1937.

NEW ZEALAND.

DEPARTMENT OF LANDS AND SURVEY.

SCENERY PRESERVATION.

REPORT FOR THE YEAR ENDED 31ST MARCH, 1937, TOGETHER WITH STATEMENT OF EXPENDITURE AND SCHEDULE OF LANDS ACQUIRED AND RESERVED DURING THE YEAR UNDER THE SCENERY PRESERVATION ACT.

Presented to both Houses of the General Assembly pursuant to Section 17 of the Scenery Preservation Act, 1908.

Department of Lands and Survey, Wellington, 1st September, 1937.

SIR,—

I have the honour to submit herewith a report on scenery preservation for the year ended 31st March, 1937.

I have, &c.,
W. ROBERTSON,
Under-Secretary for Lands.

The Hon. Frank Langstone, Minister in Charge of Scenery Preservation, Wellington.

REPORT.

AREAS set apart during the year by Proclamation or special enactment as scenic or historic reserves under the Scenery Preservation Act covered a total area of 36,468 acres, while one private scenic reserve of 1,002 acres was declared under the provisions of the Scenery Preservation Amendment Act, 1933.

In the North Auckland Land District an area of approximately 250 acres on the Kaeo–Okaihau Main Highway in the Whangaroa County was set apart during the year. This reserve is very conveniently situated and is of outstanding value, as it is the only area of kauri forest reserve on the main highway on the East Coast route between Devonport and Kaitaia. Part of the land was purchased from a private owner, part was acquired from the Natives, and the remainder comprised a portion of the Puketi State Forest which the State Forest Service agreed to have set apart under the Scenery Preservation Act in order to round off the boundaries of the reserve. Great appreciation has been expressed at the decision to have these lands reserved, and the Department gratefully acknowledges the valuable assistance given by the State Forest Service in completing the matter. It is intended to appoint a suitable Board of control in due course.

Shortly before the close of the year arrangements were completed for the purchase of 85 acres of scenic bush on the Whangarei–Kiripaka Road. This area comprises an excellent sample of mixed bush with kauri, puriri, and rimu. Regeneration in the form of kauri rikas is an additional feature. The purchase-price was raised partly by means of local subscriptions, partly by grant from the Bruce Trustees, and partly by Government grant. When the necessary survey has been completed and the title adjustments made the area will be proclaimed under the Act.

As a result of exchanges under Native consolidation proceedings the Crown has acquired approximately 980 acres of bush country formerly held under Native ownership, and comprising portions of the Waikare and Tutaematai Blocks in the watershed between the Bay of Islands and Whangaruru Harbour, and adjoining the main Russell–Whangaruru Road. In pursuance of the policy of general conservation a further 500 acres is in course of acquisition from a private owner, and the

whole area will be reserved as soon as possible. These areas, together with existing reserves, will form a substantial contribution towards a continuous reserve along the main watershed.

Areas totalling a little over 7,000 acres in the Auckland Land District were dealt with during the year. The reservations made included a block of 316 acres (formerly State forest) situated near Wairakau, about six miles from Te Aroha. This is steep and broken country, mostly in tawa bush, and containing a fine grove of kauri. Farther south a block of 4,441 acres (including two small State forest reserves each of 50 acres) of steep and broken bush land on the ranges behind Gordon were brought under the Act. Arrangements were also completed for the reservation of an area of 2,183 acres on the slopes of Pirongia Mountain. Of this area, some 1,700 acres was purchased from private owners, the remainder comprising Crown land lying generally within the purchased areas. The Bruce Trustees made a most generous contribution in this case, and the Department is once again deeply indebted to them for their practical assistance in the cause of scenery preservation. A small reservation of 128 acres was made on the watershed between the Waitekauri and Grace Darling Streams in the Waikino district.

No reservations were made in the Gisborne and Hawke's Bay Districts, but various proposals for the acquisition of areas of scenic interest are under consideration.

The only reservation in the Taranaki District was that of a small area of closed road and severance on the Stratford–Taumarunui Main Highway. This was added to an existing reserve in the locality.

Reservations totalling some 3,251 acres were made in the Wellington District. These included an area of 204 acres of recreation reserve in the Makuri Gorge which was dealt with by special legislation (section 15 of the Reserves and other Lands Disposal Act, 1936); small areas in Ohakune Borough and Pongaroa Township; a number of small areas in the Turakina Valley; and some nice pieces of bush land in the Hautapu Block, Taihape District. An area of 715 acres near Mangaweka was also brought under the Act. This land had been reserved in 1907 for forest conservation and as a sanctuary for native birds, but it was considered that more adequate protection would be given by applying the provisions of the Scenery Preservation Act to the land. Arrangements were completed for the surrender by a Crown lessee of some 43 acres of excellent second-growth bush facing the Makatote Stream on the Main Trunk line; and the land was duly proclaimed as a scenic reserve. The Railways Department made available for reservation an area of nearly 12 acres of railway land situated in a bend of the Hautapu River. This area carries a good stand of native bush, which is seen from the main Taihape–Ohakune Road, and which, together with the existing scenic reserve between the river and the road, is recognized as being one of the main beauty spots on that road. A small area of a little under 2 acres on the Marton–Hunterville Highway was purchased, and, together with an adjacent closed road area, was reserved and added to the Silverhope Reserve. An area of 1,888 acres of steep and broken bush country on the Wanganui River was also set apart during the year.

Nelson District reservations totalled over 13,700 acres. Two areas of 3,000 acres and 4,100 acres respectively of the Buller Coal Field Reserve were set apart under the Scenery Preservation Act by section 18 of the Reserves and other Lands Disposal Act, 1936. These areas comprise hilly bush country at the Westport end of the Buller Gorge, and it is considered that the bush should be strictly reserved for scenic purposes. A small area of Crown land adjoining was also reserved. Six areas of provisional State forest, totalling some 4,975 acres and extending for about twenty miles along the Reefton–Maruia Road in the valleys of the Inangahua and Rahu Rivers, were set apart as scenic reserves with the consent and approval of the State Forest Service. They comprise generally a strip of bush approximately 20 chains in width on each side of the road. Large areas of provisional State forest reserves in the locality have been set apart as permanent State forests, but by special arrangement the strips along the road were excluded from the permanent State forest proposals in order that they might be brought under the Scenery Preservation Act. The Reefton–Maruia Road has considerable scenic beauty, the solid stand of bush along the road, with snow-capped mountains in the background, proving very fascinating to travellers. Two small reservations were made in the Motueka District, and Crown land areas totalling over 1,300 acres were set apart along the Westport–Greymouth Coast Road in continuation of the policy of reserving areas of scenic value situated along or in sight of main highways. Two small areas at Lake Rotoiti were reserved and placed under the control of the Rotoiti Scenic Reserves Board. These areas, which comprise attractive bush-clad slopes, were acquired from a private owner, the purchase-price being raised by public subscription. The people concerned are to be congratulated on their keenness to preserve the bush around the lake.

Marlborough reservations included an area of 26 acres in the Kaikoura District purchased from private owners, areas totalling 91 acres in the Rai Valley, and an area of 1,050 acres of provisional State forest in the Pelorus Valley. The last-mentioned area was dealt with by section 29 of the Reserves and other Lands Disposal Act, 1936. It comprises milled bush, which is, however, still of scenic interest, and was set apart under the Scenery Preservation Act with the approval of the State Forest Service.

An area of 1,002 acres in Endeavour Inlet was declared a private scenic reserve under section 6 of the Scenery Preservation Amendment Act, 1933, at the request of the owner, Commander H. L. Howden. This splendid area of virgin bush reaches from the shores of the Inlet to Mount Ferneaux, and adjoins the historic Ship Cove Reserve. It is recognized as comprising one of the most beautiful specimens of New Zealand forest still in existence, and the Department is very pleased at being afforded the opportunity of giving it the protection of the provisions of the Scenery Preservation Act. A bush track traverses the lower portion near the shore, providing a delightful walk and an added attraction for visitors to Endeavour Inlet.

Several most interesting reservations were made in the Westland Land District during the year. Under the provisions of section 26 of the Reserves and other Lands Disposal Act, 1936, eight areas

of provisional State forest land, totalling 9,975 acres, were declared to be set apart as scenic reserves. The lands so dealt with comprise generally the whole of the northern slopes of the Cook and Fox Valleys visible from the Weheka Hostel and the Main South Road, and also sufficient additional area to include Lakes Gibbs, Gault, Mueller, and Matheson, together with a strip of land 10 chains in width along both sides of the road to Gillespie's Beach. The areas are unsuitable for settlement purposes, and have been set apart under the Scenery Preservation Act with the approval of the State Forest Service. It is considered that the scenic reservations in the vicinity of the Fox Glacier should be on a generous scale, and it may be mentioned that, in addition to the areas referred to above, arrangements were made during the year for the surrender of various portions of Crown leaseholds which it is desired should be brought under the Scenery Preservation Act. Action for the permanent reservation of these areas is now in hand, and the thanks of the Department are due to those Crown lessees who gave willing co-operation in the matter. Other Westland reservations included some 28 acres at Turiwhate; 21 acres of freehold at Waitaha (Ferguson's Block), purchased from a private owner; 359 acres of land on the Greymouth–Mitchells Road acquired after protracted negotiations, in which the State Forest Service gave valuable assistance; and three small areas at Cobden, Greymouth, and Waitaha.

Two small reservations were made in the Canterbury Land District, one of which comprised closed road and severance areas added to the Rosewill Scenic Reserve on the Pareora River, and the other an area of 15½ acres on the Glendore Creek, a tributary of the Selwyn. In the latter case the area concerned was State forest land made available by the State Forest Service for reservation under the Scenery Preservation Act. The bush extends over adjoining freehold land also, and arrangements are being made to have some 20 acres of the freehold bush declared a private scenic reserve under the Scenery Preservation Amendment Act, 1933.

In the Otago District a small area of bush lying between the road and Catlins Lake was set apart with the object of preserving a large number of ratas and kowhais, which are much admired when in bloom. An area of 350 acres in the Catlins District was also dealt with by addition to the Table Hill Scenic Reserve.

The only reservation made in Southland was that of an area of 240 acres on the Waituna Creek in Oteramika Hundred. The reserve contains about 35 acres of mixed forest, the balance being swampy land in manuka and other growth, and will make a valuable sanctuary for native birds.

The areas set apart during the year may be roughly classified as follows:—

Class of Land.	Area (Acres).
State forest areas made available	16,649
Crown land areas	10,515
Buller Coal Field Reserve areas	7,100
Private land acquired by Department with assistance of Bruce Trustees	1,700
Private and native land acquired by Department	81
Private land purchased by means of public subscriptions	76
Land held under deferred payment license acquired by Department with assistance of State Forest Service in disposing of certain timber rights	335
Railway land made available	12
Total	36,468

It will be seen from the above that State forest areas take a prominent place in the reservations made during the year, and I am deeply indebted to the Director of Forestry and his officers for their willing assistance at all times in scenic matters.

The reservation over scenic reserve areas totalling 1,364 acres was revoked during the year. An area of some 1,322 acres near Lake Okareka, which had been set apart with other areas in the vicinity in 1930, was found on a careful investigation being made to comprise practically all open country suitable for development and settlement, and arrangements were therefore made to cancel the scenic reservation. It has since been disposed of to the Native Department for use with other lands in connection with a Native-land-development scheme. The reservation over the Huatoki Scenic Reserve of nearly 10 acres was revoked by section 12 of the Reserves and other Lands Disposal Act, 1936, and the land made part of the Huatoki Domain. A revoking Proclamation was also issued over an area of approximately 31 acres in the Longwood District, Southland. The bush had been destroyed by fires, and as there was no prospect of regeneration it was considered inadvisable to retain the scenic reservation.

The number of scenic reservations in the Dominion is now 1,030, covering a total area of over 740,000 acres.

Scenery Preservation Board.

Meetings of the Scenery Preservation Board were held to consider scenic matters in the North Auckland, Auckland, Taranaki, Wellington, Nelson, Marlborough, Westland, Canterbury, Otago, and Southland Land Districts, and thirty-one recommendations were submitted by the Board to His Excellency the Governor-General for the acquisition and reservation of areas of scenic and historic interest throughout the Dominion under the provisions of the Scenery Preservation Act.

Supervision of Reserves.

During the year special scenic Boards were appointed or reappointed as follows: The Dunedin City Council, to control the Waipori Falls Scenic Reserves; the Ohakune Borough Council, to control the Ohakune Scenic Reserve; the Akaroa County Council, to control the Otepatotu Scenic Reserve; the Taumarunui Borough Council, to control two reserves at Taumarunui; the Northcote Borough

Council, to control the Northcote (Kauri Glen) Reserve; and the Mount Balloon Hut Scenic Board, to control the Mount Balloon Hut Scenic Reserve. Additional areas were placed under the control of the Pongaroa and Hundalee Scenic Reserve Boards. An appointment was made filling a vacancy on the Kirk's Bush Scenic Board.

Four gentlemen were appointed as honorary inspectors of scenic reserves throughout the Dominion, and certificates of appointment issued. Much valuable work has been performed by the numerous honorary Inspectors who are assisting the Department in safeguarding scenic areas, and the assistance of these public-spirited ladies and gentlemen is gratefully acknowledged. It is pleasing also to record that the public generally are taking an increasing interest in the preservation of the Dominion's scenic reserves.

An Inspector of Reserves was appointed for the South Island, and a similar appointment is being made for the North Island.

Special instructions were issued to all field officers of the Department drawing attention to the importance of a close supervision of all scenic reserves in order to prevent damage by trespassing stock, fires, removal of trees, &c.; and every available opportunity is being taken to keep the reserves under as close supervision as is possible.

Condition of Reserves, etc.

