1878.

NEW ZEALAND.

CALIFORNIA SALMON AND WHITEFISH OVA,

(PAPERS RELATIVE TO THE INTRODUCTION OF)

Presented to both Houses of the General Assembly by Command of His Excellency.

No. 1.

The UNDER-SECRETARY to the Hon. SPENCER BAIRD.

SIR,— Wellington, 31st May, 1877.

With reference to the offer which you kindly made in your letter of the 7th ultimo, addressed to Dr. Hector, I have the honor to request that arrangements may be made for the transmission to this colony during next season of 500,000 of the ova of the Californian salmon, and 250,000 of the ova of lake whitefish *(Coregonus albus)*.

I have, &c.,

Professor Baird, G. S. COOPER.
Commissioner United States Fishieries Commission,
Washington.

No. 2.

Dr. HECTOR to Professor BAIRD.

DEAR SIR,— Wellington, 28th July, 1877.

I am directed by Government to ask you to be good enough to have the next shipments of salmon ova packed, if possible, in cases containing 50,000 ova each, in order to facilitate their transit to the different districts throughout the colony.

The Government propose to distribute the ova as follows :—

Auckland	2
Napier...	1
Nelson...	1
Greymouth	1
Wellington	1
Christchurch	1
Dunedin	1
Makarewa	2
	10 = 500,000.

I have, &c.,

The Hon. Spencer F. Baird. JAMES HECTOR.

No. 3.

Professor S. F. BAIRD to the Hon. the COLONIAL SECRETARY.

SIR,— Washington, 10th July, 1877.

I have the honor to acknowledge the receipt of your letter of the 31st of May, asking for 500,000 eggs of the Californian salmon and 250,000 of the whitefish, to be sent to New Zealand during the present year.

This request I shall take pleasure in supplying, and, in the meantime, beg to be advised of the proper address of the packages, and whether they shall be sub-divided into smaller quantities. Of course I can only promise them conditionally—in the event of nothing untoward happening to the fisheries.

I have, &c.,

The Hon. the Colonial Secretary. SPENCER F. BAIRD.

No. 4.

Mr. W. ARTHUR to the Hon. the COLONIAL SECRETARY.

SIR,— Dunedin, 25th September, 1877.

The Acclimatization Society of Otago had intended procuring a supply of American whitefish ova this season from the States.

In the course of our enquiries, however, we were informed that the Colonial Government of New Zealand had already taken up the matter, and were going to import a variety of the ova of *Salmonidæ*, and that a portion was to be forwarded to Otago,

Under these circumstances, the Society will gladly await the Government experiment, and give any assistance in its power to secure success, and

I have, &c.,
W. ARTHUR,
Acting Secretary Otago Acclimatisation Society.

The Hon. the Colonial Secretary.

No. 5.

[CIRCULAR.]

To the SECRETARY of ACCLIMATISATION SOCIETY.

SIR,—

I have the honor, by direction of the Colonial Secretary, to inform you that Professor Baird was, on the 28th of July last, requested to be good enough to have the next shipment of salmon ova packed, if possible, in cases containing 50,000 ova each, of which case is intended for your Society.

This shipment may be expected to arrive by the next, or at latest, the following San Francisco mail, and I am to request that you will be prepared to receive it immediately on arrival of the steamer at

I enclose a copy of the papers which have been laid before Parliament on the subject generally, for the information of your Society.

[*To Mr. Firth,*—]

Should it appear to you that any additional expenditure for supplying of ice, or on any other account, is required to insure the chance of success for the shipments to Southern Societies, I am directed to request that you will kindly make such arrangements, and incur such expenditure on behalf of the Government, as may in your judgment appear necessary to attain the object in view.

I have, &c.
G. S. COOPER.

No. 6.

Mr. J. C. FIRTH to the UNDER-SECRETARY.

[TELEGRAM.] Auckland, 2nd November.

Preparations for safe distribution of salmon ova completed. Shall send ova boxes and ice chests for Nelson or Greymouth, Wellington and Christchurch per Wanaka. Those for Napier, Dunedin, and Invercargill per Rotorua. Make prior arrangements for forwarding ova for Invercargill from Dunedin if mail arrives to-morrow. I wish to convey to King country and Upper Thames. Pray ask Minister to authorise of running of locomotive to Newcastle on Sunday morning.

No. 7.

Mr. FREDERICK HUDDLESTONE to the UNDER-SECRETARY.

SIR,— Nelson, 16th October, 1877.

I have the honor to acknowledge the receipt of your letter of the 11th instant, wherein you inform me that a shipment of 50,000 salmon ova may be expected by the Nelson Acclimatisation Society, by the next, or, at the latest, the following San Francisco mail.

In reply, I have to request that you will be good enough to convey the thanks of this Society to the Government, and inform the Hon. the Colonial Secretary, that the ponds will be ready for the reception of the ova before the arrival of the next mail, and every care will be taken to hatch the fish.

I have, &c.,
FREDERICK HUDDLESTONE,
Hon. Sec. Nelson Acclimatisation Society.

The Under Secretary, Colonial Secretary's Office, Wellington.

No. 8.

Mr. JAMES PAYNE to the Hon. the COLONIAL SECRETARY.

SIR,— Greymouth, 25th October, 1877.

I have the honor to acknowledge receipt of your letter of date and number as per margin, and to inform you that this Society will have all its hatching boxes and ponds in perfect readiness to receive the salmon ova on its arrival.

The boxes have been cleaned from all trout, and are available at any moment.

I am further directed by this Society, to request that its claims for portion of the whitefish to arrive, be recognized, and that you will be good enough to put such upon record.

This Society acknowledge, with deep gratitude, the attention of the Government in securing salmon ova for it.

I have, &c.,
JAMES PAYNE,
Hon. Sec. Grey District Acclimatisation Society.

The Hon. the Colonial Secretary.

No. 9.

Mr. S. C. Farr to the Hon. the Colonial Secretary.

Dear Sir,— Christchurch, 18th October, 1877.

I beg leave to acknowledge receipt of yours of the 12th instant, covering papers for our information, for which receive our most sincere thanks.

I have, &c.,

The Hon. the Colonial Secretary. S. C. Farr.

No. 10.

Mr. W. Arthur to the Hon. the Colonial Secretary.

Sir,— Dunedin, 1st November, 1877.

I have the honor to acknowledge your letter of 11th ultimo, regarding a box of American salmon ova to arrive soon. In reply, I have to state that the Otago Society has given the necessary instructions to Mr. Deans, the curator, to make his preparations for accommodating 50,000 ova in our hatching boxes.

I have, &c.,

W. Arthur,

The Hon. the Colonial Secretary. Acting Secretary Otago Acclimatisation Society.

No. 11.

Mr. Henry Howard to the Under-Secretary.

Sir,— Salmon Ponds, Wallacetown, 20th October, 1877.

I have the honor to acknowledge the receipt of your letter of the 11th instant, informing me of the expected arrival of salmon ova, and to inform you that everything is ready for its reception.

I should feel thankful if the Government could give such directions to the railway authorities at Invercargill, as would prevent any unnecessary delay in its transit from Bluff to the Makarewa station.

The Under Secretary, I have, &c.,

Wellington. Henry Howard.

No. 12.

The Under-Secretary to Mr. Henry Howard.

Sir,—

With reference to your letter of the 20th instant, relative to preparations being made for the reception of salmon ova at the Makarewa ponds, I am directed to inform you that the Railway authorities have been instructed to give you every facility in the transit of the ova from the Bluff to its destination.

You had better place yourself in communication with the Station-master at the Bluff on the subject.

I have, &c.,

G. S. Cooper.

No. 13.

The Hon. Mathew Holmes, M.L.C., to the Hon. the Colonial Secretary.

Sir,— Wellington, November 2, 1877.

On behalf of the Oamaru Acclimatisation Society I beg to thank you for the manner in which you were prepared to meet their application for salmon ova for that district, and am sorry to find that all the shipment now on its way from San Francisco was promised before my application was made.

As further shipments are to follow, I now beg to apply for two cases salmon and two cases white-fish ova, out of the first shipment to arrive from America, for the Oamaru Acclimatization Society.

I may state that suitable provision has been made to receive and hatch the ova, and that Mr. Young (one of the most successful in this line), has undertaken to conduct the experiment.

I have, &c.,

The Hon. the Colonial Secretary. Mathew Holmes.

No. 14.

Mr. J. C. Firth to the Under-Secretary.

[Telegram]. Auckland, November 6th, 1877.

I have shipped per Rotorua, sailing this evening, one case of fifty thousand salmon ova to Williams, Napier, with one chest of ice in reserve. Same quantity ova and two chests reserve ice each, to Travers, Wellington, Farr, Christchurch, Perkins, Invercargill, and have wired advice of shipment to each party. Did Greymouth ova arrive?

J. C. Firth.

No. 15.

Mr. J. C. Firth to the Under-Secretary.

Sir,— Auckland, November 20th, 1877.

I perceive by your telegram of yesterday that some misapprehension exists as to the quantity and distribution of the salmon ova received by the November mail steamer.

By way of putting the matter fully before you, I may state that in answer to my letter of 11th April, to the Hon. S. F. Baird, that gentleman arranged to send 200,000 ova for the Auckland Acclimatisation Society, and in answer to a subsequent request of mine, a further shipment of 50,000 for the Canterbury Society, and 50,000 for the Victorian Society. On receiving your letter of the 11th October, asking me to receive and provide for the safe distribution of the 500,000 salmon ova the New Zealand Government were expecting to arrive by steamer on November 3rd, or at latest by next mail steamer, and knowing that the ova boxes, are shipped from their crates in San Francisco so that they may be placed in the steamer's ice-house I immediately set to work to provide a double chest (the interspace packed with sawdust) for each ova box expected (16 in number), with the necessary ice boxes for a reserve of ice. I had provided also 2 tons of ice as a first instalment if the whole 800,000 ova arrived. These preparations were fully completed on November 2nd, when the mail steamer arrived at Auckland. On her arrival I found that 11 boxes only had arrived, consigned on ship's manifest to Auckland Acclimatisation Society. I could learn nothing of any for the New Zealand Government.

I had a staff of 8 men on the wharf, but the difficulty of getting the ova boxes out of the ice-house, where they lay imbedded in tons of ice, was so great, that I had not completed the packing of the 11 boxes till 5 o'clock on the morning of the 3rd November, though I and my men had been hard at work all through the night.

Not wishing to disappoint the more suitable localities in the South, I arranged to ship some of the Auckland ova to Christchurch [in addition to their own parcel], to Dunedin, to Invercargill, and Napier —to be returned to us on receipt by Government of the ova ordered by them. I therefore placed on board the Wanaka, s.s., before 7 o'clock a.m., November 3rd, 4 boxes with reserves of ice for the three places first named, intending to ship to Napier by the Rotorua, on the 6th. When on my return from Onehunga, the Secretary of our Society, having obtained his advices, waited upon me with a letter from Messrs. Cross & Co., our San Francisco agents, advising shipping 11 boxes salmon ova for the Auckland Acclimatization Society, and enclosing press copy of a letter from Professor Baird's deputy at Redding, in which there fortunately happened to be a copy of the names of places to which the 10 boxes were to be sent—identical with Dr. Hector's list of 28th July, 1877—embodied in the Parliamentary papers you sent to me (with one for the Victorian Society). I then found that for some reasen or other the United States Fish Commissioners had not forwarded the Auckland and Canterbury orders. I at once telegraphed Captain McGillivray, of the Wanaki, s.s., to deliver the two boxes marked "Christchurch," to Nelson and Greymouth. On the 6th I despatched per Rotorua :—

1 box to Napier		
1 „ Wellington		With 7 ice boxes in reserve.
1 „ Christchurch		
1 „ Invercargill		
4		

Per Wanaka—

1 box to Nelson	(as above)	
1 „ Greymouth	do	With 5 boxes ice in reserve.
1 „ Dunedin		
1 „ Invercargill		
8		

leaving for Auckland $\frac{2}{10}$ and $\frac{1}{10}$ for Victoria Society (not included in Government order.

