INDIVIDUAL REPORTS

OF THE

COMMITTEE ON EDUCATIONAL PROBLEMS IN NATIONAL PARKS

Individual Reports of Members of the Committee on Educational Problems in National Parks, Together with Minutes of Early Meetings of Committee

THE specific recommendations resulting from studies of the Committee on Educational Problems in National Parks have already been presented to the Secretary of the Interior through reports of the Committee under date of January 9, 1929, and November 27, 1929. These results were based upon extensive studies by members of the Committee working individually and in groups through a period of approximately two years. In the course of these investigations much material of value was accumulated by individual members. Each of these reports was transmitted at the earliest possible moment to National Park Service for use in development of various aspects of the educational program. In order that the data in these separate reports, and the expressions of opinion of the Committee in the earlier minutes, may be of record with the office of the Park Service, it was decided by the Committee to have these documents put into permanent form by means of gathered proof sheets.

The following pages representing work of the seven members of the Committee on Educational Problems in National Parks, while not approved by the Committee as a whole, have the authority of confidential expression by the individual members. It is believed that much of importance will be developed in use of the material.

The reports are arranged in alphabetical order according to authors, and in general alphabetically by subjects touched by the authors. The table of contents for the document as a whole is given below.

JOHN C. MERRIAM, *Chairman.*
HAROLD C. BRYANT, *Secretary.*

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Reports of Dr. Wallace W. Atwood on Studies Made in 1929 on Glacier Park, Grand Teton National Park and Yellowstone National Park

THE GLACIER NATIONAL PARK

Highways

THE completion of the automobile highway along the south margin of this park is provided for by contracts which have been let. The road should be opened for traffic next July and with this new road across the Rocky Mountains a large increase in the number of visitors to Glacier National Park should be anticipated and provided for.

The proposed automobile highway through the midst of the park when completed will be one of the most attractive scenic routes in our western country. The section from Lake McDonald to Logan Pass, which has been completed, was used during the past season by thousands of automobile parties even though it is necessary to turn around at Logan Pass and retrace the route to the south margin of the park.

The unfinished portion which will follow the canon of Reynolds Creek and the north margin of St. Mary's Lake will be wonderfully attractive from a scenic standpoint.

Facilities for automobile campers must be provided along this road and the hotel accommodations must be enlarged. I anticipate that this road, when completed, will soon double the number of visitors to the park. Provisions for the educational work along this route should be improved and recommendations will appear later in this report.

Trails

The trails already completed and those under construction during the past summer constitute a wonderfully good net-work for hikers and horseback riders through this range. As the number of visitors increase and especially as more come who enjoy going into the heart of the range on foot or in the saddle, the northwestern portion of the park should be made more easily accessible. Wonderfully interesting routes could be laid out from the south end of Watertown Lake into the region of Brown Pass and the Kintla Lakes. I anticipate that a visit to Agassiz and Kintla Glaciers would be fascinating to those who like the high mountains.

There is another very fascinating and rather inaccessible portion of the park where trails may some day be needed. The region referred to is along the continental divide and extends from West Flat Top Mountain to Trapper Peak and northwestward through a series of basins to the vicinity of Mount Carter.

The Blackfeet glacier I found to be exceedingly interesting, but the trail from Gunsight Lake to that glacier would need considerable work done on it if tourist parties were guided in that direction. The glacier has been melting away rapidly during the last few decades and the workshop thus uncovered is exceedingly instructive. There one finds illustrated most of the phases of ice work.

Similar phenomena are illustrated along the margin of Sperry glacier, and since that glacier is now easily reached there is no immediate need of making the Blackfeet glacier available for the general public.

The trails in the park that are used most present a very serious problem which demands solution. These routes are so dusty that it is exceedingly unpleasant to follow them even in a small party. The experience with a large party from one of the hotels is almost unbearable. Over two thousand people have followed the route from Lake McDermott to Iceberg Lake during the past summer. The round trip is made in a day, but one rides in a cloud of dust much of the time. That dust is very irritating to the eyes and nose, and undoubtedly most unwholesome for the visitors. It is impossible to avoid the great clouds of dust for the parties are kept crowded together and they frequently meet other parties that bring with them additional clouds of dust just as automobiles did in the days before our highways were well surfaced.

Even a party of half a dozen who elect to take the North Circle or South Circle route through the park find that the horses stir up so much dust that the pleasure of going through the mountains is almost ruined. This condition is due to the fact that the rocks of this park are composed largely of shales and the frequent passing of large numbers of shod horses is certain to reduce this material to an impalpable dust.

I would strongly recommend that the trails to Iceberg Lake, Grinnell Glacier, and Cracker Lake be oiled or made virtually dustless by some method. The next most important routes for oiling are from Lake McDermott to Granite Park and the trail from Lake McDermott to the head of St. Mary's Lake. From the head of St. Mary's Lake to Lake McDonald by way of Gunsight Pass should also receive attention.

All who care to become well acquainted with Glacier National Park must follow the trails. It is in the mountains rather than at their margins where one can appreciate their magnitude, their beauty, their geologic history, and the larger problems associated with the plant and animal life of this mountain environment.

A Science Hall and Demonstration Laboratory

During the past season the educational work in this park has been carried on in certain of the hotels and on the trails. The hotel managers have cooperated and been very helpful but the conditions at the hotels are not at all satisfactory for the conduct of serious educational work. Although there may be occasions when popular lectures might well be given at the park hotels by officers of the National Park Educational Staff, the regular work of the staff demands other facilities. The absence of a suitable room and of demonstration material makes it virtually impossible to put clearly before an audience the larger and more significant lessons in the natural history of Glacier National Park. I recommend that, as soon as possible, all systematic educational work of the National Park Staff be removed from the hotels. At least three buildings should be erected and equipped as scientific laboratories and centers where this work can be conducted. One should be at McDermott Lake, one near the upper end of St. Mary Lake, and the other near the upper end of Lake McDonald. The need of additional centers may develop at Sperry Glacier and at Logan Pass.

The McDermott Lake Station

The site for a science hall or demonstration laboratory on the shore of McDermott Lake was selected in company with Dr. Ruhle and Superintendent Eakin; later this site was

carefully examined with Mr. Kitridge of the National Park Service. All who have visited the proposed site are in agreement that its location, just north of the outlet of McDermott Lake, is exceedingly fortunate. The points in its favor may be listed as follows:

1. It is within easy reach of the chief hotel and of the tourist camp.
2. The mountain panorama through the 180° is magnificent.
3. Each of the more important geologic formations of the Park can be pointed out from this location.
4. The position of the Lewis overthrust fault-plane can be seen.
5. There is good parking space available.
6. Near the building there is an area where an alpine garden might be reproduced. The suggestion of an alpine garden was made by Dr. E. P. Meinecke who was at work in this Park last year.

The equipment for this station should include:

1. A mechanical device which will make possible the demonstration of the great Lewis over-thrust fault.
2. A relief map of the park.
3. A geologic map of the park.
4. A reproduction to scale of the geologic column in the park from cretaceous strata below the fault-plane to the crest of the range.
5. Large hand specimens from each of the formations.
6. Type specimens of fossil imprints as they become available.
7. A map or model showing the maximum distribution of glacier ice during the Pleistocene period.
8. Specimens of glaciated stones.
9. Maps showing the distribution of the larger plant groups.
10. At least two telescopes mounted on an open veranda at the west side of the building.
11. A lantern and set of slides for use in evening lectures.

The St. Mary Lake Station

This station should be located on the bold rocky promonotory, north of the present hotel accommodations at Going-to-the-Sun Chalets, but south of the line of the proposed new highway. This location will have the following advantages:

1. A superb mountain panorama through about 180°.
2. Accessibility for hotel guests.
3. Accessibility by automobile road from the tourist camp.
4. Visibility of chief geologic formations.

The equipment for this station should be quite similar to that suggested for the station at McDermott Lake. The talks or lectures given at these two stations must be so planned that they supplement each other. Many who visit Going-to-the-Sun Chalets and the neighboring region go by motor boat and car or by trail to the McDermott Lake region. When the automobile road is completed through the central part of the range many visitors to the Park may make their chief stop at the head of St. Mary Lake. The number of visitors to this station will be exceedingly large when the road is completed, and provision should be made for receiving many of them at the demonstration laboratory.

The Lake McDonald Station

This station should be located at a point near the entrance to Snyder Creek Canyon where there is a favorable outlook over Lake McDonald. I could not visit that region because of the proximity of forest fires but I appreciate the importance of this center for educational work. The west side of the range offers a rich variety of plant and animal life, and biological studies might well give character to the scientific and educational work at this station.

The Lake McDonald station will be along the automobile route of travel through the Park, near one of the large hotel centers and on the way to Sperry Glacier. A visit to Sperry Glacier is one of the very attractive and valuable field trips in the high mountain region.

GENERAL CONSIDERATIONS

The Educational Program in the National Parks will require:

1. Organization of methods for the careful selection of permanent and temporary members of the staff.
2. Provision for the training of staff members. This should include field work. Each member of the instructional staff should be well acquainted with the park where he is at work.
3. Organizations of programs within each Park so that inappropriate duplications in the instructional talks will be avoided. Many visitors to the Parks plan, as soon as they learn of the educational work, to grasp every opportunity offered.
4. Suitable buildings where the educational work can be conducted effectively.
5. Special equipment at each educational center. The equipment may include certain museum exhibits, but must contain material needed in the demonstration of the more significant lessons in science.
6. Provision for research work by members of the educational staff and other scientists in the Parks. The educational work will not retain a freshness or the note of inspiration unless those engaged in that work carry on some original research work of their own. The presence of eminent scientists in the Parks, engaged in field studies and speaking at times to members of the educational staff, would be of great value in promoting our work.

Our programs should succeed in a notable way if we select well-trained young people with pleasing personalities who are good speakers, good field research workers, and who are interested in helping others. I believe scientific studies as well as educational work should be promoted in the National Parks. Many important scientific studies could undoubtedly be promoted in cooperation with other departments of the United States Government.

Questions

1. Should not the educational staff be organized separately from the Park Rangers and provided with separate accommodations?
2. Should not the salary scale for those in the educational staff be raised so that the services of the more successful members can be retained for a number of years?
3. Could arrangements be made so that married men appointed in the educational staff for the summer might have their wives and possibly their children living in the park where they are at work? Small housekeeping cabins would solve this problem.
4. Why should scientific men engaged in doing educational work in the park during the summer be prohibited from bringing their own automobiles into the parks and using the cars to help them keep their appointments, and for pleasure or field work during leisure periods?

THE GRAND TETON NATIONAL PARK

The Automobile Highway

THE present highway bordering the foothills of the range is very well located for the pleasure and convenience of visitors to this park. There are already many natural openings through the forest which present vistas of great beauty from the roadway across the lakes to the bold mountain front. A few more openings through the forests may prove to be desirable.

I would strongly recommend that no buildings or camps be permitted between this park highway and the small lakes located just east of the mountains. At present camping is permitted in that belt. It will be extremely fortunate if all such camps can be placed at some little distance east of the road, thus allowing the shore margins and the entire forested belt at the east base of the mountains to be left in their natural state. This recommendation, I understand, meets the approval of the superintendent, Mr. Woodring.

The highway must be widened and improved to better accommodate the traffic which it already carries and to provide for the increased traffic which must be anticipated.

The highway should be continued northward along the shore of Leigh Lake and might well follow the route suggested by the broken red lines which I have placed on the accompanying map. It would then complete a northern loop, pass through a heavily forested morainic country, and add a few miles of very beautiful driveway along the shore of Jackson Lake.

Trails

The development of a system of trails in this park is of prime importance. The mountain front is majestic as seen from the lowlands at the east, but anyone who wishes to appreciate fully the natural wonders of this park must go into the range, follow some one of the many canyon routes to the divide, climb to certain of the outlook stations, and walk or ride for several miles along a "skyline trail" near the western margin of these mountains. The approach to the canyons from the east and the first mile or two upstream will present no serious difficulties in trail construction but there is a constricted section two or three miles long, in each of the canyons where the stream gradients are high and where the construction of trails will be expensive. Those more difficult sections for trail work are near the eastern margin of the range where the uplift of the Teton block was greatest and where the streams encounter very resistant core rocks of the ancient or Pre-Cambrian complex. Upstream from the narrow gorges the canyons widen out and their floors present little or no difficulty for the trail makers.

On the accompanying map I have indicated in blue a system of trails which would lead those who travel on foot or in the saddle along routes of fascinating interest from the standpoints of Geology, Physiography, and of Plant and Animal life. Whichever of these trails they select the visitors would soon find themselves in true alpine environments. At the outlook stations, which have been indicated on the map, and from many other points on the trails, they would have before them magnificent mountain scenery.

The route up Death Canyon is passable today although at places it is rather difficult for saddle horses. The ride through the upper portion of the canyon is easy and the route along the crest line as far as examined presents no difficulty. Information obtained from those who have gone farther, indicates that the "skyline trail" along the divide at the west margin of the park would be an easy proposition for several miles. The trail engineers may expect some difficulty in locating a good place for making the descent into Leigh Canyon. The descent may very well be shifted a few miles farther north or south from the route which I have indicated on the map. The crossing from Leigh Canyon into Moran Canyon will probably be easy.

The route up South Leigh Canyon is already passable over a fair trail made by the foresters. That trail has not been completed down the slopes into Leigh Canyon but could be so completed.

There is no trail at present in Glacier Creek Canyon but several miles in the upper reaches were examined from an outlook station high in the range and the going appeared to be very easy in that part. A sharp narrow gorge exists in the lower or eastern part of Glacier Creek Canyon, just as in the other canyons, and in that section heavy rock work will be necessary in the construction of the trail.

The great canyons present a richness in geologic structures, in variety of rocks, and in the phenomena of glaciation that makes a day spent in travel through any one of them a most profitable and inspiring experience.

The Grant Teton group itself, which presents the culminating spectacle of scenic beauty in this rugged range of mountains, should be made accessible by an improved trail up the east slope of the range. The climb at present is difficult because the trail is too steep. On the east slope of the Grand Teton there is a small glacier which could be made available for visitors by a little trail work. This glacier is worth visiting especially on account of the moraine system that has been left during a recent period of recession of the ice.

I have suggested a trail along the eastern margin of the range through a morainic belt where there are several lakes. Such a trail would keep the saddle horses away from the highway and would offer many easy and very attractive walks or rides. This lowland trail would give to the visitors a large number of beautiful outlooks and would also offer excellent opportunities for the study of plant and animal life. There are at present many parties of riders and hikers who enter this portion of the park from nearby Dude camps. A great increase of hikers and riders may certainly be anticipated as improved highways from east and west give easier access to Jackson Hole Valley.

Judging from a distant view, I think there were at least two somewhat notable glaciers on the north slope of Moran Mountain. That region should be visited in the near future for it may prove to be one of the most interesting sections of the park.

Science Hall or Demonstration Laboratory

The site selected for the erection of a demonstration laboratory is indicated on the accompanying map by a blue cross. It lies between Leigh and Jenny Lakes and is on the east shore of String Lake.

The site chosen for this educational center is east of the main automobile highway with outlooks to the southwest toward the Grand Teton group of peaks and to the northwest toward Moran Mountain. It is conveniently located for those who may stop at the proposed Lodge or at the proposed tourist camp.

Adequate parking space should be provided near this observation station. There is an abundance of room there now and this matter should be anticipated when the camp and Lodge reservations are made.

The building should have large plate-glass windows on the west side and it might well have an uncovered veranda on the west side so that visitors could leave the main demonstration room and step out into the open to view the mountains or receive instruction. On the veranda there should be placed at least two telescopes for those who would like to study the details of this magnificent mountain front. At this site visitors would have one of the choicest outlooks possible from the east base of the range. A chart with pointers should be provided here in order that the chief objects of interest may be easily located.

In the demonstration room there should be an enlarged topographic map of the park on a scale of at least two inches to the mile. As soon as possible a relief map should be prepared and installed in this room. There should be present, for means of demonstration, large rock specimens which will give the correct impression to the visitor of the great variety of rocks in the fundamental complex exposed on the eastern face of the range and in the overlying sedimentary series. The room might well contain colored views of the plant life and of the big game which may be seen by visitors who follow the various trails through the park.

Some mechanical devices or models should be constructed with which to demonstrate, to the layman, the movement of faulting which occurred during the last uplift of this mountain block.

A geological map should be prepared as soon as possible so that the distribution of the various formations may be clearly grasped by every student of the park.

As soon as possible also a map should be prepared showing the for-

mer distribution of glacier ice in the park and on the neighboring lowland to the east. A special relief model with the glaciers represented on it would be very effective.

In the sedimentary rocks there are fossil remains which offer a good opportunity for the study of ancient life and the appreciation of some of the deeper meanings of geologic studies. Good specimens of the type fossils should be available in the laboratory.

The erection and equipment of the demonstration laboratory is necessary if an educational program with the visitors to this park is to be carried out effectively. The one who is placed in charge of this work must have had field training in geology and physiography.

High Points for the Educational Work

The outstanding possibilities for educational work in the Grand Teton Park may be summarized as follows:

1. A geologic story in which tremendous physical changes are clearly recorded. Mountain making, stream erosion, glacial work, rock weathering, rock metamorphism and phases of volcanism are well illustrated.

2. A record of ancient life in the sedimentary rocks high in the range, where a biologic history full of meaning is recorded.

3. A large variety in plant life illustrating adaptations from a lowland environment to the adaptations common to alpine conditions. Adaptations of plant life to various conditions of exposure and to the various soil and rock conditions are shown. Influences of altitude, temperature changes, moisture conditions, and winds upon plant life, are clearly illustrated. Stages in the evolution of plant societies are undoubtedly to be recognized in this region by those conversant with that field of study. There are places from which glacial ice has but recently disappeared and nearby areas that have been exposed somewhat longer, where plant life has made a little start. There are probably also landscapes where plants have had a sufficiently long period of time to have reached a mature or climax stage.

4. At present the wild game in this region is so abundant that one who travels into the region, even without any intention of searching for such animals, is sure to see them. Elk, moose, deer, and bear are there and many of the smaller animals of the forest.

5. The outstanding and undoubtedly the most significant element in this new park is its magnificent mountain scenery. There are few regions in the world of such limited area that present equal scenic beauty. The thrill which visitors receive when in the midst of so much beauty and the love for the out-of-doors, which is certainly encouraged by a visit to the Grand Teton National Park, while difficult to evaluate, are very significant.

Opportunities for scientific studies abound in this park. They are varied and extremely fascinating. College and University students and many of the younger members of the faculties in our institutions of higher learning should be encouraged to spend their summer vacation periods in field studies in our parks. I hope some plan may be worked out which will make it possible for us to promote research in each of the parks.

YELLOWSTONE NATIONAL PARK

THE educational work in this park has proceeded much farther than in either of the other parks which I visited during the past season. Here I conferred at some length with those administering the affairs of the educational division, listened to a large number of the talks which were given at hotels and lodges, accompanied groups on nature walks, and other groups who were being guided through the geyser basins.

The educational staff included seventeen people during the past season, and Mr. Yeager strongly urges the addition of five more to their staff, and the employment of a secretary at his headquarters.

From my field experiences I was convinced that the staff contains many able instructors who are doing very conscientious work, and I was deeply impressed with the interest shown by visitors to the park who accompanied the instructors in the field or listened to them in the hotels, lodges, or museum building. There is no doubt as to the appreciation on the part of a large number of visitors to this park of the educational help which is being offered by the National Park Service.

The most striking and inspiring features and phenomena of the Yellowstone National Park are geologic, and yet the great story of geologic changes is not adequately presented to the visitors. The talk given, with the help of slides, at the little museum building near Old Faithful brings out certain phases of the geology but it falls far short of what should be presented. The geological lecture or talk at the lodge near the Grand Canyon is quite ineffective. There the speaker attempts to tell a most complicated geologic history without any demonstration material. He speaks well but his efforts are in vain.

A demonstration laboratory should be erected and so equipped that the outline of the geologic history of the park can be presented clearly to the visitors. That station should be so located that the outlook is distinctly impressive. I strongly recommend that the site of that station be near Artist's Point on the east rim of the canyon of the Yellowstone River. There is room for such a station in a grove of trees where the road now forms a loop or circle. The advantages of this site are as follows:

1. A magnificent and inspiring view. The outlook would include a view of the Lower Falls and of a section of the Grand Canyon of the Yellowstone.

2. The most striking scientific phenomena at this locality are distinctly geological.

3. The climax in the geologic history of Yellowstone Park comes with the cutting of the Grand Canyon which is before the eyes of the visitor when at the proposed site.

4. Most visitors to Artist's Point have already been to several of the geyser basins and made a large part of the conventional tour through the park. They have seen so many phenomena that they should be ready for the presentation of the geologic story.

5. This site will become available as soon as certain changes in the road, which have already been provided for, are completed.

6. The plans for the new highway construction provides ample parking space for private cars and Park busses, near this proposed site.

7. The platform at Artist's Point is so near that all visitors can be encouraged to mount to that remarkable outlook station. No formal talking or lecturing should be done on that platform. There the beauty and grandeur of the scene should be relied upon to produce a profound effect.

Equipment for this Demonstration Laboratory

No instructor should attempt to present even an outline of the geologic history of the Yellowstone Park to an audience without excellent equipment. The following articles should be provided for the demonstration room:

1. A relief map of the Park.
2. A geological map of the Park.
3. A relief map of the Park on which the glaciers of the Pleistocene period are represented. I think Dr. William C. Alden, of the U. S. Geological Survey has the necessary data for such a map.
4. Large hand specimens of various rocks, of petrified trees, of fossils, of tufa, and of sinter, for use before an audience.
5. Geologic structure sections should be prepared for use in connection with the discussion.
   a. A structure section at the Mammoth Hot Springs.

b. A structure section at the "Hoodoos."

c. A structure section at the upper geyser basin, providing that certain deep borings now being made yield sufficient information for the construction of this section.

d. A structure section showing the various horizons of petrified trees in the south wall of Lamar Valley.

e. A structure section near the Grand Canyon.

6. A sketch map to illustrate the piracy committed by the Yellowstone River.

I should like to add one comment which I hope will be helpfully suggestive to those who are engaged in giving instruction in this park.

In the talks which I heard about the plant and animal life of the Park I missed the presentation of the larger ecological problems. The naming of flowers and the identification of trees has some value, but the presentation of large scientific problems suggested by the local conditions and phenomena strikes me as of much greater significance for the mature visitors whom we address in these Parks. The visitors may carry away some slight amount of detailed information from our work and that may prove to be valuable to some of them, but the inspiration which comes from living in the midst of these great wonderlands can not come from such encyclopedic data. It seemed to me that at some one of the stations, where visitors are invited to listen to a naturalist, the plant life of the park should be treated as a unit. The talk might include the story of the tiny algæ living in the hot waters, a description of the meadow lands, the forests, and the wild flowers of the Park and an account of the giant Sequoia that were buried in volcanic debris. The plants all present wonderfully interesting studies in adaptation and the ancient Sequoias suggest remarkable changes in the plant societies of the region during geologic times.

Could not the story of the animal life of the Park be presented from a thoroughly scientific point of view and made just as fascinating as when recounted as a series of humorous incidents in the life of the animals? Mr. Martindale's remarkable performance at Old Faithful while the bears are eating may well be continued while Mr. Martindale is available, but at some one of the stations a non-technical scientific talk based on the wild animal life of the Park should be given.

Reports of Studies by Dr. H. C. Bryant on Educational Problems Presented in Lassen and Sequoia National Parks

NOTES ON LASSEN NATIONAL PARK

AFTER a three-day study of Lassen National Park, I am convinced it is of national park caliber and has splendid possibilities in an educational way.

Itinerary

Mr. George Collins was assigned to show the park. The itinerary was as follows:

Oct. 9. Park Headquarters Mineral.

Oct. 10. Draksbad.

Oct. 11. Viola to Manzanita Lake, Chaos Crags, Devastated Area, Summit Lake to end of road.

Oct. 12. New road to Bumpa's Hell.

The highly praised Butte Lake and Cinder Cone recreation area of the northeast corner of the park was not visited.

SIGNIFICANT FEATURES

Geology

Devastated Area: There are other places where thermic activity and volcanism can be studied with almost equal advantage, but nowhere in the United States is there such visual evidence of devastation wrought by mud flow and steam blast. Probably the most gripping exhibit within Lassen National Park is the devastated area on the north side. Every visitor will be stirred by the actual evidence of a beautiful mountain meadow filled in fourteen feet deep with mud, and at the same time ability to see uncovered by the stream, trees which have evidently been buried in a previous mud flow. Furthermore, it is a fascinating experience to trace out on the devastated area, the direction and strength of the blast which leveled the forest and swept the mountainside clean.

Summit of Lassen Peak: The lava plug and evidences of flow together with a typical crater steaming at the bottom is visual evidence that one is looking at the one active volcano in the United States proper. A study of old and new lava flows is possible.

Bumpa's Hell: This is apparently the better of the two areas showing thermic activities. It is easily reached by a good trail of little over a mile which leads from the new road. There are good examples of hot springs, mud pots, fumeroles and like thermic activity. Crystals of sulphur are to be found around the fumeroles. The area is not large, but is full of interest. To be appreciated, however, there must be some understanding of the causes of such phenomena.

Draksbad: A short distance above the summer resort owned by the Sifords lies anotner hot-spring area. The same phenomena as are to be seen at Bumpa's Hell are here in evidence, but in my personal opinion, in less spectacular form. The mud pots are not so brightly colored, but are of a thicker consistency. The hot springs, likewise, are not quite so active. Boiling Lake, to the south of the Draksbad resort, is a stupendous spectacle. To see a lake of this size in a boiling, steaming condition with numerous mud pots around the edge stirs every visitor. This is certainly one of the choicest of the hot-spring phenomena. This area which is now privately owned should be purchased and added to the park.

Cinder Cone: The Cinder Cone area is said to be a splendid geological exhibit with a chance to study both the cinder and the lava type of deposit.

Chaos Crags and Jumbles: To the northwest of the mountain lies a great ridge of lava known as Chaos Crags. Below this to the west is a tumbled area indicating a flow which has been named Chaos Jumbles. This flow has been largely overgrown by a young forest. A short distance north of Manzanito Lake, a new road crosses this interesting area. A prominent geologist has recently published a paper dealing with this formation.

Biology

Forest: The flanks of Lassen Peak are beautifully forested with yellow pine, sugar pine and incense cedar. These forests are park-like in appearance and have added beauty because of the spacing of the trees. Stream sides are bordered with aspens and poplars. In the forests, the undergrowth of flowering dogwood is of particular beauty in the fall when the leaves have turned.

Timberline: John Muir has called attention to the beautiful growth of hemlocks on Lassen Peak. This hemlock forest is an outstanding feature of the eight and nine thousand foot level. The accompanying flora also makes a fine study.

Ecologic Studies: A succession of mud flows and lava flows gives a fine opportunity for a study of plant succession. It is interesting to note what sort of vegetation first appears on a new flow and what the eventual flora is like. There are numerous areas of great contrast which give a suitable background for environmental studies.

Fauna: The park is well stocked with deer and other animals. The trout in Butte and Summit Lakes are of extraordinarily large size. Bird and animal life differs somewhat from that in the southern Sierra.

Historical

Emigrant Trail: As one travels the road around the north side of the mountain, the old Lassen trail is often in evidence. It probably constitutes the most interesting historical exhibit contained in the park. Numerous log cabins are scattered about indicating many attempts made by the pioneer to establish himself in this area.

Museum

The museum building at Manzanita Lake is of pleasing architecture and the location appears to be good, even though the main road around the mountain will not pass by the building. The numerous enlarged photographs of the mountain in eruption made by Mr. Loomis furnish visual evidence of the appearance of the mountain in 1914 and 1915. The natural history exhibits at present are of very poor quality. The taxidermic work is very poor. The backgrounds, on the other hand, painted on enlargements actually taken around the mountain have possibilities. Thus far the collection of historical relics is small and poorly displayed. Eventually a rearrangement of exhibits will allow better portrayal of Lassen Park and its associated features.

Educational Work

Actual nature guiding in Lassen National Park will always be difficult for a number of reasons:

The headquarters are outside of the park proper.

There are four actual entrances.

The museum is far removed from the recreational area around Cinder Cone and is actually off the main highway.

With these difficulties in view, it is evident that other educational features than nature guiding need to be stressed. The Loop Road will provide a route to most of the interesting educational features. It is possible that a nature guide might properly handle a caravan of automobiles on this route, stopping to give instruction at each interesting location. Cer-

tainly, there is need of a first-class naturalist at the Museum, and a part-time man stationed at the recreation center at Butte Lake would have plenty of opportunity for conducting field trips. The possibility should be considered of detailing a man to remain throughout the day at the Devastated Area to help people to understand it.

If lectures can be given regularly at the principal resorts, numerous visitors will have an opportunity to learn what are the best things to see and will be able to secure a basis of interpretation.

Publications

A splendid little guide booklet has been issued by Mr. George Collins. It is on sale at all of the principal resorts. Thermic activity is dependably described in Carnegie Institution publication No. 360.

A report on the fauna of Lassen National Park, the result of a biological study of a cross-section through the peak, is in press. This biological survey, which covered several years, was made by various members of the staff of the California Museum of Vertebrate Zoology headed by Dr. Joseph Grinnell. After this report is published, there will be available a fairly complete knowledge of the animal life of the park.

AN EDUCATIONAL PROGRAM FOR SEQUOIA NATIONAL PARK

SEQUOIA National Park may be considered as an example of a park where the outstanding feature is of biological significance. The largest tree, the most extensive forest of big trees (*Sequoia gigantea*), are contained within its borders. An unmodified climax type of forest with its native life, typical of the southern Sierra Nevada furnishes a background for these choice exhibits. The new addition to the park includes on Chagoopa Plateau as fine a display of foxtail pine as can be found anywhere. Of but slightly less significance are Mt. Whitney (14,501 ft.), highest peak in the United States, other rugged peaks of great height, deep canyons, flower-grown meadows and other accompaniments of the best part of the southern Sierra Nevada.

Since every visitor is impressed with the age of the big trees, splendid opportunity is afforded to link the life of the present with the plant and animal life of the past. Those great thoughts which through time have been expressed by poets and philosophers when inspired by contact with majestic trees and forests may well find a place in stirring the individual to great thoughts and to appreciation of beauty.

An understanding and an appreciation of the biological features forms the minimum objective of any plan to be helpful to visitors. Here may be explained the laws of life, the laws by which we live. Educational work in this park should aim at giving every individual who enters the borders of Sequoia National Park:

1. A vision of the antiquity, age, height, girth, longevity of the big tree, a taste of its symmetry and beauty and understanding of the contributary causes.
2. An insight into the interrelations found in a forest of big trees and the means to be taken to maintain them.
3. A knowledge of accessory features of the park: animal life, flower-grown meadows, geology.

Methods

An organized program having but recently been started (1929) there is need for a general working plan.

As far as possible the imparting of information to the visitor should come from personal contact with the feature itself. This is more true of biological phenomena than of others, for specimens of living things are sorry objects out of their own environment. Leading people to the Sherman Tree and helping them to discover for themselves is a preferable method to that of lectures. Consequently means should be provided for furnishing personally conducted excursions, both short and long, to view the big tree in its most interesting features and to bring an understanding of its native environment.

Guided study of big trees and allied features of Sequoia National Park may well bring about as nowhere else the following educational results:

1. Experience in interpreting Nature and her laws.
2. Training in observation.
3. Understanding of interrelations among living things.
4. Appreciation of the beauty found in a climax type of forest.
5. Concepts of time, durability, solidity, permanence, perseverance.
6. Veneration of old age.
7. A look into the past through a window of the present.
8. Ideas of success in life as a result of protective features.
9. Fire as an agent to tree destruction.
10. Knowledge of results of protection of forests and wild life by man.
11. Religious inspiration.
12. Inspiration for further studies.

Suggested Field Trips

1. *General Sherman Tree to Congress Grove (Circle Trip).*

Without undue effort one may see the choicest trees in the giant forest in a morning's walk. The Circle Trip may either start or end with the General Sherman Tree where there is an especially fine opportunity for the visitor to get a full appreciation of the size and grandeur of the sequoia. The Congress Grove, the Lincoln and Roosevelt trees should not be missed. The animal life of the forest and the plant life of forest and meadow may well claim a share of the studies made.

1½. *Hale Thorp Log, Log Meadow and Return via Broken Arrow Trail Return via Parker Group.*

This route leads through fine primitive forest and meadow to historic hollow log used as cabin and includes visit to the Parker Group of big trees and Morro Rock may be included.

2. *Short Trip to More Interesting Trees in Giant Forest Center. (Round Meadow.)*

On this trip there is splendid opportunity to study the effect of fire on the big tree. Splendid growth of cambium in healing old fire scars is evident. Though the trees are not so outstanding, one may gain a real appreciation of the life and habits of the sequoia within a radius of a quarter-mile of park headquarters.