Reports from the various districts disclose in general a fairly satisfactory state of affairs so far as our scenic reserves are concerned. In some localities, however, there is a regrettable tendency to regard scenic reserves as sources of free grazing and free timber. Closer supervision and the gradual fencing of reserves which are particularly liable to stock trespass will tend to greatly improve the position, as will also the trend of public opinion, which now seems definitely in favour of the preservation of the beauty spots of the Dominion.

No fire damage of any consequence occurred during the year, practically the only case reported being that of a fire which burnt the fringe of the Brown River Reserve in the Rai Valley and destroyed about 30 acres of light bush and fern.

General.

The Trounson Kauri Park maintains its great popularity with visitors from all parts of the Dominion and from overseas. A permanent caretaker is employed, who gives every assistance possible to those wishing to view this magnificent kauri forest. A splendid regeneration of young kauris is taking place in those portions of the forest where light is able to penetrate through the vast canopy of trees. Suitable motor-camping and picnic areas have been established for the convenience and enjoyment of visitors, and have been freely availed of by the public.

Public interest in the Cape Kidnapper Bird Sanctuary has been well maintained, the number of visitors during the season being between three and four thousand. Last winter £50 was spent in constructing steps on the steep part of the track leading to the nesting area, in erecting a shelter-shed with tanks for water-supply, and in fencing a small area surrounding the shelter-shed as a preliminary step to planting native trees. Remarks in the visitors' book indicate general appreciation of these amenities, which have been financed principally by funds contributed by the public.

Further work has been carried out in reconditioning the tracks in the Tennyson Inlet Reserves, and the bush walks have been much appreciated by many visitors. Steady efforts are being made to control the deer, pigs, and goats on these and other reserves in the Marlborough Sounds, and the position is gradually improving in that respect. The colony of rabbits on the Inner Chetwode Islands still persists, but is being kept in check, a number of the animals being destroyed during the year. The total eradication of the pest is most difficult owing to the rugged nature of the land and the dense undergrowth.

The picturesque reserves on the Kaikoura Coast are being disturbed to some extent by construction work on the South Island Main Trunk Railway. Every care, however, is being taken to destroy as little bush as possible, and it is considered that quick regeneration of much of the bush will occur after the completion of the railway.

It is proposed to create a special fire district in order to minimize the fire risk in the Papatowai and Tautuku reserves on the South Otago Coast, and the initial steps have been completed. The proposed fire district, together with the adjoining State forest fire area, should go a long way towards ensuring the protection of these valuable reserves from fire. Pigeons, tuis, and bellbirds appear to be increasing in the Otago reserves generally, while the smaller native birds seem to be holding their own. This is particularly so in the reserves in the Catlins District.

The Ranger on Stewart Island reports that, so far as he can judge, the native birds seem to be holding their own, and that some species appear to be increasing. Deer, however, continue to spread, and it is evident that some effective steps will have to be taken to reduce their numbers. Opossums also seem to be on the increase. No fire damage to scenic reserves occurred during the year.

Gifts of Scenic Areas.

A valuable gift has been made to the public by Mr. F. Hutchinson, of Omatua, Rissington, who has transferred to the Crown an area of some 274 acres near Puketitiri Township. The area comprises approximately 220 acres of open country and 54 acres of bush land. The gift has been accepted by the Government, and arrangements are being made for the control of the bush area under the Scenery Preservation Act and of the open area as a public domain. The actual reservation of the scenic area has not yet been completed, as it has been found necessary to arrange some small exchanges to improve the boundaries of the bush land.

Another valuable gift of bush land is that of an area of approximately 125 acres which has been offered to the Crown by Captain G. Humphreys-Davies, of Clevedon, on condition that it is made a permanent reserve. The area is situated on the main road between Kawakawa Bay and Orere, and contains valuable specimens of various forest trees. The offer of the land has been accepted, and the Department is making arrangements for the necessary survey so that the transfer to the Crown can be completed and the land set apart as a permanent reserve under the Scenery Preservation Act.

It is hoped that the example set by Mr. Hutchinson and Captain Humphreys-Davies will be followed by other owners who possess bush areas worthy of preservation as national reserves. In this connection it may be stated that arrangements are being made in various parts of the Dominion whereby Crown lessees are surrendering without consideration portions of their leaseholds containing bush of scenic value.

Urewera Country.

A decision was made during the year that the whole of the Crown's holdings in the Urewera, amounting to some 400,000 acres, should be reserved in the interests of the preservation of the native flora and fauna. The details have not yet been fully worked out, but the Government's decision will be put into effect in due course.

Future Operations.

While a progressive policy is being followed in reserving all available areas that are suitable for setting aside under the Scenery Preservation Act the position is not entirely satisfactory so far as concerns the acquisition of privately-owned land on which the bush should if possible be preserved. A great deal requires to be done in that direction, but results can only be achieved by systematic effort coupled with financial provision sufficient for the purpose. During the past thirty-three years (1904–37) the sum of £171,353 has been expended in the acquisition of land for scenic purposes, representing an average expenditure of £5,192 per annum. The annual expenditure has, however, fluctuated greatly, the amount varying from under £10 to over £57,000. During recent years particularly it has been difficult to obtain an adequate allocation for scenic purposes, and the average yearly expenditure on the acquisition of scenic areas has been only a little over £700 during the last eight years. It is probable that no greater contribution to the prosperity and welfare of the Dominion could be made than a well-conceived and steadily executed plan of acquisition of bush areas that should be preserved not necessarily for their scenic value alone, but also for their great value as water-conservation and general protection areas. It is natural that a great many areas which are of considerable scenic value function also as water-conservation and general protection areas, and their acquisition would serve a dual purpose to the great advantage of the State. The Department, therefore, while continuing the present policy of reserving all available areas of Crown land of scenic value, will also represent in the proper quarters the necessity of acquiring freehold lands that should be owned by the State, and of resuming where necessary leasehold areas that would have been better left unleased in the first place.

Special Article.

The Department published as an Appendix to the 1929–30 report a special article on the glacial scenic reserves of Westland contributed by the late Dr. L. Cockayne and Dr. E. Teichelmann. That article dealt principally with the reserves from a botanic point of view. Towards the end of 1930 Mr. A. P. Harper supplied, at the Department's request, a descriptive account of the same reserves on more general lines. Unfortunately, publication had to be held over for reasons of economy, but the Department is pleased to be able to arrange for the printing of the paper as an Appendix to this year's report. The article, which has been brought thoroughly up to date by the author, describes the physical and topographical features of the reserves, and gives much information of general interest. It is illustrated by a series of very fine photographs.

Appendices.

The appendices to this report are listed hereunder :—

A. Schedule of reserves made and reservations revoked during the year, accompanied by statement of expenditure.

B. The Glacial Scenic Reserves of Westland (Mr. A. P. Harper, late president of the New Zealand Alpine Club).

C. An account of the work carried out on Kapiti Island.

APPENDICES.

APPENDIX A.

RESERVES MADE IN 1936–37 UNDER THE SCENERY PRESERVATION ACT, 1908, AND AMENDMENTS.

No.	Local Name.	Description.	Area.	Date of Proclamation.
		North Auckland Land District.	A. R. P.	
824	Manginangina ..	Section 37, Block XV, Kaeo S.D. ..	228 3 13	21/12/36
		Section 38, Block XV, Kaeo S.D. ..	19 2 34·2	21/12/36
		Section 39, Block XV, Kaeo S.D. ..	0 3 6	21/12/36
		Auckland Land District.		
827	Kaimai Range ..	In Blocks IV, VII, X, and XI, Wairere S.D.	4,341 0 0	4/11/36
		Section 1, Block X, Aongatete S.D. ..	316 2 33	(*a*)
		Section 28, Block VII, Wairere S.D. ..	50 0 0	(*a*)
		Section 10, Block XI, Wairere S.D. ..	50 0 0	(*a*)
825	Waitekauri Stream	Section 28, Block X, Ohinemuri S.D. ..	128 1 0	1/12/36
826	Pirongia Mountain	In Blocks II and III, Pirongia S.D. ..	2,183 2 0	1/12/36
		Taranaki Land District.		
828	Whangamomona Saddle ..	Section 176, Block IV, Ngatimaru S.D. ..	1 3 8·9	21/12/36
		Wellington Land District.		
817	Ohakune	Suburban Section 33, Town of Ohakune ..	7 2 12·8	28/4/36
		Suburban Section 34, Town of Ohakune ..	15 3 11	28/4/36
813	Pongaroa	Sections 7, 8, 9, 10 11, and 12, Block V, Town of Pongaroa	3 0 0	28/4/36
		Sections 7, 9, 10, 11, and 13, Block VIII, Town of Pongaroa	1 1 0	28/4/36
812	Titirangi Road	Section 29, Block XI, Hautapu S.D. ..	715 0 0	28/4/36
809	Turakina Valley ..	Section 79A, Block IX, Maungakaretu S.D.	57 3 24	3/8/36
		Section 69, Block XIII, Maungakaretu S.D.	27 3 0	3/8/36
821	Turangarere	Section 11, Block VIII, Maungakaretu S.D.	11 3 34	3/8/36
815	Makatote	Section 27, Block VIII, Maunganui S.D. ..	43 1 0	3/8/36
810	Hautapu	Section 6, Hautapu Block, and part Section 14, Block IV, Hautapu S.D.	44 2 25	3/8/36
		Parts Sections 3 and 7, Block IV, Hautapu S.D.	155 2 29	3/8/36
811	Turakina Valley ..	Section 22, Block XII, Mangawhero S.D.	5 1 32	3/8/36
		Section 23, Block XII, Mangawhero S.D.	4 1 8	3/8/36
		Section 24, Block XII, Mangawhero S.D.	29 3 24	3/8/36
		Section 25, Block XII, Mangawhero S.D.	25 3 26	3/8/36
		Section 26, Block XII, Mangawhero S.D.	3 2 26	3/8/36
		Section 31, Block XII, Mangawhero S.D.	3 1 30	3/8/36
816	Te Tuhi (Wanganui River) ..	Section 4, Block XV, Tauakira S.D. ..	1,888 0 0	7/11/36
830	Wanganui River	Section 30, Block III, Retaruke S.D. ..	1 1 32	21/12/36
820	Silverhope	Section 5, Block VI, Ongo S.D.	3 1 7·7	21/12/36
808	Makuri Gorge	Part of Section 47, Block XIII, Makuri S.D.	202 1 35	(*b*)
		Nelson Land District.		
834	Buller Gorge ..	Section 16, Blocks II and III, Ohika S.D.	3,000 0 0	(*c*)
		Section 19, Blocks I, II, III, VI, and VII, Ohika S.D.	4,100 0 0	(*c*)
831	Torrent Bay	Section 31, Square 10, Block III, Kaiteriteri S.D.	59 3 0	1/12/36
833	Brooklyn River	Section 21, Block IX, Kaiteriteri S.D. ..	134 0 0	1/12/36
832	Greymouth–Westport Road	Sections 3 and 16, Block V, Brighton S.D.	293 2 0	1/12/36
		Sections 11, 12, and 13, Block V, Brighton S.D.	1,011 0 0	1/12/36
834	Buller Gorge	Section 20, Block II, Ohika S.D. ..	69 1 24	1/12/36
836	Lake Rotoiti ..	Part of Sections 1, 2, and 3, Block V, Roto-iti S.D.	40 1 32	1/12/36
		Part Section 1, Block XIII, Motupiko S.D.	36 1 0	1/12/36
700	Reefton–Maruia Road	Section 9, Block VII, Waitahu S.D. ..	450 0 0	(*d*)
		Section 1, Block XI, Waitahu S.D. ..	880 0 0	(*d*)
		Section 2, Block XII, Waitahu S.D. ..	1,110 0 0	(*d*)
		Section 1, Block XIII, Rahu S.D. ..	1,190 0 0	(*d*)
		Section 4, Block XIV, Rahu S.D. ..	835 0 0	(*d*)
		Section 1, Block II, Lewis S.D.	510 0 0	(*d*)

(*a*) Section 7, Reserves and other Lands Disposal Act, 1936.
(*b*) Section 15, Reserves and other Lands Disposal Act, 1936.
(*c*) Section 18, Reserves and other Lands Disposal Act, 1936.
(*d*) Section 24, Reserves and other Lands Disposal Act, 1936.

RESERVES MADE IN 1936–37 UNDER THE SCENERY PRESERVATION ACT, 1908, AND AMENDMENTS—*continued.*

No.	Local Name.	Description.	Area.	Date of Proclamation.
		Marlborough Land District.	A. R. P.	
801	Kahutara	Part Reserve "G," Block IX, Mount Fyffe S.D.	26 2 0	24/9/36
837	Pelorus Bridge	Sections 54, Block VIII, and 2, Block XI, Heringa S.D.	1,050 0 0	(*e*)
800	Pelorus Bridge ..	Part Section 73, Block VIII, Heringa S.D.	4 0 33·4	11/3/37
		Lots 1 to 7 of Section 73, Block VIII, Heringa S.D.	86 2 5	11/3/37
		Westland Land District.		
842	Fox Glacier Vicinity	Part of Provisional State Forest No. 1643, Block XIV, Gillespies S.D.	230 0 0	(*f*)
		Part of Provisional State Forest No. 1721, Blocks IX and X, Gillespies S.D.	30 0 0	(*f*)
		Part of State Forest No. 1643, Block X, Gillespies S.D.	15 0 0	(*f*)
		Part of State Forest No. 1643, Blocks X, XIV, and XV, Gillespies S.D.	500 0 0	(*f*)
		Part of State Forest No. 1643, Blocks XIV and XV, Gillespies S.D.	1,750 0 0	(*f*)
		Part of State Forest No. 1644, Block XVI, Gillespies S.D., and Blocks IX and XIII, Waiho S.D.	6,200 0 0	(*f*)
		Part of State Forest No. 1696, Block XII, Gillespies S.D.	1,000 0 0	(*f*)
		Part of State Forest No. 1721, Block X, Gillespies S.D.	250 0 0	(*f*)
839	Ferguson's Bush	Section 1983, Block V, Totara S.D. ..	21 0 0	21/12/36
843	Turiwhate	Reserve 1181, Block I, Turiwhate S.D. ..	28 3 14	21/12/36
844	Greymouth–Mitchell's Road ..	Reserve 1182, Block X, Hohonu S.D. ..	359 1 19	21/12/36
840	Rapahoe Range ..	Section 3725, Block IV, Cobden S.D. ..	6 1 0	11/3/37
		Section 3726, Borough of Greymouth ..	1 0 19	11/3/37
838	Urquhart's Creek	Section 3727, Block XI, Waitaha S.D. ..	2 0 2·9	11/3/37
		Canterbury Land District.		
845	Rosewill	Reserve 4354, Block XI, Opawa S.D. ..	0 2 32·3	21/12/36
846	Glendore Creek	Reserve 3297, Block VI, Horarata S.D. ..	15 2 0	21/12/36
		Otago Land District.		
847	Catlins Lake ..	Section 30, Block III, Woodland S.D. ..	5 2 20	21/12/36
		Section 31, Block III, Woodland S.D. ..	3 3 0	21/12/36
850	Table Hill	Section 2, Block VI, Woodland S.D. ..	146 3 31	6/2/37
		Section 27, Block VI, Woodland S.D. ..	202 3 39	6/2/37
		Southland Land District.		
851	Waituna Creek	Sections 69 and 70, Block III, Oteramika Hundred	240 2 10	21/12/36

(*e*) Section 29, Reserves and other Lands Disposal Act, 1936.
(*f*) Section 26, Reserves and other Lands Disposal Act, 1936.