Having made every arrangement at great expense and much personal inconvenience for the safe reception and proper dispersion of the full quantity of 800,000 ova, I must confess to a little disappointment at being therefore rendered unable to stock the Auckland rivers to the number and extent I had intended.

Since the arrival of the mail steamer on November 2nd, I have been actively engaged in carrying out the work you intrusted to me—of packing and transhipping the ova to Southern ports—and in placing the Auckland portions in the King country to the south, and in the Wairoa river and its tributaries to the north.

From telegrams I have received, I am pleased to think that the work, arduous though it has been, has not been in vain.

Pray pardon the length of this letter as I could not permit any misapprhension as to the proper disposal of the ova to exist in your mind, without endeavouring to remove it.

I have, &c.,

G. S. Cooper, Esq.,
Under-Secretary, Wellington.

J. C. Firth,
President of the Auckland Acclimatisation Society.

No. 16.

Mr. J. C. Firth to the Under Secretary.

Sir,— Auckland, 21st January, 1878.

I beg to inform you that I have successfully deposited the 100,000 salmon ova placed at the disposal of the Auckland Acclimatisation Society, as follows:—

40,000 in the Puniu river, in the King Country—the chief Rewi Maniapoto co-operating with me and assisting me.
8,000 in the River Thames.
7,000 in a small stream near the chief Tirarau's settlement, Wairoa North.
7,000 in the Mangakahia river, near the Hikurangi stream.
36,000 in the Mangakahia river, near Te Wero's settlement.

About 95 per cent of these hatched out, and, though the occurrence of a fresh in the Mangakahia river interfered somewhat with the success of the enterprise, I have no doubt that a very fair measure of success has been attained.

I enclose—1.—Duplicate receipt from Mr. Myron Green, for 750dols. paid by Mr. Creighton to United States Fish Commission, for package and transit charges of 500,000 salmon ova; and 2.—Letter from Professor Spencer F. Baird confirming same. For this sum Mr. Creighton drew upon me, which I honored, and was subsequently refunded a like amount by the Treasury at Wellington—£164 1s. 3d,

I have to thank you for the very efficient aid you have rendered me in the distribution of the half-million ova.

I have, &c.,

G. S. Cooper, Esq., Under Secretary, Wellington. J. C. Firth.

No. 17.

Frederick Huddleston, Esq., to the Hon. the Colonial Secretary.

Sir,— Nelson, 7th January, 1878.

I have the honor to report for the information of the Government the success that has so far attended the introduction of American salmon ova into the rivers of this district.

The ova arrived from San Francisco on the evening of Sunday, the 4th of November. On Monday morning I opened the box said to contain 50,000.

I found eight layers, each about a quart, and packed between a thin material like scrim, and each layer separated by moss. I caused all the dead eggs to be picked out (about 1,500). The sound ones were then put into the hatching ponds, and the ponds covered with boards to protect the eggs from the sun. On Friday, the 9th November, the first fish made its appearance, and by Monday, the 19th all were hatched out, with the exception of about 1000 bad eggs. They were thus left undisturbed until the 8th December, when, finding they had begun to feed, I caught about half of them and turned them into the Wairoa river, close by the railway bridge. On the following Saturday, 15th December, the remainder were caught and placed into two large *tin-lined* cases, and sent by rail to Fox Hill, from which place they were taken by spring conveyances over Spooner's range, a distance of about fourteen miles, and placed into the Motueka river, with a loss only of about fifteen on the road.

I estimate the total number turned out at about 25,000, and the bad ova at about 2,500. It will thus be seen that the box contained little more than half the estimated quantity, viz., 50,000.

The ova was certainly most carefully and beautifully packed, and the arrangements for supplying ice were exceedingly good. Great credit is due to the shippers, and it would be well if Dr. Buckland and others in England interested in the acclimatization of fish would take a lesson in packing ova from our American friends.

In conclusion, I hope the Government will continue the good work so well commenced, until salmon is established in New Zealand waters beyond a doubt, and our rivers well stocked.

I have, &c.,

The Hon. the Colonial Secretary. Frederick Huddlestone,
Hon. Sec. Nelson Acclimatisation Society.

No. 18.

Mr. W. Arthur to the Hon. the Colonial Secretary.

Sir,— Dunedin, 16th December, 1877.

I have the honor to inform you that the box of American salmon ova (supposed 50,000) arrived here safely by the Taupo on the 7th, and contents transferred to the breeding boxes of the Otago Acclimatisation Society with as little delay as possible. The supply of ice was not exhausted, and the ova were in very good condition, only four or five per cent having gone bad. I am sorry, however, to say that after being four days in the hatching boxes many of them died, but others are healthy, and some are hatching out.

The Society will be glad to hear soon as to when the supply of whitefish ova may be expected for our lakes. Our accommodation is limited, and besides the salmon ova we have a great number of young trout recently hatched out still in the hatching boxes.

I have, &c.,

The Hon. the Colonial Secretary. W. Arthur,
Acting-Secretary Otago Acclimatisation Society.

No. 19.

The Hon. J. A. R. Menzies to the Hon. the Colonial Secretary

Sir,— Wyndham, 25th January, 1878.

I have the honor to inform you that Mr. Howard reports that he has placed the following numbers of Californian salmon fry in the rivers named:—

In the	Oreti	35,000
„	Waipahi	10,000
„	Makarewa	18,000
	Total	63,000

He retains for the present about 800 fry in the ponds. Mr. Howard remarks, that only 25,000 fry were available from the oxa contained in the second box he received—that box, as you may remember, having been transhipped in Auckland, by mistake, to the Rotorua, whereby it reached the ponds above a week later than the other box—the hatching of the ova of which seems to have produced 80 per cent of fry.

Mr. Howard also says "the young fish are exceedingly healthy and strong, and the arrangements for the transport of the ova from America, though simple, were almost perfect."

Have you any intelligence of the dispatch of the English salmon ova ordered?

I have, &c.,
J. A. R. MENZIES,
Chairman of Commissioners of Salmon Ponds.

The Hon. the Colonial Secretary.

No. 20.

The Hon. the COLONIAL SECRETARY to His EXCELLENCY the GOVERNOR.

Wellington, 1st February, 1878.

MINISTERS desire respectfully to inform His Excellency the Governor that the half million salmon ova which arrived by the mail steamer from San Francisco in November last, have been successfully hatched and distributed to the different rivers of the colony; and that, by information that has reached the Government from various directions, it has been demonstrated that owing to the extreme care with which the ova were packed in America, the very satisfactory result of about 95 per cent of the fish has been obtained.

In addition to the half-million sent at the request of the Government, an equal quantity has been sent to the various Acclimatization Societies in the colony, and this handsome gift of salmon ova has been made to the colony without charge, except cost of package and transit, by the Fish Commission of the United States, under the direction of the Hon. Spencer F. Baird, as Chief Commissioner.

Ministers venture to think that so generous an action on the part of a foreign nation, is worthy of being acknowledged in a special manner. They would, therefore, respectfully ask His Excellency to bring the matter under the notice of Her Majesty's Government, through the Secretary of State for the Colonies, in the hope that Her Majesty's Government will permit a communication to be made to the Government of the United States, of the thanks of the colony of New Zealand for the generous and valuable gift of a million salmon ova to the colony.

I have, &c.,
G. S. WHITMORE,
Colonial Secretary.

His Excellency the Governor.

No. 21.

The Hon. the COLONIAL SECRETARY to Mr. J. C. FIRTH.

SIR,— Wellington, 6th December, 1877.

Referring to the correspondence which has taken place on the subject of the salmon ova supplied by the American Fish Commissioner, and which reached New Zealand by the November mail, I have the honor to inform you that communications have been received from all the Acclimatisation Societies to which consignments were sent, stating that the importation seems likely to turn out perfectly successful.

It gives me great pleasure to offer you the thanks of the Government, for the readiness with which you undertook the arduous task of attending to the shipment on its arrival, and for the judicious arrangements you made for the distribution of the portions assigned to Southern Societies. There can be no doubt, that to those arrangements is largely attributable the success which has attended the experiment.

I have, &c.,
G. S. WHITMORE.

J. C. Firth, Esq., Auckland.

No. 22.

Mr. J. C. FIRTH to the Hon. the COLONIAL SECRETARY.

SIR,— Auckland, 11th February, 1878.

I have the honor to thank you for your letter of 6th December last, conveying the thanks of the Government to me for my services in distributing the salmon ova recently presented to this colony by the United States Government.

I have also to thank you for bringing under the notice of His Excellency the Governor, the act of genuine international courtesy displayed by the Government of the United States, in the noble gift of one million salmon ova to the colony of New Zealand; and for the information that His Excellency has communicated with the Secretary of State for the Colonies, requesting that the Government of the United States may be thanked on behalf of this colony.

I have, &c.,
J. C. FIRTH.

The Hon. the Colonial Secretary.

No. 23.

Mr. R. J. CREIGHTON to the Hon. the COLONIAL SECRETARY.

SIR,— San Francisco, California, 19th January, 1878.

I have the honor to inform you that I have consigned to your Government from the United States Fish Commission, per favor of Professor Baird, 500,000 whitefish eggs, which I hope will arrive

in good condition and hatch out. I enclose Professor Baird's letters and telegrams to me on this subject; also telegrams from and to Mr. Clark, Deputy Fish Commissioner at Northville, Michigan. In further explanation, however, I may state that I wrote to Professor Baird on this subject several months ago, and expressed a desire of obtaining, if possible, another supply of whitefish eggs for the colony, in consequence of the failure of previous shipments. I explained to him the geographical position of the leading settlements, and the risk of failure in distributing the ova on arrival about midsummer, along such an extended sea-board, and he promised that the next consignment would be left to my discretion in that regard.

Accordingly I have written to J. C. Firth, Esq., President of the Auckland Acclimatisation Society, requesting him to take charge of at least 250,000 eggs, and hatch out the same in the breeding ponds at Auckland, from which stock the North Island lakes should be supplied. It is necessary that there should be running water. I should be gratified if, in addition to Lake Taupo and other lakes on the line of the Waikato, the Wairarapa could be speedily stocked with this valuable fish. The lesser lakes could be attended to subsequently.

I have likewise telegraphed to the Christchurch and Dunedin Acclimatisation Societies, requesting them to put themselves in communication with you; but I am of the opinion that only these leading Societies, and perhaps Nelson, should be supplied with eggs, and these only if, upon examination in Auckland, the eggs could fairly stand the journey. In any contingency, or if there should be a doubt of the eggs spoiling, I should recommend that the entire consignment should be hatched at Auckland, and the young fish thence distributed over the colony. But as there is always a reasonable feeling of pride in such matters, the Societies named are entitled to the utmost consideration, consistent with the preservation of this valuable contribution to the food fish of the colony. 100,000 eggs might be shipped to Canterbury, 100,000 to Dunedin, and 50,000 to Nelson. This would dispose of the entire shipment, which is in ten (50,000) boxes.

