the last week in September for off-reservation schools in New Mexico, Arizona, California, Nevada and Oklahoma. All of the children were over 12 years old, and below the fifth grade. Many had never been to school before.

There are an estimated 10,000 Navajo children between the ages of 13 and 18, but current funds and facilities were sufficient to take only 1000 in the off-reservation school program this year. Of these, 200 went to Albuquerque, 200 to Phoenix, 100 to Chilocco, Oklahoma, 350 to Sherman Institute, Riverside, California, and 150 to Carson Indian school, Stewart, Nevada. Thirty children of high school age went to Indian schools at Ft. Sill and Anadarko, Oklahoma.

The reservation schools opened during the first week in October. They were expected to take 4500 of the estimated 12,000 Navajo children who are between the ages of six and 12. Ft. Wingate will be the only reservation school taking older students this year, and 75 war veterans were expected to be among the students there.