REVOCATION OF RESERVATIONS.

Land.	Area.	Date of Proclamation.
Auckland Land District.	A. R. P.	
Part Lot 2 of Section 2, Block II, Tarawera S.D.	1,322 2 30	16/11/36
Taranaki Land District.		
Section 4s, Huatoki Settlement, Block V, Paritutu S.D.	9 3 15	(*a*)
Southland Land District.		
Sections 11 and 1 of 10, Block XI, Longwood S.D.	31 2 20	4/9/36
Total area revoked during the year	1,364 0 25	

(*a*) Section 12, Reserves and other Lands Disposal Act, 1936.

Summary of Reserves.

Land District.	Number.	Area.
		A. R. P.
North Auckland	1	249 1 13·2
Auckland	4	7,069 1 33
Taranaki	1	1 3 8·9
Wellington	10*	3,251 2 36·5
Nelson	15	13,719 1 16
Marlborough	3	1,167 0 38·4
Westland	11*	10,393 2 14·9
Canterbury	1*	16 0 32·3
Otago	4	359 1 10
Southland	1	240 2 10
Total reservations for year ended 31st March, 1937 ..	51	36,468 2 13·2
Reservations up to 31st March, 1936	980	705,542 1 21
	1,031	742,010 3 32·2
Less reservations revoked and area taken for road ..	1	1,365 1 2·7
	1,030	740,645 2 29·5

* Also additions to existing reserves.

Private Scenic Reserve declared under Section 6 of the Scenery Reservation Amendment Act, 1933.

Local Name.	Description.	Area.	Date of Warrant.
		A. R. P.	
Endeavour Inlet	Part Section 42, Block XI, and Section 34, Block XII, Gore S.D.	1,002 2 0	26/1/37

Statement showing Expenditure on Scenery Preservation for the Year ended 31st March, 1937.

	£ s. d.	£ s. d.
Acquisition of land and improvements to reserves		524 5 6
General administration, eradication of noxious weeds, destruction of rabbits, maintenance, &c.		144 19 6
Trounson Kauri Park: Charges in connection with improvement, maintenance, and protection		338 4 3
Waitangi Historic Reserve: Clearing, ploughing, grassing, internal roading, and compensation		469 4 10
Waitangi Endowment: Tree-planting, &c.		1,169 18 9
Gross expenditure for year		2,646 12 10
Less credits-in-aid received—		
Trounson Kauri Park: Rent, &c.	19 10 0	
Waitangi Historic Reserve: Wage subsidy from Employment Promotion Fund, &c.	18 15 6	
		38 5 6
Net expenditure for year		£2,608 7 4

Comparison of Expenditure.

It is interesting to note how money raised under the Act or provided from other sources has been expended. It will be seen that the cost of administration has been reduced to a very small proportion of the total expenditure.

Year.	Compensation for Land.	Fencing and Maintenance.	Surveys, Valuations, &c.	Board's Expenses.	Salaries.	Total.
	£	£	£	£	£	£
1904–5	216	Nil	52	1,822	*	2,090
1905–6	3,336	,,	527	1,221	*	5,084
1906–7	7,856	304	801	185	*	9,146
1907–8	4,286	382	555	86	175	5,484
1908–9	3,813	1,063	540	24	325	5,765
1909–10	1,688	1,159	2,603	Nil	325	5,775
1910–11	1,066	685	1,643	11	325	3,730
1911–12	2,619	715	2,237	22	345	5,938
1912–13	12,997	798	2,697	6	345	16,843
1913–14	10,467	627	1,547	3	365	13,009
1914–15	6,253	758	476	12	388	7,887
1915–16	1,530	698	104	6	390	2,728
1916–17	252	836	76	1	390	1,555
1917–18	428	602	114	3	390	1,537
1918–19	1,295	1,964†	49	1	280	3,589
1919–20	510	188	12	..	40	750
1920–21	3,031	471	299	..	25	2,825
1921–22	57,768	227	224	..	25	58,244
1922–23	6,306	377	290	..	25	6,998
1923–24	1,488	118	1,589	..	25	3,210
1924–25	1,158	1,565	240	..	18	2,981
1925–26	17,923	2,310	305	9	..	20,547
1926–27	2,617	1,182	75	17	..	3,891
1927–28	5,182	1,342	58	17	..	6,599
1928–29	11,642	1,810	538	1	150‡	14,141
1929–30	445	1,548	108	6	300‡	2,407
1930–31	574	1,335	92	2	300‡	2,303
1931–32	2,373	838	1,099	16	279‡	4,605
1932–33	7	476	15	..	200‡	698
1933–34	92	1,221	21	..	156‡	1,490
1934–35	750	1,804§	18	..	38‡	2,610
1935–36	909	3,473‖	3	..	..	4,385
1936–37	476	2,132¶	..	..	..	2,608
Grand total ..	..	..	..	..	..	231,452

* Included in Board's expenses. † Includes £1,750 paid to Summit Road Scenic Reserve Board. ‡ Ranger for Summit Road Scenic Reserves. § Includes £1,344 expended on Waitangi Endowment and Historic Reserve. ‖ Includes £2,814 expended on Waitangi Endowment and Historic Reserve. ¶ Includes £1,621 expended on Waitangi Endowment and Historic Reserve.

It must be noted that the above expenditure does not include expenses of raising loans and recoupment of interest, &c.

APPENDIX B.

GLACIAL SCENIC RESERVES OF WESTLAND.

By Arthur P. Harper, Late President of the New Zealand Alpine Club; Member of the Alpine Club, London; Author of "Pioneer Work in The Alps of New Zealand."

Dr. L. Cockayne and Dr. Teichelmann, in their joint article on these reserves which appeared in the annual report for the year ending 31st March, 1930, described very fully the vegetation, flora, and bird-life of this district, so I propose to confine myself to the physical and topographical features of reserves which, in my opinion, are certainly not surpassed and, in some particulars, probably not equalled by any similar alpine area in temperate latitudes (always excepting the Himalayas). They are well called "The Glacial Scenic Reserves," for within their boundaries are no less than twelve primary glaciers, also in the two great "neve" basins of the Franz Josef and Fox Glaciers (which will be described in more detail below) is to be found by far the largest snow-covered ice-field in New Zealand, and certainly larger than anything in Switzerland.

As these reserves are undoubtedly destined to be a great playground for the rising generation, I shall endeavour to give information which will assist parties to penetrate the lesser known portions of the reserves, as well as some data which will make it more interesting for travellers over the better-known routes.

Scenic Reserve 1019.

Topography.—Reserve 1019 (64,000 acres) takes in practically the whole watershed of the Karangarua River, and it is important to understand the topography. From Mount La Perouse (10,101 ft.) at the north-east corner of the reserve, the Main Divide of the Southern Alps runs about south for four miles, and then circles round in a south-westerly direction past the Footstool (9,079 ft.), Sefton (10,359 ft.), to Mount Brunner (8,678 ft.), thence it again goes south for two or three miles before turning south-west to the Haast Pass.

From La Perouse the Copland Range branches off to the west and divides Cook River from the Copland River (a branch of the Karangarua); from Mount Sefton the Karangarua Range runs for twelve miles rather north of west between the Copland and the Twain Rivers. From Mount Isabel the Hooker Range runs five miles to Mount Howitt due west, separating the McKerrow Glacier, which is the head of the Landsborough River, from the head of the Twain River, and then turns south-west to Fettes (8,092 ft.) and for about thirty miles runs parallel to the Main Divide. From Howitt a short precipitous offshoot goes west for about seven miles and divides the Twain from the Karangarua main stream, which rises near Mount Howitt and has a saddle leading into the McKerrow Glacier. The Hooker Range has therefore cut off the Karangarua main stream from the Main Divide. From Fettes Peak, an unnamed but very bold rock range extends north-west and forms the western boundary of the reserve.

The so-called main stream of the Karangarua is really not the largest; strictly speaking, it should be considered as a branch of the Twain River, which drains the very large ice-field of Sefton, whereas the Karangarua, above its junction with the Twain, is not glacier-fed.

Historical.—In 1889 the late Mr. C. E. Douglas, one of our greatest West Coast explorers, conducted the first exploration of the Landsborough River, and looked into the head of the Twain River and saw the Douglas Glacier, and in 1894 Messrs. Fyfe and Geo. Graham crossed from the Mueller Glacier and succeeded in also visiting this glacier. They returned to the east without attempting to reach the west coast. In 1894–95 I made the first complete exploration of the Main Branch and the Twain River when, accompanied by a Maori, we succeeded in reaching the headwaters of these rivers from the west coast. In 1908 Dr. Macintosh Bell, following my route, went in and examined the Douglas Glacier; in December, 1928, a party consisting of my daughter Rosamond, and Messrs. S. A. Wiren, R. Lucas, and C. Turner Williams and myself succeeded in making the first transinsular pass, crossing from the Hermitage to the west coast via Fyfe's Pass at the head of the Mueller Glacier and down the Karangarua River. In 1934 and 1936 Messrs. A. J. Scott, W. S. Russell, and C. Johnston went into the Twain from the east.

The Copland River was first explored and mapped by Mr. Douglas in 1892. In March, 1894, Mr. E. A. Fitzgerald (A.C.), with his guide Zurbriggen, using Douglas's map, succeeded in making the first transinsular pass via this river from the Hermitage over Fitzgerald Pass (6,863 ft.), not used since. I showed them a route back via Fox Glacier, and returned alone over a pass about a mile north of Fitzgerald's Pass, now frequently crossed and known as Copland Pass (6,950 ft.). Then, in company with R. Fiddian, completed the exploration of the glaciers at the head of the River. In 1905 Dr. Teichelmann (A.C.) and H. Newton (A.C.), with guides Clarke and Batson, made the first crossing of Baker's Saddle (7,148 ft.), and went down the Strauchon Glacier and out by the Copland branch to the west coast. This valley is now one of the best known on the coast.

Description.—Cassell's Flat is situated just outside this reserve at 680 ft. above sea-level. Like most of these flats in the heart of the great ranges, Cassell's is the centre of magnificent scenery surrounded by high rocky mountains, reaching the line of perpetual snow (see Fig. 1). It is roughly one mile and a half long and one mile wide, and into it three streams—the Main Branch, the Twain River, and Regina Creek—flow through magnificent gorges over high cataracts, which I believe are unique in New Zealand.

The structure of this piece of country is most interesting, for the three valleys centring on Cassell's Flat are typical hanging valleys—that is, they descend at a normal slope from heads of the rivers and then the valley-floor drops abruptly for several hundred feet into Cassell's Flat. In the course of ages the water has cut deep gorges at the entrances of the lower valley, and huge boulders, left by ancient

glaciers, have fallen into the gorge and apparently prevented further water erosion. The effect is most difficult to describe—these cataracts and gorges must be seen to be realized; no photograph does them justice.

The Twain River enters Cassell's Flat through a truly magnificent gorge. The south bank rises nearly sheer—that is, precipice after precipice—with ledges here and there for some 3,000 ft. straight out of the water. In places overhanging rocks seem to be ready to topple forward as one climbs along beneath them, at one point the cliff leans forward to such an extent that I estimated a stone would fall nearly 1,000 ft. without touching the cliff. The north side slopes back at an angle of 40 degrees, and is clothed with luxuriant rata forest. Through the gorge the river descends some 500 ft. in about a quarter of a mile over boulders up to and probably over 40 ft. in diameter, forming a wonderful cataract. I envy the man who happens to see this in a flood from close quarters; it looks stupendous from a distance.

The gorge at the head of Cassell's Flat, through which the main branch flows, is quite different, but in its way is almost as impressive. The stream descends about 1,100 ft. in a mile and a quarter over two great cataracts, the upper one, I should estimate, is 400 ft. to 500 ft., and our party in December, 1928, are the only people to have seen this at close quarters. The whole of this large river plunges over a practically perpendicular drop and is dashed into a white welter of foam as it is broken upon the huge boulders (some must be 80 ft. in diameter) which have been jambed together in hopeless confusion in the rock-walled gorge. It then runs deep, with an oily smoothness, into a black, narrow canyon preparatory to its leap over the lower cataract, which no one has seen closely, but which I saw in 1894 from a distance. To reach the upper valley above this gorge necessitates an intricate high-level route amongst a somewhat complicated series of rocky bluffs and thick bush.