In this connection I have consulted several gentlemen experienced in the American fisheries, and they unhesitatingly place whitefish as the most valuable of all fresh-water fish, ranking as a food fish above all other varieties. They are prolific, grow to a large size, and are equally good for food fresh or salted. Should they be successfully acclimatized in New Zealand, the colony will derive an immense return for the small outlay incident to introducing them.

I have taken advantage of the refrigerator box of the Auckland Society, in which the late consignment of salmon ova were shipped, and filled it with ice in lieu of the ship's ice-house, which Captain Dearbour has placed at my disposal for the whitefish. This will economise ice, and give a more reasonable certainty of the consignment arriving safely. I may here state that Captain Dearbour, of the City of Sydney, takes a very deep interest in this work of acclimatization, and, I think, deserves some recognition by the Government.

I have also consulted Mr. Redding, Fish Commissioner for California, from whom, and his Deputy Mr. Woodbury, I have received every possible aid. I need not, however, encumber this communication by enclosing my correspondence with these gentlemen.

The fact that I received intimation of this shipment by telegram on the 5th instant, compelled me to wire a message through by cable to prevent the possibility of the consignment failing for want of preparedness on arrival. It was addressed to the Premier. As I was not in funds to meet this and other disbursements on account of the colony, I have drawn for the amount, as per vouchers and statement of account annexed, which please honor. I also enclose statement of account from Mr. Clark, to whom you will be good enough to remit the amount by return mail, apprising me of the fact. You will observe what Professor Baird states upon this subject—and I would respectfully suggest that the Government convey to him an expression of their appreciation of the interest he has taken in the acclimatizing of food fish in New Zealand.

I have acted in this matter without instructions, but in the belief that my conduct will meet with your approval.

I would suggest, in conclusion, that the Government in future would prevent risk of loss by apprising me when they order fish eggs from the United States Commission. I had no knowledge of the last order for salmon, until after the ship sailed, and it was by a mere accident that the entire consignment was not left behind.

I have, &c.,

ROBT. J. CREIGHTON.

The Hon. the Colonial Secretary,
Wellington.

Enclosure 1 to 23.

Professor BAIRD to ROBERT J. CREIGHTON, Esq.

SIR,— Washington, 5th January, 1878.

Mindful of the desire of New Zealand to obtain an additional supply of whitefish eggs, I arranged with Mr. F. N. Clark, of Northville, Michigan, for half-a-million, and to bring them forward to a proper stage for shipment. I am informed that the eggs are now ready, and he has been instructed to forward them to you at once. They are to be put up in ten packets of 50,000 each, so as to be more conveniently divided.

It may be well for you to confer with Mr. B. B. Redding, Commissioner for California, in regard to the proper treatment of these eggs. They are not quite so far advanced as those of last year.

Mr. Clark's charge for these eggs is 1dol. per thousand, or 500dols. for the lot, exclusive, I presume, of packing and expressage. If you have not this amount on hand you can collect it at your earliest convenience from the colony and send it direct to Mr. Clark. My own appropriation did not permit me to incur so large an expense during the present season.

It is possible that, for greater security, the eggs may be shipped in two lots at intervals, of two or three days, so that if one is lost the other may not be.

Presuming that you have ample instructions from New Zealand as to the distribution of these eggs, and leaving it to you to attend to their specific assignment,

I have, &c.,
SPENCER F. BAIRD,
Commissioner.

R. J. Creighton, Esq.,
Agent for New Zealand, San Francisco, California.

Enclosure 2. in No. 23.

Mr. R. J. CREIGHTON to Professor BAIRD.

SIR,— San Francisco, 15th January, 1878.

Accept my best thanks for your letters and telegrams, and the valuable contributions of food fish for New Zealand, which you have been good enough to make on behalf of the United States Fish Commission.

I have forwarded your letters and telegrams to the New Zealand Government, which will not fail to appreciate your kindness. Mr. Clark telegraphed me of the departure of the ova from Northville, on the 11th, and I expect their arrival to-night or to-morrow. I have made arrangement for their shipment per City of Sydney, which sails for New Zealand and Australia on the 21st inst., and have apprised the Government by cablegram, of the consignment, Mr. Clark's bill for the eggs will be forwarded to the colony, and a remittance direct made by the Government. I shall write to him to that effect. If I had been in funds, I should have had pleasure in paying the amount at once.

I am happy to say that the shipment of salmon ova arrived at its destination safely, and has proved a great success. I think New Zealand is now fully stocked with salmon, at least, to such an extent, as to render further shipment, for some time to come, unnecessary. Small parcels of eastern trout have been sent and are successful, but I attach greater importance to the acclimatisation of white fish than to all the others, as well from the delicacy of the flesh as from its commercial value. New Zealand is a country of lakes and rivers peculiarly adapted for it. I can only express a hope that this consignment may fare better than the consignment of last year,

I have, &c.,
ROBERT J. CREIGHTON.

Professor S. F. Baird, Washington.

Enclosure 3. in No. 23.

Mr. FRANK N. CLARK to Mr. R. J. CREIGHTON.

SIR,— Northville, Michigan, 11th January, 1878

I have this day shipped you two crates (500,000) of whitefish eggs for your Government, and telegraphed you to that effect. Please have your Government report condition, upon opening of the same to me.

I have, &c.,
FRANK N. CLARK.

Enclosure 4 in No. 23.

Mr. R. J. CREIGHTON to Mr. F. N. CLARK.

SIR,— San Francisco, California, 20th January, 1878.

I have pleasure in acknowleding the safe arrival of ten boxes whitefish eggs for New Zealand from your fish-hatching house. They arrived early Friday, and were opened and examined by Mr. Woodbury, foreman of the State hatching house, San Leandro. They are in good condition, and promise to arrive safely at their destination. I have had them packed in ice in the ice-chest of the mail steamship City of Sydney, which sails on the 21st. They will remain in ice all the voyage, and be hatched out prompt on arrival.

I regret that the consignment to the State Fish Commissioners of California and Nevada was valueless, as on opening them they were all found to be dead and stinking. They had been placed near the stove in transit; hence the total failure of the shipment. As it is impossible to freeze fish eggs in the express car, owing to the fact that a stove is always kept alight, I should suggest that in future consignments instructions be given that they be kept as cool as possible. The instructions on the Commissioner's crate not to let the eggs get below zero, appears to have been literally followed. The sawdust packing was at blood-heat when opened by Mr. Woodbury. To the absence of this special instruction I attribute the safe arrival of the New Zealand consignment, and a parcel of trout from Wisconsin.

I forward Professor Baird's letter to the New Zealand Government, in which he intimates that your charges for the eggs would be 1dol. per thousand and packing. You did not send me an account, but I presume this to be correct. The communication with the colony is monthly. I have requested the New Zealand Government to transmit the amount direct to you, and inform me of the fact. I likewise forward your letter to me with a request that the Government should report the condition of the eggs upon opening the same.

I can only express the hope that the consignment may arrive at its destination in as prime condition as it leaves San Francisco.

I have, &c.,
ROBT. J. CREIGHTON.

F. N. Clark, Esq.,
United States Fish Commissioner, Northville, Michigan.

No. 24.

Mr. R. J. CREIGHTON to the Hon. the COLONIAL SECRETARY.

SIR,— San Francisco, January 20th, 1878.

I have the honor to state, in reference to my previous letter, that I have had a conversation with the members of the State Fish Commission, and learned several facts of great practical value in reference to the propagation of whitefish, which I have embodied in a letter to Mr. Firth, of Auckland, in the belief that the Auckland Acclimatisation Society will have the task of hatching out the bulk, if not all, the whitefish eggs. I am unable to copy the letter in time for this mail. Should the suggestions given therein be acted upon, I have no doubt of the success of the experiment.

I have further to request that you will cause the request in Mr. Clark's letter to be attended to. As Mr. Clark did not send any statement of account, I infer that the 1 dol. per 1000 mentioned by Professor Baird, covers cost of package. It may not be the case, however. If so, 500 dols. is due the Fish Commission at Northville, and should be remitted. I have sent two tons of ice, not three, as I originally intended. I think two tons will be ample. I may mention that I received very great assistance from Mr. Woodbury, who came a long distance twice in very inclement weather, to examine and repack, after drenching the eggs with water at proper temperature. I should be pleased if the Government would authorise me to thank him for his gratuitous help.

The accompanying telegrams and correspondence give the history of the transaction. It will be observed from my reply to Mr. Clark that the New Zealand shipment was fortunate in not sharing the same fate as those consigned to the State Fish Commissioners of California at Nevada, which perished by the way.

I have, &c.,

The Hon. the Colonial Secretary, Wellington, N.Z. ROBT. J. CREIGHTON.

No. 25.

Mr. J. C. FIRTH to the UNDER-SECRETARY.

[TELEGRAM.] Auckland, February 15th, 1878.

MAIL steamer arrived last night at 7 o'clock. I shipped on board Hawea eight boxes containing your hundred thousand whitefish ova—packed ice in two insulating chests with hundred weight ice in reserve. Hawea cleared wharf at half-past eight. Owing to having no information of dimensions of ova boxes, I could not pack the remaining two boxes containing one hundred thousand ova. These I forward per Rotorua. Creighton sends full instructions, which I will wire you to-day for information of Southern Society. Creighton's exertions well deserve the thanks of the Government.

G. S. Cooper, Esq., Under-Secretary. J. C. FIRTH.

No. 26.

Mr. J. C. FIRTH to the UNDER-SECRETARY.

SIR,— Auckland, April 19th, 1878.

I have this day forwarded one box whitefish ova said to contain 50,000 ova, properly packed in ice in insulating box, and one box containing ice in reserve. I enclose Mr. Creighton's instructions. Having fully acquainted you of all matters relating to this shipment of whitefish ova, it is not necessary for me to enter into any recapitulations. My account for cost incurred will be forwarded to you shortly.

I have, &c.,

G. S. Cooper, Esq., Under-Secretary, Wellington. J. C. FIRTH.

(NOTE.—This box was forwarded from Wellington to A. M. Johnson, Christchurch, on 22nd April). J.H.

Enclosure to 26.

Mr. CREIGHTON to Mr. J. C. FIRTH.

MY DEAR SIR,— San Francisco, 20th January, 1878.

Since I wrote to you *re* whitefish, as per enclosure, I have learned some facts which are of interest relative to the artificial hatching of them, from the State Fish Commissioner (Mr. Redding), and the foreman (Mr. Woodbury), which you should know.

1st. Mr. Redding declares that it is almost essential that they should be hatched out at the first point of landing, owing to their delicacy. They will thrive anywhere if the water is deep enough, their food being small crustacea adhering to rocks in fresh water lakes, having a current running through them. They should have a sandy and gravelly bottom.

2nd. They are much more difficult to manage than salmon, and, until recently, little was known of their habits. They lose their sacks in ten days at a temperature of 35°, and earlier, at a higher temperature. It will be necessary to feed them three days afterward, or perhaps earlier, if they are to be transported any distance. The Fish Commissioners of Wisconsin discovered this year, that whitefish could be fed with blood for an indefinite period, and in the San Leandro hatching establishment, and at Lake Chabot in this State, the same experiment has been tried with success. Mr. Woodbury, therefore, suggests that you keep twenty of the fish in the hatching trough and feed them with blood, which can be squirted into the water with a syringe and thoroughly mixed. This would serve a double purpose. It would establish, as a fact, what is now experiment, that whitefish may be fed upon coagulated blood, and also give you a permanent stock for purposes of spawning, by which your society might derive no little profit. The Fish Commissioners here, are very anxious in regard to this matter, and I would be glad if you could give it a fair trial and report the result. As fish culture is now becoming a leading industry, the economic side of the question will readily suggest itself to your mind.