3. *Morro Rock.*

The view from the top of Morro Rock (6719 feet) into the Kaweah Canyon is spectacular and the rock should be climbed by every visitor. Vistas emphasizing depth and distance first appeal. Closer study shows the older sedimentary rocks below topped by the granite. Masses of brush and live oaks indicate the Upper Sonoran Zone, with the forest (Transition Zone) well marked at an elevation of about 5500 feet. A properly mounted telescope gives opportunity to get a closer view of more distant objects. The dome structure beneath one's feet forms an interesting geological study. A new stairway being installed will make this lookout place more useful in the future.

4, *Watch Tower and Heather Lake.*

This trip makes one of the best all-day excursions, leading one through beautiful flower-grown meadows to a vantage point at Watchtower, where a glaciated valley (Tokopah Valley) can be viewed. Opposite is Mt. Silliman and the ridge separating the Kaweah from the Kings River watershed. Heather Lake, a short distance beyond Watchtower, is typical of a Sierran Lake, its borders fringed with heather. The lake is an attraction to fishermen. The trip may easily be shortened by driving in caravan formation to the foot of the trail about two miles from Giant Forest.

5. *Lodgepole to Tokopah Falls and Return Through Tokopah Valley:*

This trip necessitates auto transportation to Lodgepole. The walk through Tokopah Valley is a delightful one giving abundant opportunity

to study the fauna and flora of the upper part of the Marble Fork Canyon. No sequoias are to be seen, but there is a splendid growth of cottonwood and lodgepole pine, Jeffery pine and white and red fir. Brush types such as green manzanita, service berry and hazel are abundant. Birds are numerous and the study of them could well be stressed on this trip.

6. *Admiration Point.*

This trip is scenic and at the same time of particular interest to those interested in geology. It must be made by auto caravan to the trail junction (8½ miles), the trail being about a mile long. A sharp drop from the road leads through splendid yellow pine and sugar pine forest. Crystallized sugar can be found in some of the burned sugar pines giving indication of how this tree was named. The most attractive view from the point is that of some seven waterfalls on the Marble Fork. At the base of each one is a fine large pool of water. The point is located in a belt of white limestone which stretches for a considerable distance at the same altitude in a general north-south direction. An interesting biological study is afforded in the yucca which apparently finds the limestone belt particularly favorable for its growth. A good view of three different life zones is afforded.

7. *Crystal Cave.*

A three-mile trail leads from the old road (Black Oak Trail crossing) to a remarkable limestone cave known as Crystal Cave. At the present time, the cave is kept locked to prevent vandalism. This cave, still largely unexplored, with numerous galleries and "organ room" and a beautiful stream of water is a splendid exhibit. Cluff Cave to the southward is said to be largely spoiled by the curio hunter. Should it be found possible to guard the contents of the cave and yet open it to the public, this would afford a splendid feature.

8. *Self-guiding Nature Trails.*

A start has been made on a nature trail near headquarters. Others can be developed as needed. A wild-flower garden with numerous metal labels was built in the summer of 1929.

Lectures

The most suitable place for a lecture on the big tree is at the General Sherman Tree. A ranger-naturalist should be stationed here at certain hours of the day in order to answer questions and to help people to study this largest of trees. Likewise, a study of the general geography of the region can best be made at Morro Rock, where a lecture might well be given at an appointed hour of the day. For some time a man has been stationed at the bear feeding pit to answer questions. An informal talk to the assembled crowd is possible.

Camp-fire lectures are an established routine. They should be of a kind to stimulate hearers to go and see the choice features of the park. Here is a proper time also to answer the numerous questions put by the average visitor. Do lichens injure trees? Are there any young sequoias? Why is the bark so thick? Why are the big trees fire scarred? What is the difference between the Sierra and the coastal form of redwood?

There should also be an endeavor made to offer special series of lectures by scientists. A series given by Dr. Chaney of the Carnegie Institution in the summer of 1929 is typical of the kind most suited to the situation.

Museum

Judge Walter Fry has brought together a splendid set of exhibits which are now housed in the Administration Building. Of particular value are the Indian baskets and other historical materials. Eventually these valuable collections should be housed in a fireproof building. They are altogether too valuable to be exposed to fire hazard. The suggestion that the permanent museum should be placed at Hospital Rock meets our approval though consideration should also be given the site near the General Sherman Tree. The former location furnishes a splendid historical site and makes the museum available to both winter and summer visitors. The disadvantage of being far from the center of activity in Giant Forest in summer must be considered.

Publications

As in other parks, there is need for some leaflets which will more satisfactorily explain the chief features to be found within Sequoia National Park. Particularly is there need for a dependable account of the big tree. "The Secret of the Big Trees" by Ellsworth Huntington, which is available, could be greatly improved in the light of recent findings. There are numerous questions put by the average visitor, the answers to which are not to be found in this leaflet.

Personnel

Considering the travel record and the diverse locations of the outstanding features, it will take a staff of at least three men to institute satisfactorily a proper educational program. One man will need to be stationed at the museum, two others at Giant Forest who will alternate in taking the shorter and longer trips and in giving the lectures. At least one of these men should be a trained botanist or forester capable of gathering and filing research materials on the *Sequoia gigantea* and capable of satisfying technical visitors. A study of the ecology of a forest of big trees would constitute a real contribution to science.

Conclusion

The foregoing suggestions are to be taken in a general way. Experience on the ground will doubtless demand modification of some parts of the program. The report is an attempt to interpret the outstanding educational problems of Sequoia National Park and indicate the type of program that is most satisfactory for a park whose chief features are biological.

Reports of Dr. Hermon C. Bumpus on Studies made in 1929 on Educational Projects in Acadia National Park and Yellowstone National Park

ACADIA NATIONAL PARK

ACADIA National Park, superb in its oceanic, lacustrine, mountain, and woodland features, is incomparably the most beautiful and, although one of the smallest, offers the widest range of educational possibilities of any National Park. It has an entertaining history running back to the time of Champlain, long before the advent of the Pilgrims. Unlike many of the larger Parks, Acadia has grown in size and in importance by a rapid process of accretion and this process is, happily, still going on. Just what are the educational possibilities of this area and how may they best be developed?

Mount Desert and the neighboring islands and land and the surrounding ocean received the attention of geologists, botanists, zoologists, geographers, archeologists and historians long before the establishment of any National Park. There is an abundance of literature covering a wide range of subjects available for those who desire authoritative information.

The Park area is well provided with motor highways and there is a network of bridle paths and charming trails leading to all points of interest.

Although nearer to Chicago and the large cities of the East than any of the great National Parks, and thus embracing within its radius a major part of our vast population, Acadia is not a place that is overrun by restless tourists and probably never will be. Maine, itself, is a great recreational area and its seaside resorts, numerous camps and popular hotels, arrest and detain the ordinary tourist. The attractions of this Park appeal rather to those who are able both to recognize and to enjoy the finer creations of nature, to those who seek quietude, contemplation, inspiration, and that kind of mental satisfaction which accompanies discriminating appreciation.

While it is a recognized duty of the Service to provide for the accommodation and of the multitude visiting the National Parks, it is also the duty of the Service—an imperative duty—so to conserve and administer its priceless possessions that they will not become exhausted, destroyed, or even suffer depreciation. Acadia is preeminently a place for those who can discriminate, who seek information, and intellectual improvement and any educational program must take into consideration these conditions.

As above intimated, there is already a sufficiency of scientific literature to satisfy the average visitor. Research and publication will doubtless continue without special effort on the part of the Government. Avenues of approach are already provided. Visitors are, and probably will continue to be, exceptionally well-informed, and there are already, either within the Park itself or near its boundaries, several establishments which make it unnecessary to recommend an extensive program of construction.

A marine biological laboratory, attracting a large number of scientists, has been in operation at Salisbury Cove for several years. It has an admirable scientific library, representative collections, aquaria, and a good working equipment. Its publications have covered a wide range of subjects.

At one of the entrances to the Park a number of college students and investigators are occupied with problems connected with the natural fauna and flora. It is here that the State is maintaining one of its substations for the economic study of insects, fungi, etc., in their relations to forestry.

Geology has received and is still receiving the attention of men from eastern universities.

Anthropologists are busy with the archaeological problems and a beautiful little museum, of the trailside type, has been constructed near one of the entrances and is freely open to the public.

Out in the ocean, on Little Cranberry Island, quite within sight of the Park, is a unique and a most instructive museum of local history and at Bar Harbor there is an excellent public library.

The waters of Frenchman's Bay are now receiving special attention by the Federal Government because of their wealth of plankton upon which the fisheries are so immediately dependent.

An excellent Nature Trail—one of the best—has been maintained for the past two years near Jordan Pond in the heart of the Park area.

The fact that Acadia National Park impinges on the ocean and embraces within its boundaries a rich and varied marine fauna and flora gives it an educational value quite its own, a value that is still further enhanced by the fact that this is the only location in the entire system of Parks where the ocean may be observed actually at work in its tireless process of remodeling the shore-line, a shore-line furthermore presenting a wide range of variation and both a recent and a remote past of great historical significance.

It is idle for one to make recommendations for an educational program that will extend far into the future, but the pleasure and profit of those visiting—as well as those now residing near—Acadia may be increased without the expenditure of any considerable sum of money.

On the completion of the highway to the summit of Cadillac Mountain, there should be an observation station where the visitor could tarry, enjoy—and further enjoy by understanding, or partially understanding—the geological events that have made the superb panorama possible, a panorama that extends to the horizon in every direction.

There should be a small museum of the trailside-laboratory type located near the auto camp and made the field headquarters of a competent Ranger Naturalist. Evening lectures should be given around the campfire. The small buildings on Bar Island should be kept in repair and a Ranger Naturalist selected for this charming spot who is acquainted with and competent to care for and tell about the animal and plant life of the locality.

Most important—in the opinion of the undersigned—is the early development of the shore-line at and near Anemone Cave. In other Parks, much is made of the fossils of marine animals and plants, footprints and petrifactions, but here are *living* things abundant, colorful and entrancing. It is recommended that a series of rockwork basins—artificial tide-pools—be constructed among the ledges above tidewater and sheltered by the trees and shrubbery growing luxuriantly in this locality. If these basins, or pools, are placed on different grades and a moderate amount of sea-water is forced into the highest, the overflow, as a little stream, will find its way through the lower pools until

it finally returns to the sea. There is every reason to believe that the native fishes and other forms of marine life will flourish in these shady pools and if the spot is properly landscaped, it will give a kind of pleasure and profit to those visiting the Park that cannot be provided in any other way or place. The cost of operating an outdoor aquarium would be trivial when compared with the good it would do.

Another recommendation is to the effect that the several centers of interest, both on Mount Desert Island and the National Park areas on the main land be linked together by the publication of a Trailside Guide, similar to that used at Yellowstone.

The recommendations here embodied are justified as applying to the immediate, rather than the remote, future. They involve an enlargement of the Ranger Naturalist service and increased appropriation for construction, maintenance, etc. They should not all be undertaken at once, but should be developed on a firm basis of observation and experience.

YELLOWSTONE NATIONAL PARK

IN ORDER to have constructive value, a report on educational projects already undertaken at Yellowstone, and on opportunities for further educational work, it is necessary to consider: The educational agencies operating at the present time and their present and potential efficiency. The principal localities where these agencies are operating and the sufficiency or insufficiency of the places chosen. The reaction of the tourist toward existing educational efforts. The reaction of utility operators. Prophecies and recommendations concerning the immediate future.

The educational instruments and agencies in operation within the park at the present time are as follows:

(a) Publications; Trailside Notes.
(b) Bureaus of Information.
(c) Museums.
(d) Lectures.
(e) Nature Guide Service.
(f) Trailside Notices.
(g) Nature Trails.
(h) Photographic Facilities.
(i) Animal Enclosures.
(j) "Caravans."
(k) Public Utility Operators.

(a) *Publications.*

The so-called "Circular of Information" issued by the government and given to all entering the Park is and probably will continue to be the most generally used agency of information and instruction. The Service has itself prepared, printed and contributed this very practical publication and has expressed a desire that the several sections should be revised by those specially qualified and has shown its willingness to insert additional material and omit portions of only minor importance. Suggestions to this end will be made the subject of a special report.

A second publication, "Haynes' Guide," is privately printed and is purchased by about one in twenty of those entering the Park. This high percentage of sales argues for a real desire on the part of the public to obtain—to even pay for—reliable information. The publisher has expressed a desire to revise and improve this booklet so that it may continue to be the best thing of its kind in the Park and thus the better serve the public.

For several years the Park Naturalist and those cooperating with him have issued from Yellowstone a mimeographed monthly, similar to that issued by several of the National Parks. This is primarily a "friend-maker." Its obvious function—as a means of recording local observations and sustaining the interest of those who have once visited the Park—should be sustained. The Park Naturalist also issues a Ranger Naturalists' Manual.

For something like five hundred years, the printed page has been a means of popular education, and the use of printed material for conveying information in the National Parks will doubtless continue to outrank in importance and in efficiency all other agencies. The preparation and issue, as an experiment, during the past summer of "Trailside Notes" amply demonstrates the practical value of this method of popular instruction. The publication covered only the motor trail from Mammoth to Norris Junction and was hastily drafted and hurriedly printed. The reaction of the public, as shown by return postals, is such as to warrant the extension of the system to other sections of the Park and to all main approaches. Properly prepared, a series of Trailside Notes will not only serve the public but will enable the motor drivers and other employees to derive and dispense reliable information and will act as a check upon misconceptions and misrepresentations.

(b) *Bureaus of Information.*

The "checking-in stations" and the Bureaus of Information are the first points of contact between the visitor and the Park personnel. The attitude of the visitor toward the management of the Park is definitely and often permanently established at these points of entry. Here the tourist should feel that he is entering territory that is spiritually elevating and that those wearing the Park uniform are companions competent and willing to assist in overcoming difficulties, in designating economics and in recommending ways and means that will enhance pleasure and produce a satisfactory grade of intellectual profit. Those in charge must have sympathy, courtesy, patience and an almost inexhaustible fund of general and technical information. They must have an equipment of maps, guides, etc., adequate to meet all reasonable requests.

It is the plan to make each Bureau of Information an essential part of each Trailside Museum. The latter is merely a practical device for giving information about local phenomena. Why not, then, extend its functions to include all questions which arise locally? If a visitor wants to know the way to the buffalo corral he will doubtless profit by an inspection of other ungulates and the descriptive matter accompanying the exhibits close at hand.

It is planned that each Bureau of Information will be an organic part of each Trailside Museum and each local Museum will become, in fact, a bureau of information.

The Trailside Notes—each covering a special section of the "Loop" and other highways, as above described—will serve not only as a source of reliable information and as a sustainer of interest between the respective termini, but will prepare the visitor, on arrival at the information center, more profitably to make use of the agencies of information—Nature Guides, relief maps, charts, specimens, exhibits, etc.—there provided. It is more profitable for a tourist to understand what he *has* seen than to indulge in faulty visions of what he is *about* to see.

(c) *Museums.*

In Yellowstone, with its several centers of outstanding interest, it is planned to construct a series of buildings of the Trailside Museum type, each intended primarily to explain the phenomena of its immediate neighborhood. While this is the primary purpose of these establishments, experience has shown that the visitor is frequently keenly interested in what he has observed on his journey to the station and not indifferent to what he is to see on his way to the next stopping place.

The location of these stopping places is a matter of basic importance. They are the exclamation and interrogation points of an informational recital. They must be timed to the schedule of traffic and situated where there are ample parking facilities, an adequate supply of water and where the standard sanitary regulations and provisions may be conformed with.

The construction and equipment of these minor museums classify as capital expenditures. Their operation, however, becomes a charge against current maintenance. It is proper that economy be practised under both classes and it is probable

that for some years to come those who are appointed as custodians will be largely selected from those that serve on temporary payrolls as Ranger Naturalists. It is, therefore, felt that the grade of service will be materially elevated if modest living quarters are provided—in or adjoining these trailside structures—and believed that men can be found to fill these positions who are particularly interested in the scientific problems abundantly present throughout the Park. These little museums may thus serve not the flowing public alone, but they may become active centers of research where small groups of students may spend the season profitably and intimately associated with elders who may direct their field and laboratory work and give continuity to prearranged programs of investigation.

Conference with the officers of the Service, with the operators of utilities and observations made during the past two years have resulted thus far in the selection of the following locations on the western and southern Loop. Other portions of the Park will require further study and observation.

Leaving Mammoth, where it is planned to construct a building appropriate to the needs of a general educational headquarters, the first regular stopping place of importance will be at the Norris Geyser Basin, a distance of twenty miles. It is presumed that the tourist while at Mammoth has been prepared, to some extent, for the journey and that the Trailside Notes, "shrines" and temporary labels have called his attention to points of interest along the way.

At Norris he will find (1) Agencies that will enable him to review and classify what he has already seen; (2) A nature trail properly labelled that will give him a survey of this particular locality and he will be given what might be called a laboratory outline, which will serve as a program while he is on the trail; (3) Collections and apparatus that are designed to make clear what nature is doing in this, the most recent of the several "basins"; (4) Information that will prepare him for the second section of his journey, viz., from Norris to Madison Junction, a distance of fourteen miles.

The small museum at Madison Junction, primarily designed to function as an orienting center for those entering the Park from the west, and for those motoring toward the north and south, has, as an underlying theme, the historical story of the discovery of the geyser basin and the birth of the national park idea. The exhibits will be arranged accordingly.

From Madison Junction—sixteen miles up the valley of the Firehole—the tourist passes through a series of events which culminate at Old Faithful. At the several "basins" and points of particular interest it is necessary that relief maps, descriptive material and orienting agencies be installed. Correctives should be invented which will prevent the mental confusion which is inevitable to those who rush from place to place not knowing what they see, eager for and only partially conscious of their passing emotions.

While the museum at Old Faithful was primarily designed to tell the story of geyser activity and serve as the headquarters of the local staff of ranger naturalists, those having its planning and construction in charge have not been unmindful of other factors.

Until such a building was actually constructed, several important matters were in doubt:

1. Would a museum as a place of instruction and study withstand the competition of commercial and recreational attractions of the neighborhood? Experience has shown that it will.

2. If material germane to the locality is exhibited and labelled in the ordinary way, will it attract attention and be used? Observation has shown that it will.

3. What kind of educational material will most attract the public and what methods of exhibition are most effective? The public will read labels that accompany specimens, even when the verbiage is stilted, technical and uninteresting. Photographs and posters attract little attention. Hand specimens, exposed in the open, give promise of having more educational value—much more educational value—than those exhibited under glass.

4. Will visitors use hand specimens, lenses, microscopes, etc., and will they follow a laboratory outline? Certainly.

5. Should a museum at Old Faithful for example confine itself strictly to geyser activities, or should it broaden its function and embrace a wider range of subjects appropriate to the general locality? The wider the local range, the better.

6. Is it really worth while to provide relief maps and geological charts? For orienting purposes their value has been amply demonstrated, but the number of tourists who show an eagerness for more than general geological information is relatively small and that of those who really comprehend the geological story of the Park as a whole is still smaller. We need someone who will devise a method of telling the geological story so that it may be understood. It is perhaps the most important story of all.

7. Are publications sought and read? Yes. They give ample evidence of wear.

8. Will tourists leave their camps and will guests of the hotel and lodges bestir themselves in order to attend instructive lectures given elsewhere? They certainly will.

9. Will it be possible so to encourage members of the permanent educational staff that they, without special training, will collect, prepare, label and exhibit museum material in such a way as creditably to meet the special requirements of the sightseer? Much will be acomplished if within the service a competent technical staff can be organized. The experiment of the year has uncovered individual enthusiasm and capacity for this kind of work. The ranger naturalists at Yellowstone were encouraged to undertake the installations at Old Faithful and—taking all factors into consideration—they did a very creditable job. Among these factors were limited time, limited facilities, limited funds and limited material. Their relief map work has been excellent; the exhibits of geyserite, while doubtless rather too technical for the average visitor, are nevertheless wisely selected, attractively placed and carefully labelled. The birds are sufficiently well mounted to answer every practical purpose. Since only the common forms are of popular interest and are easily mounted, it is quite unnecessary to place them under glass. (The mounting of mammals requires a high grade of technical skill and has not as yet been undertaken.)

Now that the first Museum has been constructed and has been in operation, it will have no little effect upon the structure and equipment of other similar establishments in other parts of the Park. The patronage of the public is assured and space in the newer structures must be provided sufficient to accommodate an average attendance which will vary both in time and place. The adaptation to the locality and the background of exhibited material are of primary importance, but there must be ample space for the individual examination and study of hand specimens and opportunity for the consultation of books of reference, etc. The introduction of what may be called laboratory methods into the educational program of the Service will give a durability to the information derived by the visitor that can not be obtained in any other way. The presence of a well-informed resident ranger is another essential.

(d) *Lectures.*

Credit must be given to those who in earlier years have overcome obstacles and actually created and put into operation the present system of lectures—it is much more difficult to create than to criticize. There will presently be held at Des Moines, Iowa, a conference the purpose of which is to formulate plans and methods for improving this service. Dr. E. N. Jones, now immediately in

charge of the Service, Mr. Carl Russell, Field Naturalist, Drs. Kelly and Conrad, veterans in this kind of work, and Dr. McDougall, conspicuously successful during the past season, will meet with the undersigned and it is hoped that out of the conference distinct progress will result.

Some doubt has been expressed in regard to the propriety and feasibility of instituting and maintaining a series of illustrated lectures. During the past summer, however, a trial was made at the small out-door auditorium at Old Faithful which proved quite convincing. At this center there are several evening attractions, but the attendance on the illustrated lectures—hurriedly prepared though they were—was such as to tax the capacity of the auditorium. All directly connected with this phase of instruction are now fully convinced of its value and believe it will become one of the important features of the final educational program. Dr. Oastler, of this committee, has taken and is taking an active part in preparing lantern slides, Mr. Ansel Hall, Mr. Yaeger, Mr. Haynes, Mr. Russell and Dr. Jones are giving their assistance. The Service has already purchased and installed projection apparatus and the season of 1930 will make a distinct advance in the development of this activity.

Now arises the important question of auditoriums, concerning which there is some diversity of opinion. Hitherto the lectures have been given in the lobbies of the hotels and lodges—under the sufferance of the proprietors—and in small improvised out-door amphitheatres at the auto-camps.

While an audience may be guaranteed when the lecture is given in a hotel lobby, where it is practically forced upon the guests, there are, nevertheless, unavoidable interruptions and interferences which are most annoying to the lecturer and disturbing to those who wish to listen. The attitude of the proprietors has been, in the main, favorable—provided the lecturer did a good job. Unfortunately some lecturers have not been wisely chosen, or at least have not lived up to their presumed ability.

If lectures of a higher order are to be given and if these are to be illustrated, it is improbable that the hotels and lodges will undertake the expense and inconvenience of providing suitably therefor. On the other hand, the hotel attendance is not increasing and prior attention might well be given to those entering the Park by private motor who now outnumber those coming in by train four to one. If one can judge the grade of intelligence by the questions asked of the lecturer, the mental capacity of those occupying the camps is not inferior to that of the hotel guests.

It would be ideal if large auditoriums, operated by the Service, could be built and equipped at Mammoth, Old Faithful, Lake and Canyon. This may prove feasible at Mammoth when the new museum is constructed. It is possible also that satisfactory arrangements may be made which will lead to the use of the large auditorium—now a part of the lodge at Old Faithful.

In the meantime it is recommended that an outdoor amphitheatre be constructed near the old power station at Mammoth, a location midway between the Hotel, the Lodge and the Auto Campground. If this is done, the reaction of the public can be noted and further procedure made accordingly. There is an appropriateness and charm to an evening lecture given under the dome of heaven that is not present in the ordinary lecture hall. The weather at Yellowstone is not unkind and in stormy weather the smaller audiences may be accommodated elsewhere.

(e) *Nature Guide Service.*

The information given by Nature Guides to small parties in the field is theoretically and perhaps practically—because of its directness and intimacy—the best that the Service provides. It is expensive and it loses in value on the one hand, if the Nature Guide is perfunctory, poorly informed, or lacking in the power to arouse and sustain interest, and on the other hand, if the conducted party is too large, tends to loiter, is lacking in compactness, and becomes physically fatigued.

The present methods of discovering and appointing Ranger Naturalists as Nature Guides is not entirely satisfactory. The compensation while adequate for a certain grade of service, is quite inadequate for the grade of service really desired. During the season, which opens abruptly, there is little time or opportunity for conference, for the detection of faults, or the discovery of special aptitudes.

The distinctive features of Yellowstone are volcanic—geological—but Nature Guides, who have had geological training and can use this training in a constructive way, are conspicuously absent. It is hoped that at the Des Moines conference, already mentioned, procedures will be agreed upon that will materially improve this service.

The writer feels that at each of the four centers there should be at least one man of maturity who has been a successful teacher and understands not his subject alone but the people that visit his section. He must be inventive in providing means for giving efficient instruction. Such men will naturally have about them in their own colleges and universities, certain graduate students, or they will be acquainted with such students or instructors in other educational institutions, as are especially fitted for outdoor work. The heads of these several centers will almost automatically compose a responsible educational staff of practical value. Here again, however, we need, and need sadly, men that have had a geological training. Some provision must also be made to enable the members of the educational staff to move about the Park more expeditiously and which will relieve them of unnecessary routine and give those of special training in a certain subject the opportunity of advising and assisting those whose training has taken them into other fields.

In closing this section, the writer makes the following suggestions.

1. Shorten the Nature Trails. A shorter trail that inspires is better than a longer one that exhausts.

2. Have resting places—small natural amphitheatres where the tourist may comfortably listen to a review of what has been seen and the bearing that the things seen may have upon the larger problems of science. At these rendezvous it will be quite possible for the Guides to have certain illustrative material, specimens, geological and topographic maps, perhaps lenses, a telescope, almost anything that will elucidate or tend to fix in the memory the essentials of the little expedition that is in all probability the first of its kind that the tourist has enjoyed.

(f) *Trailside Notices.*

A legend is as appropriate to an illustration in the open country as it is to an illustration in an open book. The grass is well worn in front of every historical notice that has been erected in Yellowstone. These notices—at present far too few in number—have proven to be of real use and it is hoped that an extension of this kind of trailside instruction will be made the coming season. There is something, however, about a sign or tablet that is obviously a temporary makeshift that gives it an exceptional educational value and without discounting the permanent educational value of signs of a more permanent nature, it is suggested that transient events along the trailside receive transient treatment and that one of the Ranger Naturalists be delegated to motor around the Park and see that temporary labels are properly placed and properly removed as the flowers, etc., follow the course of the seasons. This attention may not be confined to flowers alone.

(g) *Nature Trails.*

Probably no recent device for outdoor instruction has exceeded in popularity the so-called Nature Trail. Four years ago the first Na-

ture Trail was about half a mile in length. In the intervening time, Nature Trails have been constructed in different parts of the country that have an aggregate length of several hundred miles. This has meant a lot of study for those who have constructed and a lot of profit for those who have followed these inviting pathways in nature's museum.

The writer, an ardent believer in this method of outdoor education observes:

1. That Nature Trails tend to be too long.
2. That they are not self-sustaining, but need daily attention.
3. That new events are frequent and require new labels.
4. That geological factors are often neglected.
5. That quiet resting-places provided with reading matter add materially to the attractiveness and no less to the efficiency of Nature Trails.
6. That wherever a Nature Trail permits of a view of the country at large, the visitor is as much entitled to the geological interpretation of the panorama as he is to information concerning the objects of interest immediately about him and at his feet.

(h) *Photographic Facilities.*

Although not directly maintained by the Government, but nevertheless an important factor in an educational program at Yellowstone, is the maintenance of widely distributed photographic supply stations. The photograph is a quick memorandum of an object or an event. Photographs of characteristic objects in the Park have more educational potency than a great deal of the printed matter and they are retained and repeatedly used long after circulars and pamphlets are discarded.

So far as the writer knows, no one has attempted seriously to capitalize as an educational agency, the prevailing interest in photography. If a series of legends of what *may* be seen from a number of discreetly selected points throughout the Park could be prepared—preferably by a geologist or physical geographer—and issued as a photographic album *in blank*, the amateur photographer might be disposed to fill the blank spaces with photos of his own taking. Since he would naturally scrutinize the landscape in order to have his photograph fulfill the obligations of the text, the instructional by-product of a popular fad would have a greater educational value than the fad itself. Furthermore, in exhibiting such a completed album, the owner would be automatically self-promoted from a camera craftsman to an amateur instructor.

(i) *Animal Enclosures — Ranges and Barriers.*

It is most unfortunate that so many of the characteristic animals of the Park migrate away from the neighborhood of the highways and camps at the very time their presence is most desired. The absence of animal life leads to the keen disappointment of thousands of visitors who are led to believe—through the announcements and advertisements of tourists agencies, and even through the circulars issued by the Government itself—that the Park is a place teeming with big game and animal life in general.

The use of pens, corrals, and cages in National Parks is to be deplored, but when *natural* barriers can be so adapted and added to in such a way as to provide what are substantially natural enclosures, there can be no valid reason why they should not be used for temporarily restricting the range of some of the larger mammals and thus lead to the enjoyment, satisfaction and information of many who come to the Park in order to observe animal life in its native habitat.

It is recommended, therefore, that an examination of the Park be made to the end that suitable and feasible areas for such purposes be discovered and ultimately developed.

(j) *The "Caravan."*

Yellowstone is becoming more and more a resort for motorists. During the past season, six times as many entered the Park in their own conveyances as were brought in by the transportation companies. Auto-minded parties are not given to hiking. Indeed, and unfortunately, hiking is not a popular pastime at present in Yellowstone and horses are used only to a very limited extent. The motor, therefore, becomes an important factor in any comprehensive plan for popular education.

At Mesa Verde and at Yosemite during the past season, advantage has been taken of this situation and the so-called Caravans are the outcome. Steps should be promptly taken to make the Caravan service a distinct and important feature of the educational program at Yellowstone.

The plan involves the establishment of a series of rendezvous and the adoption of a timetable which is posted at the various auto-camps, hotels, lodges, etc. At a point of departure and at a fixed time the Ranger Naturalist meets the convened motorists, gives a brief outline which prepares the Caravan for the first stage of the journey, which ends, say in half an hour, at a definitely arranged rendezvous—a place selected for a reason, or for reasons—where the Ranger Naturalist meets the motorists again, reviews the section just traversed and prepares for the next. The timetable provides for another party starting at a later hour and so on throughout the day.

It is obvious that this plan, while not interfering with those who choose to be absolutely independent, or with those who are making use of motor busses, makes it possible for a single Ranger Naturalist to serve a large number of visitors in an orderly and efficient way, and it is quite possible that the several Caravan rendezvous will eventually require an equipment that will add to the educational effectiveness of this now novel service. In this connection, the value of Trailside Notes, local labels, and the opportunities for making brief excursions from the beaten trail become apparent.

(k) *Public Utility Operators.*

It is the opinion of the undersigned, based on rather intimate observations, that the relations existing between the public utility operators and the educational activities of the Service are as cordial and as cooperative as reasonable agencies of somewhat diverse aims and purposes can be. It is certain that without the really excellent service given by the Hotel, Lodge, Transportation and other companies, a very large number of tourists would be prevented from visiting, or at least would not care to visit the Park. It is also certain that anything that can be done through popular education to render more profitable to the tourist his visit to the Park is a help to those who are, as one unhappily says, commercially interested. We must not expect that private capital invested for one purpose can be diverted into another, nor must business concerns presume that a program of education, designed to enhance the value of the Park, can be modified materially in order to conform to minor requirements of business expediency. It is natural that transportation and hotel companies should encourage a continuous and fairly rapid flow of tourists and fortunately it is quite possible for the instructional service to adjust itself to this kind of a program.

One of the adjustments productive of improvement would result from devising some scheme or schemes whereby the drivers of the transportation companies could and would become better informed.

Those who are primarily interested in education prefer that the tourist extend the time of his visit and that instead of hurriedly viewing outstanding features he be encouraged to remain, to tarry, and become more intimately acquainted with, and better informed concerning what nature here has so bountifully to offer. To the educator the Park is an inviting laboratory where people may study and learn and derive mental and physical improvement, rather than a spectacular movie designed for temporary, casual and profitless entertainment. To be

hurried through the Park on a quick schedule is like being shown a library without the privilege of opening a book. But some sightseers prefer this method.

It should be the job of the educational service so to arrange its program that the tourist is not compelled to hasten on, but voluntarily determines to remain in the Park until it can become a part of him and he can become a part of it.