Above the cataracts the valley opens out (see Fig. 2) and has on the south bank a steep rocky terrace of hard gneiss rock, some 300 ft. high, over which the tributary streams drop in fantastic waterfalls (see Fig. 3). This terrace becomes lower as the floor of the valley rises, until, two miles up, it "peters out" in a fantastic gorge, with smooth rock sides of some 40 ft. high, which approach within a few feet of one another in places. I named this the "Dovetail" Gorge, because it looks as if it had been roughly sawn out in zig-zag pattern and the two sides pulled slightly apart.

The water is very deep here and drops into the upper end of the defile over a fine fall of some 20 ft. On my latest journey down the river in 1928 I found that, for the upper quarter of a mile, the north side had fallen forward on to the south wall and completely hidden the river, which could be heard roaring amongst the huge blocks of rock far below and out of sight. The lower half, however, is still intact. Above this is a second small flat, which I named "Lame Duck," above which the valley alternates heavy-boulder work with short gorges. At one place the two sides, 20 yards wide at the water's edge, approach to within 6 ft. of each other 40 ft. above, while 3 chains farther up the valley the two sides actually touch from below the water to 15 ft. above. Here the river is sucked down in a whirlpool and bursts up seething and bubbling below the obstacle.

More large boulders, and then the Troyte River comes in from the south through an imposing and gloomy gorge between towering mountains. This drains the small ice-fields of Fettes Peak. After passing the Troyte, about one mile and a half of bad boulders, taking a good three hours to negotiate brings one to a small flat at the head of the river which I named "Christmas Flat"—for on that day I reached it with a light camp, by myself, in 1894. The flat is 2,803 ft. above sea-level, dominated by bleak rock peaks and lying immediately under the Karangarua Saddle (5,600 ft.), from which a wonderful view is obtainable down the Karangarua to the west, the Landsborough Valley with the peaks of the Divide to the south-west, while eastward the fine McKerrow Glacier sweeps down from Mount Isabel and curves past, 300 ft. or so immediately below one's feet, and to the north-east Mount Sefton towers up over Douglas Pass, which leads from the McKerrow Glacier into the head of the Twain River. I have been up many rivers on the coast, but I do not think any of them equal the Karangarua main branch for beauty, variety, and grandeur. It is not unduly difficult, but might lead a party into endless trouble if attempted without directions from some one of the very few people who have penetrated these solitudes. Dr. Cockayne has already commented on the interesting discovery I made in 1894 of the 1,000 acres of beech forest which is found, above the great gorge, intruding on the rata forest, and in view of his hesitancy in accounting for this I would not venture an opinion, but can only hope that a competent botanical authority will some day find time to make a personal examination on the spot.

The Twain River.—Unfortunately, I was for some weeks alone at the end of 1894, and had to tackle the Twain Gorge under a disadvantage. I found it impassable for one man, at any rate; it is probable that a party with ropes could pass through this defile on the south bank, but the north side is impracticable under any conditions. I ultimately reached the head of the branch via the Karangarua Saddle, McKerrow Glacier, and Douglas Pass, and followed the river down to the upper entrance of the gorge.

The whole character of the Twain Valley is a great contrast to the Karangarua, the latter is full of beauty combined with grandeur, while the Twain is harsh and cruel looking, but at the same time extraordinarily fine. Above the cataracts the valley extends some seven miles up to the Douglas Glacier, and, for the whole distance on its south side, is walled in by rocky precipices descending from terrace to terrace for 2,000 ft. and even 3,000 ft. These fearsome cliffs are practically bare rock, and in places are so sheer that they might have been rough hewn by human hands for hundreds of feet. Here and there they are separated from the river by more gentle slopes of scrub-covered debris which lie at their base—the north side, clothed with stunted scrub merging into bare snow-grass, rises at an angle of 30 degrees to the snow summits of the Karangarua Range. At the bottom of the valley the river has, in one or two places, cut deep narrow gorges, one of which I estimated to be 200 ft. deep and very few feet across at the top.

About four miles above the cataracts a beautiful glacier (see Fig. 5) flows in (nearly to the river) from the north, which I named the "Horace Walker," after the then president of the Alpine Club (London). This glacier has no surface moraine, its pure-white ice curving round under a huge lateral moraine, and, curiously enough, flowing *up* the valley. I went about two miles up the ice and found it smooth and uncrevassed. Fine cliffs from 300 ft. to 900 ft. high hem it in as one ascends. Behind the great lateral moraine is a complicated system of old moraine terraces which, some day, will give glaciologists something to discuss; but as no one else (so far as I can ascertain) has yet visited this spot, it is difficult to get up any discussion on its peculiar features.

A mile above the Horace Walker, after passing two small flats, is the terminal of the Douglas Glacier, whose trunk is covered with very rough and heavy moraine for its whole length; another two miles, and the cliffs on the south, which at this point are very grand, open out and disclose a small gravel flat (4,562 ft. above sea-level), nearly a mile long by half a mile wide, at the southern end of which ice-worn rock rises sharply in terraces for 1,550 ft. to the Douglas Pass, over which lies the McKerrow Glacier, by which a route can be taken over Karangarua Saddle into the Main Branch.

It is most difficult to convey any adequate idea of this weird basin, which I venture to say is unsurpassed for grandeur of scenery in our alps. However, I will try and describe it.

On the western side are barren cliffs rising 1,000 ft. or so sheer, and then, in tiers and ledges for another 1,000 ft., to a snow-covered peak; to the south is the 1,550 ft. wall leading up to Douglas Pass; in the south-eastern corner is a narrow defile in which lies the Fitzgerald Glazier covered with debris, and bounded by enormous over-hanging black cliffs from the top of which the ice-fields of the Main Divide by Mount Thomson send down a running fire of avalanches. These cliffs must be well over 2,000 ft. But it is on the north side that the most wonderful sight is to be seen, for here lies the Douglas Glacier coming off the western side of Mount Sefton (10,359 ft.), (see Fig. 4). The glacier has aroused much interest in alpine circles, and is peculiar because *there is no connection at any single point between the névé and the trunk.*

The great ice-field coming from Sefton lies on the southern slopes of the Karangarua Range, and is about four miles long by one mile wide and slopes down to the top of a long, absolutely perpendicular, precipice (only broken in one place) extending its full length and varying from 200 ft. at the western to about 900 ft. at the eastern end, over which great ice blocks "calve" off and drop on to the valley-floor, day and night, to such an extent that ice reforms into a glacier trunk at the bottom. While there I counted from twenty-five to thirty in the hour in the daytime. Perhaps the simplest way to convey some idea is to imagine an ordinary "lean-to" with a roof about four miles by one and the back wall rising from 200 ft. to 900 ft.; on this roof lies the 2,500 acres of *névé* ice, which drops over in such large quantities that it forms a glacier to flow along the foot of the wall.

Personally, I imagine that this basin was at one time occupied by a lake, like the "Marjelen See" in Switzerland, fed by the Fitzgerald Glacier and upheld by the trunk of the Douglas as it flowed past and blocked the northern outlet.

Bad weather in these western ranges is not uncommon, nor is it pleasant to be "bottled" in bad country by three or four days' storm, but I shall never regret having been caught in a terrific storm at night while bivouacing under a boulder in this weird basin. It was grand beyond my power of description. The peals of thunder, the vivid lightning which lit up those beetling cliffs, and Mount Sefton's snows 6,000 ft. above us. The roar of the thunder and crash of ice avalanches echoed and re-echoed from the surrounding precipices. To judge by old Bill's (the Maori) muttered comments that night, he must have thought that all the pakeha and Maori demons had been let loose for our benefit.

So much for the Twain—and though I advise enterprising parties to visit this locality, I must admit a hope that for very many years to come it will only be available to those who are prepared to tackle it in its virgin condition. Such scenes are more appreciated when it has taken hard work to reach them than if accessible by motor-car.

(NOTE.—The visit of Messrs. Scott, Russell, and Johnson in 1934 proves that the Horace Walker and Douglas Glaciers have retreated half a mile since my exploration in 1894 and both glaciers have a terminal lake, which will no doubt gradually silt up.) (See Fig. 6).

Copland River.—This is now so well known and easy of access, with its track and huts, that no special description is necessary. Suffice to say that Welcome Flat is in every way equal, and in some respects superior to other "flats" on Westland rivers. Visitors to this locality will agree that the combination of river, luxuriant forest-clad slopes, and grey-rock precipices backed up by the eternal snows of the great peaks presents a picture to stir the imagination and enthusiasm of any but the most blasé tourist.

Points of interest off the track of the Copland Pass are:—

(1) Ruera Stream and Lyttle's Peak:
(2) The Strauchon Glacier and remarkable precipice from La Perouse, which must be at least 4,000 ft. high and practically sheer:
(3) Hot spring near Welcome Flat Hut.

Expeditions and Notes.—Parties going into Reserve 1019 should include an experienced rough-country bushman and, above all, a man experienced in fording rivers—*the latter is dangerous work in this country.* A bill-hook, or short slasher, is essential for getting through the bush. A base camp can now be taken by pack-horse to Cassell's Flat and pitched at the junction of Twain River and Main Branch—good firewood and shelter. From here the following interesting expeditions can be made:—

(1) Ford Main Branch (quite easy) and go along the south bank of Twain River as far as possible and look into the great gorge and cataracts.

(2) Ford Main Branch as above and then cross Twain River above its junction with the Main Branch (the latter is a dangerous ford, ice-cold water and better tackled in the morning), and go down to Regina Creek, which descends over a cataract of some 700 ft. in a quarter of a mile. Not only is the gorge filled with great boulders, but they extend far up the hillside and are overgrown by huge forest trees. This portion requires care and takes time. I took an hour to go 6 chains in one place, but if the route is blazed the return journey is easy. At the top the valley opens out into a broad basin lined with bold mountains. Another small cataract occurs about a mile above the big gorge, and then more open valley to the head. Return same day, or take a flying-camp and climb the range at the head of the valley and look into Copland River. This has not yet been done.

(3) Mount McGloin, which dominates Cassell's Flat, has not been climbed, and would afford interesting and, I should think, very good sport.

(4) To reach the head of the Main Branch take the gorge on the right-hand bank (looking up river). A complicated route to find, but safe enough if blazed with a bill-hook. Cross to the north bank above the gorge, and follow it to the open Lame Duck Flat, after which either side of the river will "go" as far as Christmas Flat. Then follow the creek coming in on the south until the grass-line is reached, thence no difficulty to the Saddle. Owing to the great shrinkage of the McKerrow Glacier there may be some difficulty to reach it from the Saddle; a mile up the ice brings one to Douglas Pass on its north bank, from which can be seen the Douglas Glacier and the gravel flat above described. Descent to the Flat is not difficult.

To avoid returning by the same route a party can follow (in reverse direction) the route advised in (5) below. No snow and ice work involved. But it must be again stated that the party should be experienced in bush craft, rough-country work and, above all, in fording rivers.

(5) To reach the head of Twain River from Cassell's Flat a shorter alternative route can be taken. Follow route (2) to Regina Creek and camp in the more open valley above the cataracts. Next day go over the range on the eastern side of the valley (there is a saddle behind the big conical hill). This leads to open grass slopes over which there is no difficulty in reaching Horace Walker and Douglas Glaciers, and so on to the gravel flat below Douglas Pass. Good camping just beyond Horace Walker Stream. No firing on the gravel flat beyond the Douglas trunk, but good boulder for bivouacing. A return can be made in reverse direction via route (4) if the ascent from McKerrow Glacier to Karangarua Saddle is open.

(6) Instead of returning to Cassell's Flat from the Twain by routes (4) or (5) it would not be difficult to ascend the Karangarua Range and drop down into the Copland River and reach Welcome Flat Hut. This would involve some snow-work, but of no difficulty, and several new passes are available.

(N.B.—*I wish to stress that no expedition from head camp should be taken without plenty of "tucker" if there is any danger of bad weather cutting off retreat owing to flooded rivers.* A party might easily be suddenly cut off from supplies for a week, and there are now no birds to rely on for food, as when I made the original exploration.)

Scenic Reserve 1018.

Topography.—This reserve (61,000 acres) takes in the whole watershed of Cook River. Commencing again at La Perouse (10,101 ft.) at the south-east corner, the Main Divide running practically north-easterly for eight miles to Conway Peak (9,519 ft.) forms the eastern boundary, and for the whole distance the summits of the peaks rise above 10,000 ft., while Mount Tasman reaches 11,475 ft.

From La Perouse the Copland Range runs west, separating the river of that name from the Cook River, which takes its rise from the very fine La Perouse Glacier. From Teichelmann Peak the shorter and steeper Balfour Range divides the main branch of Cook River from its tributary the Balfour, while an off-shoot from Mount Tasman to the west, named the Fox Range, separates the Balfour watershed from the great snow-fields of the Fox Glacier, which also drains into Cook River after reaching the low country. The Fox Glacier is cut off from the Franz Josef Glacier by the snow-covered Fritz Range.

Historical.—The main branch of Cook River was first explored by the late C. E. Douglas and myself in 1894, when we penetrated to within a mile or so of the terminal of the La Perouse Glacier. In 1905 a party consisting of Dr. Teichelmann (A.C.), Rev. H. Newton (A.C.), R. S. Low (A.C.), with Alex Graham as guide, reached the glacier and, ascending Harper's Saddle (8,559 ft.), crossed to the Hermitage. Parties have since been in for the ascent of La Perouse, and one party (Miss Stevenson, A. Duthie, and Guide Suter) crossed Clark's Saddle from the Tasman Valley and went down Cook River to the coast in 1934–35.

The Balfour branch was first visited by C. E. Douglas alone in 1888–89, and its exploration completed by him and myself in 1894. I believe no one else has been in since, except a well-known old prospector, Paddy McKenna, who never gave any information about his work. Government prospecting parties are examining the valley now.