3rd. Whitefish, as soon as hatched out, rise and swim, unlike trout and salmon, which lie dormant. The little fellows are, therefore, carried down the trough with the current, and, unless fine wire screens are placed across it to intercept them, they are almost certain to be lost. It was in this way, I suspect, the Christchurch society lost their whitefish, and not by a fresh during the night, as reported. No. 18 mesh (eighteen) will keep them in. They should have as much back-water as possible to swim in. In ten days, as I have said, they lose their sack at a temperature of 35°, but, as they may lose it earlier, it is necessary that a register of the daily temperature of the water be kept, and food be furnished as above described.

4th. In the interest of science and acclimatization, should any portion of these eggs be sent South, I have to request that you communicate these facts to the persons in charge of them, for their guidance. One way and other I have written a decent volume in this connection, and cannot possibly duplicate or quadruple these notes, which are in the rough. I have not written on this subject to the Government, which must depend upon your society and similar bodies for the propagation and distribution of the whitefish.

I may remark here that the acclimatization of whitefish is in its infancy, and much has yet to be learned regarding it. It was thought, less than four years ago, that the eggs could not be sent across this continent. Several parcels failed, but at length a few were hatched and placed in Lake Tahoe, in the North. This was less than three years ago, and now the fishes which come to the sandy pebbly banks on the Californian side of the lake, are being netted and sent to Virginia City Market. They spawn, it is believed, the third year. Last year, ten men and two teams were employed by the Lake Commissioners to cut a road several miles through the snow, to place whitefish in another Northern California lake, and Lake Tulare in the South, warmer than Taupo and about as large, has been stocked. The entire shipment of whitefish ova for California and Nevada, from Northville, Michigan, packed precisely as those for New Zealand by Mr. Clark, and coming in the same car, were spoiled in transit. On being opened by Mr. Woodbury and myself they stank and were putrid. They had been placed near the stove by the express agents to prevent their freezing. Ours had been less considerately treated, and arrived sound and lively, as I had proof, every box having been opened and examined by Mr. Woodbury, in my presence. We then ascertained their temperature, and gave them a drenching with water at a similar heat; screwed them up, reversed their position, placed them upon and surrounded them with ice in the Pacific Company's ice-houses. I telegraphed to Mr. Woodbury, and brought him twice from a considerable distance, by road and rail, in extremely wet weather, to assist me, and as it was a labor of love, I am anxious that he should, at least, have honorable mention. I should also remark that Woodbury has invented a hatching basket, in which 30,000 salmon eggs may be hatched with certainty. It occupies about two feet square, and would, I think, be a great assistance to you. I don't know the price, but it is trifling, and I thought I would mention it to you. If I can get one by next steamer, I will send it down.

Perhaps it would not be trespassing too much upon your kindness to ask the Secretary of your society to make copies of this letter, or so much of it as may be necessary for their guidance, and forward one to the Christchurch, Dunedin and Nelson Societies; or send one to the Government requesting them to communicate the same to those bodies.

I dare say I have nearly wearied you, but I know your enthusiastic love for acclimatising such natural products as animals and fishes as may be useful to man, and therefore presume upon your time and patience. I forgot to say that whitefish take bait. They should be closely protected for, *at least, four years.* The wire screen referred to in paragraph 3, should be higher than the water, to prevent loss of fish by overflow.

I have, &c.,
ROBT. J. CREIGHTON.

No. 27.

Mr. J. C. FIRTH to the UNDER-SECRETARY.

(TELEGRAM.) Auckland, 16th February, 1878.

Since wiring last I find I can push on preparations at the hatching house, and will therefore take charge of one box. The other goes on by Rotorua.

G. S. Cooper, Under-Secretary. J. C. FIRTH.

No. 28.

Mr. J. C. FIRTH to the UNDER-SECRETARY.

SIR,— Auckland, 18th February, 1878.

Whitefish ova turned out very badly in the box you wished me to take charge of. All destroyed but thirty. Some of these died in hatching, others died soon after. Two fish living; eight ova yet to hatch. Cause of destruction too many in one box, and too much compression. Shall I forward the second box or open it here?

G. S. Cooper, Esq., Under-Secretary. J. C. FIRTH.

No. 29.

The Hon. the COLONIAL SECRETARY to JAMES HECTOR, M.D.

SIR,— Wellington, 15th February, 1878.

As you are already aware, a shipment of 250,000 whitefish ova sent from San Francisco by the United States Fishery Commission has arrived by the City of Sydney at Auckland, and has been transshipped with the mail on board the Hawea.

I should be much obliged if you would hold yourself in readiness to take charge of the ova on arrival here, and to proceed with them to the Bluff, and superintend their deposition in Lake Te Anau, taking with you, if necessary, an assistant from the staff of the Museum.

The necessary instructions have been sent to the railway officers at Invercargill to co-operate with you, and rendering every assistance in the transport of the ova.

I have, &c.,

James Hector, M.D., F.R.S., C.M.G., &c., &c. &c. G. S. Whitmore.

No. 30.

James Hector, Esq., M.D., to the Hon. the Colonial Secretary.

Sir,— Wellington, March 5th, 2878.

I have the honor to report that in accordance with your instructions, I have distributed the cases of whitefish ova received by the last San Francisco mail in the following manner:—

Eight boxes, each containing 50,000 ova, were received in Wellington by the s.s. Hawea on the 19th ultimo, packed in two large ice-chests, two boxes having been left in Auckland. The four ova boxes half-filled each chest, the space above being filled with broken ice and non-conducting pads. The chests stood on the fore-hatch, which is a convenient and safe position, but liable to the objection that the ova boxes have to be moved at every port, and that they might be influenced by the vibration of the steam winch.

At Lyttelton one chest was opened, and two of the small ova-boxes were left with Mr. G. S. Farr, Honorary Secretary to the Christchurch Acclimatisation Society. I should state that one of these boxes had the cover loose. The space in that chest was filled up with ice and blanketing, and at Port Chalmers it was delivered with the two remaining ova-boxes to Mr. Arthur, of the Otago Acclimatisation Society, with instructions to hand one of them to Mr. Connell, or his agent, for the Oamaru Acclimatisation Society on application.

The other chest and the spare ice, of which I got a fresh supply at Dunedin, were then transhipped to the s.s. Wanganui, the sailing of which had been delayed 24 hours, through the liberality of the owners—Messrs. Houghton & Co. Notice having been previously given, a special train was awaiting my arrival at the Bluff, but the steamer being later than was expected, there was a little delay at Invercargill, so that it was not until 1 o'clock p.m. that we reached the Elbow.

The two chests, one containing the spare ice, and the other the ova, weighing about 600lbs., were transferred to an American wagon with leather braces, and having covered them with blankets and our tent, a start was made at 2.30 p.m.

The arrangements for the conveyance of the ova from the Elbow to Lake Te Anau, upon which the success of the experiment so much depended, had been made by Captain Hankinson, with great judgment.

Travelling at about 4 miles an hour, by sundown we reached Centre Hill Station, and halted to rest two hours until the moon rose. At 11 p.m. we again started, guided by Mr. Connor, the road, and especially the fords, being difficult to find in the dark. By daylight the first ford of the Mararoa river was reached, and we again halted for an hour, and repacked the chest containing the ova, filling it up with all the ice that was left, and leaving the spare ice-chest, and so lightening the load. At 11 a.m. on the 23rd we arrived at Messrs. Hankinson's station and obtained fresh horses, and by 3 p.m. the most difficult part of the road, which is that crossing the mountains bounding the east side of the lake, had been overcome, and the journey safely accomplished. By previous arrangement, the hatching troughs had been prepared by Mr. F. Hankinson, so that with his assistance no time was lost in unpacking the ova and by 6 p.m. the operation was completed and the result of the experiment ascertained. I regret to say that this was not very satisfactory, as out of the four boxes of ova three were almost completely destroyed by the growth of white fungus, and the young fish, which had evidently been hatched out for some time, were reduced to a pulpy jelly. In the fourth box, in which there was only a slight growth of fungus, a considerable number of the ova were found in sound condition, and hatched out rapidly as they were transfered to the trough. The trough was not placed actually in the lake, but in a small stream, fed by a spring close to the shore, the temperature of the water being a little below 50° Fahr. After completing the arrangements I returned to Messrs. Hankinson's station, leaving Mr. Burton, taxidermist to the Colonial Museum, in charge of the young fish, with instructions to camp beside them, and tend them until they were sufficiently advanced to turn out in the lake.

I should state that the supply of ice proved to be quite sufficient, more than 50lbs. being left in the ice-chest at the end of the journey.

The reason of the failure of the ova was evidently defective treatment during some part of the long journey from Lake Michigan. Each box contained four layers of eggs placed between layers of gauze net and moss. The ova boxes, which were 11 inches square, by 5 inches deep, had several holes bored in both top and bottom, and the only sound ova were in the top layers, and out of reach of these holes. I may state that this was also found to be the case in one out of the two boxes left at Dunedin, the other being a total failure.

At Christchurch, also, a few sound ova were found in a similar position in one of the boxes.

I am inclined to think that the ova boxes when placed in the ice-chests should have been surrounded with ice instead of having it only on the top, as, if great care was not taken to cool the ice-chests thoroughly before the ova boxes were placed in them, it is obvious that the temperature of the ova boxes would be at first considerably raised, while at the same time the water of the melting ice would drip through the holes and saturate the contents, and so cause the ova to hatch.

The white fungus growth which was found so abundantly in most of the boxes seemed to spring from that portion of the moss in contact with the layers of dead fish, but one of the boxes was nearly free from it, except in the bottom layers, and in that the moss was green and springy. It is probable, therefore, that the decay of the moss and the growth of the fungus commenced after the hatching out and death of the young fish, and was not the cause of the failure. From the circumstance that the other boxes which

were opened at Christchurch and Dunedin were in the same condition, it is to be concluded that the failure of those taken to the Te Anau Lake was not due to the long and rough land journey to which they were subjected, so that with the experience now gained, and with some modification of the method adopted in packing the ova boxes, so that they may be thoroughly *surrounded* with ice, I feel confident that future consignments can be safely conveyed to our large Alpine lakes, where they have the best chance of thriving. The ova that escaped destruction were those which were protected from the drip of the melting ice, and were therefore comparatively dry, and in such a position that they were at the same time kept at a low temperature by the ice resting immediately above them. It did not appear to me that too much moss had been placed in the boxes, which has been suggested as a reason for the failure, but when the fungus had grown the moss was necessarily crushed into less space and formed into a sodden mass. At the same time I would recommend that in future experiments the gauze on which the eggs are spread should be stretched on light frames supported at proper intervals by intermediate corner pieces, but these and other suggestions I will defer for another report upon the subject, after conferring with Mr. Firth at Auckland.

The experiment on this occasion has been so far successful that a few hundred fish at least will be turned out in Te Anau lake, and I have recommended that the fish hatched in Dunedin, of which there are about a thousand, should be sent to the Wanaka lake, and the small number (about a dozen) obtained at Christchurch, to lake Coleridge.

I have, &c.,

The Hon. the Colonial Secretary, Wellington. JAMES HECTOR.

Enclosure 1 to No. 30.

Mr. S. HERBERT COX to Dr. HECTOR.

SIR,— Te Anau, February 20th, 1878.