In drafting this report, and making the suggestions therein, the writer, as a member of the Committee, refrains from advocating a program that will extend very far into the future. He feels that greater progress can be made on an experimental basis and on observed reactions than is possible through the advocacy of a preconceived, fixed and final mode of procedure. The entire problem of outdoor education is still in its infancy and to recommend large expenditures on a theoretical basis is hardly justifiable. Funds should be forthcoming adequately to advance those phases of educational activity that have already proved their practical value, and it would be poor business not to continue the program of experiment, study and observation that has been so productive of positive information in the immediate past. He also refrains, for the present, from making recommendations concerning the further extension of roads, within the Park and beyond, because at the present time it seems wiser to render educationally profitable what already exists rather than to enter upon a program of general expansion.

This report closes with the following conclusions:

1. A real beginning has been made in developing an educational plan for Yellowstone.
2. An essential defect in this plan, at the present time, lies in the fact that, for certain reasons, it has been too largely the creation of those interested in the biological and historical rather than in the geographical and geological features of the area. This does not mean any reduction in or disparagement of what has been already done in the domain of living things.
3. The instruction given will be of a higher grade if arranged by a small staff—a faculty—composed of those who have had experience as teachers, than if arranged by any single individual. The *execution* of any plan must, of course, be entrusted to an executive officer duly appointed by the Service therefor.
4. The compensation of those holding the more responsible positions on the temporary educational staff should be increased to equal that for service of equal value performed elsewhere.
5. Provision should be made to enable frequent, easy and prompt contact between the various officers of instruction during the active season.
6. Provision should be made for the proper housing, domestic and professional, of those who are willing to devote their summers to this kind of work and are temperamentally fitted for it.
7. Provision also should be made for camping facilities for such graduate students and instructors—prospective Ranger Naturalists—as may accompany those placed in charge of the several educational centers.
8. The early construction of one or two outdoor auditoriums.

Report of Dr. Vernon Kellogg on Educational Problems in Rocky Mountain National Park, October 21, 1929

FROM my visit to the Rocky Mountain National Park last summer—and from several visits in earlier years—I am strongly impressed with the special educational opportunities provided by the Park in connection with (a) the evidences and results of glaciation, and (b) the striking character and ready accessibility of the biological conditions at timber-line and above.

The glacier gorge and morainal systems are of remarkable obviousness and symmetry. One does not have to be a geologist—and I am not one—to recognize easily the paths and the mountain-sculpturing work of the ancient glaciers. There are no living glaciers in the Park except two or three small remnants which have little to reveal. But to be anywhere in the Park is to be face to face with the enduring signs of the ancient glaciers. I have never seen in any of my mountain experiences any more abundant and easily visible and understandable exhibits of ancient glaciation.

With regard to the biological phenomena of timber-line and higher, the peculiar character of the main crest (Front Range) within the park affords unsurpassable opportunities for studies of these phenomena. At one place, readily accessible from the park village and hotels by easy trail—and even by motor road—one can begin a walk of ten miles, all of it at the altitude of timber-line or above (roughly 11,000 to 12,000 feet) and all of it, in the summer time, through a veritable alpine garden with all its characteristic features. The effects of high altitude on plant, insect and bird life are revealed in striking and unforgettable manner.

The whole Park, with its high mountain tops, well-forested mountain flanks, and numerous open lush mountain meadows, can be looked upon as a great alpine and subalpine botanical and zoological garden of unusual educational and inspirational values. But to realize these values there is needed the help of a much larger naturalist staff than the Park now has. The superintendent, a man of high intelligence and sympathy with the higher aims of Park Service development, is doing his best. But he greatly needs and deserves an adequate naturalist staff. Rocky Mountain National Park seems to have been sadly neglected in this respect.

Reports of John C. Merriam on Studies of Educational Problems in National Parks

SUGGESTIONS RELATING TO PURPOSE AND EDUCATIONAL PROGRAM OF CRATER LAKE NATIONAL PARK, 1929

NOT at any stage in discussion of the purpose and function of Crater Lake does there seem to have been question regarding the general purpose in dedication of this area as a National Park. The crater and the lake have always been the distinguishing features. Analysis of the characteristics of the lake and its surroundings brings out two special characteristics: (1) The extraordinary beauty of the lake expressed more particularly in its color. (2) The exceptionally interesting geologic or dynamic aspects of the volcanic mountain in which the lake rests.

The first feature may be characterized as an exceptional expression of color, with atmosphere produced by varying lights and shadows arising from the quality of the sky, the nature of the clouds, and many other features. The second is an unusually clear illustration of the effect of volcanic activity, the essential element being dynamic, and representing one important phase in the history or development of the earth.

Along with the two outstanding features of the Crater Lake region there are many accessory factors of much interest. Such are the beauty of the hemlock forests, the nature and distribution of the flora and fauna in the immediate region, and the extraordinary outlook from the mountain over a surrounding region of great forests and mountain peaks. The setting of Crater Lake, as it were on the backbone of the Cascade Range, in a region presenting the results of tremendous volcanic activity as seen in the lava flows and in the volcanic cones, is of importance in considering the general problem of the mountain in which Crater Lake rests.

The administrative policy of Crater Lake National Park must center itself upon furnishing opportunity to enjoy and appreciate, first of all, these special things—the beauty of the lake with its exceptional setting in the crater, the dynamic story of the mountain, and the forests growing around and upon it. The program must combine three principal types of effort: (1) The development of avenues by which the public may reach the points at which the beauties and wonders of the region present themselves to best advantage; (2) the making available of means through which the public can obtain essential information regarding the nature and history of the crater and the lake; (3) the providing of such necessities and comforts of living as will permit the visitor to secure maximum enjoyment of the peculiar features of this park.

One of the greatest needs concerns the making available to tourists of essential information regarding the nature of the mountain, and the history of its making, as a part of the story of tremendous igneous activity of this region. It is essential that we bring the visitor into contact with those features indicating the reality of the crater as the result of an actual series of events in history of a volcanic mountain. It is desirable to proceed as far as our knowledge permits, with an interpretation of the events which have brought the crater to its present state and have made possible the origin and the exceptional development of beauty in the lake which it holds.

In preparing a plan for educational work at Crater Lake it is essential that concise definition be made of the principal elements of interest, both in the story of the crater from the geological, historical, or dynamic point of view, and covering the principal features involved in the origin and nature of the beauty in the lake and its environment. While it is desirable to have available in well-organized and simplified form all scientific data regarding the history of the crater, it is necessary that from this material there be selected those things of exceptional importance because of the possibilities for appreciation of their reality, because of their accessibility, and by reason of the bearing which they have upon interpretation of the dynamic history of the crater.

As the objective of this program concerns presentation to open-minded persons of materials upon which they themselves can judge, it is desirable to find a locality from which the features to be the objects of principal discussion can be observed together and under most favorable conditions. Such a locality is possibly presented by Victor Rock.

An educational program at Crater Lake should provide the following:

1. A plan of roads and trails designed with special reference to presenting the features of the region which have been determined by experts to be of outstanding importance.

2. An adequately equipped observation station situated on the best available point for study of outstanding parts or aspects of the crater and the lake.

3. A staff of persons competent to study the region effectively, and to take charge of all educational work on the ground. This staff should prepare the publications needed for use of the public, and take charge of necessary talks or lectures. There should be a Naturalist in charge at a salary of $3,000 to $4,000 per annum and an assistant at $1,800 to $2,400 per annum.

4. Talks or lectures designed to assist in informing large groups of visitors as to the objects of principal interest in the region, and how they may best make acquaintance with them.

5. Conferences and walks for interested visitors who desire guidance and assistance of competent naturalists.

6. A series of publications representing two types: *one,* a relatively full but clear statement, scientifically exact and discussing the principal features of interest in the Crater Lake region. A *second* type of publication should be a small booklet, which might be broken up into leaflets, each of which would treat of a special feature. This second type of publication should be of such simple form that in the course of examination of any particular locality the visitor could obtain the major facts of interest within this space of two or three minutes. The booklet and the leaflets should be illustrated with the best possible photographs and drawings.

The *observation station* should be so situated as to give one of the outstanding views of the crater and the lake. It should be equipped with specially selected materials by use of which the story of the crater can be told to best advantage.

With the living accommodations located approximately as they are at present, the best available point for such an observation station and museum seems to be at Victor Rock.

It should be approached over a carefully constructed trail from the rim of the crater. The rocky point should have built upon it a platform approximately 25' x 40', with a carefully designed parapet and, if possible, a sheltering roof of such a nature that it would not be conspicuous from points around the margin of the lake or the rim of the crater.

The station should be equipped with several telescopes. Some of these must have sufficient field to show the location of objects of principal interest in their setting. At least one telescope should have sufficient power to give the maximum opportunity for careful examination of distant objects. There should also be available such maps as would be needed to show all the details of the lake and surrounding region. If possible, a relief map should be prepared for use at the station. Finders locating points of interest would also be useful. A small exhibit room back of the observation platform should contain specimens illustrating materials of peculiar interest at localities to be pointed out by the attendant.

A collection of the most significant plants and animals of the region with selected specimens illustrating the types of rocks may well be assembled in the Community House or in a small museum, in addition to facilities at the Victor Rock Station. This collection should have as its purpose the interpretation of the region to those who are making its acquaintance, and would be of especial use in connection with general lectures given at the Community House.

It is important to provide for carefully prepared *general talks* to be delivered by a qualified naturalist at the Community House, possibly also at the hotel, and at such other places as may be suitable. These lectures should, in the first instance, outline the elements of major interest in the Crater Lake region with which the visitors would wish to make acquaintance.

Other *talks* of a more distinctly *special* nature might be given at the Community House or at the Observation Station. The lectures of the second type would be in effect the special discussion of things of particular interest rather than general descriptions of the region.

It is important that the lectures, wherever possible, be illustrated by carefully selected lantern slides of the highest type, and by the use of such specimens as can be utilized readily for the occasion. To this end there should be a stereopticon lantern of the best type at the Community House, and a set of lantern slides prepared particularly for general and special talks.

It is important to provide means for *walks* with scientifically trained guides in the immediate vicinity of the hotel and camps, for the purpose of pointing out special views of the lake from carefully selected localities, and for showing through direct observation something of the materials forming the rim of the crater, and to give opportunity for making acquaintance with the elements of special interest in the flora and fauna.

In selecting a group of features to be used for interpretation of the story of the crater as it may be read from Victor Rock, it is desirable to present to the visitor the following points:

1. Evidence that the rocks forming the rim of the crater and the surrounding region could have been formed only through volcanic, igneous activity—in other words, they could have been produced only by the pouring out of igneous or heated-melted materials on the surface of the earth by way of volcanic eruptions. This proof would be based on examination of specimens of several types of rocks from the rim of the crater, such as volcanic glass, pumice, lava showing ropy or flow structure. If necessary, comparison could be made with rocks of similar types from known volcanoes—if possible those near Crater Lake such as Mount Lassen, or Rainier, or Shasta.

2. Evidence that the structure of the strata surrounding the crater is that which would be produced by pouring out of material from a vent or volcano. This would include evidence of the tilting of the strata away from the crater on all sides; also lens-like character of the strata; also evidence of flows of limited extent running out through old valleys on the sides of the crater.

3. Evidence indicating pouring out of lava from the old crater through vents or cracks such as are commonly formed on the sides of volcanoes, illustrated especially by the dike known as the Devil's Backbone.

4. Evidence that the layers of lava have burned or baked or otherwise modified strata over which they have been poured. (Possibility of finding evidence of vegetation on old surfaces of the mountain on which the vegetation has been burned or carbonized by pouring out of lavas upon it.)

5. Evidence of the Wizard Island cinder cone, both as to character and formation, indicating that it has been thrown out of a volcanic vent, as in the case of modern cinder cones. At some stage in the discussion there should be a general comparison in form and structure of this crater with volcanic vents for which the history of eruption is known.

6. After having proved the igneous nature and origin of the crater, it is important to consider specific stages in its development, as shown by the succession of flows of varying kinds, and such variation as is known in the character of the rocks. This would bring out the gradual building up of the mass, the variation of materials, both as to type of lava and as to difference between flows of molten lava and outpourings of tufa or ash. In this way the story of growth of the crater wall as a mass would be shown. If possible, evidence should also be presented showing any changes in the region about the crater, such as evidence of general quiescence during which the region may have been forested, or evidence of change of climate during which there may have been intensive glaciation of some of the older surfaces.

7. Evidences which concern the later story of the crater showing what events have brought about the present situation as to great width and depth of the crater with relatively low altitude, and evidence of almost continuously fractured inner walls showing the exposed edges of broken strata. The evidence here would include those suggestions as to the height or mass of the mountain such as may have obtained in a past period; also evidence on the one hand indicating that the present situation may have been brought about by explosion of the center of the mountain leaving only the sides and base, or evidence that the mountain may have subsided, leaving only the present remnants. Any available evidence should also be presented which indicates that the mountain may never have been a great cone, but that subsidence or sapping may have broken down the original walls until the present condition developed.

8. As a further chapter in the story of the crater it is important to bring out evidence of glaciation, and its bearing upon problems which concern the original size or height of the mountain, or which might relate to conditions in this region at a time when the climate of the earth was materially cooler and more humid than that of the present, as was the case in late Pleistocene time.

Although the story of the crater as it can be read from an observation station at Victor Rock will be one of the major features toward which attention of visitors should be directed by this station and the apparatus related to it, it is important to note that at the same time there will be great advantage in using the station for a study of the beauty of the lake, and for discussing questions relating to the nature and distribution of life in that region.

The problem involved in examination of the lake as an element of beauty is one presenting many difficulties, but some of the questions concerned will always be raised, such as: what is the scientific cause of the deep blue color of the

lake. It is important that in connection with demonstrations at the observation station all available data be brought together for use in presenting an answer to this question. This will involve information touching the composition and nature of the water, the elements of the problem based upon meteorology, and the psychological factors involved in a study of problems of this nature.

It is important that either in the observation station or in a museum situated elsewhere there be a simple but effective representation of materials illustrating the principal features of the fauna and flora which would naturally attract attention in a visit to the Crater Lake region. Some of these things of interest may possibly be shown from Victor Rock with the naked eye or with low-power telescopes. It is desirable also to have available information as to means by which persons who wish to do so can reach all points of interest seen from the observation station.

EVERGLADES OF FLORIDA

March, 1929

THE following statement is merely comment and should not be taken as final judgment. Before decision is made as to the course to be followed in preservation of desirable features in the Everglades region, the area should be made the subject of extremely careful study by students of plant and animal life familiar with the southern region, by landscape engineers, and by persons familiar with the purposes, opportunities, organization and administration of National Parks, National Monuments, and State Parks.

The Everglades region possesses sufficient of interest in the strangeness of its setting with wealth of plant and animal life to make important the preservation of an adequate area. Although careful consideration should be given to availability of this area for National Park purposes, it is desirable also to give attention to possibilities for utilization of features of the region as a National Monument, or as a State Park, or as a wild life reserve, or a combination of some of these features. A considerable part of the area, especially those regions which might be useful for recreational purposes, for camping, boating, fishing, might perhaps be set aside as a State Park which could be supplemented by a carefully guarded and well administered National Monument, and perhaps by other reservation purely for protection of wild life.

The broad glades with hammocks scattered through them are interesting and picturesque. The hammocks of mangrove, palm, and cypress, with many other trees are unusual, picturesque, and scientifically extremely important. The landscape is quite different from that of the northern region. In general it gives the effect of a grassy plain with fairly evenly spaced but widely separated mounds, which are the hammocks. The small channels and lakes give variety to the landscape and add to its attractiveness.

The whole region has large educational value, which is expressed in terms of contrast with the conditions familiar to those living north of middle Florida. It illustrates in a striking way many phenomena of the tropics with which most residents of this country are not familiar.

The nature of the inner jungle, especially where one can follow it in a boat through the wild places, would be stimulating to thought and of large educational value, as showing the nature of tropical jungles and wild life. This can be maintained only if there are rigid restrictions regarding disturbance of the life both animal and plant. Under such conditions it would contribute much to education. Its inspirational value would depend in part upon the element of strangeness. Contrast would be an important element. Under good guidance the biological story could be told here in an extraordinary way. Animal and plant ecology, and evolution with relation to the life of past periods would be important.

The Everglades would in considerable measure lack the stupendous compelling influences which form the basis of attraction at Grand Canyon, Yosemite, or Rainier. These parks affect visitors by striking features of magnitude and power which take and hold the attention. The stimulation of thought originating through the type of contact in the Everglades would bring exceptional and important types of questions which a well organized educational program would satisfy.

The scenic values of the Everglades will have much interest. The beauty of the place, being of a type different from that of other reservations, will develop a sense of appreciation which should have special study by scientist and artist in order to give its full value.

It is possible that some parts of the Everglades region, as the flats and beaches from Flamingo to Cape Sable, might be camping ground—possibly mosquitoes would prevent this. Perhaps such use would interfere with preservation of the bird life in this region by eliminating the wide flats as a feeding ground.

Perhaps the Thousand Island and White Water Bay region might be made a recreation ground for boating and fishing without interfering with the protection of wild life, but I am doubtful whether this is possible. If the Thousand Island region is to be boating and fishing ground it is doubtful whether it should be so established under National Parks. It might be so set aside by the State.

It is doubtful whether the Everglades region can be protected fully if the recreational feature of park administration, or the bringing of large crowds for either park or general community purposes, is permitted to become a dominating influence. The principal national value of the Everglades is as a place where nature of tropical cast can be seen in its primitive condition. The principal features are biological, both plant and animal, with a necessary recognition of the dependence of the biological features upon characteristics of climate, topography and geological history or development of the region.

If the Nation becomes interested in the Everglades, the recreational feature should be reduced to the lowest limits compatible with opening the region to visit and study by the public. Every recreational use should be eliminated which would tend to disturb the characteristic biological features of the region.

The possibilities in use of the Everglades give an excellent illustration of the difficulties presented in attempting to "have a cake and eat it too." If a program is put in operation for protection of the region for national use, it should be based upon intensive study of the problem by the best minds in the country familiar with the scientific, esthetic, and administrative aspects of the problem. Administration of the area might be under continuous guidance of a board especially conversant with the biological problems involved and of the means for full protection of the region.

A considerable part of the area might be shut off from all but the most exceptional use or penetration. Other areas could be open for entrance by special canoe paths or foot trails, largely or entirely under guidance of regularly authorized persons. Carefully selected areas so situated as to give a view of features of great interest could be entered by good roads and well constructed trails open to all visitors without guides, but under stringent regulation as to injury of plants and animals. The regions open to the whole public should be chosen for their special interest, and the approaches carefully planned on the basis of biological and landscape studies.

SUGGESTIONS REGARDING EDUCATIONAL PROGRAM OF GRAND CANYON

THE educational program of Grand Canyon National Park is as yet only in early stages of development as regards definition of purpose, program of operation, personnel, and equipment. As the principal features

of the Canyon region appear well defined, planning for educational work would seem relatively easy, but intensive study reveals difficulties due in part to stupendous size of elements composing the picture.

Purpose

Although the purposes of educational work in the Canyon may comprise an infinity of subjects, it is essential that for use of the fleeting multitude of visitors there be outlined that group of features unquestionably distinguishing this area. The great number of details will inevitably be subject for inquiry by scientific and lay visitors, and a well-developed program must provide for answers to such questions. Means for furnishing information will be presented through especially prepared literature, museum facilities, and personal interpretation by a well informed staff of naturalists.

Study of what constitute major purposes in educational work at Grand Canyon has been the objective for carefully planned effort on the part of a considerable group of the leading scientific men of America acquainted with this problem. These results will be presented in a special statement to be issued in the near future. The essence of values from this study has already been incorporated in development of the station at Yavapai Point.

The idea of giving thorough study to objectives for educational work in National Parks has justified itself fully in examination of the Grand Canyon program. At any place of great wonders it is easy to pick out a large number of things any or all of which may be interesting to the public. But the object of this particular work has been conceived as relating to the exceptional opportunities which the parks present. It is, therefore, important to give assurance that a brief period which may be at the visitor's disposal can be in part devoted to the greatest available features.

Program of Operation

While the educational program of the park must arrange itself around the elements of principal interest, it will involve a study of the means for giving the best opportunity to see and to understand these most significant features. The educational facilities will necessarily be organized both according to methods of approach determined by geographical conditions, and to means by which information can be transmitted in the most effective way.

With reference to organization of methods of approach in the physical or geographic sense, the educational plan at Grand Canyon is relatively easy to define, as the main points of view are followed closely by the roads and trails along the north and south rims, and the trails from the South Rim to the floor of the canyon and from the canyon floor to the North Rim. In general the roads and trails as now established may be assumed to represent natural means of access determined by geographic features.

There can be no doubt that the future will bring out many new lines of study relative to points of view. Other roads and trails will be designed to bring out striking views of the Canyon with the maximum of effectiveness and the minimum of damage to the landscape. It should be a part of the program of educational service to have such possibilities under continuous study. For this work it is desirable that every aspect of the program be included which has importance to visitors, including scientific, aesthetic, and other aspects of personal interest.

The general program of educational work may for temporary purposes of classification be described under the following heads:

1. Definition of the general features or subjects of interest, the nature of which should be known to every visitor.
2. Selection of the major points of view and defining modes of approach by roads and trails or by other methods to be devised.
3. Plans by which visitors may, on their own initiative, obtain such general or orientation views as will present the major features in their natural relation to each other.
4. Installing of such necessary labels or signs along roads and trails as may call points of special interest to the visitor's attention.
5. Preparation of literature in the form of leaflets and simple guides giving concise information as to points of peculiar interest along roads and trails.
6. Organization of park naturalist personnel fitted to give information to visitors at selected points, and on special occasions, relative to features of major interest.
7. Planning of excursions by visitors (a) by way of concessionaire assistance through busses, private conveyances, by animals, with aid of guides; (b) through assistance of Park Service naturalists to visitors in their own conveyances, singly or in groups, and to visitors on foot, singly or in groups.
8. Carefully planned talks of stimulative and informative type to be given either under auspices of the Government at camp sites and specially selected auditoriums or in connection with activities of concessionaires.

It is essential that these several elements of the proposed program be always considered as only parts of a unit plan.

In general the attitude of the National Park Service by way of its Educational Division should be so to develop the opportunities for learning to know features of special interest in the park that visitors may exercise the maximum of personal initiative. At the same time it is important to make clear the desire of Park Service, and of the concessionnaires, to be helpful in promoting the enjoyment and furthering the interest of visitors. There is grave danger that in all programs for educational work the plans of visitors be so organized that the individual is moved about under guidance, and loses in considerable measure those values which come through the joy of personal discovery.

Development of these various aspects of the program might be carried out tentatively as follows:

1. *Definition of general features or subjects of interest, the nature of which should be known to every visitor.*

The most successful of all European guide books have been those in which the points of major interest could be separated quickly and accurately from those interesting details which have generally a lower rating. The stars and double stars and triple stars have had great value to casual or hurried visitors. Even to persons giving more careful attention to the places visited, these outstanding points are recognized as those to which there is most frequent return.

In an area as large, and with as many stupendous features as the Grand Canyon, it will be possible for any visitor to have an experience of tremendous significance through contact with even a small group of the features within reach. It is, however, important that every visitor on leaving the Canyon be able to say to himself, "In the brief time available I have had at least a view of those things of greatest interest and renown in this region." The study of this problem is one requiring the highest knowledge of the region, the greatest skill in interpreting the value of the features, and the most intimate knowledge of human interest and appreciation of natural features. Whatever the plan by which the educational program be developed, this highest thought, through which selection is made of the things of primary value, will have relatively large responsibility. The fact that the problem is difficult should not mean that it may, therefore, be set aside for some future time. The best effort should be made as early as possible, and the results then modified through further information as it accumulates.

In any list of outstanding features of the canyon it will be essential to include the following: (1) an exceptional panorama illustrating depth and magnitude of the canyon, (2) view of the Colorado River at a point where its power and volume are evident, (3) view illustrating na-

ture of the great plateau into which the canyon is cut, (4) residual peaks of Red Butte and Cedar Mountain, (5) bordering area of the Painted Desert, (6) contrast of the Archaean Inner Gorge with overlying Algonkian and Cambrian.

2. Selection of the major points of view and defining modes of approach by roads and trails or by other methods to be devised.

What constitute the principal points of view at Grand Canyon will depend upon such a variety of interests and opinions that there will never be a plan so clearly defined as to go beyond the range of profitable discussion. There are, however, a number of places and points of view which come so near to universal acceptance that there can be no question regarding their need for special treatment.

It should be the function of the National Park Service administration, and especially of the Chief Naturalist, to carry on a continuous study of this aspect of the problem. The outstanding views should be selected by reason of combinations comprising the purely scenic and esthetic along with the scientific and spiritual values of these localities.

It is important to place emphasis on the time of day and the weather conditions which are particularly favorable for the best views. Certain points may have relatively little value in the middle of the day and be exceptionally beautiful in early morning or evening. A general guide to the Grand Canyon should list these places especially, and if the guide is so voluminous as to make impossible its thorough study on a brief visit, such conventions should be utilized as will make it difficult for the visitor to overlook these localities.

The leaflets prepared for trails and roads should be so organized and printed as to give special attention to the principal points of view. For bus and general trail trips it should be possible to select the special leaflets relating to the particular regions to be visited.

Roads and trails should be constructed in such a manner as to promote interest in the landscape and the features which they open to view. Means of access which form scars on the face of the landscape, or especially upon cliffs or canyon walls, are disfigurements difficult to erase. The planning of roads should not be merely the development of an engineering approach. The road is a part of the landscape and unless it contributes definitely to the beauty of the picture, it should come as near to being completely invisible as is possible. This should be accomplished under the most expert and esthetic development of engineering art. It is not sufficient to say that the funds permit making only a particular type of a road. If the landscape is one for which it is worth while to spend large sums in opening it to view, it is sufficiently important to require that whatever is constructed be so handled as not to deface the very elements which it is expected to make available.

The constructing of roads and trails will inevitably develop as a special art involving the highest talent of the scientist, the artist, and the engineer, in order to show the great values and beauties of the canyon, without changing the face of nature through means used for access or through mere presence of the multitude in the region.

Due to the fact that the North Rim has been developed less rapidly than the South Rim, exceptional opportunity is open for special study of that area with reference to the points which have been made. Many extremely beautiful regions will be opened by new modes of access. Many other tracts should be left as nearly as possible in their primitive condition, and such entrance as is permitted should be arranged by way of trails constructed with the greatest care and under the highest development of artistic engineering skill.

Such view places as the points known as Havasupai, Mojave, Hopi, Grand View, Yavapai, Yaki, Moran, Lipan, and Comanche should be reached by roads and trails giving the principal effects of the view at the places where the greatest values can be reached. Such is true on the North Rim for Point Sublime and for several of the prominent locations in the region of Cape Royal.

3. Plans by which visitors may, on their own initiative, obtain such a general or orientation view of the Canyon as will present the major features in their natural relation to each other.

Aside from views developed through roads and trails, which may be known as the unconscious approach, it is important to set up means for opening to visitors the most important views of principal features.

The consensus of opinion from careful study at the Grand Canyon indicates desirability of selecting two or more points with exceptionally comprehensive views, where the visitor may obtain an understanding of matters having special importance. It was believed desirable that these elements be seen in the perspective of the picture as a whole, and in such relation to each other as to give maximum value through this setting. The plan as worked out has centered upon development of an observation station at Yavapai Point on the South Rim. A somewhat similar station has been planned for a comprehensive view at Cape Royal on the North Rim.

Although orientation at these stations would be largely by means of fifteen or more special views, good organization makes it possible to include most of the greater elements of the Canyon story, as well as to express the principles which underlie its interpretation.

Selection has been made of a number of other viewpoints somewhat less comprehensive and not so easily accessible for the larger group of visitors. For each of the subsidiary viewpoints the visitor would have full value for all information previously obtained from Yavapai Point or Cape Royal. In time special arrangements for orientation may be found desirable for the subsidiary points. In the absence of necessary apparatus it is desirable that the subsidiary points be fitted out with finders by which things of peculiar interest can be located, and that they be covered by preparation of special leaflets. These leaflets for special use should be related to the leaflet or booklet for description of the orientation panorama at Yavapai Point or Cape Royal.

For the station at Yavapai Point the views from the parapet cover the following elements of the Canyon and its story. The views as utilized from the parapet are numbered as in the list following.

FORCES WHICH PRODUCED CANYON AND WALLS:

I. How the Colorado River cuts its canyon

II. How the Canyon walls were built
- Movement of earth's crust makes possible canyon-cutting and formation building
- Evidence of movement in earth's crust
- Colorado River makes new formations from products of canyon erosion accumulated at its mouth

HISTORY OF EARTH BUILDING:

III. Oldest rocks in the Canyon, and among the oldest in the world—so old that their original characters have been destroyed

IV. Oldest rocks which retain their original character as gravels, sands, muds, etc.

V. Greatest single geological story told by the Canyon

VI. Tremendous changes in surface of the earth, shown in widely differing formations of the upper Canyon walls

RECORD OF LIFE THROUGH THE AGES:

VII. Most ancient relics of life preserved in walls of Grand Canyon—primitive plants

VIII. Oldest remains of animals in Grand Canyon walls—crab-like creatures and shell-fish

IX. Earliest imprints of ferns and insects in Canyon formations
X. Oldest traces of four-footed animals preserved in Canyon walls—last to appear in the story.
XI. Continuation of Grand Canyon story of earth history and life through isolated hill of strata upon Canyon rim

FORMING OF GRAND CANYON AS AFFECTING LIFE OF TODAY:

XII. Cutting of Grand Canyon as influencing variation of life by separation of North and South Rim Plateaus
Distribution of animals and plants today according to Zones of climate developed in cutting Grand Canyon
XIII. Life of the North Rim area, like that of southern Canada
XIV. Life of the South Rim area
XV. Life of the Canyon floor region, like that of desert areas in Sonora, Mexico

4. *Labels and signs along roads or trails.*

Even if adequately prepared guides and leaflets are available, it is desirable that certain key points in the Canyon be so marked that one traveling without personal guidance can keep continuously orientated with reference to the landscape. Marking objects of special interest by labels or signs in a landscape such as that of the Grand Canyon presents a problem of difficulty, both as regards selection of features and with reference to the danger of detracting from their beauty.

As useful as labels or signs may be, they should not under any conditions be so placed as to mar the landscape or diminish the pleasure of the visitor. The situation requires a small group of carefully placed markers, serving to help in guiding the visitor to the elements of greatest interest. Careful handling of the problem will make it possible to keep the fullest attractiveness of the landscape. It is always important to bear in mind that one is dealing with a place of tremendous natural beauty, and not merely with a section of out-of-doors to be labeled as a group of museum specimens.

Along the roads on both the north and south rims it is desirable to have a small group of markers indicating outstanding views and features of special interest. Important as it may be to give visitors a knowledge of the flora and of other individual elements in the picture, labels or signs furnishing information regarding trees or plants or particular rock specimens should be so unobtrusive as to be practically invisible for anything excepting careful inspection.

It is desirable to extend the system of trail and road markers to the north and east in such manner as to lead toward and connect with elements of special interest in regions beyond the park boundaries toward which visitors will naturally travel.

Labels or markers along trails and roads should be related to the system of guides and leaflets, as also to the plan for orientation, in such manner as to indicate elements emphasized by these other aids to visitors.

5. *Preparation of guides and leaflets for use along roads and trails.*

Study of the Grand Canyon region will undoubtedly produce a number of published guides of varying stages of elaborateness, which will be considered from the point of view of different groups of visitors. For general use, whether for brief or for long periods, it is important to have literature with concise statements as to outstanding features along the principal roads and trails. It is desirable that this literature be so organized as to make it especially useful at the principal viewpoints.

The guide for use of visitors to orientation stations such as Yavapai Point and a corresponding location on the North Rim will give a basis of reference for literature relating to special roads and trails. Leaflets for trails and roads should be planned so as to place each item in its relation to the panorama of the Canyon.

A series of leaflets should be constructed with reference to each of the principal roads and trails. This should include a statement for the South Rim drive from El Tovar to Desert View and return, with special attention to each of the principal points of view along the road. Similar leaflets should be constructed for the drive from El Tovar to Hermit Rest on the South Rim, and for the North Rim drives from the hotel to Cape Royal, to V. T. Ranch, and to Point Sublime. Similar leaflets should be prepared for the Bright Angel Trail trip, Hermit Trail trip, the trail from Yaki Point to the river and return, and the trail from Phantom Ranch to the North Rim.

The leaflets should be so organized that the parts relating to special stopping places could be looked over in not to exceed two or three minutes, so as to direct attention to the essential points at the moment of arrival. The data should be thoroughly tested scientifically. They should be clearly worked over with reference to their human interest, and should be presented in language so clear that it can be understood immediately. Simple sketches of the impressionistic type are desirable. They should center attention upon particular features as related to their environment. It is not wise to spread the illustration so liberally through texts and margins as to diffuse attention.

The leaflets relating to special view points should be so constructed that they can be obtained separately for a price not to exceed five or ten cents.