The first recorded visit to the Fox Glacier was that of Sir Julius Von Haast in 1865, and he was followed in 1872 by Mr. W. Fox, Premier of New Zealand, with Mr. G. Mueller, Chief Surveyor of Westland, when the name "Prince Alfred" was changed to "Fox." In 1875 Mr. H. Cox (later Sir Hubert Cox) visited the valley with Mr. Alex. McKay and penetrated two miles on the south side of

the valley. The first actual traverse of the glacier itself was made by me, alone, in 1894, when I made the ascent of Chancellor Ridge and also explored the Victoria Glacier. In 1895 I showed Mr. E. A. Fitzgerald and his guide the route via the Fox and Victoria Glaciers, over the Fritz Range to the Franz Josef, thence via Grahams Saddle to the Tasman Glacier (the first crossing of this now well-known pass). Later in the same year Messrs. W. Wilson and C. E. Douglas surveyed the glacier, reaching about the same point as I had. In 1913 Dr. Teichelmann (A.C.), Rev. H. E. Newton (A.C.), with Peter Graham as guide, were the first to reach the divide at the head of the glacier. Of late years it has become a favourite playground for both climbers and skiers. There are two huts in the valley—one on Chancellor Ridge and a small one on a rocky outcrop under Douglas Peak 8,000 ft. above sea level.

Description.—The main branch of Cook River has very fine mountain peaks at its head in addition to the La Perouse Glacier, which is beautiful and in many ways interesting. But to reach the upper basin of the valley involves much hard work, unrelieved by the beautiful scenery of Copland and Karangarua.

After passing the inflow of the Balfour branch the valley is deep, narrow, and heavily timbered—so shut in that views are very limited. The chief interest lies in the enormous boulders in the bed of the river and distributed up the hillsides in the bush with great trees growing on them. These are undoubtedly "erratics" deposited by the ancient glacier which at one time occupied the valley (see below under "Glaciology"). In places almost equally large boulders are found in other rivers, but I know of no other stretch of four miles which shows such a collection of these huge blocks, making travelling very slow and difficult anywhere near the river. We measured two when making the original exploration, the dimensions are—Castle Rock: 120 ft. high, 348 ft. in circumference; and Tony's Rock: 158 ft. high, and 843 ft. in circumference.

Above the inflow of the Balfour this narrow boulder-filled valley runs south and then swings round to the east up to the La Perouse Glacier, the last four miles being an unexpectedly wide scrub-covered basin bounded on the south by great precipices of over 2,000 ft. from the Copland Range and dominated by Mounts La Perouse (10,101 ft.), Hicks, or St. David's Dome (10,410 ft.), Dampier (11,323 ft.), and Silberhorn (10,757 ft.), while over Harper's Saddle (8,559 ft.) is seen the top of Mount Cook, which lies on the eastern side of the divide (see Fig. 7).

The main points of interest are the enormous boulders, especially Tony's Rock, and a narrow gulch cutting into the base of Mount La Perouse and the big La Perouse Glacier.

Balfour River drains a glacier coming off Mount Tasman and, after cutting through a spur of Craig's Range, flows through what we believed to be an impassable gorge to join Cook River about four miles above where it emerges on to the low country.

The Balfour Valley is exceptionally fine, forming a quadrangular basin seven miles long by a mile to two miles wide and completely shut in by mountains. At the western end is the spur of Craig's Range, over 5,000 ft. high, on the north and south it is walled in by very steep slopes of 2,000 ft., while its eastern end is blocked by the stupendous buttresses of Mount Tasman (11,475 ft.), rising fully 7,000 ft. from the floor of the valley, its black and frowning cliffs only relieved by one small ice-field (see Fig. 8). This is, I believe, the highest almost sheer face of any peak in our alps, but is closely challenged by Elie de Beaumont's north face.

The trunk of the Balfour Glacier is covered with moraine and, except for one insignificant little inflow of ice, it is entirely cut off from its *névé* supply and is fed chiefly by avalanches. The river falls very rapidly a mile below its outlet from the glacier and must drop 1,500 ft. in two miles through the gorge, into which it leaps beneath enormous cliffs. There are traces of gold in this valley.

Expeditions and Notes.—There is practically no fording of dangerous rivers needed in this reserve, but experience in rough bush country is required. A short slasher or bill-hook is essential for bush work:—

(1) To ascend Main Branch keep on the south bank. A good boulder shelter available a mile or so above Balfour inflow. Above this is a very high bluff over which, for 800 ft. or so in height, a track must be blazed, and the best route is to keep well up on the hillside and not too close to the river, as the boulders are terrific; but these should be inspected for sake of interest. A blazed track now exists to the more open valley at the head, which can be reached in one day from Weheka.

Just about the point where the valley swings round to the east is "Tony's Rock" the huge boulder mentioned above. This affords a good shelter; beyond this point the bad boulders cease and river travelling is easier and more open right up to the glacier. Some scrub work, however, is necessary.

(2) An ascent on Ryans Range to the West of the Main Branch, or on Balfour Range coming off Mount Tasman, would afford very fine views of the great peaks.

(3) In order to avoid returning down the river from above Tony's Rock a saddle to the west of Lyttle's Peak could be crossed into Architect Creek, and so to the Copland Track. This has not been done yet.

(4) To reach Balfour Glacier go up on north bank of Cook River to inflow of creek from Craig's Range well below the Balfour River junction. Ascend this creek to large erratic boulder, which affords good shetler. Thence continue up the creek for about half a mile and ascend, by a tributary, coming in on the right, to the top of the spur from which a wonderful view is to be seen (see Fig. 8). Descend straight down into the Balfour Valley; good camping ground in McKenna's creek.

Points of Interest.—Fine specimens of quartz crystals on Craig's spur; colours of gold in surface moraine of Balfour Glacier; look into Balfour Gorge.

(5) Instead of returning the same way a route can be made over the Fox Range into the Fox Galcier, and so to Weheka. This has not yet been done, though the various peaks have been climbed from the Fox. No very serious snow or ice work required.

Fox Glacier.—This is now so well known it is not necessary to describe it, but there are one or two interesting features which are more marked on the Fox than on any other glacier in New Zealand. For instance, the veined structure of the ice is very apparent; I have never seen so fine an example anywhere else. There were also exceptionally fine "Moulins," or funnels in the ice—some go down to unknown depths, others descend for a few feet and then ran level for some chains and came again to the surface lower down the glacier. The third point of interest is the very clear evidence of old ice-levels, shown by the very distinct lines of different periods. These lines are marked in all Westland valleys, but in the Fox they are shown probably better than in any other. (See Fig. 9.)

RESERVE 1461 (48,500 acres).

Topographical.—The south-eastern boundary is the Fritz Range, an offshoot of Conway Peak thence the Main Divide is followed to the Minarets (10,058 ft.), from which the Baird Range runs north-west and divides the Franz Josef Glacier from the Callery River, thence along the divide to Mount Elie de Beaumont (10,200 ft.), from which three large glaciers flow in a northern direction and give rise to the Callery River, which joins the Waiho just within the Reserve to the west. At Elie de Beaumont the boundary leaves the divide and circles round to the north and north-west to the source of the Atupau River, which it follows to near the main road.

Historical.—Dr. Macintosh Bell, in his "Geological Report of the Franz Josef Glacier" (Department of Mines New Zealand Geological Survey, 1910), states: "There is some uncertainty as to who was the actual discoverer of the Franz Josef Glacier, but to Sir Julius von Haast belongs the honour of the first examination, and it is not unlikely that he was the first white man to visit it. This visit took place in 1865 and is, I believe, the first visit by a European." The first white man to see these two glaciers from the beach was my father, Mr. Leonard Harper, who made the first crossing of the Southern Alps in 1857 with the late Mr. Locke and four Kaiapoi Maoris, continued south, alone, with Terepui, the local chief, and ultimately reached a point about half-way between Jackson's Bay and Milford. His journey was not published in detail, as he had promised the Maoris not to say too much about it, but he saw the Franz Josef and Fox from the beach and told me he had named them Victoria and Albert respectively, though he did not attempt to visit them. Of course, Captain Cook and the early whalers must have seen both these glaciers from the sea. Sir Julius von Haast did not go beyond the terminal face; the first exploration of the whole valley was made by Mr. C. E. Douglas and myself in 1893. We made a close examination of the whole locality, reached the top of the ice-fall above the Almer Glacier, and climbed the ranges on both sides of the valley. In September, 1894, I succeeded in ascending the great ice-fall, and turned back at a point just below Mackay Rocks. In March, 1895, Mr. E. A. Fitzgerald, Zurbriggen, and I crossed from the Fox Glacier and traversed the whole snow basin under the divide to Graham's Saddle, as mentioned above. Some years later Dr. Teichelmann (A.C.), the Rev. H. E. Newton (A.C.), with W. Batson as guide, were the first to reach Graham's Saddle by a complete ascent up the Franz Josef Valley but they took a route along the Baird Range and struck the glacier above the ice-fall. In 1909 Dr. Teichelmann, Professor Linden, and Alex Graham (guide) followed Douglas's and my route to the Almer Glacier, took the spur on the left, thus avoiding the ice-fall and discovering the best route to the head. This has been used ever since.

The Callery, branch of the Waiho, carries gold as far as the Burton Glacier, and prospectors went in, I believe, as early as 1880, but the first record of this fine river appears in the *New Zealand Alpine Journal*, Vol. I, page 90, from Mr. George Park, then of Hokitika, who claims that his "party were the first to explore the Callery." It was, at any rate, the first to give any useful information, and for that reason may be accredited with the honour.

Nomenclature.—For the last thirty years there has been much adverse criticism of the names Bismarck, Roon, Moltke, Kaiser Fritz, and other German celebrities, and Douglas and I have wrongly been held responsible, so the actual facts should be recorded.

When we made the first exploration of the valley we found these names already on the rough map made from the distant low country trig stations. I believe the late Mr. Mueller, who was then Chief Surveyor in Westland, was responsible.

The only prominent peaks named by Douglas and myself were Conway Peak, after Sir Martin Conway, of Himalayan fame, and Mount Anderegg, after that great Swiss guide Melchior Anderegg. We also put Swiss guides' names on to certain glaciers—*i.e.*, Almer, Croz, Baumann, Melchior, Andermatten, and Carrel—"Rope," "No Go," "Arch," and such names are reminiscent of incidents in our work. Many others were placed on the map by the Survey Department.

Descriptive.—The Franz Josef (see Fig. 10) and its surroundings are now so well known that it is unnecessary to go into details. It is enough to say that this glacier is one of the most beautiful in the world. The Rt. Hon. L. S. Amery (A.C.), with whom I had the pleasure of ten days' climbing in 1927, told me he had never seen anything to equal it. The Callery River, with its fine canyon-like gorge and the wonderful alpine scenery at its source, would be considered remarkable in any alpine country. Mount Elie de Beaumont (10,200 ft.), with the fine glaciers sweeping down its slopes, as seen from near Mount Spencer, is, I think, quite as striking as Mount Tasman from Craig's Spur. The two views differ materially, but I place them amongst the best in our Alps.

Glaciology.—The evidence of the past size of the glaciers and other facts in connection with them have been written plainly on the face of the country within these reserves and are there for any careful observer to read and theorize upon. If my conclusions differ from those of professional scientists I can only apologise for my courage not only in stating them, but in maintaining that they are sound.

Dr. Macintosh Bell, in his "Geological Survey Report on the Franz Josef Glacier," says, "It is noteworthy that the West Coast glaciers descend, in general, to much lower altitudes than those of the East Coast." He then instances the Tasman (2,354 ft.), Mueller (2,550 ft.), Hooker (2,882 ft.), Fox (670 ft.), Franz Josef (692 ft.). On this assumption he drew certain conclusions. As a matter of actual fact, the glaciers on the west do *not* "in general" descend to any lower level than those on the east—for instance, Balfour (2,308 ft.), Horace Walker (3,800 ft.), Douglas (4,000 ft.), McKerrow (4,200 ft.), La Perouse (about 3,200 ft.). It is true that the Franz Josef and Fox descend to phenomenally low altitudes, but they are unique in this respect not only in New Zealand, but in the world, considering their latitude; therefore they cannot be taken as examples of west coast glaciers, for their conditions are exceptional even on the west coast, and I propose to deal with them later.

Not only Dr. Bell, but several other scientific writers in the past, have theorized to account for the supposed greater glaciation on the western side of the alps, and have assumed that the much greater rainfall on the west would account for the difference. Here again I make bold to join issue and say that *within the area of glaciation* the precipitation is not very much greater on the western side than on the eastern, because within four or five miles of the divide the moist westerly winds precipitate almost as much moisture on the one side as on the other. But, quite apart from this, I say there is no need to account for what does not exist, because I cannot agree that there is more glaciation on the western side of our alps as a whole. It is true that there are more separate glaciers on the west, but they do not compare in size with those on the east. They are, in my opinion, *due not to a greater snowfall, but to the configuration of the country.*

Dr. Bell, in support of this theory, instances the *névé* fields on the Fox and Franz Josef as being "unsurpassed in the alps in extent" (see Geological Survey, 1910, report on Franz Josef Glacier). This is quite true, but I submit it is not a greater snowfall so much as the formation of the country which accounts for these huge snow fields. They are really great basins which *catch and hold all the snow that falls*, whereas on Tasman the mountains are too steep to permit of similar accumulations. Much of the snow dissipates in the form of avalanches. For the same reason the great ice-fields at the head of the Tekapo Valley are far in excess of those on the western slopes in that locality.

If all districts are examined from Mount Aspiring to Arthur's Pass it will be at once seen that there is little support for the statement that the glaciation is heaviest on the west. Any difference can be accounted for by the configuration of the mountains, and no other explanation is necessary.