You will be pleased to hear that the whitefish are doing very well. They are all hatched out and are feeding well on the blood which they are having given them.

But very few have died, and if cold be an essential to their existence, it has been cold enough to-day for almost anything. Burton says he would be afraid to turn the fish into the lagoon now, as the distance is rather far, so they will, I presume, be let loose in the lake about Saturday, if it is calm enough.

I have, &c.,

S. HERBERT COX.

Enclosure 2 in No. 30.

Mr. W. ARTHUR, to Dr. HECTOR.

SIR,— Acclimatisation Society, Dunedin, 10th July, 1878.

You will be sorry to hear that our American whitefish experiment has failed. I suppose we had about 1000 young fish which throve very well at the breeding ponds. The last I know of them is, that Deans started with the whole lot for the Wanaka, before they had reached that age and size which, in conversation with you, we all agreed to be most prudent before turning them out. He got as far as the Teviot, but they had nearly all died or escaped during the night into a creek where the cans were put. Both Maitland and I knew nothing about it until Deans returned, or we should, certainly, never have sanctioned so rash a step. I hope those in the Te Anau will get on better, and be the means of stocking our deep lakes.

I have, &c.,

W. ARTHUR, Secretary.

No. 31.

Mr. A. M. JOHNSON to the Hon. the MINISTER for PUBLIC WORKS.

American Whitefish.

SIR,— Troutdale Farm, Opawa, Christchurch, 6th February, 1878.

If you should receive any whitefish ova, will you kindly consider my application for a portion. I have every facility for fish culture, and have this season hatched out about 70,000 ova (English trout and American salmon.)

My establishment being a private one, I am not in receipt of public moneys in the shape of subscriptions, licenses and fines, like the various Acclimatisation Societies, although I have to compete with them in the sale of young fish for stocking purposes, therefore, I trust you will see that I have an equal, if not a greater claim on your consideration.

I may also add that the English brown trout, English perch, and the American brook trout (*Salmo fontinale*) were first introduced into New Zealand at my expense.

I have, &c.,

The Hon. the Minister for Public Works. A. M. JOHNSON.

No. 32.

MR. A. M. JOHNSON, to the Hon. the COLONIAL SECRETARY.

SIR,— Troutdale Farm, Opawa, Christchurch, 23rd April, 1878.

The whitefish ova received to-day by the Rotorua, I regret to report as all hopelessly bad, with the exception of three.

From the appearance of the ova the failure most probably arises from the eggs having been obtained too long, or kept without ice before the starting of the steamer.

It is quite possible that a further supply might be obtained this season, if instructions are sent by the outgoing mail so that the order could reach the collector direct from San Francisco. The actual cost of eggs in America is not much—I have had out many lots of trout ova, and seldom paid more than 4dols. per thousand.

With a view to increasing the chances of success in future similar shipments, I would suggest that the lids of the ova boxes be screwed down instead of nailed, a larger number of holes made in the lid, and the inside of the boxes slightly burnt.

Again thanking you for your kindness in forwarding me the ova,

I have, &c.,

The Hon. the Colonial Secretary, Wellington. A. M. Johnson.

No. 33.

Sir J. Cracroft Wilson to Mr. S. C. Farr.

Sir,— Cashmere, 2nd April, 1878.

I have the honor to report the following circumstances in connection with the fry of the whitefish :—

On the 26th of February you reported that you had opened the two boxes supposed to contain 20,000 whitefish ova, a present from the United States Fish Commission to the Government of New Zealand, that there were a few of the ova hatching out, but that the majority of them had hatched on the voyage from San Francisco or Auckland, the fry from which, were dead. Finally, about 20 eggs produced fry in the hatching boxes of the Society. Two of these died previous to Sunday, the 17th of March, On that day, in consequence of a hot wind from the north-west raising the temperature of the water to 62° Fahrenheit, six more died, and it was evident the remaining twelve would not survive such hot weather.

On Wednesday afternoon the 20th of March, I started, according to promise, by the 4.20 p.m. train for Coalgate station, taking with me an American vehicle, a pair of horses, two servants, one small fish can with an aerating ball and tube, containing the twelve surviving fish, two large fish cans filled with fresh Artesian well water, a four gallon block tin bucket, and 6 packets, each containing ten ozs. muriate of ammonia and 6 packets, each containing ten ozs. of nitre, prepared for the trip by Dr. Macdonald, of Lyttelton. The whole party was franked by General Government, and the thanks of the Society are due to all the railway authorites in Christchurch.

Having taken up my position in the guard's van with one servant, nine parts of water were placed in the four gallon bucket, and three packets of muriate of ammonia and three packets of nitre being added, the mixture was well stirred. The thermometer was then placed in it, and it fell, in a short space of time, to 34° Fahrenheit. The thermometer having been withdrawn, the can containing the fish was placed in the bucket. The servant kept continually aerating the water in the fish can, and thus, without changing the water, or interfering with the mixture, we arrived at Coalgate station at 7.15 p.m., the temperature of the mixture during the journey, never having exceeded 38°.

After giving the fry fresh water, and preparing the freezing mixture as before, four of us started in the American trap, Mr. James McIlraith having kindly volunteered to accompany and show me the new road, which skirts the swamp known by the name of Dr. Turnbull. We, however, lost our way, and nearly two hours of our valuable time. As we were approaching the hotel at Windwhistle, we were joined, according to appointment, by Mr. F. E. Upton, who, on horseback, piloted us to Snowden, the residence of Mr. W. Gerard, where we arrived between eleven and twelve o'clock, midnight.

Having partaken of some refreshment and given the fry fresh water, we were supplied with another pair of horses by Mr. Gerard. Mr. Upton having taken Mr. McIlraith's place in the vehicle, we continued our journey towards Mr. Cotton's house on the border of Lake Coleridge, which we reached about 3 o'clock a.m.

Owing to a cold north-westerly wind which had prevailed all night, there was a considerable surf rolling on to the shores of the lake. We, therefore, thought it advisable to liberate the fry in a small rivulet about two hundred yards from the lake. Previously to liberating them, we took the can into a stable, lighted a candle, and satisfied ourselves that not one of them were dead or injured. We then retraced our steps to Snowden, and took possession of our beds about 5 a.m. Thursday, 21st March.

Lamentable as is the outcome of this handsome present from the American Fish Commission, I congratulate the Canterbury Acclimatisation Society on the fact that nothing was left undone to insure success. Ice was prepared according to Dr. Hector's instructions, and taken by you on board the steamer which conveyed the boxes of ova to Canterbury, but it is evident that the ice, *en route* from San Francisco or Auckland must have failed, and the ova hatched out only to die.

In conclusion, I cannot help making a few observations. The fry of the American whitefish are evidently more delicate than the fry of any other fish known to me, and I am pursuaded that not a fry would have reached Lake Coleridge alive, had it not been for the freezing mixtures and the great cold we experienced after reaching Windwhistle.

It is greatly to be desired that all the parties to whom the boxes of this consignment of ova were trusted, should write detailed reports as to results, which reports, if printed and circulated, might help us to discover some means of rearing to maturity these far-famed fish.

One thing is very certain, that they cannot succeed in any place in New Zealand not situated in the mountains.

Trusting that the Council will admit that I have faithfully fulfilled the promises which I made to them respecting these fish, and that the Government of New Zealand will be satisfied with the endeavours of our Society,

I have, &c.,

S. C. Farr, Esq., J. Cracroft Wilson,
Secretary Canterbury Acclimatisation Society, Christchurch. Chairman.

No. 34.

Mr. R. J. Creighton to the Hon. the Colonial Secretary.

Sir,— San Francisco, California, 18th February, 1878.

I enclose herewith letter from Mr. Clark, Michigan, relative to the shipment of whitfish eggs per City of Sydney, for New Zealand. From it I gather that the charge for the eggs and packing, as per Professor Baird's letter, will be 500dols., at 1dol. per thousand, which amount you will be good enough to cause to be forwarded to Mr. Clark.

I hope the consignment arrived in good order, and has been hatched out and distributed successfully. Whitefish is more highly esteemed than salmon where it is known. It is difficult to acclimatise it, but should the colony succeed, it will add a valuable food fish to its other attractions for settlement, and solve a difficult problem for scientists.

Professor Baird has written to me for the history of salmon acclimatisation in New Zealand, so far as the Californian salmon is concerned, and I was only able to make a very fragmentary report in relation to the last shipment. He is solicitous of obtaining full information for his annual report to Congress, and lays great stress upon the New Zealand experiments, similar shipments to Germany having entirely failed. I have, therefore, to request that you will cause a report to be forwarded to me, supplemental to that made by me, showing the date of arrival of the eggs at the several ports of the colony; by what conveyance, and the time occupied in transhipping and handling them; how packed during coasting voyage; proportion of eggs hatched out in each province, and how the young fish were distributed. I approximated the time on the coasting voyage, but I was ignorant of the success, if any, except in Auckland, the newspapers of which contained a general statement that the eggs distributed by Mr. Firth had hatched out. I trust this information will be supplied by return mail. It may not be too late for Professor Baird's report, and will complete my, otherwise, imperfect one.

I observe by the London *Times*, that Sir Julius Vogel sent out a consignment of salmon ova from England, per steamer Chimborazo, *via* Melbourne.

The result of this experiment will be of great interest to the United States Fish Commission, and to the California State Fish Commission, to both of which New Zealand is under great and lasting obligations.

I would, therefore, esteem it a favor if you would advise me, in due course, of the success had in introducing British salmon, and the relative cost of the two sources of acclimatisation.

As the Sacramento salmon may now be said to be introduced permanently into New Zealand, details regarding its habits, &c., will be interesting and of value to the colony. I therefore append extracts from the Biennial Report of the California Fisheries Commissioners, presented to the State Legislature recently, bearing upon the point. It will be seen that it possesses many special advantages over the British salmon, and for commercial and food purposes is decidedly superior. On economic grounds alone, the acclimatisation of this excellent food fish is an event of very great importance. I likewise extract the passages relating to whitefish and catfish, (the latter introduced, I understand, by Mr. Thomas Russell, C.M.G.)

I have, &c.,
R. J. Creighton.

Enclosure to No. 34.

Extract from Biennial Report of the California State Fisheries Commissioners, 1876-77.

Salmon (Salmo Quinnat).

1. Before the discovery of the gold mines in California, nearly all of the tributaries of the Sacramento and San Joaquin rivers were the spawning beds of the salmon. Soon after mining commenced the sediment deposited by gold washing covered the gravel bottoms of the streams. The fish found no proper place on which to deposit its eggs, and after three or four years became extinct in those tributaries. The instinct of the fish leads it to return from the ocean to the stream in which it was born for purposes of reproduction. If this place, for any reason, is rendered unfit, it will not seek a new and appropriate place. In 1850 the salmon resorted in vast numbers to the Feather, Yuba, American, Mokolumne, and Tuolumne rivers for purposes of spawning, and many places, such as Salmon Falls, on the American, were named from the abundance of these fish. On the Yuba river, as late as 1853., the miners obtained a large supply of food from this source. At the present time no salmon enter these streams. It would be safe to estimate that one-half the streams in this State to which salmon formerly resorted for spawning, have, for this purpose, been destroyed by mining. As mining is the more important industry, of course, for this evil there is no remedy, other than by artificial means to increase the supply in those tributaries that are still the resort of these fish. The principal spawning grounds remaining, are the McCloud, Klamath, Little Sacramento, and Pit rivers in the northern part of the State, and the San Joaquin and Merced in the southern. The short streams entering into the ocean from the Coast Range of mountains from Point Conception, in latitude 34° 20′ north to the boundary of Oregon, are also spawning grounds for salmon. The fish of the coast streams deposit their eggs in January and February, during the winter rains, when the streams are full, while the salmon of the tributaries of the Sacramento and San Joaquin spawn in August and September, when the water is at its lowest stage. The salmon of the short coast rivers do not average as large as the Sacramento salmon, but they are probably the same fish with habits modified to suit the streams to which they resort.