It is important that all guides, bus drivers, and other employees of Park Service or of concessionaires be thoroughly familiar with the data included in the road and trail leaflets. There should at least be familiarity with the object described, with its general significance, and with the available sources of information.

It is desirable that all visitors traveling on regularly organized trips handled by concessionaires be provided with leaflets covering the region to be visited. There would be advantage in having a leaflet for every trip furnished with the ticket for the particular journey.

6. *Organization of park naturalist personnel.*

The element of personal relation to visitors desiring information is of enormous importance. No two visitors are alike as to interests, mode of approach, or supplementary questions which may be raised by the experience of the Canyon. The personal relation is valuable in that it permits deviation from stereotyped form of statement, and facilities explanation of secondary features related to major aspects of the Canyon.

But we must note that there is advantage in so arranging the experience of making acquaintance with the Canyon that the visitor can make his discoveries with aid of roads, trails, road signs, and carefully prepared literature. It is therefore desirable to reduce instruction or talking at the visitor to the minimum which gives opportunity to enjoy the region.

In view of the fact that the Grand Canyon story represents a superlative development of nature, it will always be difficult to find a naturalist staff competent to give information which will be scientifically and philosophically correct and at the same time intelligible to persons of average intelligence. It is not easy to describe the superlative in terms which are themselves less than the supreme effort of expression. It is difficult for one not saturated with knowledge and with interest in the miracle of the place to present a statement measuring up to the opportunity evident in the face of nature. It will always be difficult to satisfy any intelligent person with a purely scientific statement regarding a picture which clearly requires a philosophic interpretation, and which at the same time demands the highest type of spiritual appreciation.

Every educational system tends to develop what is known as the stereotyped view of the subject. If there is any place at which discussion of the material in hand will fail com-

pletely of its objective under a formal treatment, it will be under the conditions prevailing at Grand Canyon. It is essential that the naturalists have clear scientific insight, accurate philosophic judgment, and the sympathy of human interest. Formal instruction will be wholly unsatisfactory. It would be less advantageous than planning the general program of roads, trails, leaflets, and general approaches as leading lines, and leaving the visitor to follow his own interests.

For leadership in development of an educational program at the Grand Canyon, it is clear that no level of scientific, intellectual, and human interest would be too high. The subject has superlative scientific, philosophic, and spiritual interest, the picture smites the eye in such manner as to hold attention, and the audience is drawn from the most virile intellectual group of the country. Under these conditions the possibilities are too large to justify any guidance excepting that which lifts the spirit high. One has the right to assume that this experience may easily become a permanent influence in the lives of all who are exposed to the wonders of the region.

7. *Planning of excursions by visitors on their own initiative, or under guidance of Park Service, or under guidance of concessionaires.*

Among types of excursions by visitors for which definite plans should be prepared, there may be listed: *First,* those organized by visitors on their own initiative and traveling either on foot or in their own conveyances to points which may be indicated by aid of maps, guides, leaflets, or series of trail signs set up by Park Service; *Second,* excursions organized under guidance of park naturalists, and visiting points of interest either on walking tours or in their own automobiles; *Third,* the various types of excursions organized under management of a concessionaire. This third type would consist of riding parties along the rim or on the trails, regular excursions by bus to various points on either rim, or parties conveyed by special automobile transportation arranged and conducted by the concessionaire.

For the *first group* it must be recognized that the planning of excursions by the individuals who follow in a general way their own inclinations will in reality represent the development of leading lines toward points of interest which have been developed by careful study of the Canyon problem. Even under these conditions, the visitor will have a relatively large element of personal discovery in his experience. Excursions of this private nature will be influenced enormously by planning of roads and of trails, by the placing of guide signs and labels along the trails, and especially by orientation of the visitor through use of the stations on the North and South Rim, and by the leaflets extending interest along all roads and trails.

For the individual visitor there will also be much of profit in planning excursions through discussion of personal problems with naturalists at the orientation station, or at campfire and other lectures, or on guide walks and automobile trips.

It is important that special consideration be given to the interests of the individual following his own inclinations, and tracing out through his personal interest the methods of approach developed by previous study of the problem on the part of the administration.

For the *second group* of visitors, namely those attaching themselves to walking parties or automobile parties under the guidance of naturalists, it is important that there be, first of all, the experience of orientation from the stations on the North and South Rim, and second, the opportunity to secure the special literature relating to trips planned.

The *third group* of persons, carrying out their plans under guidance of the concessionaire, will represent a large portion of the total group of visitors. For their advantage it is desirable that the concessionaire and the Park Service keep in close touch as to means by which all information available for the advantage of visitors may be used on the excursions.

It is important that all visitors in this group be provided with available literature touching points of principal interest along the road or the trail. It is also essential that all guides or drivers be acquainted both with the geography of the region and with the special literature describing it. They should also have acquaintance with the sources of further information relating to the area. It is also desirable that visitors on all trips of this nature have opportunity to visit the orientation station. If these conditions are met, even on a fleeting trip, it should be possible to learn the essential elements of the picture as it is met.

It is believed that cooperation of Park Service with the concessionaire can develop an extremely effective service through this third method of excursion. On the one hand, it must be recognized that there is the possibility of a routine trip with little explanation of value. On the other hand, there is the possibility of developing through the concessionaire extremely intelligent groups of guides and drivers in close touch with the naturalists, and fully acquainted with the means of assistance open to the visitor.

8. *Carefully planned talks on subjects of special interest to visitors.*

It should be a part of the program of the naturalist staff to work out three types of carefully planned discussions for the information of visitors: (a) Regular, but brief and concise discussions of both general and special topics at the orientation stations; (b) general and special talks at campfires, community houses, and at other points where visitors naturally gather in the evening when it is not possible to enjoy the principal beauties of the Canyon; (c) talks arranged in cooperation with the concessionaire.

It is important to recognize the necessity of what might sometimes be called "selling" talks by the concessionaire for the purpose of informing the visitors of trips which may be to his advantage. It should be possible to arrange, in relation to such talks, authoritative statements regarding items of special interest in the Canyon. Such combinations may be of advantage both to development of the educational program and to development of legitimate and important features representing responsibility of the concessionaire.

It is desirable to use illustrative material in the form of specimens or pictures whenever this is possible.

All general talks should be in simple and clear form, and should lay before the visitor groups of items of real human interest. The special talks should center upon objects accessible to the visitor, upon which a general interpretation of certain important features of the Canyon can be based.

It is essential that for all talks, of whatever type, the naturalist responsible be fully acquainted with the scientific detail of all materials considered. He must also have a clear, philosophic, and human view as to the significance of his subject. He must further have good training in the art of presentation of his materials; otherwise the subject will have relatively little value to the visitor.

NOTES ON MOUNT LASSEN PARK, 1929

The road from Mineral to White Mountain and from Hot Rock to White Mountain constitutes a very beautiful scenic highway. There can be no doubt about the value of this area, or that the automobile journey will be of much interest to visitors. According to the view that the parks have as their primary function the showing of certain outstanding features, and according to the idea that the main roads which enter these regions may have as one function the showing of certain great features, one would expect the main highway to be planned in such a man-

ner as to present this picture and at the same time to bring out the scenic beauty of the region. No plan has been worked out showing the major features of the park, but the general concensus of opinion would indicate that Mount Lassen itself would be of first importance. The opinion of many, both scientists and those interested in the scenic features of the park, would indicate that Bumpass Hell, or Bumpass Hell and the Devil's Kitchen, would constitute a second feature illustrating a present activity of the mountain evidently related to the volcanic activity. Cinder Cone region with its lava beds and Snag Lake would probably be the feature third in interest.

In a general way the thing which would be of primary interest to the visitor is the fact that Mount Lassen is a great volcano, the only volcano in activity in the United States in recent time. It will be of much importance to the visitor to see evidences of the volcano in action. This could be done only by the use of Mr. Loomis' and other pictures and Mr. Hammer's movie. The Bumpass Hell and Devil's Kitchen regions furnish present evidences of volcanic activity. The Cinder Cone-Snag Lake region represents a related and possibly an associated phenomenon.

Placing of Roads With Reference to Scenic Features

It would seem that the main road going through the Mount Lassen region should show at least the two main features. This road passes within less than a mile of Bumpass Hell and leaves that area completely invisible. The next plan should take into consideration access to Bumpass Hell, and perhaps the Devil's Kitchen, and should work out a means by which the Cinder Cone region could be made accessible without defacing the landscape and without disturbing the possible wilderness feature of the middle park area.

In development of the Mount Lassen region use of some of the most important educational features depends upon development of adequate parking spaces where visitors may leave their automobiles and view the landscape without the rush, hurry, and tension of automobile travel. If possible, parking spaces should be sufficiently removed from the observation points to allow greater quiet to those who enjoy the scenery.

Attention should be called to the fact that a primitive peripheral area bordering a park serves as an outer sanctuary, entrance into which helps to develop in the visitor a frame of mind in which he can to better advantage appreciate the wonders and beauties of the greater features constituting the holy of holies of the sanctuary.

Museums

A museum at Manzanita Lake and perhaps another similar building at Mineral could be made tremendously attractive if the illustrative material were based largely on the eruption, or on the living mountain, which is the great attraction of the region.

Such exhibits should include:

1. Carefully prepared maps of the region.
2. An exhibit of the volcano in action, including Mr. Loomis' splendid pictures and Mr. Hammer's film.
3. Specimens of the lavas, and materials of such a nature as to indicate the character of the activity of the volcano.

Other major features of the park would naturally be introduced, but the museum showing the mountain in action would be one of the great features in connection with development of the park.

MEMORANDUM CONCERNING RAINIER NATIONAL PARK 1929

Rainier park seems to present as its principal features the following:

1. The story of a great volcano with little upon it destroyed excepting that which has been torn down by the glaciers. There is still enough evidence remaining at the summit to show that it is a volcano. It is also important to recognize that Mount Rainier lies in an area which has been one of great volcanic activity through a long period in late geologic time. The story of the mountain can be told best in direct relation to the record of tremendous crustal movement and igneous activity of the region around it. We should have full information concerning the structure, and sequence of volcanic activity of the mountain in order to illustrate the phenomena to the visitor.

2. The glaciers of the mountain present a tremendously interesting story illustrating nature, origin, movement, rate of change in relation to climatic variation, and erosional or destructive effects. The record is peculiarly interesting by reason of the fact that it appears in rather sharp contrast with the story of the volcano over which the glaciers flow.

In development of the story of the glaciers it is well to call attention to the way in which the mountain has been built, layer upon layer, by the internal forces of the earth which produce the land formations, and to contrast this effect with that of the glaciers and streams operating upon the mountains as a group of forces, tending to tear down or level the land. These two forces are responsible for the face of the land and for all that goes with the variation in land forms.

It is important also to note that variation in length of the glaciers is an extremely interesting indicator of changes in climate. This evidence is important to us when we reach back slightly further in geological time and consider the tremendously significant and interesting glacial history of the world.

3. An interesting feature of the mountain is found also in the beauty of light and shade and atmosphere clothing the rugged scenery. Especially significant is the dynamic aspect of the mountain scenery contrasted with the subtle atmospheric changes producing the element of beauty.

4. Beauty of the forest, meadow, and flowers, both in detail and as a scenic effect is of great significance.

Beauty of the forest as shown in luxuriance of the tree growth, and in attractiveness of individual trees, as cedars and beautifully developed hemlocks is exceptional.

The flower gardens have a wealth of types and great variety in the masses of color. The floral display attracts by individual beauty and by the massed effect of color. To persons on vacation flowers are friendly and graceful and restful and do not bring recollections of anything unpleasant. Their value in the recreational and therapeutic sense is very high. As color values seem to increase with age appreciation of the flowers may be a thing of developing interest with persons of middle life and advanced years.

The beauty of the meadow and forest and flower gardens is undoubtedly greatly enhanced by contrast with what to many people would be the somewhat forbidding features of the mountain. There is nevertheless an interesting relation between the strength and bulk of the mountain upon which as a form or skeleton the mantle of verdure is spread.

The tendency of the excellent nature guide work has been to lean in the direction of emphasis on the life story, assuming that because human beings are interested in living things and because they ask questions about the trees and flowers therefore these represent the most important elements of the park. It is probably appropriate to assume that the interest in moving things by the people is as a whole correct. A large percentage of the questions asked always relate to the flowers and trees even if the mountain and glaciers were overwhelmingly important. Even under such circumstances it is, however, desirable to base the development of an educational program upon the greater features which exist, and not allow the trend of work to be determined by the incidental questions which may be asked. It is the function of an educational scheme to present the great things for understanding of the people. Accepting the large value of the fauna and flora, and especially the great artistic beauty of what is there

presented, it is desirable that everyone have opportunity to know the tremendous story of the volcano and the glaciers. The relation between these two great forces so clearly expressed there should also be shown, as also the development of the land forms which has been in considerable measure responsible for differentiation of the forest and flower gardens. It is also desirable that the average person have some recognition of the contrast between the elements of beauty and friendliness of the flower gardens as compared with the force and power and might of the mountain as represented in the volcano and in the smashing, grinding erosion of the glacier.

The organization of educational work at Rainier is extremely well developed as compared with other National Parks. The short nature trails at Longmire are well conceived and are kept within reasonable limits. The walks with guides seem extremely useful and are much appreciated by the visitors.

There seems to be need for study of the whole plan of the mountain with relation to roads and trails and with regard to objectives of the nature guide trips, and with reference to presentation of the things which might be seen by the visitor unassisted excepting by literature and following the trails. There is need of a clearly conceived plan with leadership of a sufficiently high type to define the things most important. The most sympathetic attitude of the superintendent guaranties success in development of such a plan.

The sharp contrast of Mount Rainier with the routine of ordinary life, the wealth of material in the story of the volcanoes and glaciers, the beauty of the forest, and the extraordinary splendor of the flower gardens make this park a place where a great work will be accomplished.

MEMORANDUM REGARDING SEQUOIA NATIONAL PARK: 1929

The educational program at Sequoia should initiate with study of the great trees. There would be advantage in preparing small orientation maps giving location of points of principal interest in study of the trees. Brief leaflets regarding the sequoias could be utilized for these trips.

Beginning with the study of the great trees, it is possible to develop a tremendously interesting biological story which can extend itself to consideration of other aspects of this great forest which serve as a background for the giant sequoias. This study of the setting of the trees provides the materials for a general study of the appreciation and interpretation of nature which can absorb all of the attention that can be given by the average visitor.

In another direction the element of time and the history of the sequoia tree can be made the basis for reaching out into consideration of the geological environment and history of the trees. With this measuring rod of time one can approach the Pleistocene story and ultimately the origin and shaping of the great mountain ranges. The story of granite, as at Yosemite, will be one of the most interesting aspects of the geological story.

In consideration of the biological problem of Sequoia Park it is important to bring out the life zone story as represented along the road in visiting the park.

It is important to have a number of leading students of geology and biology visit Sequoia National Park and study the problem with a view to furnishing the essential materials for this work. Such a group should include F. E. Matthes and another geologist, with Harold Bryant as a biologist, along with someone who is thoroughly familiar with the problem of the trees. A careful study of the region by Ralph W. Chaney would probably be as important as any work that could be done in laying out a program for research and education at Sequoia Park.

PURPOSE AND FUNCTION OF YOSEMITE NATIONAL PARK: 1929

Intensified interest of recent years in parks and park problems, together with the need for large expenditures in their development and maintenance, has made necessary the attempt to define various types of park and recreation areas. It may never be possible to define any one of the types of parks in such way as to cover all possible questions for all places and all purposes. But the clearer the definition of purpose or function, the easier it will be to plan operation and development.

As contrasted with municipal and state parks, or with the extraordinary opportunities for recreation and education in national forests, the national parks are distinguished by characteristics which represent scenic beauty or natural phenomena unique in the country or in the world.

The evident purpose in the setting aside of each of the major parks leaves no room for doubt that it is the unique thing in the use of which the nation as a whole would wish to participate that constitutes the basic element in definition of national parks.

The characteristics of national parks have never been classified, and it may be difficult to reduce them to any simple form of definition. These areas are commonly included under the term of scenic or natural features. They have elements of exceptional beauty, and generally contain an unusual representation of primitive life of the region, both plant and animal. Generally the element of magnitude, as expressed by dimensions or power, is involved. In practically every instance the distinguishing thing is recognized as being an extraordinary clear expression of the type of phenomenon represented. It is usually true that the aspect of a given national park which distinguishes it from other areas has qualities which give the visitor such a definite emotional reaction to the principal elements presented in its story that the effect may be characterized as inspiring.

There has never been doubt that the extraordinary features of magnitude and beauty of Grand Canyon, or in the evident power exerted in producing this phenomenon, exert upon the visitor an effect which makes inescapable a measure of recognition of the elemental laws of nature involved in the forming of the Canyon. There can be no doubt that observation of the Grand Canyon gives to the average person a deeper understanding of principles or laws widely expressed in nature, but which are usually difficult to understand or appreciate.

A study of the major features of national parks indicates that while their use must overlap to a large extent that of other types of park areas, the development and defense of the system as of national significance must depend in the first instance upon emphasis on the features to which the parks owe their existence. While in general recreational and therapeutic values of national parks must be recognized as of interest and importance, there is no special reason why the nation should consider the support or administration of reservations for such purposes unless there be involved certain features which are of definitely limited extent and of clearly national importance. If it be true that national parks owe their origin to outstanding expressions of beauty, or to presentation of exceptional opportunity for understanding natural phenomena, it is through the utilization of these features that we must expect the National Park program to develop. There is, however, every reason to assume that along with the outstanding features of these parks there are collateral or related features which should be utilized and developed to as great extent as possible consistent with continuing emphasis upon the distinguishing characteristics.

In the history of Yosemite Valley there does not seem at any time to have been doubt as to the peculiar

characteristics of this area. Along with climatic, physical, and biological features which may be duplicated in many other regions on the west side of the Sierra, the outstanding characters of the Valley are universally recognized as essentially of the inspirational or educational type. While everyone realizes that there are many accessory aspects which may have large value in association with the distinctive elements, the things which have justified the existence of Yosemite National Park are represented in those features which distinguish it from the many other areas of exceptionally interesting mountain country of the inspirational type in the Sierra region.

SUGGESTIONS AS TO DISTINGUISHING CHARACTERISTICS OF YOSEMITE VALLEY:

Obvious Features

1. Striking features of magnitude shown in depth of valley and steepness or abruptness of walls.
2. The contiguous or surrounding region of high mountains with occasional slopes covered with snow or glaciers.
3. The exceptional contrast between abrupt, sheer walls of massive rock with their awe-inspiring expression of power and, on the other hand, the level areas of quiet meadow and forest. ("The hills rock-ribbed and ancient as the sun, the vales that stretch in pensive quietness between.")
4. The beauty and power of waterfalls, unique in their expression of living which produced the valley.
5. The significant accessory features shown in widespread forests, meadows, lesser streams, and wild life enhancing the beauty of the region.

Less Obvious Features, Representing the Fundamental Phenomena of Nature

These represent elements in the region which may be in some measure sensed or recognized by a large number of observers. Their full understanding depends upon something more than casual inspection. They are within reach of the average observer, but only through the medium of extended study and the use of organized knowledge.

Certain of these features are in some part responsible for the emotional reaction described as inspiration. They represent aspects of knowledge in which human imagination extends itself through the medium of organized realities to an understanding far beyond that of mere photographic reflection of nature in the mind of man. The appreciation of these things is a natural function of the intellectual and spiritual life. The development of some of these characteristics represents a considerable part of the opportunity for growth in understanding and appreciation of nature.

1. The stupendous natural phenomena represented in the origin of the granitic masses out of which the Yosemite region has been carved. This includes the development or intrusion of tremendous volumes of molten material forming the axis of the mountains and replacing that part of the earth's crust upon which the sediments of the foothills region originally rested.
2. The series of tremendous movements involved in the origin of the mountain region.
3. The enormous and extended erosion which has removed from the mountain region the covering sediments and has modeled the mountains through the power of water and ice.
4. The history of climatic change and the effect of glacial action in the glacial period.
5. The zonal associations of life, both plant and animal, as illustrated in the range of fauna and flora from the lower valley to the higher mountains. The illustration of life adaptation or variation in accordance with variation in physical conditions produced by altitude, temperature, and change in soil conditions.
6. The relation of variation in zonal distribution of living forms to the principle of specific variation in the plant and animal kingdom as expressed in the general theory of life development and variation.
7. The relation between movement of the earth's crust and change of land forms to variation of life through the ages. Recognition of the living earth as affecting the development of living things. The unity of the story of nature beginning with the causes which produce crustal movement and extending into the development of the living world.
8. Evidence that the phenomena illustrated in so spectacular a manner in Yosemite are forces which are active everywhere and through all time and are a part of the effective environment in which human life is lived. They also constitute a part of the material which man naturally uses in development of his environment to meet his own needs.

Suggestions as to Development Program

It is recommended that in development of the plan of Yosemite Valley special emphasis be placed upon opportunity for use and enjoyment of the Valley as represented in those features which have distinguished it from other types of parks and have given it its unique position among the National Parks.

While every way should be opened for use of Yosemite in the sense of possibilities of rest and recreation and enjoyment of living, the maximum opportunity should be given for understanding and appreciation of the major or distinguishing characteristics of the Valley. Where judgments or decisions must be made among a number of possibilities involving use of the valley, preference should always be given to those uses which relate to the basic purposes. If a study of the program indicates that sacrifice must be made among the possibilities of use, judgment should favor those forms of utilization which concern feasible combinations of recreational life and enjoyment with the higher intellectual, inspirational, or spiritual values. It should always be recognized that essentially man is an intellectual or spiritual being, and that where decisions are made between lower uses and higher uses, there can be no defense of any action which sets aside the higher uses at a place where these forms of utilization can be carried out to best advantage.

It is recommended that all possible consideration be given to development of the educational or inspirational utilization of Yosemite Valley along lines which involve use of those forms of guidance which present to the visitor the major interests or opportunities of the Valley, in the manner in which they may be most fully understood, appreciated, and enjoyed.

INTERPRETATION OF STORY OF THE GRANITE AREAS IN YOSEMITE NATIONAL PARK

The form and beauty of Yosemite Valley are due in considerable measure to the shaping of its features in granite. Had the rocks of this region been the same as those of the lower Merced area, or of the Grand Canyon, the result would have been widely different from what we see in Yosemite today.

The mode of origin of much that has unique interest here gives reason for suggestion regarding the materials from which the valley is formed. Additional reason for making available to visitors something of the story of the granite at Yosemite is found in the fact that the circumstances relating to origin of the granite mass of the Sierra probably constitute the greatest single event in the story of the Yosemite region.

The account of building of these granite masses is an epic representing the action of tremendous creative forces. It possesses that attractiveness inherent in movement or development or growth. We need only to find means for presenting to

the visitor observational evidence from which average intelligence can construct a picture of realities in the history of this region.

The essentials in presenting the story of development of the granite and its relation to the history of Yosemite involve finding such localities as will permit the visitor to see for himself the relation of the granite to the sedimentary masses into which it has been intruded. It is also desirable to present evidence of the sediment remaining in fragments above existing granite mountains.

Sentinel Dome. The best point of observation for telling this story seems to be the summit of Sentinel Dome. At this locality there is wide and unobstructed view over the whole of the Yosemite region and out to the Coast Ranges. From Sentinel Dome it is possible to see practically the whole stretch of the vast sedimentary series lying upon the granite and extending beneath the great valley of California. The general area of contact between the sediments and the granite is visible in the lower Merced valley.

There are also visible from the summit of Sentinel Dome a number of patches of sediment resting upon the granite at what has been called tentatively "Sediment Peak," near Mount Clark, also on Parsons Peak. Occurrence of blocks of altered sedimentary material near Sentinel Dome may also be seen.

The development of a station for the purpose of showing the granite involves preparation of a small smoothed area on or near the summit of Sentinel Dome with equipment consisting of a well designed finder to locate the principal points of importance, a single case to contain a few important specimens and photographs with labels, and further a small booklet or leaflet giving simple and concise statement of the story and description of the localities to be observed. The station at the summit of Sentinel Dome should be approached by a well defined path with as little as possible of artificial construction. The platform of the station would best be constructed of concrete in order to remove unevennesses. A small bordering wall or parapet should be so low as to be inconspicuous and not mar the summit of the Dome.

The finder at this station could well be modeled after the type at Pilot Butte, Oregon, of which full specifications are available at the central office of National Park Service in Washington.

The case at the summit should contain specimens of the sediments near the contact in Merced valley, photographs of the tremendously folded sediments near the contact with the granite in Merced valley, and a few specimens from the sediments resting upon "Sediment Peak" and Parsons Peak.

The leaflet for use at this point should include a simple, brief description of the nature of the intrusion of the original molten granite mass and of its gradual cooling to take on its present physical characters. There should be a cross-section through the granite area extending out to the great valley and illustrating the nature of the contacts in the Merced valley and on the summit of the range.

The leaflet should also call attention to the erosion process by which the sediments were removed from the great granite area exposed. There should be reference to the old erosion surface of approximate Miocene time so clearly seen from Sentinel Dome over the region to the north of Yosemite Valley. The aid of Dr. Matthes in preparation of this leaflet would be extremely important.

Glacier Point. At Glacier Point the multitude of visitors makes it important to present, so far as possible, the story of the origin, nature, and significance of the granite mass which can be told to best advantage from Sentinel Dome. Although it is not possible to see the lower Merced valley from Glacier Point, the features illustrated from Sentinel Dome and not visible at Glacier Point could be represented through good photographs. There are many reasons why it may seem desirable to develop at Glacier Point a station which will show Half Dome and the Little Merced region, including the sediment cap on "Sediment Peak" near Mount Clark. A station to represent this and the few other major features visible to the east from Glacier Point could be constructed in the depression immediately to the north of the present lookout. In this depression a platform could be prepared with moderate excavation. A parapet could be constructed such as would not mar the face of the cliff, and side walls and a roof could be constructed which would be practically invisible excepting within the range of a few yards of the station.

In this lower crypt or hidden station at Glacier Point there could be included a relief map and such other materials as would show to advantage features which can be seen better from Glacier Point than from other localities. The type of equipment for such a station would be in general similar to that at Sentinal Dome.

A second station and platform designed for the purpose of pointing out features seen better from Glacier Point than from other places should be constructed near the east end of Glacier Point. There is a low area at the east end of the Point which could be provided with a cement platform with an adequate stone, reinforced parapet, and with a well-constructed finder—perhaps also with telescopes. From this station many points of interest in the main valley and above Mirror Lake could be shown to advantage.

Museum. It is also desirable that in the geological room of the museum on the Valley floor the essentials of what has been discussed as important exhibit material for Sentinel Dome and Glacier Point be illustrated by use of carefully prepared transparencies, well selected specimens, careful labels, and a small leaflet.

Merced Canyon. It is also desirable that on the Merced canyon road near the contact of the granite and the sediments one or two small sign labels be set up pointing out the nature of the tremendously disturbed and folded sedimentaries near the point of contact with the granite. At such a locality it may be important to have a small case with a few photographs and labels. The leaflet used at Sentinel Dome would also be helpful in an explanation of what is seen at this locality. If argument is made that illustrating this point would obstruct traffic on the narrow road, suggestion might be made that the road exists in order to carry visitors into a region in which they are to learn something of exceptional wonders in nature. The distorted strata along the Merced road represent a part of this story, and there is abundant justification for so adjusting the situation on the road as to make it possible for visitors to park for the few moments necessary to come to understanding of this locality.

It is probable that visitors would make most frequent use of the locality illustrating disturbed sediments in the Merced River region when on the way out from the Valley after having heard the story of the granite. If, however, they could visit the locality on the journey into the Valley, this would be helpful in understanding the story as it will be learned from the various points mentioned at Sentinel Dome, Glacier Point, and the museum.

SIGNIFICANCE OF CERTAIN BIOLOGICAL FEATURES IN THE EDUCATIONAL PROGRAM OF NATIONAL PARKS, 1928

ALTHOUGH in development of the educational program of National Parks a relatively large part of the effort expended up to the present time has been directed toward study of life, the biological aspect of educational influence is probably much more important than has been recognized. A considerable part of the work done up to the present time has related to the more elementary

features of field botany and zoology. It has been of real significance, and has served an important purpose through initiating study of the fauna and flora for many who under the conditions of relaxation in the park environment have welcomed a friendship with nature. Visitors to the parks commonly wish to have rest and freedom along with the desire to learn. There is an element of refreshment in the contact with flowers and forests and birds. It is a relation free from that routine of everyday life which the visitor especially desires to leave behind.

Among the major opportunities for education in biology, one of the most important concerns the factors which have to do with variation of life, and the relation between life and its environment. This is expressed in some measure in the geographical distribution of animals and plants, according to what are called life zones, representing a relation between variation of types of life and variation in physical conditions. Without reference to special theories advanced in discussion of the factors governing distribution, the relation between range of certain types of environment and the range of kinds of plants and animals is a striking thing in many parks. Through the suggestion and guidance of clear-minded naturalists, study of the illustrations here may bring about development of a train of interesting interpretations by visitors.

There is also in the geographical range of organisms in National Parks an extremely important relation between the distribution of life zones and the development of the geography or geology of the region. The life zones have been made possible by geological changes resulting from contrast of two sets of forces: those involved in movements of the earth's crust producing uplift, and those expressed in wind, running water, and ice which have carved or moulded the land forms. The geological processes responsible for conditions governing distribution of life in the National Parks really represent one phase of the story of development of life through the ages. We describe them as physical forces. We do not know their origin. Perhaps the elements of the unknown in these activities are not less significant than those unexplained factors which elude us in study of the physiology and other life processes of the living organism.

The physical activity of the earth seems so intimately related to development of the living world that the two are in a sense one process. There are no places where these and many other relations of the story of life can be developed better than in National Parks. The beginnings of understanding may initiate with small details, such as are involved in distinguishing one interesting animal or plant from another. It is important to bring out these fundamental aspects of the life problem in connection with the educational program.

A further point of great importance in connection with study of the biological problem of National Parks relates to the opportunity to study unmodified primitive associations of plants and animals. This is increasingly important as we come to recognize that civilization is rapidly wiping out, or fundamentally reorganizing, a large part of the biological complexes of the world. The adjustment is taking place so rapidly that only under special conditions can we expect any areas to remain long with the composition of fauna and flora which existed when the parks were established. The time is not distant when areas in which the original biological grouping remains unmodified will have the same relation to the surrounding world altered under the hand of man, that a Pleistocene or Pliocene biological complex or association would have if somewhere isolated in the living world today.

The more deeply we study the living world, the more fully we recognize that what man has obtained from nature to meet his economic needs represents only a part of what might be secured. The animals and plants forming the so-called domesticated group today are not the only ones that might have been domesticated. Their present status is due to a variety of circumstances, one of the most important of which is the fact that they are among the types long associated with man. Had the association been different the plants and animals domesticated might have differed in some measure.

It is to be assumed that with the increasing needs and intelligence of man, research of the future will bring to our service groups of organisms now largely known as wild or weeds. The existing fauna and flora may include many forms which man will need in the future, but which will soon disappear unless considerable areas are preserved intact—not merely intact as to certain species, but intact as to the whole association of organisms.

No better illustration is to be found of the need for preserving a biological group unmodified than that which has become evident in the development of forestry. We are just now beginning to consider growing new forests in the place of those cut. It is sometimes assumed that all we need to do is to plant a tree in the place of one removed. But a forest is not merely a group of trees of one kind. It is an association of plants including many types. In order to grow a forest such as has been harvested we must know the original conditions which we seek to duplicate. The only fully satisfactory situation for the future will be one in which we have original forests available for study of their composition, and of the many plants and animals associated in them.

What is true of the need for preservation of trees in a forest, so far as original association of organisms is concerned, is true of a large variety of associations of plants and animals regarding which we shall require information in the future.

In National Parks with a wide variety of plant and animal types, and with the biological zones most remarkably developed and related in their origin to geological phenomena, there is reason for attempting complete preservation of certain relics of plant and animal life associations for the enjoyment and appreciation of the people, and for future needs in scientific and economic studies. There is no doubt that such reservations will ultimately be enormously important sources of information regarding life, and concerning the principles that controlled its development before man began to sweep over the earth and modify it.

SUGGESTIONS REGARDING SIGNIFICANCE OF PROBLEMS IN THE FIELD OF GEOLOGICAL SCIENCES IN CONNECTION WITH AN EDUCATIONAL PROGRAM IN NATIONAL PARKS

1928

MUCH of the research and education which naturally develops in National Parks will relate itself to problems in the field of the geological sciences. In most instances, the great scenic features are fundamentally geological. Full value should also be given to the covering of vegetation, the beauty of the forests, and all wild life. Far too little has been said regarding these aspects of the landscape. It is, however, important to realize that in large measure the great characteristics of National Parks are of the geological type.