Ancient Glaciers (on the authority of several distinguished geologists such as Haast, Hutton, and others).—It may be taken that during the period of maximum glaciation known as the Glacier Period an ice-sheet covered much of the centre of the South Island; there is ample evidence of this. This ice-sheet spilled over wherever an opening occurred, and the ice would flow down the steeper slopes towards the sea. To quote Dr. Bell, "In the Pleistocene period the ice deployed on to the narrow coastal plain of Westland and formed a vast piedmont ice-sheet, above which the isolated peaks and ridges rose as lonely Nunataks." Haast estimates that this great ice-sheet went fifteen miles out to sea in some places. Judging by the clearest evidence which Douglas and I observed in the various valleys, the ice in places was 4,500 ft. thick and practically covered the whole area included in these reserves. The ice-lines in the upper valleys over the whole area of Karangarua and Twain are clearly to be seen at 5,800 ft., being fully 3,000 ft. above the present floor of the valley. On Ryans Range I found a very distinct line of large boulders poised on the steep hillside at over 4,000 ft. above sea-level which were unquestionably an old lateral moraine left by the ice. From this and a great deal of other evidence, too long to set out in this paper, we concluded that at this remote period the only peaks or ice-free rocks showing in the area covered by these reserves were a small portion of the Karangarua, Ryans, Copland, Craig's, and Fritz Ranges, rising, as Dr. Bell says, "as lonely Nunataks" in a field of ice. The Karangarua main valley is a perfect example of a valley which was once completely occupied by a large glacier, which I am satisfied came from the central ice plateau over the Karangarua Saddle to the west. When the ice began to recede this branch would be cut off from its main source of supply at the Karangarua Saddle, which is 5,600 ft. above sea-level, and, having no high peaks near it from which to maintain its size, it would suddenly and rapidly shrink, leaving this great valley in its present state.

It would unduly prolong this paper to go into further details on this matter of ancient glaciers. Any one interested can refer to my book "Pioneer Work" and to several reports by Douglas in the Survey reports from 1892 to 1896, which contain not only our conclusions, but the evidence, on which they were based. The latter, at any rate, is valuable, even if our conclusions are open to argument.

Glacier Variations.—Our glaciers are undoubtedly steadily receding. I can see considerable shrinkage on the Tasman Glacier, its tributaries, and immediate neighbours, in the course of the last forty-one years. The retreat of the glaciers at the head of the Twain and Landsborough Rivers since I examined them in 1894 is very remarkable (see Figs. 5 and 6). This retrocession seems to accord with the general climatic conditions of the world, for the Canadian and other alpine glaciers show even greater retreat. If any cases of temporary advance exist, the variation is very slight, except in the case of the Franz Josef, which since 1893 has shown periods of steady retreat, followed by very rapid recovery, not only at the terminal face, but in the depth of the ice over the whole trunk. As lately as 1928–29 the whole glacier advanced a considerable distance and recovered much ground vacated by the ice. It also rose considerably along the sides.

During these advances the ice swept away vegetation which had sprung up since its last retreat. Observation proves, however, that each advance falls short of the previous one; thus general retrocession is going on here as elsewhere. Unfortunately, owing to the want of co-ordination between the Geological and the Survey Departments, the elaborate system of marks and cairns erected, *and officially recorded* by Douglas and me in 1893 for checking future variations, were entirely

ignored by the Geological Survey under Dr. Bell and Mr. Greville in 1909, who set up their own pegs to check the terminal advance only, and nothing to check lateral variation. This neglect of previous records has left an important gap in the observations, because our cairns for lateral measurement, which were in existence up to about 1914, had disappeared by 1926.

In addition to the 1893 and 1909 observations, Professor Speight and I have made independent examinations between 1914 and 1932. These indicate a marked retreat after 1893; a rapid advance almost recovering lost ground in 1908–9; and a further retreat, which amounted to 170 ft. by 1914, increasing to about 230 yards by 1926. In thickness the ice had shrunk about 150 ft. in the centre to nearly 200 ft. at the sides between 1893 and 1926, but a big "wave" was seen coming down the glacier, which reached the terminal in 1928–29 and pushed it forward past the 1914 line and almost recovered the shrinkage in thickness. No other glacier in our alps has shown such variations.

The Fox Glacier, its close neighbour, which descends to the same low altitude as the Franz Josef, has not materially altered since 1894. Thus the variations on the latter can hardly be due to a general change in the climatic conditions. The problem presented by these two glaciers remains to be solved.

Rate of Ice-flow.—The two main factors which influence the speed by which a glacier moves down the valley are the fall per mile and the nature of the trough. The Tasman Glacier, for instance, has a fall of about 187·7 ft. to the mile from *névé* to terminal and has a shattered rock-lining to the valley, while the Franz Josef falls about 1,064 ft. to the mile in a trough of hard rockfor mation, which cannot retard its flow very seriously. The result is an enormous difference in speed. The Tasman was most carefully tested by the theodolite observations of Mr. T. N. Brodrick in 1891, and his figures show a summer movement up to 18 in. a day opposite the Ball Glacier, and up to 13·3 in. opposite Mount De la Beche the side motion varied from 2 in. to 9 in. The Murchison, Hooker, and Mueller were even less.

In 1893 Douglas and I made as careful measurements as possible across two different sections of the Franz Josef, but as these were checked by prismatic compass we can only claim them to be approximate. The results were startling. On the line 30 chains above Cape Defiance we got a maximum summer daily rate of 200 in. in the centre of the glacier. No actual side measurement was possible, owing to crevassed ice, on a line below Roberts Point 132 in. in the centre down to 5 in. on the eastern side.

These figures showed so much greater movement than is usual that we put them forward with some hesitation, but subsequent conditions on the glacier seem to indicate that they are fairly approximate. In 1909 Dr. Bell and Mr. Greville observed a line across the ice 56 chains nearer the terminal face than our No. 2 line, showing a maximum of 2 ft. in the centre; no side motion was checked. This result, when I saw it, gave me more confidence in our figures on the two lines above quoted, because Bell's figures were practically the same as we obtained at about the same point.

The great difference between our two lines and Dr. Bell's can be explained by the fact that we checked the speed at two points where the speed is obviously exceptional, whereas Dr. Bell's line was at a point where the ice has lost its fall, and its speed is undoubtedly checked by the "roches moutonnees" which extend across the valley just below.

It is difficult to believe that in thirty-seven years which have elapsed since Douglas and I explored it no attempt has been made to check our figures. One thing is clear—namely, that in such a climate the ice must of necessity travel abnormally fast to reach so low an altitude—for the terminal face of a glacier is at the point where the forward motion is counteracted by its rate of melting.

Conclusion.

The above is really a very inadequate description of the various matters of great interest to be found in these reserves. To lovers of Nature they afford an infinite variety of beauty and grandeur, for climbers there are numbers of expeditions available to suit every inclination, scientific men will find work for many years to solve such problems as the relation of *névé* to trunk in the Douglas and Balfour Glaciers, also ice-movement and its effects in the Fox and Franz Josef, and the study of past glacial action in every valley, while Dr. Cockayne has already shown what a wonderful field is here for botanists. Finally, ski-enthusiasts will find here the best snow-fields in New Zealand for their sport, whether in winter or summer.

The wisdom of setting aside this great area will be more and more realized as time goes on, and I hope I shall yet see the day when they are extended to include the whole chain from Arthur's Pass to the Sounds.

Bibliography.

The following publications deal with one or other parts of the above areas and the scientific points of interest:—

Sir Julius Von Haast's "Geology of Canterbury and Westland"; Dr. Macintosh Bell's "Wilds of Maoriland"; sundry articles in the *N.Z. Alpine Journal;* the *Alpine Journal* (London), and the Geological Survey report of 1910; N.Z. Survey Reports from 1892 to 1896; sundry papers in the "Transactions of the New Zealand Institute." My book, "Pioneer Work in the Alps of New Zealand," 1896, deals with the whole area under these reserves from every point of view.

APPENDIX C.

KAPITI ISLAND RESERVE.

(H. W. C. Mackintosh, Commissioner of Crown Lands.)

It gives me great pleasure to report that the year just closed has been an excellent one for the plant and bird-life on Kapiti. The absence of strong gales and the abundant rainfall throughout the whole period resulted in extraordinary growth amongst the plants. Some plants made such growth that they were unable to hold themselves upright, and stakes had to be resorted to. This was the case with a tanakaha near Mr. Wilkinson's cottage, but the growth has been general all over the reserve. Plants in exposed places along the coast usually have a hard struggle for existence. This year, however, these plants, such as ngaio, pohutukawa, and taupata, show new growth 1 ft. or 18 in. All over the reserve young plants are coming away, and the forest-floor is being rapidly covered with a variety of trees, shrubs, ferns, and mosses. Some important works have been carried out during the year. The boundary-fence between the reserve and the neighbours at the northern end of the island has been completed, and a first-class job has been done. The old portion of the boundary-fence has also been repaired. The whare has been repaired and painted, and the boats have been overhauled. Trapping of vermin has been diligently carried on, and just under five hundred rats have been accounted for. That the menace from rats is being minimized is evidenced by the fact that not one pipit's nest was interfered with on Rangatua Flat, according to Mr. Wilkinson's report. A few opossums were killed, but these animals are getting scarce.

The Caretaker reports that honey bees have invaded Kapiti and are to be seen working on fine days. Apparently a hive has been established somewhere on the island. If they are not found and exterminated, they will increase and will become serious competitors with the honey-eating birds.

The Caretaker, Mr. A. S. Wilkinson, desires to thank the following, who kindly sent over plants, &c., to set out on the reserve :—

Mr. A. Morris Jones, Kelburn	Plants and seeds.
Mr. Waddle, New Plymouth	Plants.
Mr. Max Roberts, Wellington	Plants.
Mr. A. Ainsworth, Wellington	Plants.
Plant Preservation Society, Lower Hutt	Plants.
Mr. Beddie, Petone	Plants.
Mr. Clarke, Constable Street, Wellington	Plants.
Mrs. R. H. D. Stidolph, Masterton	Plants.
Mr. B. C. Aston, Wellington	Plants and cuttings.

I would again express my appreciation of the able and thorough manner in which Mr. Wilkinson carries out his duties. I append hereto extracts from Mr. Wilkinson's annual report :—

"The beautiful filmy ferns are spreading everywhere; also the kidney-fern. These plants were almost exterminated by goats. Fortunately, enough of them were left on branches of trees and rocks where goats and sheep could not reach them, to again spread their like far and wide.

"Most of the trees, shrubs, and vines flowered well. The rata and pohutukawa were beautiful. The last named has flowered two seasons now. The young plants were sent to me ten years ago by Mr. Mackenzie, Director of Parks and Reserves, Wellington, and flowered last year for the first time. This year they were covered with blossom and should sow plenty of seed. In a few years we should see young pohutukawa coming up in all directions.

"Tawa, miro, and matai, among the larger trees, had the usual supply of flowers and will in due course provide the berry-loving birds with plenty of food. The hinau, that is so lovely when in full flower, was dull in comparison with the display given last year, also the rewarewa, a tree that is haunted by honey-eaters in the flowering season and much frequented by parrakeets when the seeds enclosed in the canoe-shaped pod are maturing. But the kamahi made up for the shortage of bloom in some of the other trees by giving a magnificent display of veronica-like flowers.

"The smaller-growing trees, such as the mahoe, puka, kohepiro, houhou, horoeka, matipo, and toru, all bore their usual supply of flowers. Although the flowers of these small trees are inconspicuous the fruit is very beautiful on some of them. The mahoe, with its mauve-coloured berries on the naked branches, is very pretty. All are very much sought after by birds, both large and small. The kaka is very fond of the seeds of the kohepiro. This is the only bird I have seen eating the seeds of the kohepiro. The coastal species, such as the karaka, ngaio, and taupata, provided a lot of food. The karaka was particularly prolific, so the pigeons reaped a great harvest. Some belated berries are still on the karaka, but they are nearly done now. The manuka was very poor in flowers this year—too much rain, I think. It takes a dry season to make the manuka flower well. Neither did we have any lowland so-called flax (*Phormium tenax*) flowers to attract the honey-eating birds, although the mountain species flowered as usual. Other birds besides the honey-eaters missed the flax-flowers about our house this year. As soon as the seeds of the flax begin to form parrakeets are after them. They still fly down and search the old seed-stalks, and appear quite mystified at the absence of their favourite food. However, the toetoe (*Arunda conspicua*) is making a good show this season, and the seeds of this plant are greedily taken by parrakeets. The olearias flowered well, especially the heketara, the most prominent species of the genus on the island. This plant never lets us down. Some seasons it is much better than at others, but there are always some beautiful patches of it, even in a lean year.

"The clematis was also much in evidence in early spring, draping the bush trees and manuka with splashes of exquisite bloom, and the beautiful flowers of the bush lawyer, to my mind one of the finest flowers in the New Zealand bush, sprawled around over the tops of shrubs here and there. The

lawyer provides the birds with a great deal of food when the small raspberry-like fruit is ripe. The kohia, or passion fruit, was also covered with flowers. Although not so conspicuous in the flowering-stage as the other two vines I have mentioned, it makes up for this when it bears its lovely fruit like a small orange in late autumn. Parrakeets are particularly fond of the seeds contained in the orange-coloured cases, so are blue wattled crows, but we have none of these charming birds on Kapiti. The kareao, or supplejack, flowered as usual and will provide some much-needed food in winter, but few birds care much for the berries. It is generally left to the last. The same applies to the berries of the porokaiwhiri, or pigeon-wood. Pigeons are often seen eating the leaves and young shoots of other plants in winter and early spring, even though there are plenty of berries on the pigeon-wood.

"Another plant that has done well this year is the turutu (*Dianella intermedia*). Although a common plant in many parts of the country, it is only seen to advantage when growing in a warm, sheltered place. The flowers are nothing much to look at, but when covered with the exquisite fairly large berries like small blue-bags hanging in graceful clusters, one of the gems of the bush is before you. The slightest breeze shakes off the berries, otherwise this plant would be in great demand for rock gardens. The weka is the only bird I have seen eating the berries of the turutu.