2. The *salmo quinnat* readily adapts itself to a life in fresh water, and reproduces its kind where it has no opportunity to go to the ocean. When the dams were constructed on the small streams that go to make the reservoirs of San Andreas and Pillarcitos—which supply the City of San Francisco with water—as also when the dam was constructed on the San Leandro, to supply the City of Oakland, the young of the salmon that had spawned the year previous to the erection of these dams, remained in the

reservoirs and grew to weigh, frequently, as much as ten pounds; these reproduced until the reservoirs have been stocked. As the supply of fish increased the quantities of food lessened, so that the salmon have gradually decreased in weight until now, after nine years, they do not average more than two pounds. From the fact that, when food was in abundance, they grew to weigh from eight to twelve pounds, and that, as they increased in numbers, they averaged less in size, but still continued to spawn and produce young fish, it would seem that the Sacramento salmon may be successfully introduced into large lakes in the interior of the continent, where, in consequence of dams or other obstructions, they would be prevented from reaching the ocean. The history of this fish in these small reservoirs shows that all that is requisite for their successful increase is the abundant supply of food, to be found in large bodies of fresh water. Salmon, fully mature, weighing two pounds, and filled with ripe eggs, were taken, in September, 1877, in the waters of San Leandro reservoir. These fish were hatched in the stream which supplies the reservoir, and by no possibility have ever been to the ocean. The San Leandro is a coast stream, not exceeding fifteen miles in length, and empties into the Bay of San Francisco. It contains water in the winter and spring, at which time, before the reservoir was constructed, the salmon sought its sources for the purpose of spawning. There was never sufficient water in the months of August or September to permit the fish to reach their spawning grounds. After the construction of the reservoir, large numbers of the salmon that came in from the ocean in January and February were caught at the foot of the dam and transported alive and placed in the reservoir above. The descendents of these fish thus detained in fresh water and not permitted to go to the ocean, have so far modified the habits of their ancestors that they now spawn in September, instead of in January and February. Inasmuch as these fish spawn in the McCloud, in the headwaters of the Sacramento, and at the sources of the San Joaquin, in the Sierra Nevada, in September, and in short coast range rivers, in January and February, and as, when changed to other waters, their eggs ripen at a time when the conditions of their new homes are most favourable for reproduction, they show a plastic adaptability, looking to their future distribution, of much practical, as well as scientific, importance.

3. The statistics hereafter given of the temperature of the water through which the Sacramento and and San Joaquin salmon pass to reach their spawning grounds, show that they swim for hundreds of miles through the second hottest valley in the United States, during the hottest portion of the year, where the mean temperature of the air is 92° Fahrenheit, and of the water, 75°. These statistics have been obtained from the record kept by the Central Pacific Railroad Company, and are for the months of August and September of the years 1875-6-7. They are of importance as showing that the Sacrameno salmon will enter rivers for spawning purposes, where the water is so warm that the eastern salmon *(salmo salar)*, if it were to meet it, would turn back to the ocean. They are also of importance as illustrating the probability that there are many streams on the Atlantic Coast, from the Potomac to the Rio Grande, into which this fish could be successfully introduced.

4. Mr. Livingston Stone, Deputy United States Fish Commissioner, in charge of the Government hatching establishment on the McCloud river, reports officially that, in his opinion, all of the salmon of that river die after depositing their spawn. This is possibly true, but it does not acconnt for the fact, that in the spawning season the McCloud contains grilse and fish evidently of three, four, and five years old, unless we are to imagine that some salmon, after being hatched and going to the ocean, remain there two, three, or more years without returning to the parent stream for purposes of spawning. Beyond doubt the salmon that spawn in the coast streams go back to the ocean, as they are frequently taken in the lagoons at the mouths of these rivers on their return. Somewhere on the tributaries of the Sacramento or San Joaquin, there are salmon that do not die after the act of spawning, for they are frequently taken in the nets of the fishermen in the brackish waters at Collinsville and Rio Vista, on their return from their spawning grounds. If it were a fact that the Sacramento salmon so widely differed from other fish that it spawned but once and then died, it would detract from its value. This subject is one of importance, but at present the facts are so obscure that we have made considerable effort to obtain the opinions and the result of the observations of the men who are practically engaged in the taking of salmon in the Sacramento river.

5. The following, from the letter of a fisherman who has pursued the business of taking salmon for the San Francisco market during more than fifteen years, gives some facts and his theory, based on his observations. In reply to an inquiry on the subject, he says "As to the return of the seed salmon to the sea after depositing the spawn, I am inclined to the opinion of Mr. Stone, so far as the greater part of the female fish is concerned. I think very few of these, but many, though not all of the males return. I should judge that 5 per cent. of females, and 20 per cent of males might be an approximation. I express this opinion diffidently. It is based on the style of fish caught in the lower part of the river (from Sacramento to Collinsville). After about the 20th of September, of the fish then dropping down, the nets catch but few, for the reason that the net is drifting with the current and the fish are doing the same thing, and in consequence, as a rule, the two do not come together, and the greater part of the return fish escape. When the run is upward, the net drifts with the current, and the fish swim against it, and the rule is reversed. The per centage named above is not that of return fish caught, but of fish that I estimate may have returned, judging by the very few return fish that are caught. It is a very cloudy subject to all fishermen. I have heard, perhaps, a thousand discussions on the river, at all times of day and night, at the head of the 'drift,' among men of the largest experience—men right in the teeth of the business—men born to a boat and net, and grown gray and grizzled in their use—upon the point you raise, and the average conclusion always was that nobody quite knew how it was. Of one thing I am convinced, to wit, that return fish need no protection from the drifting gill net. Not one fish in ten could be caught in that way. No such thing as a run of salmon down the river ever occurs. The normal position of salmon is head to the current. Though drifting with the current, his head is toward it. In the light (or darkness) of these facts, you see how difficult it is to say, positively, what proportion of these fish that have delivered seed, return to the ocean. No man can say positively that the mass do not return. That some return is beyond doubt of a reasonable nature. If they all perish, it is certain that many survive long enough to reach the fishing grounds lying in the bays nearest the ocean. But I fail to see why the value

of the California salmon is affected by the fact (if it is a fact) that the fish never spawn but once. I have a theory of the salmon of this river. It may not be scientific, but it is mine, and I can give reasons for it. It is this: the female salmon seldom or never spawns but once. The exceptions to the rule, if any, are few, and the second product of these exceptions is found in a salmon differing slightly from the mass of fish found in the river. A goodly, though not the larger part of the male salmon that have assisted in reproduction, return to the ocean and 'live long and grow broad,' and return to the river many times. On their return these fish constitute that class far above the average size. They reach 30, 40, 50, and even a greater number of pounds in weight, while the average weight for which our meshes are sized is from 16 to 20 pounds. The female spawn is not ripe for delivery, nor the male fish sufficiently mature for milting, until they have made repeated trips between the ocean and the river. The yearly broods return periodically and in regular cycles; the youngest fishes arrive earliest in the season, which begins about the 1st of November, and do not penetrate far the first time. In the order of their birth, the other broods arrive and return to the sea until in August and September, the great seed run, consisting of mature fish, always on time, always urgent in their movements and purposes, passes up to the headwaters. Salmon of different ages are always coming in and going out to sea. The older the fish the longer his stay in fresh water. The younger the fish (after he once leaves for the ocean), the more of flirting about the bays and brackish water near the mouths of the river, with short excursions up the river. The foregoing is the outline of a theory, though it is derived from, and apparently justified by known truths in the history of the Sacramento salmon during the last twenty years. I believe it to be correct; that is to say, that in any year representations of the brood of any other year not yet extinct, enter the river, and that not one-fifth of the fish that enter the river in any given year go to the headwaters that year, but that more than four-fifths return to the ocean, and, consequently, that all the fish that come in to the river each year, but one-fifth go to the headwaters for purposes of reproduction."

6. The habits of the Sacramento salmon, while on their spawning grounds in the McCloud river, have been closely observed by Deputy United States Fish Commissioner Livingston Stone, and the result of his investigations has been published by Congress in the Report of the United States Fish Commissioner, Spencer F. Baird. But little is known of their habits while in the ocean. They probably feed on shoals not many miles from the shore. They are occasionally taken in the nets of fishermen, in the ocean not far from Golden Gate. Many grilse, and a few mature fish, make their appearance in the bay of San Francisco in December, and remain several weeks feeding upon smelts and other small fish. During this period thousands are taken with hook and bait on lines from the Oakland pier, and other wharves. Many more are also taken in the nets of fishermen. After leaving the salt water of the bay, they go to the brackish waters where the currents of the Sacramento and San Joaquin meet the tide from the ocean. After entering the fresh water of the river they cease to feed. No food has ever been found in all the tens of thousands caught in the Sacramento. As it is of importance to obtain a knowledge of the habits of the salmon while it remains at the mouths of the rivers, playing back and forth between brackish and fresh water, before it makes its long and perilous journey to the head of the stream, we select from our correspondence extracts from a letter from Mr. Samuel N. Norton, of Rio Vista. Mr. Norton is a practical fisherman of many years experience, and the record of his close observation is of much value. He says: "I will give you a synopsis of one year's trip with the salmon, showing the general habits of the fish in all years while remaining in or passing through that part of the Sacramento river lying between its mouths and the point where the Feather river empties into it. For this purpose the Georgiana Slough, the Three-mile-Slough around the head of Shearman Island, the San Joaquin river between these sloughs and the bay, and the Montezuma Slough leading into the northern arm of Suisun Bay from the Sacramento river, are considered as mouths of the river with like functions and processes as the main trunk of the river. Indeed, some of the best fishing ground, at certain seasons, is found in the Montezuma, Three-mile and San Joaquin. To commence with an anachronism, the spring run begins in the fall! In November and December a very few small (as fisherman use the word—say twelve or fourteen pounds each) bright salmon appear in the river, and if no rains occur, or only slight rains, an increase in their numbers is noticed, yet they are always very scarce in those months. There are never enough to half supply the local demand of the San Francisco and other home markets. At first, in November, we pick up occasionally on their return, the last dregs of the old seed run which occurred during August and September. These are usually male fish, very dark, ill-conditioned, lank-jawed, disconsolate looking fellows, who through misfortune, incompetency, or other cause—to me not more than presumable—seemed to have failed in their mission up the river, or to have fallen into disgrace. The last of these soon disappear. The bright ones are the *avant couriers* of the great spring run, which thus, as I said, begins in the fall. With the first heavy rains the fish that have penetrated the river recede, or as we say, back down before the thick muddy stream, retreat to tide-water in the bays, and remain there reconnoitering and waiting a steady river current. Now is the time for good fishing in the bay and just in the mouths of the river. The fish are not very plentiful, but none being caught within the river proper, there is a great demand and great price against a small area of fishing ground, where all that had before penetrated the river are now concentrated. When the river becomes steady, that is, neither rising nor falling, the fish start up again, no matter how high the water may be, and by the varying moods of the river in sudden rise or fall, is the spring run mainly governed. Sudden rise or fall alike will check them. Thus it often happens that for many weeks the fish will be taken in numbers at Benicia and Collinsville, in smaller numbers at Rio Vista, and none at all farther up. Again, there have been seasons when a steady run commenced in the early part of January, and by an almost uniform rate of increase reached its culmination in May. But this is exceptional. The spring run may be stated as commencing in November and ending in July, and having its greatest strength in May. Under the most favorable conditions the months of November and December might be classed 'very scarce;' January and February, 'scarce;' March, 'not scarce;' April, 'plenty;' May, 'very plenty;' June, 'not scarce;' July, 'scarce.' Under unfavorable conditions, November, December, January and February would have almost none at all; March, 'scarce;' April, 'not scarce;' May, 'plenty;' June, 'scarce;' July 'almost none at all.' In defining the terms here adopted, let them be applied to the product of the labor of two men with their boat and net per day: 'Almost none at all,