Under the circumstances, it is essential that the most careful study be given to the nature of the problems which must be considered in research and to the character of material to be presented in educational work in National Parks. Many of the specific features are of such a nature that they thrust themselves upon the attention of even the most casual visitor. Such, mainly, are the elements which have to do with magnitude and the figure of the land, which may be in sharp contrast to that with which visitors are familiar in everyday life. In addition to these obvious elements there are many things for which the visitor is not able to obtain anything like a complete interpretation. These great problems of the less ob-

vious type represent material which it is of the first importance that we understand and present in simple but adequate form to the visitor.

With all that has been done in the general geological study of the National Parks there is still a vast number of details and of specific questions regarding which we have little or no data. This is true even in the strictly scientific sense without relation to educational application. It is important that preliminary to educational work there be intensive study on all of these questions and on the simplification of these data for educational use.

Experience in National Parks indicates that among the greatest of all questions that may attract the interest of the visitor are some to which little or no attention has been given in the educational programs. The opportunity for study of geological problems in National Parks is one of the most important in America, and it is essential that there be leadership of the highest type for definition of the problems, as also for furtherance of researches, and guidance of the men to assist the public in understanding the material presented.

Reports of Dr. F. R. Oastler on Studies Made in 1929 Relating to Possible Additions of Areas to the National Park System and to a Survey of the National Parks and Monuments

REPORT for 1929 of investigations undertaken for the National Park Service in the following regions:—Isle Royale, Michigan; Never Summer Mountains, Colorado; Rocky Mountain National Park, Colorado; Yellowstone National Park, Wyoming; Grand Teton National Park, Wyoming; Mt. Ranier National Park, Washington; Bryce National Park, Utah; Zion National Park, Utah; Grand Canyon National Park, (North Rim), Arizona; Mesa Verde National Park, Colorado; McKinley National Park, Alaska.

The following National Monuments: —Betatakin Ruins, Aztec Ruins, Pueblo Bonito Ruins, Casa Grande Ruins, Frijolas Canyon Ruins, White Canyon Natural Bridges, Rainbow Natural Arch, Devil's Garden and Window Castles, Navajo Mountain, Pipe Springs, Petrified Forests, Inscription Rock, Glacier Bay (Alaska), Mt. Olympus, (Washington).

Respectfully submitted,
Frank R. Oastler.

THE summer of 1929 from June 26th to September 20th has been spent in two ways, (1) examining new areas, Isle Royale, Michigan, the Never Summer Mountain Range, Colorado, the northeast face of Mt. Rainier, Washington, an area ten miles northeast and twenty-five miles south of Bryce Canyon, Utah. The object of this inspection has been to determine the character of the country and decide whether or not the country is suitable for possible addition to the National Park Service, (2) visits to the remaining National Parks and Monuments in continuation of the survey commenced in 1928 made at the request of the Secretary of Interior. All of the National Parks with the exception of Lafayette and Hawaii, and National Parks which are of no importance, have been visited within the two-year period and fourteen Monuments have been inspected within the last four years. It has been impossible to cover the whole territory within the allotted time. The expense of a trip to Hawaii precluded the possibility of an inspection of that Park. A visit to some of the Monuments required the use of a pack-train, also an expense not warranted by the amount of money provided. Then too, many of our National Monuments can hardly be considered of much educational value and a visit to these would seem superfluous.

During this time the problem of the future care of our flora and fauna has been given careful consideration. Inasmuch as this work is practically in its infancy throughout the country, and the work to be accomplished in the future will be largely experimental and original, the writer has hesitated to furnish even a preliminary report without much closer study than he has been able to give to the subject up to the present moment. It is sufficient to say that it is rather remarkable how little scientific work has been conducted in these two great divisions of Natural Science. To the layman the only answer seems to be the lack of funds offered by the public to conduct proper scientific observation and experiment. It is to be hoped that the future will offer much greater promise than has the past so that our flora and fauna may be properly protected for the pleasure and profit of those not only of our time, but those who will follow us.

BRYCE CANYON NATIONAL PARK

BRYCE Canyon has been in the National Park Service about a year. There has not been sufficient time to organize this Park to any great extent. The trails into the Canyon have already been improved, however, and the development of camp sites, ranger stations, etc., is progressing. The writer has paid four visits to Bryce Canyon prior to this visit. The purpose of this visit was to study the Canyon itself with reference to its development, also to study areas to the north and south outside the Park to determine whether these areas were of National Park character, and whether, by the addition of these areas to the Park, the whole scenic field might not be more easily administered and be made available to the visiting public. It was realized that this Park, being new, should be developed with a view toward establishing winter as well as summer ranges for its wild life, particularly the deer. With the boundary as it was there was no winter range for deer. In the years to come these animals will become half tame in summer only to be an easy target for the hunter on the fall and winter range, which is at present outside of the Park. This matter required consideration.

The difficulty at present with Bryce Canyon is the inability of the visiting public to get into the Canyon and enjoy many of the beautiful objects not seen from the rim. The trails even at best are steep. Many people are afraid to ride a horse, especially on these trails, with the result that most of the visitors arrive at the Canyon, look over the rim and think they have seen all there is to see. As a matter of fact most of interest is in the Canyon itself and not on the rim. In order to overcome this difficulty it is suggested that a small concession be established in the bottom of the Canyon near it's outlet. From the diagram appended, it will be seen that a concession situated as proposed can be reached by a road running from the rim of the Canyon to the village of Tropic, which road is already in existence, and by the construction of a road from Tropic to the entrance of the Canyon for about one and one-half miles. The village of Tropic has agreed to build this road at it's own expense if allowed to do so. In this way tourists may enter the Canyon by automobile and then walk or ride to the points of interest in the side canyons, spending a few days at the concession, or they may walk or ride from the rim to the concession, spending some time there and return the way they came or by automobile. By the establishment of a hotel in the Canyon and building a road of one and one-half miles, the Canyon itself will be made available to all who wish to enjoy it. There are two sites possible for the construction of a camp. These are marked on the map. The one to the left would be more suitable, being situated on the main Bryce Canyon trail. The water supply could be obtained from a spring (by piping) from Peek-a-boo Canyon. This spring should be tested for its water supply. The site to the right is at the junction of Campbell and Fairyland Canyons. Here are two springs with an abundant water supply. The lay of the land, however, is not as good but there is plenty of room. A road

could easily be built from either one of these points to the village of Tropic. The scenic features from either point are admirable. The adoption of some such plan as proposed would seem to be one of the most important matters to be considered in the development of the Canyon.

The writer begs to be allowed to object to the location of the automobile camp as proposed. The distance from the rim of the Canyon to the boundary line is so short that it is imperative that all the area be preserved as a park. If the camp is placed here, there is no place left and besides the camp is right on the rim of the Canyon, crowding in upon the very object for which the tourist visits the park—the Canyon rim. Furthermore, the particular spot chosen is right in the middle of the best wild-flower exhibit in the park. It will not take long for this to be trampled out of sight, in fact that is almost the condition at present. There is ample room for an auto camp nearer the park entrance where it will not infringe on the chief exhibit.

Another objectionable feature which should be discontinued is the camp fire in front of the Lodge. Nobody pays any attention to the camp fire and at present it is used principally as a dumping ground for old boxes and refuse which the concession wishes to burn up. If this could be turned into a bird bath, it would be very useful, for many birds gather about this area of the park. The addition of a few bird boxes in the trees, transplanting some of the young Aspens in the vicinity, encouraging the natural growth of wild flowers, eliminating the road across the area, in fact turning the area into a little natural park, all this could be easily accomplished without much expense and it would add very much to the interest and beauty of the Park.

Posts have been placed along the rim to prevent automobiles from encroaching. If these posts could be connected with chains, it would prevent riders from using the rim as a horse trail. The rim of the Canyon should be left for pedestrians only. At some future time it would be well to construct suitable observation stations at the points of interest and do away with those in use at present. They are neither useful nor ornamental, taking into consideration the amount of room they occupy. Work on the new trails is progressing slowly but it is being well done and the Navajo trail is well conceived and executed. The steep grades are practically eliminated.

Further suggestions regarding the educational work at Bryce Canyon may be found in the report forwarded to the National Park Service in 1928.

Proposed Extension of Bryce Canyon South

To Monument Point twenty-six miles south of Bryce Canyon the pink cliffs, of the Paunsagaunt Plateau of which Bryce Canyon is a part, are exposed, the result of erosion, and are broken up into all sorts of pillars, precipitous walls, monuments, short canyons, natural bridges and rock formations of innumerable patterns and great beauty. This region was examined with a view to possible addition to Bryce Canyon. It has been suggested that this addition would do much to round out the scenic features of Bryce, open the country for the education and enjoyment of the public, and add to the ease of administration. Furthermore, this question has arisen, are the scenic features of National Park standard and is the area of greater value as a National Park or as a grazing area in the National Forest? At present this country both above the rim and below is being used for grazing sheep. About 1,800 sheep graze back of the rim and 2,400 below the rim. In the spring and fall these sheep have to travel up and down Sheep Creek Canyon to get into the valley of the east fork of the Sevier River. The forest above the rim contains some good timber—Balsam, Spruce, White and Yellow Pine, and Aspen. Below the rim the timber is not quite as good. The country above the rim is the summer feeding grounds of the deer and in winter they spend their time below the rim. Bird life is fairly abundant and wild flowers are growing all over the rim in the early spring before the sheep come. Part of the sheep are owned by local people, the rest by ranches some distance away. It would be difficult to find other ranges for these sheep, the forest supervisor relates, because the ranges in the neighborhood are all over-stocked at present and the number of sheep have had to be reduced within the last few years.

In undertaking a survey of this region the following points received particular attention (1) Head of Yellow Creek, (2) Head of Sheep Creek, (3) Head of Swamp Canyon, (4) Rim View, (5) The Natural Bridge and area beyond, (6) Podunk Point, (7) Monument Point. The rim at the head of Yellow Creek is called Little Bryce. It is practically of the same character as Bryce Canyon and contains many interesting forms of erosion. The head of Sheep Creek is even more beautiful and more extensive. Large areas looking like castles and fortresses stand up in the valley separated from one another, and the combinations of pink and green make this canyon unusually beautiful. The scenery is more majestic and of a grander type than Bryce and the colors are more intense and of greater variety. This also applies to Swamp Canyon which is a branch of Sheep Creek Canyon. At the bottom of Swamp Canyon there is considerable moisture and therefore the forest carpet is more abundant and a deeper green.

The Natural Bridge is 13 miles from Bryce, one-half way to Monument Point. It is situated in the midst of a magnificent amphitheatre formed by the region included between Sheep Creek Point and Podunk Point. The bridge is of unusual beauty, of excellent carving and well water marked. Surrounding the bridge are many fine monuments and great walls, and the whole region is extremely interesting and filled with surprises on all sides.

Podunk Point, which, by the way, is two points, projects far into the valley. It is about twenty miles from Bryce. To the south of Podunk Point to Monument Valley the rock walls though beautiful are not to be compared to the region to the north, and it is doubtful if this part of the rim would be of sufficient interest to emphasize it by addition to the National Park. To the north of Podunk Point, however, there is a large magnificent amphitheatre filled with all kinds of erosions quite equal to those of Bryce Canyon, but on a larger scale and surrounded in part by forested areas. The colors here are more intense and of a different character from Bryce. The view both from Rim View and Podunk is extremely fine and extends over tremendous distances with Escalante Mt. on the left and Navajo Mt. on the right. Many of the various canyons which empty into the Colorado River can be plainly seen. So delightful was the panorama from Podunk Point, that the greater part of a day was spent in analysing the area. The great expanse of it all was very impressive. There is no doubt but that the rim from Bryce Canyon to Podunk Point meets all the requirements of a National Park. The scenic features are outstanding in character and unique and the people of the United States should be given the opportunity of seeing and enjoying this remarkable country.

In order to administer this region properly, it will be necessary to include a stretch of land one-half mile back from the rim and one mile from the rim below. It is proposed to build a road along but away from the rim extending from Bryce to Podunk Point. The main difficulty to be encountered in transferring this area from the National Forest Service to the National Park Service is sheep. Apparently the owners of these sheep have to be accommodated with other grazing areas and these areas are hard to find in this country. Again,

twice a year these sheep have to cross at Sheep Creek, the proposed addition, from one valley to the next. Provision must be made for this. The Supervisor of the National Forest and the Superintendent of Bryce Canyon Park are practically agreed as to the transfer. While making this survey the writer was fortunate in being able to bring this matter to the attention of Major Stewart who happened to be at Bryce Canyon. The change was carefully discussed with him at this time.

Proposed Addition to Bryce National Park to the North and East.

To the north and east of Bryce Canyon the rim of the Paunsagaunt Plateau extends as far as Escalante Mountain. The deer spend the summer months on the plateau. Their winter range, however, is beneath the rim of the plateau in this region. Here in the fall of the year, and in winter also, many deer are killed. In order to preserve these animals for National Park purposes it is proposed to change the Park boundary to the north and east to include this area. The region is on the public domain. There are no sheep grazing here and only 300 goats in one small area. There is no patented land. The country is not fit for grazing. One or two small parcels belong to the State of Utah but they are of no value and could be easily obtained. Much of this country is of the same character as Bryce Canyon and is of considerable scenic value. This is particularly true of Escalante Mountain. The new addition will include the road to Tropic which the State will gladly part with to save maintenance. The proposed addition may be seen on the appended map. The country for the most part is quite barren, is of no value, but the deer are attracted to this region. With the addition north and south and with possible slight widening of the boundary to the west for administration purposes, Bryce Canyon National Park will have a scenic area of great value and withal a winter and summer range for its wild life.

North Rim of the Grand Canyon

A trip to the north rim of the Grand Canyon was made especially to study the condition of the Kaibab deer herd. The results of the investigation were extremely disappointing. It is to be remembered that part of this herd falls under the jurisdiction of the National Park Service. Unfortunately this jurisdiction obtains only in the summer time, for there is no winter range for the deer in the park and they all leave the park in the Fall to spend winter in the lower levels of the National Forest and the adjacent country. A careful investigation of their winter range has not been made as far as the writer has been able to ascertain.

The first visit to this region was made in 1913. At that time the deer were in evidence everywhere and in the evening about six o'clock the V. T. Park was literally packed with deer, bucks and does and fawns feeding peacefully together—a most remarkable sight. Five visits have been made including this one. The one before this was in 1926. At that time on the V. T. meadow in the evening, the writer counted about 200 deer. This year the count was 21, made in early September. The National Park Rangers last year counted 856 deer within the park boundary. This year 632. In a small clearing in the park especially selected 86 deer were counted in 1928, 16 in 1929. Mr. Will Rust, Proprietor of the V. T. Ranch, who has watched the deer for years states that the deer have diminished rapidly and at the present rate will soon be exterminated. Since 1913 all the deer seen and photographed by the writer have been in good condition. Upon inquiry of the park chief ranger, there has been no year in which more than a normal number of deer have been found dead in the spring. In 1926 the number was 7. Several years ago an examination of conditions by a government committee reported that the browse had all been eaten up, the deer were starving and if something was not done immediately the greater part of the herd would be found dead in the spring. Efforts were then made to drive the deer across the canyon but the deer would not drive. Shooting was permitted and some 2,000 deer were killed in the fall. The next spring arrived and the deer were found to be alive and in the usual condition, thin and poor, for all deer after passing through the winter emerge thin and poor. It was then suggested in order to save the "starving" deer that the fawns be caught, placed on farms, fed on cow's milk and sold in the fall for $25 a piece. Four farms were started with about 50 fawns on each farm and cows were imported to furnish the milk and the fawns were fed milk, cut hay and meal. Result in the fall—only 10% were left. That fall shooting continued with the destruction of about another 2,000 deer. The following year fawns were caught again and in the fall shooting continued. During this time no evidence of starving deer was reported. Last year the same practice continued with the same result. This year a new road is being constructed through V. T. Park. Automobiles have had to pick out their own road. The result has been that this beautiful park has been cut up in all directions by innumerable automobile trails and ruined. The fawns as usual were caught in the spring. The deer have been frightened away from the V. T. Park and have lost this choice feeding ground. This fall an open season on deer has been declared during October, November and half of December. Each hunter is allowed to shoot one buck and one doe. An aeroplane service between the north and south rims was established from Phoenix to the V. T. Park where the deer used to gather. At a cost of $300 hunters are taken from Phoenix to the rim and return and are guaranteed their buck and doe. The National Park Service devotes the summer to taming the deer in the park. In the fall these deer leave the park half tame, go down into the open hills on the west side of the National Forest and are shot. In order to keep the deer down cattle are again allowed to graze and browse in the National Forest where the browse has already been declared to be so scarce that the deer are starving, and when the writer inquired of one of the forest rangers what had become of the deer he was informed that the deer were in the woods at that time of the year eating mushrooms. And where is it all going to end?

Several years ago one of the most remarkable sights in wild life in this country was the mule deer herd gathered and feeding in the clover in the late afternoon on the V. T. meadows on the north rim of the Grand Canyon. Hundreds of visitors came to the north rim to see this display and none went away disappointed. It was truly a great sight.

Then came the cry that the herd had increased tremendously, had eaten all the browse and was starving. It was never realized that deer feed on different things at different times of the year and that they even eat sage brush and thrive if they have to. Nothing at all was said when the so-called starving deer didn't seem to starve. The estimate of the number of deer in this herd was 27,000. This estimate was taken in one instance by counting the deer on the V. T. Meadow and multiplying it by the number of V. T. Meadows the National Forest would hold. Nobody mentioned the fact that when the deer were on the meadow the surrounding forests were practically bare of deer. No one who has watched this herd over a period of years ever has believed that the herd numbered anywhere near 27,000. Formerly in order to protect the deer and cattle the cougars were destroyed and now there are few cougars and soon there will be no deer—a wonderful demonstration of man's care in protecting wild life. The shades of Theodore Roosevelt are ill at ease. And when the writer quietly endeavored to ob-

tain a photograph this year of the 21 remaining deer he was told by the forest ranger that he could not photograph because it frightened the deer away. Why not place at the entrance to the V. T. Park this sign for the information of the public "Slaughter and destroy as much as you like but don't photograph for it will frighten the animals"?

The purpose of all this destruction is said to be the reduction of the herd to meet the requirements of a limited food supply. Where is the real proof that the herd is starving? Restore the cougar, leave the fawns alone, limit shooting and the herd will take care of itself in a better way than by the present vicious methods in use. These animals are in a wild life preserve, under the jurisdiction of the United States. Can nothing be done to stop this miserable treatment of an inoffensive animal?

GRAND TETON NATIONAL PARK

The Grand Teton National Park was created July, 1929. It consists practically of the East face of the Teton Range of Mountains and includes the following mountains in order: Buck, Un-named, Wister, Michu, Middle Teton, Grand Teton, Owen, Pinnacle, Near M't. Considerable difficulty will be experienced in administering this Park, unless the boundaries are extended. The Park should include all the flat country to the West of the Snake River as well as Jackson Lake. It is to be hoped that this addition will be made at the earliest possible date.

The story of the Grand Teton National Park is its great beauty and its geological history. It is a little gem and it should be treated as such. Accommodations for visitors should be placed so that they will not interfere with the beauty of this great Range of mountains. People should be allowed to visit the lakes only on foot or by horse—no roads should be built to infringe on the shores of the lakes. Trails only should be constructed up the mountains and into the Canyons. The Park is at present in a primitive condition. Very few trails exist. Every opportunity is offered, therefore, for development to the very best advantage.

The Range appears to have risen abruptly from the valley. It contains many sharp peaks and the eastern face drops sharply to the valley floor. All the evidences of glaciation are present and in a peculiar manner. Streams come tumbling down the mountain sides into seven beautiful glacial lakes at the foot of the range, and there are many evidences of old glacial lakes that have long since dried up. Moran, Leigh and Glacier Canyons are of great beauty and trails should be built through them as soon as possible. There are many little drainage pools high up in the mountains that have never been properly explored. Of the mountains the Grand Teton, Mt. Owen and Mt. Moran are the most spectacular. The present trail to the glacial basin on the Grand Teton is very beautiful but needs grading badly. It is too steep for horses. At the end of this trail to the right of the point, where it descends to reach the glacier, is a very remarkable observation point. A suitable rest house should be placed here, for the view in all directions is exceptional. A system of trails connecting with one another should be started as soon as possible so that the visitor may have an opportunity to study and enjoy the great variety of rock formations near the summit of the mountains.

It would seem advisable to place the concession and buildings in the neighborhood of Leigh Lake. If it is situated near any of the other lakes their beauty will be greatly marred and the flower areas destroyed. This is especially true of String Lake, which is the most picturesque of all. In general, it would seem best to establish the concentration center in a place easy to reach, but out of sight as much as possible and away from the lakes. From this center trails could be built radiating to the various lakes, and from these to the various mountains and canyons. Every effort should be made to keep the borders of the lakes intact and remove the fire hazard as far as possible.

Transportation by row boat or launch on the lake should be limited to the conveyance of passengers to the opposite side of the lakes where the trails start up the mountains. Boating should not be allowed and the lakes should be kept as primitive as possible in order to encourage the presence of wild life. At present the mountains contain a moderate amount of wild life, Sheep, Bear, Deer, Elk and small mammals. Efforts should be made to produce a healthy increase of these animals by keeping conditions as primitive as possible throughout the Park.

One of the beautiful spots in the Park is Phelps Lake. This Lake is only partly on Park property. Some of it is a private holding. The owner, Mr. Stewart, has devoted many years of his life in developing this area and protecting its natural beauty. It will be to the interest of the Park to cooperate in maintaining Phelps Lake as a Sanctuary, where the visitor may go and enjoy its surrounding beauty, but where he may not be allowed to remain over night. It should be kept intact.

The wild flowers on the sides of the mountain appear to be varied and abundant throughout the Park. Dr. Frixell has already introduced the educational work. He has placed a tent near Jenny Lake, and has started a collection of exhibits for the Museum. In addition he is giving talks on Park subjects at night to the automobile campers and is taking visitors to interesting places whenever this is possible.

The attendance at the Park is already quite large, and promises to increase rapidly so that a park naturalist should be appointed at once to develop the work. As soon as possible a careful study of the geology of the park should be undertaken and made available to the public. This would add much toward helping the visitor to appreciate the magnificence of these rugged mountains. There is at present a road from Moran to Elk by Cunningham's Ranch, which connects with the main road through the valley at Menor Ferry. From this road a magnificent view of Jackson's Hole and the Teton Range is afforded. This road should be widened and improved and used as a scenic driveway. The close proximity of the Grand Teton National Park to Yellowstone Park will result, in all probability, in a rapid increase in the attendance at the Teton National Park. It becomes, therefore, of the utmost importance that plans for the conduct of the Park be made at the earliest possible moment and provision for the care of the public be undertaken at once.

A SURVEY OF ISLE ROYALE, LAKE SUPERIOR

Made for the purpose of determining whether the island meets the requirements of National Park standards—By FRANK R. OASTLER, October, 1929.

Isle Royale is situated in Lake Superior about 40 miles South of Port Arthur, Canada. The island is of volcanic origin. It is bisected by the parallel 48 degrees N. It is a possession of the State of Michigan and is administered at present as a Wild Life Sanctuary. There are five possible points of departure for the island—Port Arthur and Grand Mare, Canada, Duluth, Minn., Houghton, Illinois, and any of several points in Michigan. At present there are only three points from which the island may be reached. Port Arthur, Grand Mare and Duluth.

Isle Royale runs in a general direction from Northeast to Southwest. The island is 45 miles in length, nine miles wide at its southern end, and three miles wide at the northern. It contains about 210 square miles. The shape of the island is something like that of a narrow hand, the palm of the hand occupying the southwest and central portions of the island and the fingers the northeast. Between the

fingers are numerous long narrow harbors. Within the bays and harbors and surrounding the island are about 100 smaller islands. The main island is largely forested. Of the smaller islands some are forested, others simply rock areas with little or no vegetation. Within the island are several good-sized lakes and many ponds and bays. The streams are few and sluggish for the most part. With the rise of the "tide" of Lake Superior often the flow of water in the streams is reversed in part temporarily. The South shore of the island is for the most part flat with beach areas. From the South shore the island rises with a steady incline so that the North shore is quite rocky with palisades of some 300 feet extending abruptly to the water's edge. This rough, rugged, rocky North shore is one of the scenic features of the island and is quite characteristic. Running from the Northeast to the Southwest along the center of the island is a main ridge called the Greenstone Range. The highest point is about 550 feet. Minor ridges run parallel to this. Between these are corresponding valleys with their various lakes, ponds and bays. From these lakes run several small sluggish streams which drain the water into Lake Superior. Inasmuch as the fall is not very great, these streams have little force and are often backed up by the waters of Lake Superior as the "tides" rise and fall many times during the day.

The island is covered largely with a forest of Balsam, Spruce and White Birch, at the Eastern portion, and sugar maple at the Western end. Other varieties of trees are scattered among these, of which mention will be made later. Bare areas, some rocky, others the result of old fires, are scattered throughout the island offering plenty of brush cover and considerable grass. The forest is of second growth, transitional type, consequent upon destruction by fire at some remote period and at present only a few White Pines of the original forest are standing though many old burned fallen trunks may be seen here and there.

The flora and fauna of the island will be considered at length elsewhere.

One of the great charms of Isle Royale is the brilliant sunshine of the summer days. During the winter months the island is heavily covered with snow and practically abandoned. Lake Superior often freezes across to the mainland, affording communication for wild life, especially Moose. Otherwise there is no communication with the island from December 1st, to May 1st. The months of June, July and August are the most enjoyable of the year. The nights are quite cold and the days only comfortably warm. There is considerable humidity throughout this season. During June fogs are of frequent occurrence with very little wind. July and August are comparatively free from fog and there is generally a lively breeze daily especially in the afternoon. Storms begin about the middle of September and are severe. Throughout the summer thunder storms occur at infrequent intervals. The mean monthly temperature over a period of ten years in July was 62.24 degrees F. The range for July was 42 degrees—85.8 degrees. The maximum rainfall for July for a ten-year average was 4.25 inches and the total rainfall for the year 21.73 inches, more than half of which fell during June, July and August. The snowfall averaged 25.44 inches annually, the deep snows that are found in winter being due not so much to precipitation as to low temperature. Moderately heavy clothing is needed during the summer months except in the middle of the day when the heat is oppressive in the forests. The worst storms occur between September and December with the maximum in November. Of these storms the most destructive come from the Southwest preceded by East or Northeast winds. The duration of the season for recreation and enjoyment might be considered from May 15th to September 15th.

During the winter months the only inhabitants on the island are the game warden and his family. From June to September the island and adjacent islands are inhabited by (1) fishermen, (2) owners of summer cottages, (3) tourists who concentrate at Rock Harbor, Tobin's Harbor, Belle Isle and Washington Harbor, where there are modest summer resorts and a club. The total summer population might be estimated fishermen and their families, 12; tourist and cottagers and helpers about 400; lighthouse keepers and game wardens and their families and a few campers. The fishermen live on the surrounding islands and make a poor living catching lake trout and White fish. Cottagers and tourists confine themselves to shore line activities and few go inland. The summer resorts hardly pay. The game warden spends the year on the island and is supposed to do patrol duty, exterminate the brush wolves and prevent shooting. This is rather a difficult job for one man.

Transportation facilities will be considered under two heads. (1) Means for reaching the island (2) Means for getting about the island. At the present writing, facilities for reaching the islands are at a low ebb. Formerly a small steamer carried tourists from Duluth direct. This steamer no longer exists. Now the trip consists in a voyage from Duluth to Port Arthur by way of the Northern Navigation Co. (C.N.R.), a sojourn over night at Port Arthur and a four-hour trip from Port Arthur on the small steamer *Islet Prince*. There are five trips a week. A mail boat arrives at Isle Royale from Duluth twice a week, but carries no passengers. A boat from Grand Mare circles the island to gather fish three times a week and a small private boat runs from Grand Mare to Washington Harbor, for the use of club members only. It is expected that the Booth Fisheries Company will provide a steamer to run from Duluth next summer. There is at present little to encourage people to visit the island. It often happens that sudden storms arise on the lake and the present steamer *Islet Prince* is not of sufficient size to handle weather conditions with safety. Better facilities are greatly needed.

There are no roads on Isle Royale. The island has several good foot trails, no horse trails. Means of communication is accomplished largely by water, either by row boat or launch. The people rarely use the trails except those close to the summer resorts. At present the Northern end of the island is practically without communication with the Southern extremity. There are no fire trails and no fire protection. If a fire should start, the result would be disastrous for the fire would have to be reported by boat to the authorities in Michigan and they in turn would have to send men by boat to the fire—all a matter of about four days.

KEEWEENAW COUNTY.

Office of
COUNTY CLERK AND
REGISTER OF DEEDS
Charles Lampi, Clerk.

EAGLE RIVER, MICH.,
July 8th, 1929.

Dear Sir:

Below you will find the total acreage of Isle Royale as taken from our records, and divided into the different ownerships as follows:

	Acres
United States Government..	4,274
State of Michigan.....	3,393
Island Copper Co.....	27,295
Minnesota Forest Products Company	71,778
Isle Royale Land Co.....	4,229
Consolidated Water Power & Paper Company.....	3,567
All private owners combined	18,084
Total acres	132,620

Very truly yours,
(Signed) CHARLES LAMPI,
County Clerk.

Isle Royale is largely privately owned. Appended is a list of the own-

ers and the acreage owned. With the exception of the area owned by the Minn. Forest Products Co., a concern controlled by William Bachus, the owners apparently would be willing to transfer their holdings to the government. Some would ask for rental concessions. The Forest Products Lumber Co. is demanding an exorbitant price for its holdings. The Company is required to pay high taxes and these taxes are making severe inroads into the value of the property. The Company is very anxious to sell to avoid paying taxes, or else it plans to build a pulp mill on the island, cut the timber and sell it for what it will bring. This latter procedure would of course ruin the island and should never be allowed. The resort people and cottagers are alive to the situation and are endeavoring to get the State of Michigan to buy the property and make the island a State Park. Unfortunately the island, though under the control of the State, is a considerable distance from the State. If the island were created a State Park, the last to benefit would be the State of Michigan. The island would be used largely by the citizens of Minnesota and Canada. Therefore the State of Michigan hesitates to act. Last winter, however, the legislature appropriated $15,000 to have a survey of the island made during the years 1929-1930. The situation is acute and action to protect the island from the Forest Products Co. is immediately necessary. The timber on the island is hardly fit to cut and it is doubtful if the lumber could be transported to the mainland without considerable loss of money. It would appear, therefore, that the action of the Forest Products Co. had been taken to try to force somebody to take the property from them at their price. Many of those living on the island are of the opinion that this property could be purchased through private subscription, provided the purchase price was reasonable.

ADMINISTRATION—As has already been mentioned, the island is being administered by the State of Michigan. There is one game warden who spends the year on the island. From December 1st to May 15th he is alone and there is no communication with the island. The warden's duties are (1) to patrol the island, (2) prevent fires, (3) prevent shooting, (4) protect property, (5) regulate fishing, (6) destroy the brush wolves. The work can not be done by one man properly. The result is that very little is accomplished. There is no fire protection as has been mentioned. On the other hand, the taxes are said to be so high that the owners would rather turn the property over to the State and rent it than pay the present rate of taxes. In other words, except for the collection of taxes the administration of the island does not appear to function. A few brush wolves are killed each year.

THE ISLAND FOREST—There are twenty-one species of trees on the island, thirteen of which are deciduous, the remainder conifer. The predominant trees on the southern portion of the island are the Hard Maple and White Birch. On the rest of the island the trees most abundant are the Balsam Fir, White Spruce, White Cedar, White Birch, Mountain Ash, Juneberry and Wild Cherry. The list is appended:

CONIFERS

White Pine
Norway Pine
Gray Pine
Tamarack—two varieties
Balsam Fir
White Spruce
Black Spruce
White Cedar—arbor vitae
Juniper—two varieties
Ground Hemlock
Spruce—(Mariana)

DECIDUOUS

Aspen—three varieties
Birch—four varieties
Willow—three varities
Alder—two varieties
Beech
Mountain Ash
Juneberry—two varieties
Cherry—two varieties
Maple—three varieties
Dogwood—two varieties

The combination of conifer and White Birch adds much to the scenic beauty of the island and the addition of flowering Dogwood, Cherry, Shadbush and Mountain Ash during the months of June and early July makes a tramp through the woods a pleasure seldom equalled. Prof. Bruce Fink of Miami College, Oxford, Ohio, has discovered 43 varieties of Lichens on the island. Prof. J. M. Holzinger of Winona Normal School, Winona, Minn., and Dr. J. Roll, Germany, found 38 varieties of Mosses, 20 varieties of Ferns, 9 varieties of Grasses, 27 varieties of Sedges and several varieties of Horsetails, Club Mosses and Pond Weeds. One of the many enjoyable features of Isle Royale is the floral display during the latter part of June and the first three weeks of July, and continued in part throughout August. Woods, clearings and rocks vie with one another in the display of their selected plant societies and offer a wonderful opportunity for wild-flower enthusiasts and botanists. The flowers seen in greatest abundance are: Wood Lily, Bunchberry, Pyrola, Marsh Marigold, Calypso, Pitcher plant, Flowering Raspberry, White Cinquefoil, Rose, Cranebill, Violet, Willow Herb, Pipsissewa, Labrador Tea, Swamp Laurel, Senecio, Buckbean, Elderberry, Honey Suckle, Harebell, Gentian, Golden Rod, Aster. A fairly complete list of flowering plants is appended:

CORNACEAE—Dogwood Family
Cornus stolonifera Michx.
Cornus circinata L'Her. Round-leaved Cornel.