"Generally speaking, the birds have had a good year. Pigeons are numerous. All the pairs near our house reared, or are rearing, young. Kakas seem about the same; several pairs of them work about amongst the dead trees near Rangatira, tearing the rotten wood to pieces after grubs. Parrakeets have done exceptionally well, especially the red-headed species—they are to be seen everywhere. Three different flocks of yellow-headed were seen during the year. They are much more retiring than the red-headed. Tui and korimako are very plentiful; some are always about our house after syrup. It was only during the flowering of the rata and pohutukawa that we missed them. The wet season has been ideal for the robins and tomtits. They were never short of grubs. Both can now be seen in places where they were absent years ago. So much growth has come up, thus providing these bush species with plenty of cover on nearly every part of the Island.

"The saddle-backs were neither seen nor heard by myself during the year, but Mr. Hughes, the recently appointed trapper, heard bird notes that were strange to him. He is well acquainted with the commoner birds, but does not know the saddle-back. He heard the strange notes in the same place where the saddle-backs were last seen, so it may have been the call of this bird that he heard.

"The blind kakapo was seen once during the year quite a mile away from where he was last observed some six years ago. As the bird was in good condition, this proves that food is plentiful and easy to obtain. The little whiteheads are as plentiful as ever. Young ones can be seen everywhere.

"The sea-birds were able to nest this year without the usual gales. Often the gulls and terns have a lot of their nests destroyed in November and December and have to start all over again. Ths usual nesting-places were occupied, as well as several new sites. Two large colonies of red-billed gulls nested on the cliffs at Paripatea, and dozens of young were reared.

"The large black-backed gull which nests all round the island and on the adjoining islets again reared the usual number of young. The little white-fronted tern also did well. Hundreds bred on Tokomapuna. It is a beautiful sight to see a flock of these graceful little birds working over shoals of fish. The fish that the terns get is a small silvery creature a few inches in length. It is chased to the surface by larger fish. The tern floating along with slowly flapping wings a few feet above the water constantly searching the surface catches a glimpse of silver. Like a flash it darts down, splashes into the water, and is seen to rise with a small fish in its bill. Then it flies swiftly in the direction of its nest, which is perhaps a mile away. During the breeding-seasons hundreds of them are doing this all day long. It is at this time of the year that they suffer great annoyance from the parasitic jaeger, a bird that does not hunt for himself, but steals from other birds. Darting amongst the hard-working terns this northern interloper singles out a tern that has caught a fish, pursuing it with relentless fury until the tern is so hard pressed he has to drop his catch. This the jaeger adroitly seizes and swallows before it reaches the water. The jaeger breeds around the shores of the Arctic Ocean. It appears about Kapiti in October and leaves again in March. The little blue penguin nested about the island in great numbers as usual. The thick-billed penguin from the south was seen on two occasions.

"Shags are about in the usual numbers. Blue herons never seem to increase, in spite of the fact that they rear young every year. There are no more now around Kapiti than there were ten years ago. All the adults must go to the mainland. Grey ducks nested along the shores of the island in at least four places, and several broods of young were noticed. The paradise ducks reared three broods. Some of the adult birds make across to the mainland, where I am afraid many are shot.

"Stilts and banded dotterel frequented the north-end during the breeding-season."

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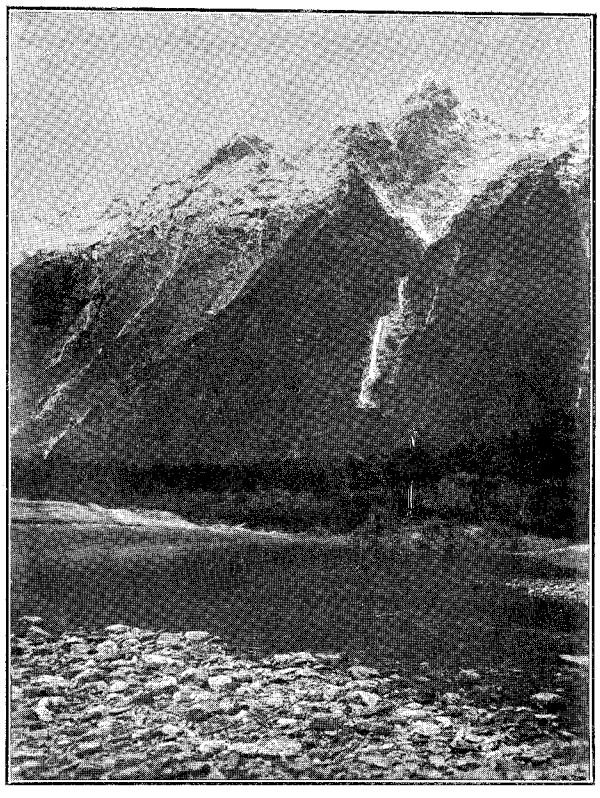
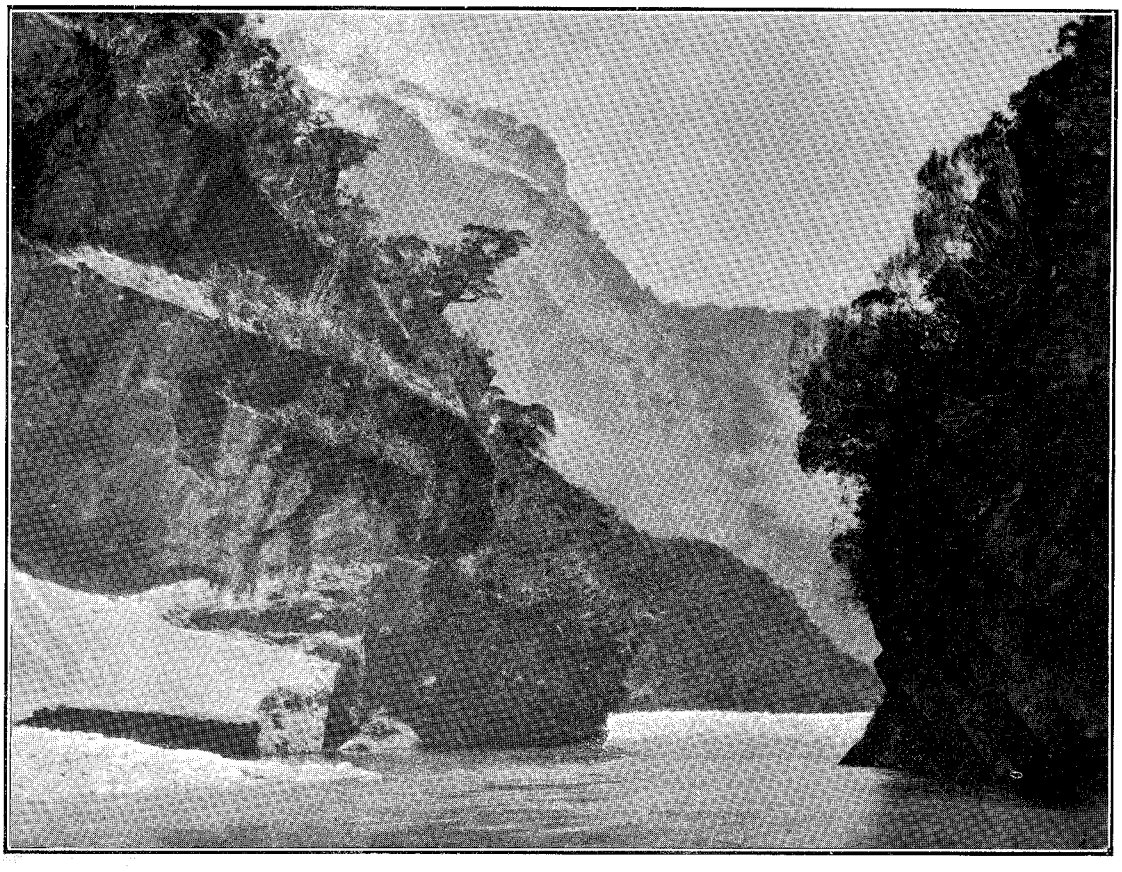


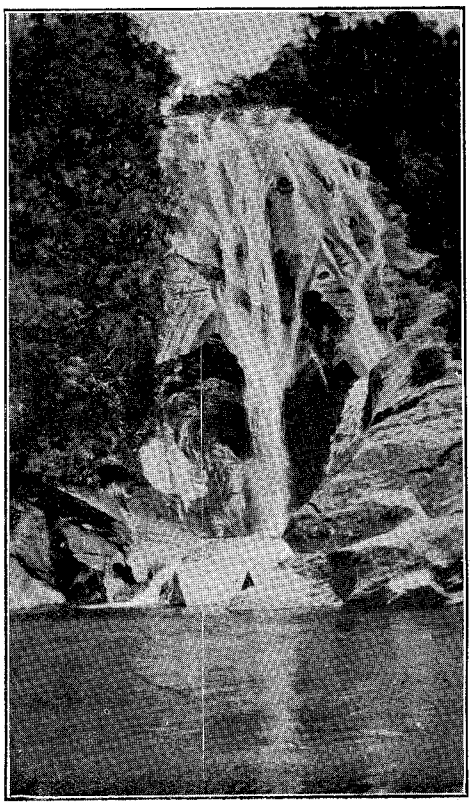
[*Photo by A. P. Harper.*

FIG. 1.—MOUNT MCGLOIN FROM CASSELL'S FLAT, KARANGARUA RIVER.



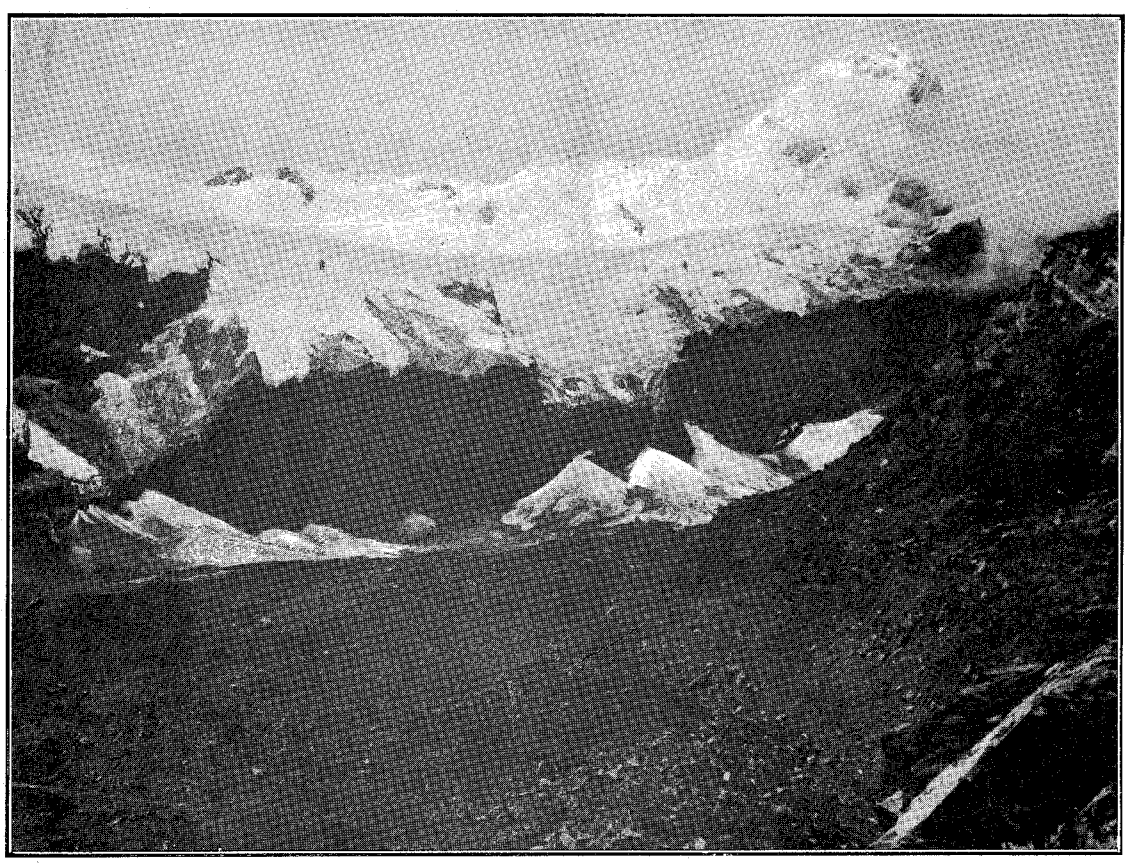
[*Photo by A. P. Harper.*

FIG. 2.—BLUFFS ABOVE THE BIG CATARACTS, KARANGARUA RIVER.



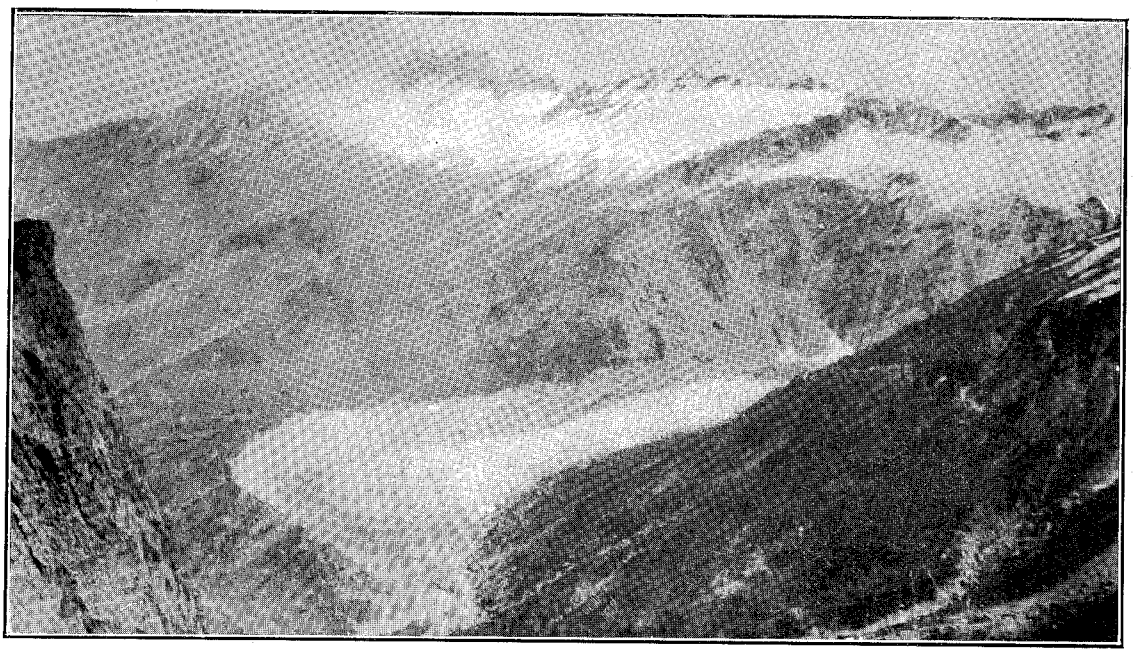
[*Photo by A. P. Harper.*

FIG. 3.—"OLD MAN" WATERFALL, 257 FT. HIGH, KARANGARUA RIVER.