would mean two fish per week; 'very scarce,' two fish per day; 'scarce,' six fish per day; 'not scarce,' eighteen per day; 'plenty,' thirty-six per day; 'very plenty,' seventy-two per day. There are times in the height of the run, when a greater number than is here named might be caught with ease, but these are exceptional. In the great run three years ago, three hundred salmon per day might be caught with ease; but in no other year, since the Anglo-American occupation, has there been such a run. It must not be understood that salmon can be caught at all times by fishing for them, even in the most limited numbers above stated. There are times when one could not be caught in a month, if life were at stake upon it. I only intend to give a fair idea of the average business. You will readily deduce from it that there are not more than two months, during the spring run, when fish can be caught in excess of the demand for home consumption. After the subsidence of the spring run in July, they are often found in great numbers near the confluence of the Feather river with the Sacramento. They have a taste for variety, it would seem, and the marked difference between the cool, muddy water of the former, and the warmer, limpid and clear stream of the latter, affords them great satisfaction. During the first half of August the mature seed fish start for the spawning grounds. All along the line, from the ocean to the most advanced posts along the river, the word (if fishes have words—if not, then wag) is onward and upward. They are on business, and on time; they do not shy much, nor stop for trifles; they rush at a drifting gill net determined to do or die, and, of course, generally die if the net is sound. The run of August and September I have before described. As for the few belated fellows that are about in October, they might as well be caught as not—and so, my year is out."

7. At the time our last report was made, Mr. Charles Crocker had requested us to cause to be hatched, at his expense, and placed in streams that do not reach the ocean, a half million of Sacramento salmon. One half of these we determined to put in Kern river, which empties into Buena Vista and Tulare lakes, and the other half in the Truckee river, which empties into Pyramid lake, in the State of Nevada. The quarter of a million of eggs sent to Kern river, where their hatching was to be completed, unfortunately were lost. At the point of the river selected for hatching, the water contains too much alkali, it is supposed, and all the eggs died within twenty-four hours from the time they were placed in the hatching troughs. The other quarter of a million sent to the Truckee, were successfully hatched out and turned into that stream. They will go to Pyramid lake the present season. They should return during the summer of 1878, and we are confident they will be taken in the Truckee weighing five or six pounds. Pyramid lake is a body of water forty miles long, and averaging ten miles in width, and has no outlet. It contains an abundance of food. This experiment will demonstrate how large the Sacramento salmon will grow, with plenty of food, when confined entirely to fresh water.

8. Since the organization of the Commission, we have caused to be hatched and placed in the streams of this State 8,350,000 young salmon. These include 1,000,000 paid for in 1875, and presented by ex-Governor Leland Stanford. As the salmon is our most important food fish, we deemed it of the most importance to keep up the supply. The numbers of fishermen are yearly increasing, as are also the numbers of persons who are consuming the fish. As railroad facilities are increased, and reach new points, the market becomes extended. The sea lions and seals at the outlet of the bay, being preserved and protected by law, are also increasing. They now number thousands, and as each requires from ten to thirty pounds of fish daily, it was a serious question whether we could keep up the supply by the addition of 2½millions artificially hatched each year. Since our last report, a salmon "cannery" has been established on the Sacramento, at Collinsville, and another opposite the City of Sacramento. This Collinsville canning establishment reports as having canned this year 8,542 cases, of four dozen cans in a case, equivalent to 34,168 fish, weighing 546,688 pounds.

Under the enlightened superintendence of Professor Spencer F. Baird, United States Fish Commissioner, the Sacramento salmon is being widely distributed to streams throughout the United States. The government establishment on the McCloud river annually hatches from six to ten million eggs. These are distributed to all States having appropriate waters, whose Legislatures have appointed Fish Commissioners. From this source the State of California has received, as a donation, a half million fish each year since 1874. In addition, we have expended a large part of our appropriation annually, in payment for the hatching of one or two million young fish, which, through the kindness of Professor Baird, have been furnished at the actual cost of hatching. The introduction of more than 8,000,000 young salmon into the headwaters of the Sacramento, since the organization of the Commission, in addition to the natural increase, has had the effect to keep up the supply, and reduce the local market price of these fish. It is reported that the "cannery" at Collinsville has purchased all the salmon it could consume during the past season at from 25 to 40 cents each.

9. Over-fishing, the absence of any close season, and no effort at artificial increase, has at last had an effect on the salmon of the Columbia river, in Oregon, and complaint is made that this river, once thought inexhaustible, has begun to fail in its accustomed supply. This decrease has been so marked during the season, that the "canners" have been compelled to pay from 30 to 50 cents each for salmon. In the absence of legislation, the canning companies on this river have subscribed 20,000dols., which have been placed under the control of Mr. Livingston Stone, Deputy United States Fish Commissioner, to be expended in artificial hatching, and restocking that stream. Fortunately, intelligent legislation in California made provision for continuing the supply of fish in the Sacramento before there was any marked decrease by over-fishing. It is not disputed that the salmon were more numerous in the Sacramento before their spawning grounds on the American, Yuba, Feather, and other rivers had been destroyed by mining. After the fish were destroyed in these tributaries, the supply of the State had to come from the other tributaries of the Sacramento and San Joaquin, on which there was no mining, and these latter streams furnished the normal supply. Before these became exhausted, the natural increase was supplemented by artificial hatching.

10. In this connection a fact, of much practical as well as scientific importance, may be stated as showing the advantages in numbers to be obtained by artificial hatching in comparison with the increase by natural methods. In 1876, Mr. Myron Green, foreman for Mr. Livingston Stone, United States Deputy Fish Commissioner, at the McCloud river, having observed in the river a favorite gravel bed

where many salmon were depositing their eggs, carefully dug up the gravel and several thousand eggs. He separated the eggs from the gravel, and placed the former, after counting them, in the hatching boxes. After twenty-four hours, he found large numbers of these eggs turning white, showing that the milt had failed to come in contact with the eggs. After throwing out all the eggs found not to be fecund, there were left 8 per cent of the whole number gathered, which were found to be fertile. When the eggs and milt are artificially brought in contact out of the water, it would be carelessness or inexperience that would prevent 95 per cent of the eggs from being fertilized.

11. The following tables will show the number and weight of salmon transported on the railroads and steamboats from the Sacramento and San Joaquin rivers to the cities of San Francisco and Stockton, from points on the river below the cities of Sacramento and Stockton, from 1st November, 1874, to 1st August, 1876; and from 1st November, 1876, to 1st August, 1877. They do not include the catch of the fisheries at Tehama or near the mouth of the Feather river, nor do they include the fish taken on the upper waters of the Sacramento and San Joaquin, nor the salmon brought to market by fisherman in their own boats; therefore, to the totals should be added, at least, 25 per cent to show an approximation of the actual catch.

12. In our last report, after adding 25 per cent to the statements of the catch which we obtained, we showed the total weight as transported from the same places, from 1st November, 1874, to 1st August, 1875, to be 5,098,781 pounds. Adding the same percentage to the totals in the above tables, and they show the catch from 1st November, 1875, to 1st August, 1876, to be 5,311,423 pounds, and from 1st November, 1876, to 1st August, 1877, 6,493,563 pounds.

13. This shows a gain of more than 1,000,000 pounds in the legal catch over any year since the organization of the Commission, and may be ascribed to the fact that our waters are now beginning to feel the beneficial effects of the millions of salmon hatched artificially and turned into the headwaters. We have no means of ascertaining the weight of fish taken out of season, but estimate that between 1st August and 1st November of this year, not less than 2,000,000 pounds were taken in defiance of law.

Close season for Salmon.

14. We are informed that a determined effort will be made to induce the Legislature to alter the time of the close season, so that fishing for salmon may be permitted in August and September, and that the close season may be changed from these months to July. With this object in view, it is reported that the proprietors of the present "canneries," and capitalists, who have in contemplation the construction of other "canneries," have been obtaining the evidence of fishermen, to present to the Legislature, to show that July is the proper month when fishing should not be permitted.

15. As we have shown, in July the spring run of fish has about ceased and the fall run but commencing. It is one of the months when fish are most scarce. To permit unlimited fishing during all the months in the year except July, would have the effect of exhausting our rivers of salmon within ten years. It is a simple proposition that if some of the ripe fish are not permitted to reach their spawning grounds, they cannot reproduce naturally, neither can the United States nor the State obtain eggs from which to restock the river by artificial hatching. One of the fishermen who was approached with the object of obtaining his testimony in favor of a change to July, wrote to the Commissioners, 30th September, as follows:—"The close season should never, on any possible pretence or persuasion, be pressed outside the months of August and September to give opportunity for fishing in those months. Right there is the life of the matter. The regularity, the multitudes and urgency of the seed run, the consequent ease and certainty of the catch, the fine weather for work, all present a weighty temptation to both catcher and canner." The object of a close season is, that some of the fish may be permitted to reach the headwaters to spawn. If they are not allowed to do so the race will soon be extinct. Cupidity and desire for immediate profit should not be permitted to influence legislation with she ultimate result of the extinction of the last fish. The interest of the public is that the fish be continued in the river. A change in the law that will omit August and September from the close season cannot but result in material and permanent injury.

Temperature of Air and Water.

16. The following statistics will be found of much importance, They exhibit the temperature of the water and air at two stations, each on the Sacramento and San Joaquin rivers, taken for three years during the months the great army of salmon are passing up to their spawning grounds. They will show conclusively that the Sacramento salmon lives for weeks, if not months, in water much warmer than any other fish of the same family. They also show the strong probability that these fish may be successfully introduced into rivers in still lower latitudes than those of which they are native—without doubt into the waters that flow into the Gulf of Mexico, and with many prospects of success into the rivers of Europe emptying into the Mediterranean.

TEMPERATURE—(FAHRENHEIT).

Railroad Crossing at Sacramento, Sacramento River, latitude 38° 35′ *N., longitude* 121° 30′ *W.*

—	AUGUST.									SEPTEMBER.								
	1875.			1876.			1877.			1875.			1876.			1877.		
	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.
Maximum...	106°	81°	81°	98°	80°	79°	99°	80°	80°	96°	75°	75°	97°	75°	75°	105°	77°	77°
Minimum...	71	75	75	75	72	71	80	73	73	72	71	71	73	70	69.50	76	70	70
Mean... ..	92.96	78.83	78-83	87.93	76.40	75.37	91.54	77.22	77.22	88.93	73	73	85.53	72.13	71.30	90.56	73.76	73.76

TEMPERATURE.

Railroad Crossing at Sacramento River, latitude 40° 01′ 30″ N., longitude 122° 06′ W.