ARACEAE—Arum Family
Calla palustris L. Water Arum.
Spathyema foetida (L) Raf. Skunk Cabbage.

JUNCACEAE—Rush Family
Juncus effusus L.

MELANTHACEAE—Bunch-flower Family
Tofieldia palustris Huds. Asphodel.
Uvularia perfoliata L. Perfoliate Bellwort.

LILIACEAE—Lily Family
Lilium philadelphicum L. Red, or Wood Lily.

CONVALLARIACEAE—Lily-of-the-Valley Family
Clintonia borealis (Ait.) Raf. Yellow Clintonia.
Vagnera trifolia (L) Morong. Three-leaved Solomon's Seal.
Unifolium canadense (Desf.) Greene. False Lily-of-the-Valley, Two-leaved Solomon's Seal.
Streptopus amplexicaulis (L) DC. Clasping-leaved Twisted-stalk.
Trillium grandiflorum (Michx.) Salisb. Showy White Trillium.

TRIDACEAE—Iris Family
Iris versicolor L. Larger Blue Flag.

ORCHIDACEAE—Orchid Family
Cypripedium reginae Walt. Showy Ladies-Slipper.
Cypripedium hirsutum Mill. Larger Ladies-Slipper.
Orchis rotundifolia Pursh. Small Round-leaved Orchild.
Habenaria orbiculata (Pursh) Torr. Large Round-leaved Orchid.
Habenaria obtusata (Pursh) Richards. Small Northern Bog Orchid.
Habenaria hyperborea (L) R. Br. Tall Leafy Green Orchid.
Habenaria dilatata (Pursh) Hook. Tall White Bog Orchid.
Habenaria psycodes (L) Gray. Smaller Purple-fringed Orchid.
Pogonia ophioglossoides (L) Ker. Rose Pogonia.
Arethusa bulbosa L. Arethusa.
Gyrostachys romanzoffiana (Cham.) MacM.
Listera cordata (L) B. Br. Heart-leaved Twayblade.
Peramium repens (L) Salisb. Lesser Rattle-snake Plantain.
Peramium pubescens (Willd.) MacM. Downy Rattle-snake Plantain.
Peramium menziesii (Lindl.) Morong. Menzies' Rattle-snake Plantain.
Acroanthes monophylla (L) Kuntze. Large Twayblade.
Leptorchis loeselii (L) MacM. Loesel's Twayblade.
Calypso bulbosa (L) Oakes. Calypso.
Corallorhiza corallorhiza (L) Karst. Early Coral-root.
Corallorhiza multiflora Nutt. Large Coral-root.

SANTALACEAE—Sandalwood Family
Comandra livida Richards. Northern Comandra.
ARISTOLOCHIACEAE—Birthwort Family
Asarum canadense L. Wild Ginger.
MYRICACEAE—Bayberry Family
Myrica glae L. Sweet Gale.
CARYOPHYLLACEAE—Pink Family
Sagina saginoides (L) Britton. Arctic Pearl-wort.
Alsine longifolia (Muhl.) Britton. Long-leaved Stitch-wort.
Silene antirrhina L. Sleepy Catchfly.
NYMPHAEACEAE—Water-Lily Family
Brasenia purpurea (Michx.) Casp. Water Shield.
Nymphaea advena Soland. Large Yellow Pond-Lily.
Castalia odorata (Dryand.) W. & W. Sweet-scented White Pond-Lily.
RANUNCULACEAE—Crowfoot Family
Caltha palustris L. Marsh Marigold, Cowslip.
Coptis trifolia (L) Salisb. Goldthread. Hummocks in wet woods.
Actaea rubra (Ait.) Willd. Red Baneberry.
Aquilegia canadensis L. Wild Red Columbine.
Anemone multifida Poir. Red Wind-Flower.
Hepatica hepatica (L) Karst. Round-lobed Hepatica.
Ranunculus abortivus L. Kidney-leaved Crowfoot.
Ranunculus ovalis Raf.
Ranunculus macounii Ritton. Macoun's Buttercup.
Thalictrum purpurascens L. Purple Rue.
PAPAVERACEAE—Poppy Family
Capnoides sempervirens (L) Borck. Pink Corydalis.
CRUCIFERAE—Mustard Family
Thlaspi arvense L. Field Penny Cress.
Sisymbrium altissium L. Tall Sisymbrium.
Arabis brachycarpa (Y. & G.) Britton. Purple Rock Cress.
SARRACENIACEAE—Pitcher Plant Family
Sarracenia purpurea L. Pitcher Plant.
DROSERACEAE—Sundew Family
Drosera rotundifolia L. Round-leaved Drosera.
Drosera intermedia Hayne. Spatulate-leaved Sundew.
Drosera linearis Goldie. Slender-leaved Drosera.
SAXIFRAGACEAE—Saxifrage Family
Saxifraga tricuspidata Retz. Three-toothed Saxifrage.
Saxifraga nivalis L. Jacq. Clustered Alpine Saxifrage.
Mitella nuda. L. Naked, or Low Mitrewort.
Parnassia palustris L. Northern Grass of Parnaesus.
GROSSULARIACEAE—Gooseberry Family
Ribes setosum Lindl. Bristly Gooseberry.
Ribes prostratum L'Her. Fetid Currant.
Ribes rubrum L. Red Currant.
ROSACEAE—Rose Family
Opulaster opulifolius (L) Muntz. Ninebark.
Rubus parviflorus Nutt. White-flowering Raspberry.
Rubus arcticus L. Arctic Raspberry, or Bramble.
Rubus strigosus Michx. Wild Red Raspberry.
Rubus americanus (Pers.) Britton Dwarf Raspberry.
Fragaria vesca L. Sparingly distributed.
Potentilla arguta Pursh. Tall White Cinquefoil.
Potentilla monspeliensis L. Rough Cinquefoil.
Potentilla littoralis Rydberg. Coast Cinquefoil
Potentilla tridentata Soland. Three-toothed Cinquefoil.
Potentilla fruticosa L. Shrubby Cinquefoil.
Comarum palustre L. Purple Marsh Cinquefoil.
Waldsteinia fragariodes (Michx.) Tratt.
Rosa acicularis Lindl. Prickly Rose.
GERANIACEAE—Geranium Family
Geranium bicknellii Britton. Bicknell's Cranebill.
POLYGALACEAE—Milkwort Family
Polygala paucifolia Willd. Fringed Polygala.
EMPETRACEAE—Crowberry Family
Empetrum nigrum L. Crowberry, Heath-berry.
ANACARDIACEAE—Sumac Family
Rhus hirta (L) Sudw. Staghorn Sumac.
HYPERICACEAE—St. John's-wort Family
Triadenum virginicum (L) Raf. Marsh St. John's-wort.
VIOLACEAE—Violet Family
Viola rotundifolia Michx. Round-leaved Violet.
Viola labradorica Schrank. American Dog Violet.
Viola arenaria DC. Sand Violet.
ONAGRACEAE—Evening Primrose Family
Chamaenerion angustifolium (L) Scop. Fireweed.
Epilobium lineare Muhl. Narrow-leaved Willow-Herb.
Epilobium adenocaulon Haussk. Northern Bog Willow-Herb.
Circaea alpina, L. Smaller Enchanter's Nightshade.
PYROLACEAE—Wintergreen Family
Pyrola chlorantha Sw. Greenish-flowered Wintergreen.
Pyrola asarifolia Michx. Liver-leaf Pyrola.
Pyrola minor L. Lesser Pyrola.
Moneses uniflora (L) A. Gray. One-flowered Wintergreen.
Chimaphila umbellata (L) Nutt. Pipsissewa.
MONOTROPACEAE—Indian Pipe Family
Monotropa uniflora L. Indian Pipe.
Hypopitys hypopitys (L) Small.
HALORAGIDACEAE—Water Milfoil Family
Hippuris vulgaris L. Mare's tail.
ARALIACEAE—Ginseng Family
Aralia nudicaulis L. Wild Sarsaparilla.
Aralia hispida Vent. Bristly Sarsaparilla.
UMBELLIFERAE—Carrot, or Umbel Family
Heracleum lanatum Michx. Cow Parsnip.
Cicuta bulbifera L. Bulb-bearing water Hemlock.
Pastinaca sativa L. Wild Parsnip.
CORNACEAE—Dogwood Family
Cornus canadensis L. Low, or Dwarf Cornel. Bunchberry.
ERICACEAE—Heath Family
Ledum groenlandicum Oeder. Labrador Tea.
Kalmia glauca Ait. Swamp Laurel.
Andromedia polifolia L. Wild Rosemary.
Chamaedaphne calyculata (L) Moench. Dwarf Cassandra.
Arctostaphylos uva-ursi (L) Spreng. Bearberry.
VACCINIACEAE—Huckleberry Family
Vaccinium uliginosum L. Great Bilberry.
Vaccinium pennsylvanicum Lam.
Chiogenes hispidula (L) T. & G. Creeping Snowberry.
Oxycoccus oxycoccus (L) MacM. Low Cranberry.
PRIMULECEAE—Primrose Family
Primula mistassinica Michx. Dwarf Canadian Primrose.
Lysimachia terrestris (L) B. S. P. Bulb-bearing Loosestrife.
Naumbergia thyrsifolia (L) Duby. Tufted Loosestrife.
Trientalis americana Pursh. American Star-flower.
GENTIANACEAE—Gentian Family
Gentiana andrewsii Griseb. Closed, or bottled Gentian.
Tetragonanthus deflexus. (J. E. Smith) Kuntze. Spurred Gentian.
MENYANTHACEAE—Buck-bean Family
Menyanthes trifoliata L. Buckbean.
APOCYNACEAE—Dogbane Family
Apocynum androsaemifolium L. Spreading Dogbane.
Convolvulaceae Morning-glory Family.
Convolvulus repens var. pubescens. Pubescent Bindweed.
HYDROPHYLLACEAE—Water-Leaf Family
Phacelia franklinii (R.Br.) A Gray. Franklin's Phacelia.
LABIATAE—Mint Family
Scutellaria laterifolia L. Mad-dog Skullcap.
Scutellaria galericulata L. Marsh Skull-cap.
Prunella vulgaris L. Self-heal.
Clinoposium vulgare L. Wild Basil.
Lycopus americanus Muhl. Cut-leaved Water Hoar-hound.
Mentha canadensis L. American Wild Mint.
SCROPHULARIACEAE—Figwart Family
Scrophularia leporella Bicknell. Hare Firwort.

Veronica americana Schwein. American Brooklime.
Castilleja acuminata (Pursh) Spreng. Lance-leaved Painted-cup.
Melampyrum Lineare Lam. Narrow-leaved Cow-wheat.

LENTIBULARIACEAE—Bladderwort Family
Utricularia minor L. (?) Lesser Bladderwort.
Pinguicula vulgaris L. Butterwort, Bog Violet.

RUBIACEAE—Madder Family
Galium spurium L. Lesser Cleavers.
Galium triflorum Michx. Sweet-scented Bed-straw.
Galium trifidum L. Small Marsh Bed-straw.

CAPRIFOLIACEAE—Honey-suckle Family
Sambucus pubens Michx. Red-berried Elder.
Sambucus canadensis L. American Elder.
Viburnum acerifolium L. Fairly common in woods.
Viburnum paucifolium. Pyl. Few-flowered cranberry.
Linnaea borealis L. Twin-flower.
Lonicera dioica L. Glaucous Honey-suckle.
Lonicera ciliata Muhl. American Fly Honey-suckle.
Lonicera involucrata (Richards) Banks. Involucred Honey-suckle.
Diervilla diervilla L. Bush Honey-suckle.

CAMPANULACEAE—Bell-Flower Family
Campanula rotundifolia L. Blue Hare-bell. Common rock crevice plant.
Campanula aparinoides Pursh. Marsh Bell flower.
Lobelia kalmii L. Brook, or Kalm's Lobelia.

CHICORIACEAE—Chicory Family
Lactuca pulchella (Pursh) DC. Large-flowered Blue Lettuce.
Hieracium umbellatum L. Narrow-leaved Hawkweek.
Nabalus albus (L) Hook. White Rattle-snake Root.
Mabalus racemosus (Michx.) DC. Glaucous White Lettuce.

COMPOSITAE—Composite Family
Eupatorium pupureum L. Joe-rye Weed, or Purple Boneset.
Solidago virgaurea L. var. (?) European Golden-rod.
Solidago neglecta T. & G. Swamp Golden-rod.
Solidago uliginosa Nutt. Siskowit cabin trail bog.
Aster macrophylus L. Large-leaved Aster.
Aster ptarmacoides (Nees) T. & G. Upland White Aster.
Aster hirsuticaulis Lindl. Hairy-stemmed Aster.
Anaphalis margaritacea (L) B. & H. Large Pearly Everlasting.
Artemisia canadensis Michx. Canada Wormwood.
Senecio balsamitae Muhl. Balsam Groundsel.

MAMMALS—Isle Royale can not boast of a great variety of mammals. Isolation from the mainland except during the winter months forest fires and trapping have reduced the species considerably. Formerly the White Tail Deer and the Wood Caribou could be seen occasionally but they seem to have disappeared in recent years. The principal animal which apparently is thriving is the Moose, and yet, although the food supply is abundant, these animals seem to be diminishing in numbers during the last few years. Four years ago it was estimated that the island contained about 1,500 Moose. This year estimates varied from 600 to 800. The next animal in importance is the Brush Wolf and it has been suggested that these animals are killing the calves of the Moose. The Wolf is no more abundant to-day than it has been for the past few years so that it is hard to believe that this is the sole cause of the diminution in the number of Moose. In-breeding may possibly be a causative factor. Inasmuch as this animal is one of the chief attractions for the visitor to Isle Royale, it would seem to be of the utmost importance that the cause of the diminishing number of Moose be investigated by proper scientific authority, and in addition that active measures be taken to control the Brush Wolf. The winter months are very severe on the Moose and it is possible that some have migrated to the mainland where conditions are better. Up to 1901 there were no Moose on Isle Royale. They first appeared following a severe winter, when Lake Superior was frozen and gave them an opportunity to reach the island. The list of animals on Isle Royale is appended: Moose, Brush Wolf, Canada Lynx, Varying Hare, Eastern Marten, Red Squirrel, Beaver, Mink, Weasel, White-footed Mouse, Red-backed Mouse, Muskrat, Bat.

BIRD LIFE—Bird life on Isle Royale is quite abundant and varied. During my sojourn from June 26th to July 17th, 86 varieties of birds were noted. Of course the most abundant bird almost constantly in evidence is the Herring Gull, but during the latter part of June and the first three weeks of July, the island is filled with the songs of many of our Eastern birds adding greatly to the enjoyment of the visit. 63 summer residents have been noted, 31 migrants, 3 winter residents, and 14 permanent residents. Appended is the list:

SUMMER RESIDENTS

Pied-billed Grebe
Loon
American Herring Gull
American Merganser
Hooded Merganser
American Bittern
Spotted Sandpiper
Marsh Hawk
Sharp-shinned Hawk
White-throated Sparrow
Chipping Sparrow
Song Sparrow
Swamp Sparrow
Cliff Swallow
Barn Swallow
Tree Swallow
Bank Swallow
Cedar Waxwing
Coopers Hawk
American Goshawk
Red-tailed Hawk
Red-shouldered Hawk
Pigeon Hawk
American Sparrow Hawk
American Osprey
Saw-whet Owl
Black-billed Cuckoo
Belted Kingfisher
Yellow-bellied Sapsucker
Flicker
Whip-poor-will
Night Hawk
Chimney Swift
Ruby-throated Hummingbird
Olive-sided Flycatcher
Alder Flycatcher
Yellow-bellied Flycatcher
American Crow
Vesper Sparrow
Savannah Sparrow
Slate-colored Junco
Red-eyed Vireo
Nashville Warbler
Black-throated Blue Warbler
Myrtle Warbler
Magnolia Warbler
Bay-breasted Warbler
Black-throated Green Warbler
Oven-bird
Grinnell's Water-thrush
Mourning Warbler
Canadian Warbler
American Redstart
Winter Wren
Brown Creeper
Red-breasted Nuthatch
Chickadee
Golden-crowned Kinglet
Wilson's Thrush
Olive-backed Thrush
Hermit Thrush
American Robin
Blue Bird

MIGRANTS

Baldpate
Green-winged Teal
American Scaup Duck
Canada Goose
Wilson's Snipe
Yellow Legs
Greater Yellow Legs
Solitary Sandpiper
Killdeer
Broad-winged Hawk
Kingbird
Phoebe
Least Flycatcher
Thick-billed Redwinged Blackbird
Rusty Blackbird
White-crowned Sparrow
Lincoln Sparrow

Migrant Shrike
Philadelphia Vireo
Blue-headed Vireo
Black and White Warbler
Tennessee Warbler
Cape May Warbler
Black-poll Warbler
Palm Warbler
Connecticut Warbler
Wilson Warbler
American Pipit
Catbird
Ruby-crowned Kinglet
Gray-cheeked Thrush

WINTER RESIDENTS

Horned Lark
Pine Grosbeak
Northern Shrike

PERMANENT RESIDENTS

Prairie Sharp-tailed Grouse
Bald Eagle
Great-horned Owl
American Hawk Owl
Hairy Woodpecker
Downy Woodpecker
Arctic Three-toed Woodpecker
Northern Pileated Woodpecker
Blue Jay
Canada Jay
Northern Raven
Purple Finch
White-winged Crossbill
Pine Siskin

FISH AND AMPHIBIA—Of the cold blood vertebrates of Isle Royale, the fishes are the most important to consider. The list of fishes is rather interesting inasmuch as species are found in the streams and lakes which could not have reached the island from the mainland. A list of fishes appended is: Sucker, Minnow, White Fish, Lake Herring, Blue-fish, Makinaw Trout, Pike, Pickerel, Trout, Perch, Yellow Perch. White fish and Makinaw Trout are still abundant, but rapidly diminishing in size and numbers. The larger lakes were formerly filled with these fishes, but they were ruthlessly caught with nets and have not been seen in the lakes recently. A problem of considerable interest is the origin of the other fishes found in lake and stream. Of late years, due to indiscriminate fishing, the White Fish and Trout have materially diminished in numbers and size in the harbors and the immediate waters around the island. In order to preserve these valuable fishes, and also to afford legitimate sport for the angler, commercial fishing about the island should be restricted and at least should be allowed only every 2d year in order to encourage the fish to increase and develop. Brook Trout are not abundant and are only found in a few streams. A list of the Amphibia follows: Common Toad, Pickering's Hyla, Mink Frog, Green Frog, Wood Frog. These species though small in variety, are in great numbers and furnish plenty of music in the Spring, especially the Common Toad. The only snake found on the island is the red-bellied garter snake. Insects abound. Mosquitos and Black Flies in June and July cause much annoyance to human beings and animals as well. Other Flies attack the Moose and drive them to the lakes and mud wallows for protection. The island abounds in the number and varieties of Butterflies, being the junction point of Eastern and Western species.

GEOLOGY—The different rock formations or flat ridges run parallel to each other along the long axis of the island. These rocks are truncated beds of ancient lava flows of fissure formation with interrupted sedimentary rocks. The outside of these beds, being softer (and the sedimentary rocks also), has worn away and valleys have been formed between the remaining ridges. These lava beds are of pre-cambrian age. Elevations and depressions of the land have followed with deposition of sedimentary strata and subsequent erosion until a final marked elevation of the land, occurring at the close of the Tertiary with the beginning of the Ice Age, has remained. The Wisconsin Ice Sheet coming from the Northeast filled the valleys exerting greater pressure towards the South, thereby wearing away the South side of the island and preserving the North. With the recession of the glacial ice and the formation of Lake Algonquin, the island became submerged with the possible exception of Greenstone Ridge. As the water continued to recede new beach lines were formed and other portions of the island emerged from the lake until present conditions existed. Associated with the glacial erosion was a certain amount of faulting and dipping of the rocks producing a northeast palisading as it is seen today, parallel ridges, intervening valleys with lakes and bays—imperfect stream drainage without any main stream and a consequent succession of swamps and bogs. This must mean that the moisture is carried away largely by evaporation, thus accounting in part for the peculiar and abundant humidity on Isle Royale.

These Geological changes, in producing the present geophysical arrangement of the island, have resulted in creating the conditions which cause the island to be of such exceptional interest today, and make it of National Park calibre, for the manifestation of its succession of beach lines, the evolution of its floral societies, the bog invasion of its lakes with ultimate bog forests, and the palisading of its North Shore are unique and of unusual interest and conspicuous beauty, educational as well as inspirational.

RECREATIONAL AND SCENIC FACTORS—Isle Royale is a veritable paradise for the man of the Out-of-doors. There he may camp, away from the madding throng, in the midst of a beautiful forest surrounded by picturesque lakes and streams, and from the shore of his island; he may gaze at length in all directions on beautiful Lake Superior with its many pretty little rock or forested islands in close proximity. The climate is ideal. All forms of outdoor amusements are at hand—boating, fishing, photographing Moose, Natural history, following the trail, canoeing, etc., and withal on an island of rocky shore or sandy beach covered with an abundance of wild flowers and inhabited by many moose on land and an abundance of bird life in the trees. The brilliance of its morning light, the delight of its white birch forest, the glory of its setting sun are features not easily forgotten. To the naturalist, with its geological story as a foundation, and the associated evolution of its flora and fauna, the island affords ample opportunity for pleasurable study.

In discussing the possibility of creating Isle Royale and its surrounding islands a National Park, certain factors must be taken into consideration, (1) Does it meet the required National Park Standards? (2) Can transportation facilities be created to properly care for the visitor? (3) Can suitable accommodations be established on the island for the tourist without interfering with National Park features? (4) Can the island be purchased by the State of Michigan or some body of men and transferred to the U. S. government? (5) Is the island so situated that it can be properly administered? (6) Is the island large enough to accommodate the ever increasing number of visitors without destroying the cardinal features of the exhibit? (7) Can the island be maintained as a National Park and not be relegated to the level of a play ground?

In answer to the first query, it would appear that the island certainly meets the requirements of the National Park Standards for these reasons—(a) the isolation and situation of the island and its tributaries are unique and it is a real wilderness area, (b) its scenic features are of an unusual type of beauty, (c) its geological story is of peculiar interest in association with the glaciation of the region and subsequent lake formation, (d) the excellent demonstration of the evolutionary changes of its plant societies from beach line to the top of Greenstone Ridge, (e) A very good example of transitional zone forest, (f) the remarkable demonstration of the evolution of bog invasion of lake areas with ultimate formation of bog forests, (g) the palisade formations and rocky shores of the island

with lichen colorations a unique feature of the island, (h) plant life in abundance with about 500 varieties, (i) bird life in abundance, (j) the presence of moose in such numbers that they may be easily seen, studied and enjoyed, (k) fish in abundance. *I.* Recreational features exceptional. *II.* Transportation facilities can easily be established if the demand be sufficient, from Duluth, Port Arthur, Houghton (drawing on Chicago and environs) and a choice of places in Michigan. This would necessitate the building of suitable docks. *III.* Suitable accommodations can be developed if properly distributed throughout the island without interfering with scenic features, allowing the tourist to travel from hotel to hotel. *IV.* The question of the purchase of the island seems to be the most difficult of solution. The Lumber Company must be bought out by the State of Michigan or private interests and the island then given to the government. "Conversations" on the subject should commence at once before it is too late. *V.* The island can be easily administered. There should be no roads on the island, only trails. At present there are trails extending from lake to lake from the southwest to the northeast end of the island and also trails running from north to south across the island connected by lakes where canoes may be used. The result is a good connection east and west along the main ridge and two north and south across the ridge. *VI.* The island is large enough to accommodate a fair number of tourists, but accommodations will be limited. Steamer transportation facilities will limit this, however. *VII.* The maintenance of the island as a National Park can be accomplished if the attendance can be limited to those who will visit the Park for their interest in the outstanding features of the Park, and not simply for recreational purposes.

I believe that Isle Royale should be created a National Park for it is of National Park character and a National Park in this section of our country will meet with general approbation.

McKINLEY NATIONAL PARK

WHEN Mr. Charles Sheldon conceived the idea of creating McKinley National Park, he must have intended this park to become a game sanctuary, for after a visit of six weeks in the park two general impressions predominate—one the Grand Alaskan Range with Mt. McKinley at its summit and the other the wonderful opportunity to come in contact with an abundance of wild life, Sheep, Caribou, Bear, offered by no other of our National Parks. Of all the National Parks, Mt. McKinley Park represents the true wilderness area as this is generally interpreted. Before Mt. McKinley is reached, many a mile of barren hill and gravel-bar valley must be passed with wild animals scattered about everywhere. The story of its rocks is of tremendous interest, the mineral deposits offer great possibilities, the beauty of the land carpeted with an endless variety of wild flowers is a great joy, but, after all, the great groups of Dall Sheep scattered over the hillsides, the passing of countless numbers of Caribou silently over the gravel-bars and the sudden appearance from nowhere of the great Alaskan Grizzly along the fringe of forest, make the greatest impression on the average visitor. When, after a journey of many miles, Mt. McKinley is at last reached, its great size, rising as it does 18,000 feet from the valley floor, surpasses all other impressions of beauty and grandeur. By its side mountains after mountains rear their great heads in noble array, high in the air, gowned in magnificent glaciers of blue and white, only to be dwarfed into mediocrity by this giant mass of rock and ice. McKinley Park will always be a park where the lure to return will be never-ending. It is a spot where the man of the out-of-doors will for years to come continue to promise himself just one more trip into its great silences, just one more sight of its sunsets—never ending.

McKinley National Park is merely a park in name today. To be sure there is a Superintendent with some assistants, a log cabin park headquarters, a tent concession and the beginning of a road winding its way over hill and dale toward its terminal goal, Mt. McKinley. The road has progressed for some 50 odd miles, and is nearing a point on Copper Mountain near McKinley Bar, where the first Lodge is to be built. This is still a long distance from Mt. McKinley. For many months to come, McKinley Park will be a trail park for horse and pack outfit, where those accustomed to some of the discomforts of camp life will revel in its glories and forget for a bit the bondage of civilization. The park is of vast acreage—too large at present for the small ranger force to properly patrol. The temptation, especially among the natives, to trespass and shoot is very great, for there is a feeling among the citizens of Alaska, generally, that all game is theirs and theirs to shoot, and the idea of a National Park where the game belongs to the people of the United States, and is there to be preserved for future generations, is entirely new and unpleasant. At present, therefore, the most important task is the development of the National Park idea and the preservation of the wild life. When later the tourists go to Alaska in large numbers for the purpose of visiting McKinley Park, and the citizens of Alaska reap the harvest resulting therefrom, then the National Park idea will take root and grow. In the meantime, it will require a superintendent with a steady nerve and a diplomatic manner to "carry on" successfully. The meager appropriations for the park by the government make it impossible to hope for development at present. It will be hard to persuade the ordinary member of Congress that there is any future for this park and therefore it will be difficult to obtain funds. Only by publicity and more publicity will this, the grandest of all our parks, become known and appreciated. But the work must be carried on. A proper set of administration buildings must be constructed to give the entrance to the park the proper dignity of a National Park. An entrance to the park must be built after the manner of other park entrances. The road to Mt. McKinley must be continued to the head of Cache Creek, where another Lodge must be built. Horse trails must be developed up the important valleys such as Igloo, Toclat, East Fork of the McKinley, Clear Water, Cache, Muddy and Birch Creeks, and one from McKinley Bar to the ranger station on the McKinley branch of the Kantishna. As soon as possible a trail should be built from the head of Cache Creek up the valley and over McGonigle Pass to the Muldrow Glacier on the side of McKinley. From the head of this trail, the best close view of the mountain may be obtained. The ascent of the mountain is made from this point. Here the Muldrow Glacier is flat for some distance and easy to travel on foot or by dog sled. It will offer a great thrill to tourists. The trail up the east fork of the McKinley fork should continue over Richardson Pass, giving to the visitor an excellent opportunity to see the mountain and the country from the south. These are just the beginnings.

And with the development of the park should go hand in hand the educational work. A temporary ranger naturalist appointed for June, July and August should be sent to the park to organize the division, plan for the museum, give lectures and start a collection. There is a wonderful opportunity for anyone with a general knowledge of the natural sciences to spend many summers in the park collecting, with great profit to himself and the park. Professor Dixon, of the University of California, will bear testimony to this fact. There will be plenty to do every minute. As the park develops, the educational formula of other parks should be followed. It may be interesting to note that the Superintendent of the park is already giving lectures at night to the visitors.

MESA VERDE NATIONAL PARK

MESA VERDE National Park is reached with considerable difficulty. Transportation by railroad

from Denver is over a miserable piece of narrow gauge road, with poor connections. The trip from Gallup on the Santa Fe is not so bad when the road is not washed out. Comfortable accommodations will have to be furnished to the public, otherwise no one will care to undertake a second trip to this most interesting spot.

The food at the concession is very bad. It is understood that the D. & R. G. has taken over the concession in the Park and expects to improve matters.

Mesa Verde is unique among the collection of National Parks. It tells the story of prehistoric man of 2,000 years ago, and it tells it in a way so impressive and so subtle that the memory remains inscribed in the mind of the visitor for all time. The whole story of the prehistoric man of the southwest of our country is so entrancing and fascinating, that, after the first visit, the desire is ever to return and return again. It is too bad that all the interesting prehistoric areas of the southwest can not be linked together under one head so that the people who visit this part of our country may be able to obtain a comprehensive knowledge of what was going on 1,500 to 2,000 years ago. Mesa Verde is but a part of the story, a very important part however. The story itself, too, is still in the making and much hard work has yet to be done before the truth is really known.

Probably the most important matter for consideration at Mesa Verde is the great need of funds for excavation and repair. Although many ruins have been exposed and many artifacts disclosed, nevertheless there are very many more that have never been uncovered, ruins that probably conceal many little blocks that are necessary to complete the mosaic of the ancient culture of the Mesa. With the present meager funds supplied by the government, very little can be done, and so the great value of this wonderful Park can be only partly utilized. Instead of building roads and more roads, this money could be utilized with much greater profit in excavation. Mesa Verde at present is in the condition of a large museum where all the exhibits are in the packing cases with no hammer to break open the cases.

Much, however, has been done through private assistance to develop the Park and the educational work is proceeding very satisfactorily. The new museum, though small, contains many objects of interest, placed in such a manner as to interpret the out-of-door exhibits. Work in restoring broken pottery and artifacts is proceeding slowly but steadily. The educational force is young but enthusiastic, and under the leadership of the Superintendent, himself an archeologist, is accomplishing a great deal. The lectures around the camp fire are instructive and entertaining and the visitors are conducted through the various ruins daily and given the story of the people who lived in this land years ago, as far as it is known. Visual education is badly needed to aid in the interpretation of the outside exhibits. The administration buildings are so in harmony with the surroundings that one is almost inclined to believe that they were always there. The ruins of Mesa Verde are so predominant that one almost forgets the flowers, birds, and mammals. These, however, are very interesting and deserve mention. The flora has been carefully analyzed and there are many good exhibits ready for display but, alas, the museum is too small and there is nowhere to show them. Could this not be done in the community house? Also, simple measures for attracting birds and small mammals could easily be arranged adding much to the pleasure of the visit.

In future excavation it is to be hoped that all material found will be allowed to remain in situ except where there are several duplicates. Already too many jars and artifacts of great interest have been taken away for sale or museum purposes in other parts of the country. The future of Mesa Verde lies in a full display of its secrets to a small attendance, an attendance of those who come to the park with a desire to learn the story of the past, who are willing to devote time and attention to every detail presented so that they may carry away with them a picture in chronological order of the culture of the poor creatures who were striving for the light in the great evolutionary progress of civilization in this part of the world.

This is not a recreational park, except in the sense that knowledge is recreation.

THE NATIONAL MONUMENTS

The time has come when the National Park Service will have to devote more attention to the National Monuments under its jurisdiction. A steadily increasing number of tourists visit the Monuments; in fact, the number in attendance is larger than the attendance in some of the Parks. The public has now become accustomed to expect special attention when visiting the Parks and wonders why it receives practically no attention on its visits to the Monuments. The Superintendent of Monuments is receiving constant complaints so he says.