[*Photo by A. P. Harper.*

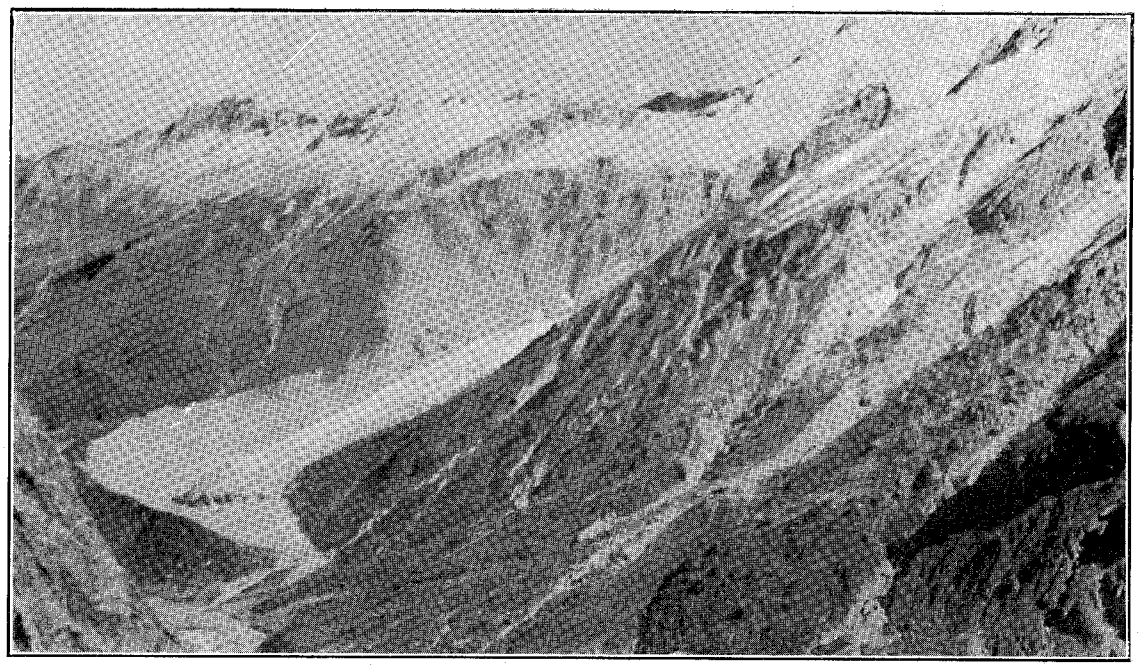
FIG. 4.—MOUNT SEFTON (10,359 FT.) AND DOUGLAS GLACIER, AT THE HEAD OF TWAIN RIVER.



[*Photo by A. P. Harper.*

FIG. 5.—HORACE WALKER GLACIER, TWAIN RIVER, 1894.

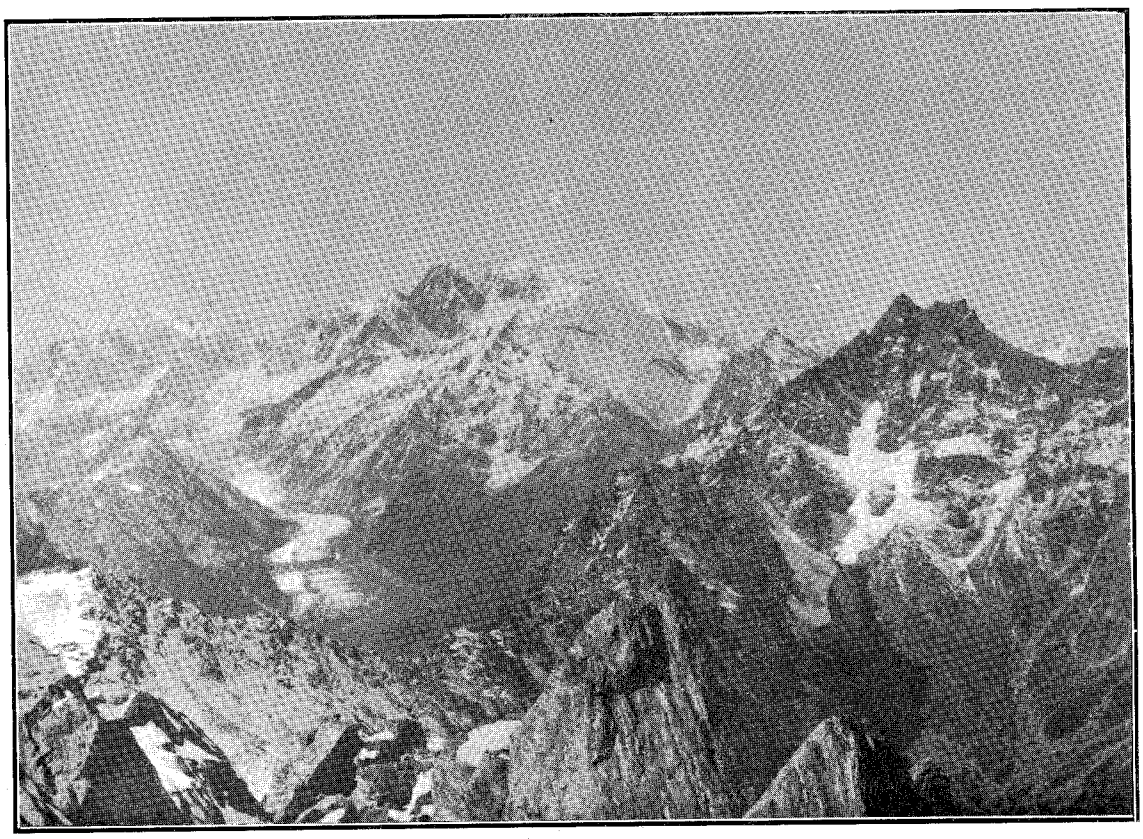
(Compare Fig. 6.)



[*Photo by W. Scott Russell.*

FIG. 6.—HORACE WALKER GLACIER, TWAIN RIVER, 1934.

(Compare Fig. 5.)

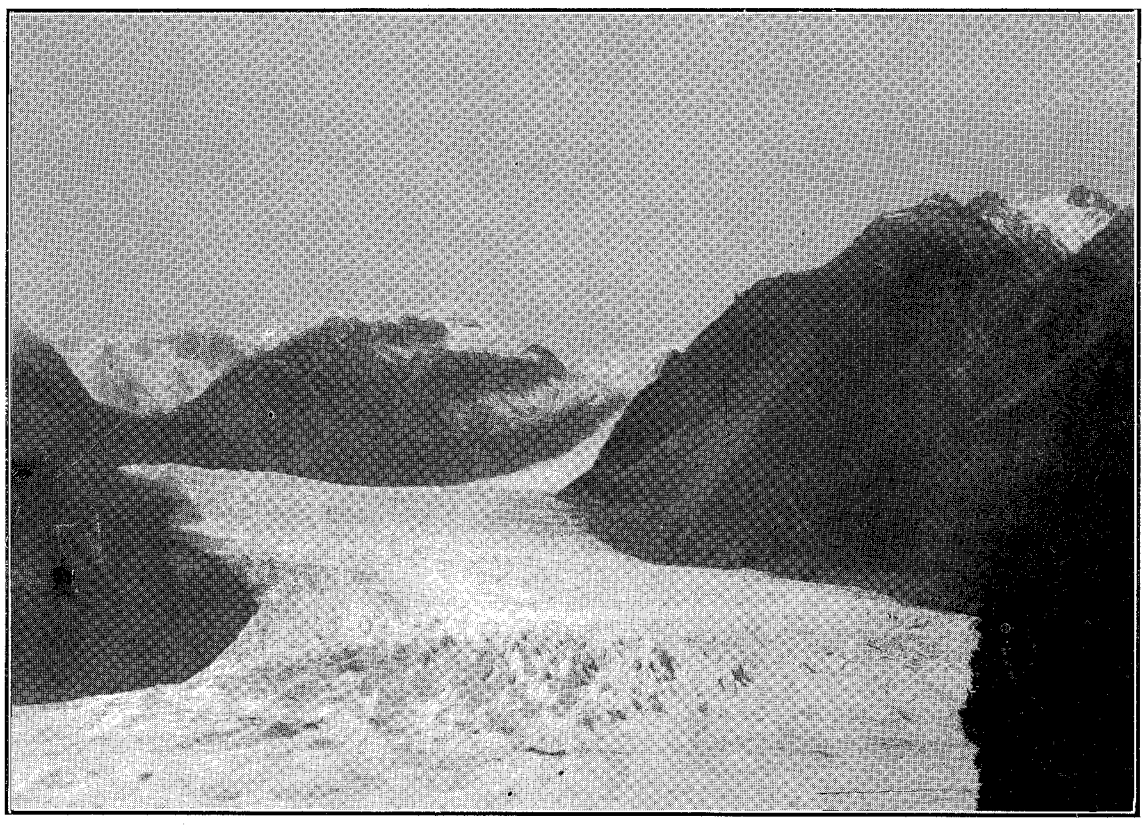


[*Photo by A. P. Harper.*

FIG. 7.—LOOKING INTO HEAD OF COOK RIVER FROM RYAN'S PEAK (6,890 FT.), SHOWING LA PEROUSE GLACIER.

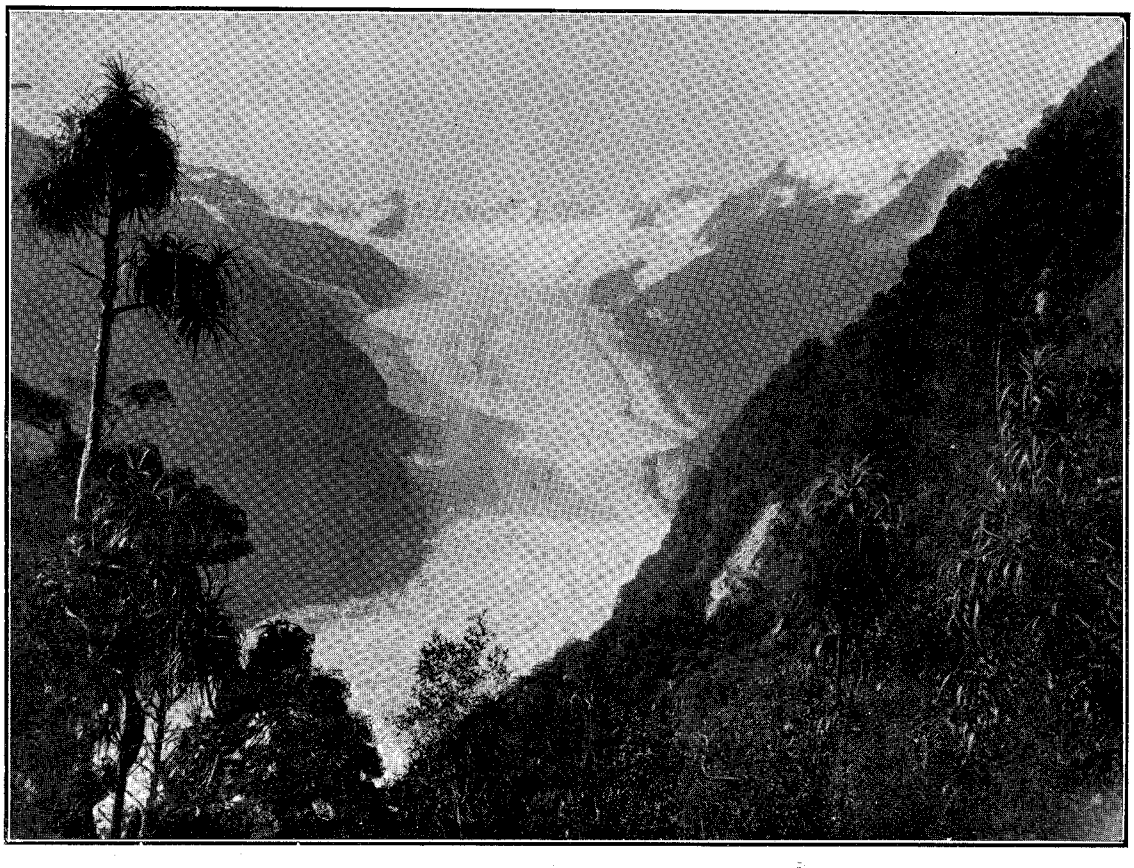
[*Photo by A. P. Harper.*

FIG. 8.—BALFOUR GLACIER FROM CRAIG'S RANGE, SHOWING MOUNTS TASMAN AND COOK.



[*Photo by A. P. Harper.*

FIG. 9.—FOX GLACIER FROM CONE ROCK (1894).



[*Photo by A. P. Harper.*

FIG. 10.—FRANZ JOSEPH GLACIER FROM 2,500 FT. ABOVE THE ICE (1893).