Many of the Monuments are of great scenic, historical or geological value and much might be done to explain these features. Other Monuments are of no value and should be removed from the service. Last year the attendance at lectures at the National Monuments was 56,600. Many of these Monuments are so situated that it is not at present possible for the public to reach them except by pack-train, and here, of course, the attendance is small, but others are easy of access and the crowds pour in during the middle of the day on their way to and from other centers of interest.

There seems to be no general way of handling this problem. Each Monument will require particular attention and a special formula. All Monuments of importance should be carefully studied by scientists proficient in the specialty which the Monument illustrates and a written report on the findings sent to the National Park Service. From these reports pamphlets should be written in popular language explaining the various phenomena. These pamphlets should be available at the National Park Headquarters at Washington and they should also be placed in the hands of the custodians of the Monuments for distribution. For those Monuments easy of access, where the attendance is large, suitable facilities for the care of the public should be arranged. The custodian in charge should be a man conversant with the subject of his Monument and he should have an assistant. Camp grounds should be developed and parking space as well. Most of the people visit these Monuments during the middle hours of the day. A concession should be established where suitable food may be provided. During these hours the custodian and his assistant should be on hand to explain matters of interest and the pamphlets mentioned above should be given to the visitors. A small museum should be built and local exhibits should be assembled. These should be used to aid in explaining the Monument. If the crowds are very large, it may be necessary to increase the staff by adding temporary ranger naturalists for the summer. Where the custodian is not a trained man the lecture should be written out and given to him for his information. Some Monuments such as Cliff Dwellings are subject to considerable damage when the attendance is large. It will be necessary to limit the attendance in such cases, for preservation is more important than enjoyment.

In those cases where the Monuments are inaccessible an effort should be made to build roads to these areas. If this is not practicable or where it will take a long time before funds are available, a suitable shrine should be constructed at the site of the Monument detailing the interesting features, informing the public that the Monument is under government protection with definite penalties for trespass, and requesting that each visitor constitute himself a guardian of the Monument during his visit. Mention should be made that descriptive pamphlets may be obtained from the Washington office or the Custodian.

Each National Park should give publicity to all Monuments in its neighborhood and offer any assistance possible to encourage people to visit these Monuments. This can be accomplished in the museums, along the trail and by visual educational methods. Great care should be taken to prevent the public from injuring these Monuments for many can not be duplicated. The writer has visited the following Monuments: Betatakin, Aztec, Casa Grande, Pueblo Bonito, White Canyon Bridges, Rainbow Arch, Devil's Garden and Window Castles, Inscription Rock, Pipe Springs, Navajo Mountain, Petrified Forest, Frijolas Canyon, Glacier Bay, Mount Olympus.

THE NEVER SUMMER RANGE OF MOUNTAINS

Survey made to determine the advisability of adding the range to the Rocky Mountain Park.

From the top of Falls Pass, Rocky Mt. National Park, looking westward, there may be seen an irregular range of snow covered mountains. This range is called the Never Summer Range. It runs parallel to the main ridge of the Rocky Mountains and is separated from it by an intervening valley, the Kawumechee, the source of the Colorado River. The west side of the Rocky Mountains and the Never Summer Range are of an entirely different type from the east. There is a greater rainfall here and consequently the forested areas and flower gardens are much more luxuriant. Snow remains in many places on the Never Summer Range throughout the Summer.

In order to obtain a comprehensive idea of this range the Phantom Ranch at the head of the Colorado River Valley was used as a base camp and trips radiating from the camp were taken as follows: (1) From the Phantom Ranch to the head of the valley, then up to the glacial Cirque, which includes Mt. Richthofen. (2) From Phantom Ranch to the head of the valley over Lulu Pass. along the irrigation ditch to Lake Agnes. (3) From Phantom Ranch to the head of the valley along the irrigation ditch to Mt. Howard and up Hitchin's Gulch. (4) From Phantom Ranch south to Howe's ranch up Bowen's Gulch to Bowen Pass and then to Bowen Lake. (5) From the Ranch up the old Indian trail, over Milner Pass by the Poudre Lakes, up to specimen Ridge. (6) Down the Kawumeschee valley to Grand Lake. (7) Continuation of this trip to Monarch Lake and the west side of Buchanan Pass and Arapahoe Pass. It was impossible to get over these passes for floods had washed away the bridges and the streams could not be crossed.

The Never Summer Range of Mountains includes the following peaks, in order from north to south, all within the Arapaho National Forest: Nokhu Crags, Mt. Richthofen, Lead Mt., Mt. Cirrus, Mt. Howard, Mt. Cumulus, Mt. Nimbus, Mt. Baker, Mt. Bowen, Cascade Mt. Between these mountains are a number of deep gulches with fair-sized mountain streams. The water from all these streams on the east side of the range is caught in a large irrigation ditch built on the side of the range, which carries water for irrigation purposes to Fort Collins and Greeley. The ditch is owned by a private company, The Home Supply Co. All mountains are over 12,500 feet in height. Mt. Richthofen the highest, reaching 12,953 feet. The Colorado River Valley, situated between the Never Summer Range and the main range of the Rockies, is very interesting. The upper end of the valley is forested with many luxuriant park areas, and many beaver dams. The Colorado River runs irregularly through the center of the valley and has its origin here. The lower part of the valley is occupied by several small ranches. The upper end by a larger one, The Phantom Ranch. The west side of the valley is heavily forested but the east side contains several large areas where the mountains are denuded as the result of an old forest fire. The mountains of the east side contain an old volcano—Specimen Ridge—of considerable interest, all within the Rocky Mountain Park. Mr. Scott, who owns the Phantom Ranch at the head of the valley, is conducting a "Dude" ranch. He is deeply interested in protecting the flora and fauna of the valley with the result that the flower display in this region is unusually fine. and the beaver work as good as can be seen anywhere. There are a great many beaver in this region and a goodly number of Black Tail Deer. Bird life is abundant. The lower part of the valley widens considerably. There are several small ranches here, but they are not profitable. Efforts are made to attract tourists with some success. On these ranches also are many beautiful beaver ponds.

The trail from Phantom Ranch to Mt. Richthofen is a very good one. It follows the valley to its head, then ascends through a delightful forest of conifers, opening at tree line into a large glacial cirque partly snow covered. To the left is a very interesting pass, Phantom Pass, looking into the valley of Lead Mt. and to the right is Mt. Richthofen. Several water falls of considerable size may be seen tumbling down the mountain to join into one stream which flows eventually into the ditch already mentioned. The open spaces are filled with wildflower gardens, and the banks of the streams as well. The rock areas are much eroded, with spires and pinnacles appearing in many places. It is an easy day's ride with plenty of time for exploration from the ranch to the glacial basin. About a dozen Black Tail Deer were seen. The trail to Lake Agnes leads up the valley to its head, then through a beautiful forested area past a lumber camp owned by the Home Supply Co., which owns the ditch. The forest all around this camp is in a disgraceful condition due to improper logging. No apparent effect has been made to restrict the cutting of timber according to forest service regulations, and no effort has been made to clean up the slash. It is really too bad that this condition of affairs should be permitted. Beyond this area the trail continues through a very beautiful open park, Lulu Meadow, filled with wild flowers, then through another timbered area finally entering a large glacial basin just below timber line. Then follows a climb up the side of this basin to the summit where Lulu Pass is reached. The Indian name was Thunder Pass, but it was changed by the Lulu Mining Co. This pass is the most picturesque of any seen in the range. There are many sharp peaks which surround very extensive Alpine Parks with two small lakes. The parks would be covered with flowers, but at present sheep are grazing in this region and consequently the ground is bare. The other side of the pass is heavily wooded with many magnificent trees, the trail following Michigan Creek to another ditch, Michigan Ditch, which collects the waters from the west side of the range all the way to Lake Agnes. Following this ditch, Lake Agnes is reached after a short scramble over the rocks and up a narrow pass. The Lake is a small drainage basin surrounded almost completely by rock ledges extending to the tops of the mountains. It is an interesting lake but of no great importance. This trail is a long day's journey on horseback. The country beyond the pass, the west side of the range, is of National Forest character filled with grazing sheep. The trail could easily be terminated at the head of the pass, as far as scenic interest is concerned.

The trail to Hitchin's Gulch is the same as that to Mt. Richthofen, up to the Home Supply Ditch. It then follows the ditch until the Gulch is reached. Here the stream from the Gulch enters the ditch. The trail follows this stream for about a mile up the Gulch where it ends at a miner's cabin, Hitchin's cabin. Mt. Howard lies to the left of the Gulch. Beyond, rock areas block any further advance but from above there may be seen two interesting lakes at the head of the valley. The valley is heavily forested and well worth a visit. The return trail is straight down the mountain to the ranch, very steep, rough and not safe for horses. The southernmost pass of the range is

called Bowen's Pass. To reach it, the automobile road along the valley will take you to the ranch at the head of Bowen's Gulch, across the Colorado River. There horses may be secured for the trail trip. The trail proceeds over an old log road up Bowen's Gulch. The valley is heavily wooded and contains some of the best timber on the Range. The trail is very interesting with an abundance of flowers. About two-thirds of the way up, it divides; one branch going to the pass and the other (the left) continuing to Bowen Lake. The trail to the pass is through some very high stands of Spruce, eventually opening into a large glacial park with stunted stands of Spruce scattered here and there. This basin is filled with flower gardens and very exceptional areas of blue Columbine may be found here. The climb to the summit affords a good view of the Gulch but the pass is not interesting and the west face of the range is of no scenic value. The journey to Bowen's Lake is through an interesting forest. The Lake is at timber line, but is not of much importance. Good trout fishing may be enjoyed, however, and many journey to this lake during the summer to fish. The Bowen Pass trail is in wretched condition and should be renovated for an increasing number of people are using it every year. The country is used for grazing sheep. Several bands were in evidence on the lower levels of the mountains. This trip, including the automobile ride, makes a very long day. It would be better to camp at Bowen's Lake over night.

The trail to Specimen Ridge follows the old Indian trail up the mountain to Milner Pass. It is very steep for horses. It passes through a forested area, by a small pond called Irene Lake. At Milner Pass the trail skirts the Poudre Lakes into the Poudre Valley. The mountains on either side of this valley are heavily wooded and many beautiful views are in evidence. Proceeding along the floor of the valley for a short distance the trail turns sharply to the left through a dense forest on the side of Specimen Ridge and continuing to tree line finally enters a large alpine meadow at the top of the ridge. Along the mountain there is open country for several miles. In the wooded area several mule deer were seen and in the meadow land, on top of the ridge, a band of sheep. Most of the sheep in the Rocky Mt. Park use this region for their summer range. The trail is too steep for horses. Many excellent views of the Never Summer Range may be obtained from Specimen Ridge and the crater of the extinct volcano on the ridge may be explored from here. The trail lies almost wholly within the National Park. It is a one-day trip with horses. There is an abundant flower display in the alpine meadows on the top of the ridge.

The trip to Grand Lake is made by automobile over a fine road that runs along the western park boundary. About two miles from the lake a road branches from the main road and continues to the Lodge on the side of the hill overlooking the lake. The Lodge is on park property and under the jurisdiction of the park. It is too far away from the lake to be of any value and is badly situated. It is simply a terminus for the busses that come from Estes Park and an excuse rather than a necessity. Grand Lake is privately owned and outside of the National Park. A small village and many private camps are established on the shore of the lake. It is really a summer resort. The trail over Flat Top Pass ends at Grand Lake. It would have been very fortunate if Grand Lake had come into the possession of the government, but this was not possible on account of the private holdings. The trip to Grand Lake is an interesting one. It is largely within the park and passes through much privately owned property. The road to Grand Lake continues along the west side of the Rocky Mt. Range over rolling country. At Sleepy Hollow School there is a branch to the left which continues to Monarch, a summer resort of considerable size. From this point the road runs to Monarch Lake. From the lake, which is really a dam used for boating and fishing, trails lead over Buchanan Pass and Arapahoe Pass. The mountains on the west side of the Rockies are heavily forested and contain many streams and several small lakes. The scenery is rather ordinary. It is impossible to get over either pass on account of the heavy rains which have washed away the bridges and made the streams impassable.

CONCLUSIONS—The Never Summer Range of mountains differs in many ways from the east side of the main range of the Rocky Mountains, which comprises the Rocky Mountain National Park. All plant life is green, growing and fresh and there is a greater abundance of water everywhere. The wild-flower areas are much more beautiful, the forests of Spruce and Balsam are quite dense and the trees are of good size. The country in general is wild, has many foot trails and contains a moderate amount of wild life, large and small. The scenery is quite interesting and snow banks on the passes add much to the beauty of the Range. The lakes are small, few in number, and of no great importance. The streams and waterfalls are well filled and add much to the scenic value of the Range. These remarks have reference simply to the east side of the range. The west side is of no special interest and is purely of National Forest character.

The Colorado River valley at the upper end between the Park and the Never Summer Range, consisting largely of small forested areas and parks and many beautiful beaver dams, is very delightful. Here is an excellent opportunity to study the life of the beaver.

The east side of the Never Summer Range and the intervening Colorado River valley would make a valuable addition to the Rocky Mountain National Park for it would add a wilderness area which it sadly needs. Then too, it would offer an outlet to the park on the west side, where a suitable concession might be established at the end of the Fall River Pass. There are several difficulties to be overcome before this region could be annexed. (1) It belongs to the National Forest Service and is used largely for grazing sheep. (2) There is a privately owned ditch furnishing water to Fort Collins and Greeley, practically running the whole length of the range. Unless some special arrangement could be made the Home Supply Co. would object to this addition to the National Park. All the streams empty into this ditch. (3) The Colorado River valley contains several private holdings. Some of these would be turned over to the government for concession rights, but some would have to be purchased.

MOUNT RAINIER

Mount Rainier has become an extremely popular National Park. Being in close proximity to Tacoma and Seattle and not far from Portland, San Francisco and Vancouver, the attendance has increased very greatly within the last few years. The administration centers, Longmire and Paradise Park, are becoming so overcrowded during the Summer months with automobiles that further developments in other parts of the Park, in order to decentralize the attendance, have become imperative. Plans are being worked out to create a new center at Yakima Park, close to the northeast boundary and just beyond White River Junction. A second development will probably be at Spray Park. The new road to the West will open other areas for the accommodation of visitors. In order to study conditions at Rainier the following regions were visited: Yakima Park, Summerland, Paradise Park, Longmire's and the new West Road.

The story of Rainier National Park is the story of an extinct volcano, 14,407 feet high, 100 miles in circumference, 1½ miles in diameter at the top. The mountain has 22 distinct glaciers hanging from its sides, and nature's efforts to tear down this magnificent rock mass by the various processes of erosion may be seen everywhere. The mountain abounds

in many magnificent parks, streams, lakes, waterfalls and cascades, and during the last week of July and the first two weeks of August presents a wild-flower display unequalled in the United States. Wild life is diversified but not abundant. There are some fish in the streams, but fishing is not good.

The geology, the floral display and the great beauty of the mountain, are the leading features of the story of Rainier. In the development of this Park, great care should be taken to preserve the beautiful park areas. Roads should be constructed only to enable the tourist to reach the points of concentration. The scenic spots should be reached for the most part by horse and foot trails. All artificial amusements should be eliminated from the Park, and every effort made to concentrate the attention of the visitor on the story of the Park and the features to be seen, enjoyed and understood. Progress in the development of Longmire and Paradise during the past few years has been amazing. Natural exhibits have been carefully preserved, and the new road is a delight. The new administration and community buildings are fine examples of what is badly needed in many of our Parks. The educational work, however, has not kept pace with other improvements. Trail talks have been given and there has been a small museum exhibit, but that is about all. The hotel concession and the former park naturalist have been at continual disagreement and much bad feeling has resulted, to the detriment of both. With the inception of the present naturalist, things are beginning to improve. The construction of two community houses, one at Longmire and one at Paradise, should help materially in developing the educational work. These buildings though finished, contain no heating apparatus and, therefore, especially at Paradise Park, where it is cold, nearly every evening, the houses can not be used for evening talks. Funds should be provided at once to heat the buildings properly, so that they may be available. In order to understand conditions throughout the park it would seem best to discuss the various concentration centers separately.

Longmire Springs

Park Headquarters is established here. A comparatively small portion of the visitors sojourn here for any length of time. Most of the people continue up the mountain to Paradise Park. At Longmire there is an excellent community house built at a modest expenditure of $6,000 with ample accommodations for a good sized audience. At present lectures are being given three nights during the week to an average audience of 40. People come from the auto camp and from the hotel to these lectures. During the day visitors are taken on trail walks. There are two trails, very beautiful and full of material to interest the people. The museum is in its infancy, but there is a beginning. Much larger accommodations are needed and more time necessary to enable the naturalist staff to collect and prepare specimens. The men in charge of the work are excellent, energetic and enthusiastic. The most necessary addition at Longmire is a suitable heating apparatus for the community house. Visual education by means of proper lantern slides is also badly needed. There are some slides in use, but they are awful.

The beauty of Longmire is not properly appreciated and should be given publicity. People in their great desire to reach Paradise pass by the interesting flora and fauna of the lower levels of the mountain and therefore understand very little of zoning changes occurring at the different levels, one of the very important demonstrations of the mountain.

Paradise Park

Educational work is practically at a standstill here. Silent trails have been laid out and partly labelled. The labels are of aluminum and hard to read. They are placed a foot from the ground and people will not bend over to read them. The trails are not easily followed and could be better located. The concession and the educational division are at loggerheads. Lectures by the concession are being held at the community house of the concession every evening. Still and moving pictures are shown, some good but mostly bad, detailing the features of the mountain in order to advertise their guide work and horse trips. The naturalist is allowed fifteen minutes to tell the story of the park in the middle of this lecture. Unfortunately the government community hall is some distance from the hotel and camps, and, in addition, has no heating apparatus, so that the park naturalist is unable to attract an audience in competition with the lecture of the concession. The lecture of the concession is announced at the hotel, but not that of the naturalist. There is practically no effort made to give proper publicity to the work of the educational division, either in lectures or trail work, so that the result has been very unsatisfactory. I would recommend the following changes in order to do away with this complex. (1) An understanding with the concession for the benefit of both the educational division and the concession. (2) Lectures to be held by the educational division every night at the Community Hall, at which lecture the announcement of the offerings of the concession be given prominence, the concession lecture to be discontinued —or each week three lectures be given by the concession, and three by the educational division. I have talked this matter over with Mr. Seavar and have found him quite agreeable to any change and willing to assist in any way. His animosity has been against the former naturalist and not against the educational division, so he relates. (3) (a) The community house be properly heated and furnished at once; (b) the main hall be divided into two divisions, one-half used as a museum and library and one-half as an auditorium for lectures and dancing; (c) a caretaker to keep the hall clean and in order; (d) a proper library and museum exhibit to be collected at once and displayed in suitable cases with charts and evergreens; (e) some one placed in charge of the museum and library. (4) Suitable flower exhibits kept in the hotel and also the community house. (5) Silent trails properly labelled, the lettering on the signs painted black and the signs elevated. (6) Suitable trails for trail talks. (7) Time off to allow naturalist staff to collect and study. (8) Proper advertising of trail and lecture work at hotel, camp and auto park by announcements, printing on the menu and by bulletin. (9) Restoration of the bear dump without planks or incinerator in evidence. (10) Printing of "itinerary notes" detailing features seen from the entrance to the park to the summit of the mountain. (11) The establishment of an Information Bureau at the community house. (12) Methods to be developed to encourage wild life for educational purposes and the addition to the park of a suitable area as a winter range for deer. (13) The community house should be attractive and comfortable and every effort made to have the public understand that it is the headquarters of the educational division and the Bureau of Information. (14) A suitable sign should be placed at a point where all automobiles pass, directing the people to the community house, and the ranger service should be instructed to direct people to the house for general information. While at Paradise, I had several conversations with Mr. Seavar regarding the educational work and he seemed to appreciate the importance of the work and agreed to cooperate with us in every way. At present he is preparing a set of prints that I have requested, to be used in visual educational work.

The only lake of any particular importance at Paradise is Reflection Lake. On my visit to Rainier this year I was much disappointed in finding a very poor cabin built on the most beautiful spot on the lake shore

with a poorly constructed dock, broken down, and a concessionaire renting boats to be used on the lake. The lake is one of the beauty spots in this region, is quite small and boating is quite out of harmony with the surroundings. To make matters worse a number of malemute dogs were being housed in the neighborhood, who by their noise had succeeded in frightening away the deer and bear that formerly spent much time around the lake and afforded much pleasure to the visitors. Flower beds, some of the best in the vicinity, had been destroyed, so that the lake has lost much of its former attraction. This concession should cease and the lake be restored to its former condition.

Northeast Entrance to Rainier Park, Yakima Park and Summerland

The road leading to the Northeast entrance to Rainier Park is now well paved and extends through a magnificent forest, similar in many respects to the grandeur of the Olympic Mountains. The public will soon become conversant with this road and it will be recognized as one of the most beautiful in the West. Beyond the entrance of the Park and up to the Park Concession at White River, the park road is in poor condition. A new road is being built to take the place of this one. A new road is also being constructed to Yakima Park. The concession at White River is being very poorly conducted and should be improved at once or done away with. The principal points of interest in this part of the park are Yakima Park and Summerland. From both these parks magnificent views of the mountain can be obtained with the Stevens and Winthrop glaciers and Little Tahoma Mountain. From the valley the trip to Yakima Park takes two and one-half hours, and three and one-half hours to Summerland. It is planned to create a concentration point at Yakima Park, where ample room is afforded and possibilities for development, trails, etc., are excellent. Water, fuel and electricity appear to be the main problems. When this area is developed it should relieve the congestion at Paradise and should become quite as popular.

The trail to Summerland is through a most interesting piece of forest and along a magnificent valley lined with rugged mountains, heavily forested, palisades, waterfalls and streams. It is called the Fairyland Trail and it is not badly named. Summerland Park is more beautiful than Yakima, though much smaller and without water supply. The views are better than at Yakima and it has a better connection with the trail around the mountain. The floral display here, as well as at Yakima, is very delightful. A trail camp should certainly be placed here, where people leaving Yakima in the morning could reach Summerland in the afternoon, spend the night there, returning next day, for Summerland is without doubt one of the most beautiful parks on the mountain.

The educational work is in charge of a temporary ranger naturalist who accompanies parties to Summerland and Yakima and gives trail talks during the week and lectures Saturday and Sunday nights. At present very few visit the park during the week but on Saturday and Sunday the automobile attendance is quite large. The concession is not patronized, for it is in a disreputable condition. The naturalist is a good man, very energetic and has accomplished a great deal with no assistance. He has built his own cabin, constructed a nature trail, built a small museum, has a continual flower exhibit and is constantly helping people to help themselves. As this new site becomes of greater importance, it will require the same attention as at Paradise. At present one naturalist is sufficient.

In order to conduct the educational work at Paradise properly two more temporary ranger naturalists are needed, and an automobile is quite necessary in order that the park naturalist can travel from station to station and keep in touch with all the work. The present park naturalist is a good man, quite enthusiastic, but easily discouraged. There is a great deal of work to be done at Rainier, but compensation for work done will be more than satisfactory.

The new West road now under construction and completed as far as the Puyallup Glacier, bids fair to become quite as striking as the road to Paradise. It will open up many new sections for future use which have never been seen at close range by many before, and some day it is to be hoped that it will extend to Spray Park, where the next concentration point will probably be undertaken. Taking all things into consideration, a road along the East side of the Park would seem to be of more importance and of greater necessity than one along the West boundary, both from an educational as well as an economic point of view. It is suggested that this matter be given serious consideration.

In conclusion, I might add that all the natural features of the Park require scientific investigation so that information as nearly correct as possible may be presented to the public.

ROCKY MOUNTAIN NATIONAL PARK

THE solution of the educational problem of Rocky Mountain National Park is one of the most difficult in the Park Service. Conditions are such that it would almost seem to have been better had the park not been created. The close proximity of Estes Park is very unfortunate. Estes Park at present is merely a summer resort and a cheap one at that. One of the two approaches to Rocky Mountain Park, Thompson's Canyon, has been practically ruined by cheap camps, hot dog establishments, and cheap catch penny places and dance halls. The utter absence of dignity in this approach to the Park is evident everywhere.

The Rocky Mountain Park itself has no particular entrance and is but a continuation of Estes Park. The apparent entrance (Estes Park) and exit (Grand Lake) to the National Park are neither of them within the National Park. Nearly all the important valleys of the Park are in the possession of private individuals and the Park itself consists principally of the mountain tops. The valleys in the Park are filled with cheap hotels or boarding houses, all on private property and not under Park control except to a limited extent. The government can not control the concession rights to the Park for there are none. Park authority is difficult to define or defend.

The region included in Estes Park and Rocky Mountain Park is rich in beauty and of great geological interest. The results of former glacial action are in evidence everywhere and offer the best exhibition of former glaciation presented anywhere in the Park Service. Cirques, drainage basins, moraines, glacial boulders, magnificent erosions are in evidence everywhere. The mountains and hills are very rugged and their summits and many of the little drainage lakes are of exquisite beauty. There is not much wild life in the Park, a few deer and elk, some sheep, a few bear, many beaver and the usual small mammals. The floral display is unusually fine and bird life is abundant. The east and west sides of the range are connected by a road over Falls Pass. Other roads have been built to Fern Lake, Bear Lake and Long's Peak. Roads extend along the east and west boundaries of the Park. Trails have been developed to most of the small lakes along the main ridge of the mountains, both on the east and west sides so that the region is available to a great extent by horse. The area called the Wild Basin abounds in small drainage lakes but these are being largely used as reservoir sites and furnish water for nearby towns. The transportation system is run from Estes Park and has the entire region under its control, another case of the tail wagging the dog. At present the Rocky Mountain National Park does not maintain the dignity of a National

Park and is merely a play ground for the people of Denver and the surrounding country. It is difficult to understand for what purpose the park was created in its present state, but if it was intended to preserve the natural scenic beauty and to emphasize the results of ancient glaciation for the information and pleasure of the people it is a fair guess to state that the number who attend the park acquire practically no knowledge of the story that the park has to offer.

Under the existing conditions it is extremely difficult for the Superintendent, no matter how ambitious he may be, to administer the Park to the best advantage. The only evidence of educational work is the presence of a woman who acts temporarily as a naturalist. Her efforts to instruct by evening talks at the various private concessions have met with varied success. At some places she is wanted, at others she is requested to stay away, and altogether conditions are in a mess. Nothing else has been accomplished. Some of the concessions have hired a man (Hutchins by name) who imitates bird calls, is a good lecturer and entertainer but not a naturalist. He gives a talk when he can get a crowd together, maybe every week or two.

If the Rocky Mountain Park is to maintain the standards set for all National Parks a radical change must be made. At present the east side of the range is the portion mostly in use. Here the people gather in the various private hotels and boarding houses. The road over Falls Pass connects the east and west sides of the range. The scenery is very enjoyable and the road is well constructed. The only place featured on the west side is Grand Lake, outside the Park. At present there are practically no wilderness areas in the Park except at the north end. To round out the Park and add some primitive country it is recommended that the Never Summer Range of mountains and the Colorado River valley at its upper end be added to the Park. The mountains to the south, the Arapahoe Peaks, are interesting but the country is largely controlled by nearby towns and private holdings, and is not available for Park purposes. Aside from the addition of the Never Summer Range to the Park, the following suggestions are offered as a possible solution of some of the difficulties in the development of this Park: (1) Isolate the Park from Estes Park as far as possible. Avoid the use of Thompson's Canyon in entering the Park. Use the North St. Vrain road and have the Park entrance at the head of this road. (2) Establish Park Headquarters near the entrance with a Museum and Information Bureau close by. (3) Establish the authority of the Superintendent so that it will be understood that the Rocky Mountain Park is a National Park with all that that implies and not merely a summer resort. (4) Do away with the western terminus of the Park at Grand Lake and establish a concentration center at the end of Falls Pass at the head of the Colorado River valley where it will be accessible for all wishing to use the Never Summer Range and the Park proper. (5) Get rid of the private holdings at once. (6) Eliminate the hotels and cheap resorts and establish concentration centers as is done in other National Parks, or give concessions to the best on condition that they turn over their land to the government. (7) Apply the same rules and regulations to these concessions that are in use in other parks. (8) Limit the construction of roads. Build a road across the range over a low pass so that it will remain open for a longer period. The Falls Pass road is open for traffic for too short a season. (9) Coordinate the trail system so that it will terminate at the points of concentration. (10) Develop certain wilderness areas to remain as such. (11) Where private holdings can not be acquired, eliminate them from the Park proper. (12) Restrict transportation to one transportation system and control this. The same applies to the use of horses in the Park. (13) Develop auto camp sites within the Park. (14) Encourage campers to use the Park and establish suitable locations for camping, and give publicity to these areas. (15) Have a census taken of the wild life and flower gardens in the Park and have both controlled for future increase in order that visitors may enjoy them. (16) Establish the Educational Division at once in order that the reason for the creation of the Park may be understood. (17) Keep accurate record of all entering the Park and give proper publicity to the Park. (18) Increase the permanent ranger force, selecting older men in order to train the temporary summer rangers. (19) Have a scientific survey made of the Park in order to determine the natural assets of the Park and the best situations for telling the story of the Park. Develop trails to these areas. This will include a careful study of the Geology, Mammalogy, Ornithology, Botany and Dendrology of the Park. (20) Emphasize the story of the Park—glaciation.

ZION NATIONAL PARK

For the purpose of inspecting the educational work, a trip was made from Bryce Canyon to Zion National Park over the new Zion-Carmel road. This road is one of the most remarkable in the National Park Service and adds very much to the interest of these Parks.

The educational work at Zion National Park has progressed very rapidly through the keen interest taken by the Superintendent, Mr. Scoyen, and the diligent efforts of Mr. Woodbury and his assistant. The flora and fauna of the Park have been very carefully tabulated and much has been accomplished in accumulating historical material. The writer was so impressed with the enthusiastic cooperation of all in charge, especially Mr. Woodbury, that he asked Mr. Woodbury to write a brief statement of the progress made since the inception of the work. This is appended.

Many of the suggestions made in the report of 1928 have been adopted, the lecture system is much improved, the museum has progressed nicely and the trail instruction along the new trail to the Narrows has become a prominent feature of the day's pleasure. While at Zion the writer had the pleasure of meeting the Park Photographer, Mr. Grant, and also the Superintendent of Monuments, Mr. Pinckney. The work of photographing the important features of the Parks is proceeding very satisfactorily. The negatives are excellent. It will take several years of intensive work, however, before a satisfactory collection can be obtained, for many pictures can be secured only when the opportunity offers, which is not often. The salary of the Park Photographer is being paid at present from private funds. This should not be allowed to continue. His services are extremely necessary and the salary should be provided from the budget. Lantern slides will be made from these negatives at cost. Mr. Grant is very anxious to receive any suggestions in the conduct of his work and any particular outline of the work of any park will be gratefully received and acknowledged.

In order to get the very best out of Zion National Park it will soon be necessary to add portions of the adjacent country to the Park. There was not sufficient time to investigate these areas. Next year, however, the writer hopes to go over the ground carefully. For instance, a rather remarkable fossil forest has been discovered, additional unexplored prehistoric ruins have been located and another canyon comparable in beauty to Zion itself has been found. Now that the Zion-Carmel Highway is completed, it is to be hoped that the Union Pacific R. R. will begin to develop a concession outside of the entrance to the Park and do away with the present buildings—leaving the Canyon intact.

(Copy)

U. S. Department of the Interior
National Park Service
Zion National Park
Utah

September 19, 1929.

Dear Dr. Oastler:

In accordance with your request, I am transmitting this statement of the educational developments of Zion National Park.

On June 19, 1925, I was turned loose in Zion as a temporary ranger with instructions to see what I could find in the way of natural features of the Park to interest the visitors. I had known Zion for many years, having visited it first as a lad in 1905 on horseback, coming down the old East Rim trail alone and in the dark. The moon arose before I reached the bottom and I spent the night trying to sleep in my saddle blankets, but mostly reveling in the moonlit chasmic grandeur—the beginning of my love for Zion. I visited the Canyon many times after that, and having been reared in the Dixie region nearby, I was already familiar with many of the general things of interest in the Park.

I immediately set to work to make collections of the flora and fauna in order to get definite scientific data about it as well as to provide specimens for a future museum. I was denied the privilege of collecting specimens of the birds and mammals so I had to turn my attention in other directions. I worked at first especially with insects, flowers and reptiles. Soon enough material had accumulated to attract the attention of visitors and my tent became the mecca of many who were interested in such things, despite the fact that most of the local Park force regarded the work with derision and called me the bug-man.

As time went on, I came to know quite intimately the dominant plants and animals, and then I began to take walks to point out the interesting things about them whenever I could get a crowd to follow me. As things were then organized, the horseback trips to the rims took most of the active people and the bus trips in the afternoon took practically all of the stage passengers to the Narrows, so that my only chance was to draw from those that could not go on other trips. These were mostly not athletically inclined and most of the trails available required that sort of ability, so I had a hard time at first to find something really worth while.

Then a little later I began giving evening talks around the camp fire or in the lobby at the Lodge, but later on the porch at the Lodge. In order to give variety to the program, I got the waitresses to organize the first Zion quartette, and I have seen the time when they were encored as many as four times. Those were agonizing talks at first from my standpoint because I was groping through experiment to find the essential things in which the visitors were interested.

Such was the beginning. Each summer since then, sandwiched in between my winter school work, the educational work in the Park has slowly forged ahead. In 1926 I developed the Narrows guided trip. This was quite a struggle. I was tired of the haphazard way of organizing parties of the year before and wanted something vital and essential. The bus drivers had been in the habit of taking their people up the trail and it was a good source of tips. At first, I started to go along with the parties, studying the things along the way and listening to the questions asked and trying to find the essential things in which they were interested. Finally I took to pointing out things along the way that the bus drivers missed and later took charge of the parties myself. Some of the drivers appreciated my help but others resented my intrusion because it interfered with tips. By the end of the season, I had it so firmly established that it has become a permanent thing.

The museum was established in 1928, in a single room, but it has grown so that we have had to double the space for it this year. I was alone in this work until the museum was established, and then Ranger Russell was assigned to help take care of it. This season, a Ranger Naturalist, J. W. Thornton, was appointed to help take care of the increasing work. But with three men at work we are still unable to handle all the work crying for attention. We need at least two more naturalists.

Today we have an organized system of presenting the material to the public. Lectures are given, guided trips conducted, information dispensed, museum specimens displayed, and research encouraged. Plans are laid for the development of silent trails.

Five different lectures have been organized dealing with the carving of the canyon, the geology of the region, plant life (showing how the canyon walls scramble the vegetation), interesting animal life, and the history and settlement of the region (Indians, early explorers, and Mormon settlers). During the season, four lectures have been given daily when conditions warranted. The one dealing with the carving of the canyon has been given twice daily at the end of the road in the Temple of Sinawava. Lectures alternately dealing with the other subjects are given each evening at the Lodge and the Public Camp.

Twice daily the guided nature trip has been conducted along the Narrows trail. This is properly one of the most popular trails of the region. Along its course may be found the key to the erosion of Zion Canyon and it is believed that the forces are at work today the same as they always have been. This is a rare combination, for here is a chance to see a rare and beautiful work of Nature and be able to understand the forces that made it. There is also opportunity to see the various types of vegetation all scrambled together, due to the way the walls modify the climate of the canyon. This is the place to get the personal contact with the visitors.

The museum contains collections of plants, insects, reptiles, amphibia, rocks, fossils, Indian relics and pioneer relics, giving a key to the much larger natural museum—Zion Canyon. In connection with the museum, we maintain an information office to supply visitors with answers to their questions and to handle the government publications about the Parks, both free and for sale.

While the Narrows trail is the only one over which we give personal guide service, yet silent trails are being developed. Signs have already been prepared for two such trails, Weeping Rock and Emerald Pool, and will be installed next spring. These signs are designed to take the place of a personal guide.

Lantern slides have been furnished by the Union Pacific for the lectures at the Lodge, but the sets are far from complete and much remains to be done to make the illustrations adequate. Mr. Grant, N. P. S. Photographer, has recently taken some 225 negatives here in the Park which will furnish a basis for a more complete set of slides for the lectures.

Nature Notes have been started, the second issue now being in press. It is expected to issue a third number in October. The first number was greeted with a lot of favorable comment from those returning slips for subscription.

Research work has not been neglected, as may be seen from the following bibliography of subjects dealing with Zion:

Chamberlain, R. V., and A. M. Woodbury, Notes on the Spiders of Washington Co., Utah, Proc. Biol. Soc. Wash., Vol. 42, March 30, 1929.

Leo, Willis T., The Geology of Zion. Unpublished mss.

Tanner, V. M., The Coleoptera of Zion National Park, Annals Ent. Soc. Amer., Vol. XXI, No. 2, June, 1928.

Woodbury, A. M., Reptiles of Zion National Park, Copeia, No. 166. 1928.

The Snails of Zion National Park, The Nautilus (in press).

Unpublished mss.:

The Amphibians of Zion National Park.
History of Zion.
The Plant Life of Zion National Park.
The Animal Life of Zion National Park.
The Geology of Zion Region.
The Narrows Nature Trip Talk.
Educational Program for Zion National Park.
What to Do in Zion.

Horseback Trips in Zion National Park.

While we have made a good deal of progress in developing an educational program, there is yet much to be done. Primarily our greatest need at present is probably an enlargement of the personnel to adequately handle the ever increasing number of visitors. Our museum is crowded and we need more room, more cases and better facilities for handling the specimens. Much yet needs to be done in the way of scientific study to give us adequate information about many things. We should therefore encourage and cooperate with scientists wherever we can to get them interested in our problems.

Very sincerely yours,

(Signed) A. M. Woodbury,
Park Naturalist.

Report on Visits by Dr. Clark Wissler to National Parks and Monuments of Historical and Archaeological Interests, 1929

DURING July and August the writer visited as many monuments as practicable. Weather conditions made travel difficult, preventing the examination of several important sites. However, the following were studied on the spot: Mesa Verde Park, Aztec, El Morro (Inscription Rock), Gran Quivira, and Bandelier. In addition, Puye, administered by the Indian Department, was studied. Attempts were made to reach the Chaco Canyon, Carlsbad, Navajo Monument, and Yucca House, but, in each case, it was necessary to turn back because of floods.

Special visits were made to the areas of two proposed monuments or parks: Canyon del Muerto and Bandelier. It was also possible to confer with many persons interested in several aspects of the park problem. Among these were: J. L. Nusbaum, Frank Pinkley, E. L. Hewitt, Fred Harvey, Earl H. Morris, A. V. Kidder, Kenneth M. Chapman, and Mr. Kitridge.

Full notes were made from day to day upon which the accompanying comments are based. For the most part, these are the impressions of a visitor and should not be taken too seriously.

Contents

Monuments and Parks Visited

The following impressions are directed chiefly to the educational functions and potentialities of the sites as enumerated.

Aztec. The outward appearance indicated a well-kept ruin, in reasonable repair, clear of vegetation, etc. The custodian had improvised exhibits in closed rooms of the ruin through which he conducted visitors. His talks, as heard (probably not what he usually told visitors) were dignified and reasonably accurate. What his talks failed to do was to give the visitor anything in the way of perspective, or of the total situation respecting the ruin itself; in large part, they were egoistic in that, "I dug this up here, that there, etc." The visitors were allowed to handle artifacts, a questionable practice from the standpoint of conservation.

This Monument comprises a group of ruins but one of which has been cleared. No attempt was observed to call attention to the important features of these additional ruins, nor to the ruins in plain view on the surrounding flood plane of the river, the emphasis being upon the artifacts and their "digging up," as shown in the rooms of the main ruin.

However, these are special points in educational method. The impression is that the Monument is an appealing exhibit and that enough is easily accessible to intrigue the alert visitor into asking questions. A roadhouse and curio store have been opened on private grounds adjoining, in which we were told that a private collection of artifacts formerly taken from the ruin would be placed on display.

One important need for this Monument is the acquisition of additional land for parking and camping, and for a museum, since this group of ruins and its archaeological associations, offers, in my opinion, one of the best places for a Park Museum. It is superior to the Chaco in this respect.

El Morro, or Inscription Rock. The Custodian of this unique Monument lives some ten miles away and can give little time to the site. The visitor finds no one in charge, no one living in sight. This adds to the charm of the place since the surroundings cannot be far different from what they were when the first inscription was made. Vandalism is rare, probably because road conditions and the lack of lodging accommodations on the route discourage visitors. Nevertheless damage has been done and will probably increase as accessibility improves.

So far, only the historical aspect of the site has been exploited, through labels and translations accompanying the inscriptions. No guide is needed; as the visitor reads, the historical background of our Southwest begins to take form in his mind. The writer was accompanied by a person who knew next to nothing of the history of the region and was not historically minded, and though at first not interested, soon perceived the significance of these inscriptions.

Atop the rock are ruins of Pueblo villages; these are not self-demonstrating as are the inscriptions below, but something might be done by labeling. Yet, the chief import of this Monument will always be historical. It is the best place to combine scenic features with a conception of the general history of exploration in the Southwest. With a resident custodian, more labels and accessory exhibits, this Monument can be made one of the more appealing in the series.

One must repeat that road conditions are, at present, hopeless during July and August, the rainy months. Until true highways are constructed, visitors will be few.

Gran Quivira. Every visitor to this Monument, especially if he drives his own car, will come away with a road experience that overshadows every other aspect of the site. This season, at least, the roads were all but impassable in dry weather.

The most striking feature is the view of the surrounding valley. The ruins are extensive, but covered with brush and grasses and, while we do not advocate clearing them at present, the aspect is of something wild and neglected. Something may be said in favor of maintaining this atmosphere at some of our Monuments.

The information given by the custodian is fair. He is ambitious to learn more and more of archaeological technique. Fortunately, so far, he has given most of his attention to the preservation of the church ruins. Of specific criticism, and this applies to Aztec as well, mention may be made of the lack of labeling; without the custodian, the visitor is helpless. No harm would be done by allowing the visitor to wander freely about the grounds, but there are no aids to orient him, as at El Morro. In my opinion, the present custodians of the two monuments under review are not competent to devise efficient labels of this kind; it is too much to expect of them.

The educational possibilities of Gran Quivira are great. It is like Pecos in that it was for a time under Spanish control; it is superior to Pecos in that the buildings were of stone and so are more in evidence and lend themselves to restoration. Around these walls could be focussed the history of Spanish missions and the adaptations of Pueblo life to Spanish culture. To carry out such a program calls for intensive excavation and repair, keen archaeological analysis, and finally, the correlation of data historical. The difficultf will be to avoid desultory tinkering by custodians, both at excavation and repair, and the consequent messing up of these data. Any efficient educational program will depend upon archaeological research on the ground and the working out of this site, alone, might require ten years and cost $200,000. Ten years' desultory digging by a custodian would not uncover much, but it might obscure forever the story the ruin could tell.

Bandelier. The setting is beautiful. The roads are good and pass through wonderful scenery. One leaves this site with the impression that the scenery dwarfs the archaeological exhibit. On the other hand, the ruins are well cleared, are in a fair state of repair, but will need attention in the near future. The visitor is left to his own devices, unless he hires horses and guides, or unless he is brought out by a tourists outfit from Santa Fe.

The educational theme of this site would be exclusively archaeological; to realize upon this calls for museum-like treatment, judicious labeling, and eventually, a resident archaeologist. For the natural history parks "naturalists" are employed; but for historical and archaeological sites anyone is regarded competent to give out information; this is a fundamental weakness in the present scheme.

Puye. Like the preceding this is a beautiful setting, but the interest of the visitor is spontaneously given to archaeology. The educational possibilities are fair. A large amount of reconstruction and clearing out has been achieved and the results of excavations published. There is also a good museum exhibit from this site in Santa Fe.

This site is under the jurisdiction of the Bureau of Indian Affairs. Indians are on the ground to collect an entrance fee, but are incompetent or unwilling to give information. There is nothing much in the way of labeling.

On the other hand, a private company has a hotel in the grounds and provides a guide to explain the ruin to those brought in by the hotel.

Mesa Verde. This is a National Park and not a Monument. Hence, it is not surprising to find a fair-sized personnel and an able superintendent. The comment here will deal exclusively with the educational service, as observed. A week was spent here. The usual procedure in a Park is followed here—evening talks and conducted parties during the day. The superintendent in this case knows his subject and so controls the guide service as far as he can. The Rangers are coached and checked in the information they give out.

The writer's impression is that the information given is reasonably accurate; it must be sketchy at best. The talks given to parties when in the several cliff ruins were to the point and well organized. The quality of the personnel was high and the job was taken seriously. These men are gradually developing a technique for the handling of a party at a ruin; the situation is rather different from other kinds of instruction. Every ranger has the tendency to over-estimate the background the tourists bring to the scene and, on the other hand, to underestimate the intelligence of the average visitor.

The museum at the Park now has a curator and promises to supplement the work of the rangers. At the request of the Superintendent, the writer reviewed the museum, discussed plans for development, conferred with the rangers on their methods, the substance of their talks, etc. The spirit of the group is commendable; it is under good leadership.

The Park itself is still rich in scientific possibilities. The Superintendent is competent to carry on exploration and expects to do so. The top of the mesa contains the less spectacular remains of other cultures; probably all of those found in the region occur there. It is thus possible to work out sites representing the successive cultures of the Southwest. This is feasible and will progress under the present Superintendent.

New Parks or Monuments

Two projects were examined and the opinions of others respecting them were sought.

Del Muerto. This series of canyons is worthy of a park status for its scenery alone. A trip up the bed of the canyon will always be a treasured experience. Yet, unless climatic change sets in the journey must often be by horse and at other times it is wholly impossible. A permanent road in the canyon is impracticable, but a drive to the rim and possibly entrance at the headwaters of the drainage may be possible by automobile in all weather.

Some of the richest archaeological sites in the Southwest are found in this canyon. At least two large sites were occupied continuously from early Basket Maker to the Pueblo period. The excavation of sections of these, slight restorations of walls and supplementary exhibits would present the prehistory of man in the Southwest amidst scenic grandeur. The opportunity to do this is greater here than in Mesa Verde; anyway here, and here alone, of all sites can the visitor be shown a real chronological section. What the Grand Canyon is to geology, Del Muerto is to prehistory. This might well be the key-note to the educational program when a Park is established here.

Bandelier. The advisability of a Park here is not clear. The situation is too complex. The area proposed is rich in ruins. As a group, however, they lack the unity of either Mesa Verde or Del Muerto. This is not meant to deny its educational possibilities; any large ruin will repay development and instruction to the public. In each locality something specific can be uncovered. What is meant here is that the problems of this Park would fall within the classes so far enumerated.

The Fred Harvey Tours

These are conducted parties from Santa Fe as a base. Tourists can join them at stated points, but usually they are an integral part of the railway journey, paid for at the outset. Regular trips are scheduled from Santa Fe to most of the Monuments, but because of road conditions are restricted to a few. Evening lectures are maintained at the hotel in Santa Fe and instructors accompany the parties. A number of anthropologists have been named as advisers to the management, but the writer could not learn that this committee actually functioned. On the other hand, the instruction given, in so far as it was heard by the writer, was as good as that offered in Mesa Verde Park and superior to what is given by the present custodians of Monuments.

This is the only private agency encountered that pretended to give educational service. Naturally, every driver of a hired car gives what incidental information he can. Outside of the area visited, conditions may be different.

Suggestions

No attempt is made to formulate conclusions or recommendations; further study is needed for these, but a number of suggestions are offered.

Key Monuments. From an examination of a map, it appears that these monuments are to be the determinants in a system of highways. Tourists will then plan trips to reach as many as practical while passing through the country. From an educational standpoint the wise plan might be to proceed with the immediate development of a few advantageously situated monuments, par-

ticularly such as stand as indices to different phases of history. In the region visited, these seem to be Mesa Verde, Aztec, El Morro, Gran Quivira, and the proposed Del Muerto Monument. The emphasis in these would be as follows:

Mesa Verde—Cliff Houses.

El Morro—The history of exploration.

Gran Quivira—The history of Spanish missions and control.

Aztec—The climax in prehistoric Pueblo cultures.

Del Muerto—The chronological sequence of cultures.

Educational Romancing. In explaining the significance of any object of antiquity, the temptation is to throw a glamor around it, to make doubtful statements about age, modes of existence, etc. In two instances the writer gave information to those giving instruction only to hear it given out next day in a more thrilling form and farther removed from the facts. The audience always pulls the speaker in this direction. These statements are made merely to cite the methodological problem; the audience must be studied and the character of the ranger personnel taken into account in formulating an administrative policy. An effort to standardize instruction is not advocated; rather by restorations and labels should the objects themselves tell the story, or at least offer the corrective.

Another important consideration is that the visitor is on a vacation to escape from work and wishes to have a good time. He wishes to be amused and not forced to think. The custodian and the ranger must concede this point and offer something in the way of entertainment.

Visitor's Handicap. As a rule, the tourist entering Mesa Verde Park for the first time has no conception of prehistoric life in the Southwest. Everything looks strange and unexpected. He has only the background of ordinary human experience; this is a difficult thing for the custodian and ranger to comprehend. Probably always, dependence must be placed on objective helps rather than on personal instruction to meet this situation.

Restoration. The most effective method of conveying information as to the mode of life in the past is by restoration. In the handling of Monuments a policy is advisable. What this policy shall be is debatable. In some cases no restoration of any kind may seem best, whereas elsewhere complete restoration will be demanded. If the issue is evaded, there will be a drift into one course or the other as the universal pattern of procedure.

In purely historical preserves, as in battlefields, a large amount of restoration in the way of equipment, dress, etc., must be provided to carry the setting of the event memorialized. Perhaps one of the most satisfactory historical restorations is in a State Park at Harrodsburg, Kentucky, where Fort Harrod has been rebuilt and fitted out as a pioneer fortified village. This becomes a key exhibit for "the crossing of the Allegheny Mountains." This principle of exhibition is, in the opinion of the writer, the fundamental factor in objective aids to instruction at historical sites.

In archaeological preserves, restorations may be less reliable, but they are possible. Moreover, living Pueblo Indians are visited by the tourists and these can be cited as in part illustrative of cliff dwellers, for instance. Further, artifacts will go far in this direction; here lies the justification for a museum at each important site. The ideal place for such restoration is Del Muerto; here cloth, sandals, etc., are well preserved, even for the earliest periods of occupation. A properly exhibited collection would tell the story very well.

The presentation of rooms as uncovered, with artifacts in place, etc., is also important. It is not enough to tell the visitor how the people lived; he is entitled to know how you arrive at such conclusions respecting people long dead.

Research. It seems axiomatic that any program or detailed policy of archaeological education must rest upon intimate knowledge of the sites involved. Each of the "key" monuments listed under another head calls for large programs of excavation and study. It seems pertinent to consider a scheme covering ten or more years during which concerted investigations can be carried on under the auspices of a single agency.

Nov. 8, 1929.

Minutes of Meetings of Committee on Educational Problems in National Parks

Mammoth Hot Springs,
Yellowstone National Park.
July 1, 1928.

The Committee on Educational Problems of National Parks met informally at 3:00 P. M. in Dr. Merriam's room in the Mammoth Hotel. Those present were Dr. H. C. Bumpus, Dr. H. C. Bryant, Dr. John C. Merriam, and Dr. Frank R. Oastler. Dr. H. C. Bryant was, by common consent, appointed temporary secretary. There followed a general discussion of the functions of the committee and the order of procedure. It was agreed that some statement should be worked out defining the purpose of national parks and the justification of an educational program before undertaking discussion of the type of program to be inaugurated. At 5:30 the meeting adjourned to meet again at 9:30 on July 2nd.

H. C. Bryant
Temporary Secretary

Mammoth Hot Springs,
July 2, 1928.

Without the formality of a chairman the Educational Committee opened discussion on the purpose of an educational program. Eight objectives which national parks are best suited to handle were suggested and listed. Then followed discussion of the methods to be employed. It was agreed that a nature guide program designed to lead people to gain personal experience with natural phenomena should have first place with other methods supplemental. The meeting adjourned at 11:30 A. M. and reconvened at 2:30 when discussion continued to center on method. Adjourned at 4:30 P. M.

H. C. Bryant
Temporary Secretary
Approved July 3, 1928

Mammoth Hot Springs,
July 3, 1928.

The minutes of preceding meetings were approved. After a review of accomplishments the committee undertook discussion of museums and nature trails. It was the consensus of opinion that all useful publications should be on sale at educational headquarters in each park. After a noon recess there followed discussion of research. The need for correlation was stressed. A report from Dr. Bumpus showed that progress was being made on the problem of libraries. The meeting ended with an incomplete discussion of type of administration as applied to the proposed educational program. Adjourned to meet at 9:30 July 5, 1928.

H. C. Bryant
Temporary Secretary
Approved July 3, 1928

Mammoth Hot Springs,
July 5, 1928.

The Committee met as usual and began discussion of further itinerary. It was decided to study educational work in Yellowstone then to proceed to Bryce, Zion and Grand Canyon National Parks, leaving Dr. Bumpus to further study work in Yellowstone.

Mr. Ansel Hall, Chief Park Naturalist was called upon to present problems concerned with educational work in Yellowstone. He explained the needs as (1) organization of current operation, (2) a program budget, (3) correlation of working plan. A sizable written report was presented for study. The requirements of the educational division were also discussed. Park Naturalist Yaeger was present. After arranging an itinerary for the following two days, the meeting adjourned.

H. C. Bryant
Temporary Secretary

Ahwahnee Hotel, Yosemite.
Yosemite, Calif.
July 30, 1928.

After emphasis on the importance of the educational program in national parks and its place in adult education, discussion turned to problems in Yosemite National Park, particularly those presented at Glacier Point and at the Mariposa Grove of Big Trees. It was agreed that Glacier Point needs more development commensurate with its importance as a place to tell Yosemite's story. Members of the committee present felt that developments at Mariposa Grove should be outside of main grove of big trees. Developments should be made accordingly. Affirmative action was taken on following points.

1. Educational program should lead visitors to intelligent contact with the great features of each park.
2. Yosemite Museum should be enlarged. Auditorium should be under government ownership.
3. Some vantage points from which main features can be seen must be selected and used as lookout stations. More trails needed to best places in valley.
4. School of Field Natural History logical training course for men engaged in educational program.
5. Hikers camps are of great service in giving opportunity to visitors to more greatly appreciate their park.

Dr. Vernon Kellogg being present the only absent member of the committee was Dr. H. C. Bumpus.

Adjourned to meet August 2.

H. C. Bryant
Temporary Secretary
Approved Dec. 6, 1928

Ahwahnee Hotel, Yosemite,
August 2, 1928.

The Educational Committee, with all present except H. C. Bumpus, held informal discussion on matters relating to Yosemite. It was decided that Tuolumme Meadows presented a difficult problem and that probably for the present a nature guide would stimulate interest in high country trips by giving mountaineering information. Another difficult situation is presented by lecturing escorts. It was decided that this problem needed further study to determine how it might be correlated with the regular government educational work. No decision was reached on the status of the Indian Village but it was the opinion that improvements on the situation are necessary. The matter of zoos was discussed and disapproval was registered on the keeping of any exotic species. The question of properly housing of species not available to the public in the open was given approval.

Approved recommendations for Yosemite included:

1. Increased educational staff.
2. Enlarged work at Glacier Point including additional space at Lookout to include museum and open air auditorium. A new location giving a view of the valley to be considered.
3. Secure Dr. F. E. Matthes to help in locating Lookout and to continue further geological work in the Sierra. Other experts needed, particularly those adapted to the study of fish fauna. Best qualified men should be invited to help solve problems.

4. Men for educational staff should have: (a) ability, (b) higher salary, (c) reasonable time for preparation.

5. Educational program needs development of means of leading people to worthwhile things to be seen. Present program is not complete or well rounded.

6. Educational work in national parks should bring to individual open vision, real happiness, and the awakening of an interest in life that may be developed further at home.

Plans were made for a meeting in Washington during the winter.

Meeting adjourned at 11:10 p. m.

H. C. BRYANT
Temporary Secretary

Approved Dec. 6, 1928

Washington, D. C.
December 6, 1928.

By common consent Dr. J. C. Merriam was made Chairman of the Committee on Educational Problems in National Parks. A meeting of the Committee, all members present, held in the office of the Assistant Secretary of the Interior, Washington, D. C., was called to order by the Chairman at 10:15 A.M. on December 6, 1928. The minutes of previous meetings were read and approved. Dr. Merriam suggested a program for the three-day meeting to be held. A list of seven specific points relating to the general problem submitted by Dr. Merriam were fully discussed and were then approved in principle. Looking toward proper administration of educational work in national parks the following was agreed upon:

1. In view of the fact that the purpose of national parks is to be found in their inspirational and educational values there should be an advisory body of five to seven of the ablest men conversant with national parks, appointed by the Secretary of the Interior, on nomination by the Director of National Parks, to serve without salary, whose duty it shall be to advise the Director of National Parks on matters pertinent to educational policy and developments in national parks.

2. There should be a Division of Education coordinate with other divisions of the National Park Service directed by a man with the best of scientific and educational qualifications who shall administer the educational program in the parks.

After informal discussion of a project of visual education in the parks and of the need for immediate action in the matter, the meeting adjourned for lunch.

H. C. BRYANT
Temporary Secretary

Approved December 7, 1928

December 6, 1928.

The afternoon meeting of the Committee began with further discussion of a visual education program and the effect that immediate action might have on the major program. There followed a discussion on a particular project, that of Mt. Lassen National Park presented by Dr. Merriam, also presentation of the problem of research in the parks. After attention to the position which minor subjects will hold in the main body of the report, the meeting adjourned to meet again on December 7 at 11 o'clock.

H. C. BRYANT
Temporary Secretary

Approved December 7, 1928

Washington, D. C.
December 7, 1928.

The Committee on Educational Problems in National Parks was called to order for its second day session at 11:05 A. M., December 7, 1928. All members were present except Dr. Oastler. The minutes for December 6 were read and approved. Discussion centered on a report on Mount Lassen Volcanic Park. The report was considered as a type of project in a new park and was discussed in detail. After suggestion of minor changes it was accepted as part of the statement of principles soon to be prepared. Adjournment for lunch was then taken.

H. C. BRYANT
Temporary Secretary

Approved Nov. 26, 1929

December 7, 1928.

The Committee, called to order at 2:00 P. M., began informal discussion on organization of educational work. At the suggestion of Dr. H. C. Bumpus, commendation was given the Park Service on their publication of the Rules and Regulations and of Nature Notes and issuance of additional larger and shorter statements about outstanding features urged. It was felt that improvement of Nature Notes might be obtained by better printing and more adequate supervision. Suggested additions to the report to be issued included: Statements on Museums, nature guide service, visual instruction and publications. Messrs. Cammerer and Demaray of the Park Service then presented facts and figures relative to administration and finance. The meeting adjourned at 4:45 to meet December 8 at 11 o'clock.

H. C. BRYANT
Temporary Secretary

Approved Nov. 26, 1929.

Washington, D. C.
December 8, 1928.

The Committee on Educational Problems in National Parks was called to order by Chairman J. C. Merriam at 11 o'clock. All members were present with the exception of Dr. Frank Oastler. A letter from Dr. Oastler was read by the Chairman, after which it was agreed that the project of visual education in national parks should not be submitted as a separate report but that it merited support and that outside means for aiding the project should be obtained without formal recognition by the Committee. Dr. Merriam presented a preliminary statement on the biological problem, after which discussion centered upon the educational experiment at Yavapai Point in Grand Canyon National Park. After agreement that recreation should be mentioned as included in the purpose of national parks the committee adjourned for lunch.

H. C. BRYANT
Temporary Secretary

Approved Nov. 26, 1929

December 8, 1928.

At 3 o'clock the Committee was presented to Secretary of Interior West by Mr. Cammerer. On being called to order the general plan of the report to be issued was indicated as follows:

I. General statement of policies.
II. Research in National Parks.
III. General plan of operation and maintenance.
IV. Specific plan of operation in the parks.
  A. Nature Guide Service.
  B. Museums.
  C. Visual instruction.
  D. Publications.
V. Lassen Volcanic Park as a type project.

Before adjournment at 4:30 P.M., Mr. Cammerer presented additional information relative to maintenance and finance. It was understood that the Committee would meet somewhere in the West early next summer.

H. C. BRYANT
Temporary Secretary

Approved Nov. 26, 1929

522 Fifth Avenue, New York City
April 19, 1929.

At a meeting of the Advisory Board of National Park Service special request was made of the Committee on Educational Problems in National Parks to carry out certain studies which are of urgent importance to the National Park Service in the immediate future.

Following the meeting of the Advisory Board of National Park Service at which this request was made, there being present six of the seven members of the Committee on Educational Problems in National Parks and the seventh member being in California and not available, the Chairman of the Committee called a meeting to discuss the request from the Advisory Board.

In accordance with a request of the Advisory Board, inquiry was made regarding the possibility of having

members of the Committee on Educational Problems study especially such parks as Grand Teton, Mount Lassen, Sequoia, Rocky Mountain Park, and Everglades, together with the new areas and proposed extensions to which consideration must be given in the near future.

Request was also made of the educational committee that it give special consideration to certain of the greater questions which will inevitably be expressed through use of the National Parks. Question was raised as to relation between the so-called historical parks representing relatively recent history and the archaeological parks, such as Mesa Verde. Special request was made of Dr. Wissler that he examine this problem from all angles and make special report.

In accordance with the request of the Advisory Board, the Committee on Educational Problems requested the Chairman of the Committee to arrange a program for studies during the coming year and to make such estimate of a budget as would make it possible to cover expenses of the members who might engage in studies during the coming summer and at the same time leave a moderate margin available in existing funds for use in printing the report of the Committee some time during the coming year.

(Signed) JOHN C. MERRIAM
Chairman

Approved Nov. 26, 1929

Washington, D. C.,
November 26, 1929.

The Committee on Educational Problems in National Parks was called to order by Chairman J. C. Merriam in the office of the Assistant Secretary of the Interior at 10:15 A.M., all members present. The minutes of the meetings held in December, 1928, were read and approved. The Secretary was asked to bring in official names for the Committee and for the advisory board. Dr. Merriam then outlined a method of procedure for the meeting, which was adopted. There followed a presentation of the limitations of educational work in National Parks in view of official attitude as to the function of the government in this regard. A discussion of a better term than education did not bring out more desirable nomenclature, but stress was placed on the desirability of suitable interpretation. Dr. Wissler then presented a statement on the part monuments might play in vividly portraying the history and pre-history of the Southwest. There followed discussion, at the end of which he was asked to present a concise statement at the afternoon session. Adjournment for lunch.

H. C. BRYANT
Temporary Secretary

Washington, D. C.,
November 26, 1929.

When called to order for its afternoon session, request was made for expense accounts to be submitted promptly. Dr. Atwood presented a report on special responsibilities and opportunities for education and research in the field of the earth sciences. Discussion of the outstanding features followed a series of questions presented. Dr. Atwood followed with a forceful statement on the emphasis that should be placed on great concepts rather than isolated facts. Dr. Wissler's concise statement was presented as follows:

> In view of the importance and the great opportunity for appreciation of the nature and meaning of history as represented in our national parks and monuments, it is recommended that the National Monuments containing, primarily, archaeological and historical materials should be selected to serve as indices of periods in the historical sequence of human life in America. At each such monument the particular event represented should be viewed in its immediate historical perspective, thus not only developing a specific narrative but presenting the event in its historical background.
>
> Further, a selection can be made of a number of existing monuments which in their totality may, as points of regard, define the general outline of man's career on this continent.
>
> The realization of such a program will entail the serious investigation of the sites involved, a determination of the phases of history to be presented in each case, their presentation as historical data, and finally the coordination of the units in this series to the end that the whole will at least sketch the history of man in relation to his changing political, social and natural environment.

This was accepted and ordered included in the minutes. Presentation was then made of a biological statement by H. C. Bryant and discussion brought out additional points needing consideration.

Adjourned to meet at 10 A.M. on November 27.

H. C. BRYANT
Temporary Secretary

Washington, D. C.,
November 27, 1929.

The Committee on Educational Problems in National Parks met for a second day session in the same room in the Interior Building. When the meeting was called to order all members were present. Dr. Atwood presented a report on the educational and research opportunities in the field of the earth sciences. This was accepted. Dr. Bryant then presented a brief summary of opportunities in the life sciences and asked for more time to improve it. The report was accepted in principle.

Dr. Merriam then presented the critical situation relative to the protection of the fauna and flora of the South Rim of Grand Canyon. It was moved, seconded and carried that the program to hold up all cutting and grazing on a defined area near Grand Point necessary to preserve intact the plant and animal life be approved.

By common consent a statement on the appreciation of nature and on spiritual values was left to Dr. Merriam and a statement on the need for intensive study before laying out a program and the need for time and space for contemplation was awarded Dr. Kellogg. It was then agreed that replacement in archaeological work should always have scientific justification.

After discussion of a suggestion by Dr. Oastler it was agreed that a general recommendation asking for appropriations to cover archaeological and other needed research should be made. It was agreed that a continuous program should be developed on the basis of an approved program.

Individual reports on various parks were then made: Sequoia—Bryant; Rocky Mountain—Kellogg; Glacier and Grand Teton—Atwood; Yellowstone—Bumpus. It was shown that activities in Yellowstone have experimentally developed certain new ideas of reaching the public. The reports were accepted in principle.

After making decision to mimeograph individual reports and present them to the National Park Service, the meeting was adjourned.

H. C. BRYANT
Temporary Secretary