	August.									September.								
	1875.			1876.			1877.			1875.			1876.			1877.		
	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	r.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.
Maximum...	104°	78°	78°	100°	74°	74°	100°	76°	76°	99°	70°	70°	98°	70°	70°	104°	72°	72°
Minimum..	78	70	70	69	68	68	84	69	69	80	66	66	70	66	66	80	66	66
Mean... ...	95.64	75.51	75.51	91.38	70.61	70.61	93-74	72.90	72.90	90.63	69.60	69.60	87.26	67.66	67-66	91.23	68.73	68.73

TEMPERATURE.

Lower Railroad Crossing, San Joapuin River, latitude 37° 50′ N., longitude 121° 22′ W.

	August.									September.								
	1875.			1876.			1877.			1875.			1876.			1877.		
	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.
Maximum...	98°	82°	81°	97°	79°	78°	95°	81°	81°	94°	78°	78°	93°	75°	75°	102°	78°	78°
Minimum...	73	72	71	75	75	74	78	71	71	73	72	72	73	70	69	70	71	71
Mean... ..	88.16	78.67	78.3	86.16	76.93	76.09	89.58	77.87	77.87	85.63	74.08	74.43	83.43	72.56	72.06	87	73.80	73.80

TEMPERATURE.

Upper Railway Crossing, San Joaquin River, latitude 36° 52′ N., longitude 119° 54′ W.

	August.									September.								
	1875.			1876.			1877.			1875.			1876.			1877.		
	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.	Air.	Water at Surface.	Water at Bottom.
Maximum	107°	84°	83°	111°	77°	76°	112°	77°	76°	104°	82°	83°	108°	78°	77°	105°	78°	77°
Minimum	82	74	73	81	73	72	90	73	72	82	74	73	80	74	73	76	75	74
Mean ...	100.61	80.67	79.67	101.09	74.96	73.96	99.64	75.80	74.80	95.53	78.83	77.83	94.00	76.76	75.76	92.96	76.63	75.63

Illegal Fishing.

17. There is a prevalent opinion throughout the States, that it is the especial duty of the Fish Commissioners to act as local police in each neighbourhood and prevent violations of the law in relation to fishing during the close season. Much time is consumed in answering questions on this subject, and informing correspondents by letter that it is the duty of every citizen to see that the law is obeyed. We believe the law which prohibits the catching or having in possession salmon from 1st August to 1st November has been more extensively violated during the present year than ever before. It is true the fish are not sold openly in the city markets, but we are informed that the fishermen have erected salting establishments and smoke-houses in various by-places in the sloughs between the Sacramento and San Joaquin, where the work of salting and smoking has been prosecuted more extensively than in any previous year. We learned that the canning establishment of Messrs. Emerson Corville & Co., at Collinsville, only made a pretence of ceasing work on the 1st of August, and that they secretly persisted in violating the law. We caused them to be arrested and fined, upon which they quit work and promised hereafter to obey the law. The canning establishment near Sacramento was also reported as at work during the close season. The proprietors have been indicted by the Grand Jury of Sacramento, and will be fined, if found guilty during the next term of Court. It is well known that salmon, during the spawning season, are unfit for food. The fish canned, salted, or smoked at this period, if consumed or sold, will have the effect of giving the Sacramento salmon a bad reputation in the market. For this reason the "canners" on the Columbia river cease work on the 1st of August in their own interest, and without any requirement of law. It is useless for the State to hatch fish and turn them into the river if there is no time in the year when they are permitted to reach their spawning grounds for purposes of reproduction. It would seem that when the State expends money in filling the river with valuable fish for the benefit of the public, and especially for the benefit of fishermen, that there should be sufficient intelligence and public spirit among local officers and the fishermen themselves to see the law obeyed and give the fish an opportunity to keep up the supply. If the Commissioners are to expend the appropriation in prosecuting

violations of the law there will be no money to pay for the hatching of additional fish. Many of the fishermen acknowledge the justice and ultimate benefit of an observance of the law, and obey it, but very properly complain that their work ceases, while those who violate it reap a greater benefit.

18. The following extracts from a letter received by the Commissioners from a fisherman who has followed the business of catching salmon on the Sacramento and San Joaquin for the San Francisco market during twenty years, will illustrate that, at least, the more intelligent and thoughtful of these men acknowledge the necessity of an observance of the law. His letter also gives facts of importance as to the habits of the Sacramento salmon. Writing from Rio Vista, August 17th, 1877, he says: "I understand the 'cannery' has shut down, but the greed for salmon is so great, I would not trust them without watching. As to the fishermen, they will be salting them all along the banks of the Sacramento and Lower San Joaquin (as far up as the mouth of the Mokelumne) unless special means are taken to prevent it. The Three-mile Slough, leading from one river to the other, around the head of Sherman Island, is also fine fishing ground, and more retired from public observation than any other. Many of the fishermen started off with their tanks, etc., the very day the 'cannery' was reported to have stopped. Many of them are energetic, restless men, and the idea of doing something sly or contrary to law gives zest to their labor. Right here where I write a few boards have been thrown up shed-fashion by a party I need not now name. You may well believe salted salmon will be under it if some stranger does not prevent it. You may rest assured that the people who reside here will not be known as the initial instruments in punishing anyone for the violatian of the salmon laws, although there are many who feel it ought to be respected. No doubt, public feeling and practice will occupy about the same status at Collinsville and wherever salmon fishing is a business. As I wrote to you the other day, now (August) is the time to protect the salmon. In review of long experience and observation I opine that of all the salmon passing in the months of August, September and October, more than ninety per cent. pass between August tenth and October first. The seed run is always on time, not being like the spring run, accelerated or retarded by the different moods of the river, caused by the winter and spring rains. If during the last named period (August 10th to October 1st) the law were rigidly enforced, you would find seed enough for home use and a good part of all creation besides. Indeed, I think that one month out of the thickest of them, say 20th August to 20th September, would be quite sufficient, and therein I differ with you in opinion, no doubt. But you have not, perhaps, observed in person, as I have, the multitudes and urgency of the run at that time; and this is almost uniform—it has not varied in time ten days in twenty years. Now, during the period of four or six weeks, the State, in view of the magnitude of the producing interest involved, ought surely to provide beyond peradventure for the enforcement of the law. The statute names the taking or possession of salmon a crime, but in the public mind this crime is only an illegal act. You cannot force sentiment by act of the Legislature. The absence of sentiment excuses the citizens' apathy, and between ignorance and cupidity the salmon will suffer unless special agents of the State do for the public what the public have not yet quite learned they ought to do for themselves. Strangers are the best agents for this business. Citizens living in a fishing neighbourhood do not feel like subjecting themselves to the enmity and revenge of a rough class by complaint. And, again, in this salting business, the criminal acts are beyond observation, except by express intention, as the fish are caught chiefly in the night, and the salteries are usually situated away from public highways and thoroughfares."

19. We have expended a part of the appropriation in prosecuting offenders against the law, but the field is so large and the profit so great, that but little good has been accomplished. The more fish hatched and placed in the river, the more numerous the fishermen, and the greater, apparently, the desire to make a profit from a violation of the law. As has been stated, unless the fish are allowed, in their season, to reach their spawning grounds, the rivers will be exhausted. Until the fishermen realise that the object of the law in creating a close season is the perpetuation and increase of the numbers of fish, the law will continue to be violated. We see no remedy at present except, hereafter, to devote a larger portion of the appropriation in preventing illegal fishing, and in prosecuting offenders against the law. This will require the use of a part of the appropriation which should be devoted to increasing the number of fish placed in the river. If it is expected that the Commission shall employ special means to enforce an observance of the law, and also employ attorneys to prosecute offenders, it is necessary that the appropriation should be increased. It is not now sufficient for these purposes, and also for the hatching of any large quantity of salmon with which to keep pace with the increased fishing and the increasing numbers of sea lions. We have consulted with many of the fishermen, and they admit that the law creating a close season should be obeyed, provided all be made to obey it. It is but proper to say, however, that they, at the same time, urge that the close season for salmon (August 1st to November 1st) is too long a period. In correspondence with one of these men, who has made a business of fishing for salmon on the Sacramento and San Joaquin for many years past, as to the necessity for an observance of the law, he says: "I do not wish to be known as urging the enforcement of the law, or as a special informer against any party who has violated it. My reasons for this reservation affect alike my own peace and safety and that of many persons whom, I know, have no worse intention than to earn a living and obey the law, provided that others, less honest, are prevented from violating it with impunity. Your idea of a patrol boat, or boats, with officers, is the correct one, and I firmly believe that if, by this or other means, the prohibition were strictly maintained from Benicia upward, wherever there are practical fishing grounds, during the period of one month at the right time, that the perpetuation of salmon in our rivers would be abundantly secured. Between the 10th of August and 1st of October more than ninety per cent. of the seed run passes, and has not failed to pass, during twenty years of my observation. If the whole of the seed run is not wanted for seed, they ought not to be so used, for the fish is just as good food then as at any other time, only the wastage is something more, the spawn being larger. On the Columbia river I understand that the fall run is almost or quite worthless. Not so on the Sacramento. Well, we may be proud of our river; it is the paradise of the salmon, and they seem determined to resist the devils—who also seem determined to drive them out—better than could be expected; but they will need help in the future. The nets for taking them are being multiplied and improved. The fishing grounds are better known than

formerly. Such obstructions as snags in the river bottom are less common—many of them having been broken off or taken up by the nets and put out of the way, or covered by sediment, so that a wider and longer sweep may be taken by the drifting net. Altogether, the salmon is sure to be exterminated, fight he ever so persistently, unless we help him. Surely the State can afford to guard him effectually one month in the year. The cupidity of the fish speculator, who only cares for the greatest number of cases he can pack and ship, should not be allowed to influence the statement of that time. Let it be somewhere between the 10th of August and the 1st of October. By the way, it seems to mee that at the extreme upper waters, on the spawning grounds, the fish should be protected during their entire stay, excepting as needed solely for the purpose of artificial hatching. But of this you are a better judge than I can be."

20. While not agreeing with this intelligent fisherman as to the propriety of shortening the close season, we fully concur as to the absolute necessity of a patrol to prevent unlawful fishing while the salmon are passing up to their spawning grounds. We also concur in his suggestion that the salmon should be protected on their breeding beds. The most important spawning ground left in this State is the McCloud river, in Shasta County. Its banks are mainly composed of lava and limestone, and, so far as known, they contain no mines. By some inadvertence or intentional manipulation, this county was exempted from the law creating a close season for salmon, and the fish are persistently taken in this county for market, while in the act of reproduction on their spawning beds. We respectfully urge that Shasta County be re-incorporated in the law, and that no salmon be allowed to be taken there during the close season, except for purposes of artificial propagation.

21. The Chinese and others continue to use nets of a mesh much finer than is allowed by law, and the young of all kinds of salt water fish that spawn in the bays and estuaries, are persistently caught, dried, and shipped to China. The records of the Custom House show that there were shipped to China, from San Francisco, during the year ending 1st July, 1877, dried fish and dried shell fish valued at 293,971dols.

22. We have caused several arrests to be made for violations of this law, but it is impossible for the Commissioners to act as local police on all parts of the bay and rivers, and we see no remedy except in increasing the penalties for violations of the law, involving even, if necessary, the destruction of the nets, when used out of season. Unless in some way the wise provisions of the statute are compelled to be observed, we can see no reason why our present abundance of fish will not decrease, as they have decreased in other States, in consequence of the disregard of wise enactments made for their preservation and increase, Ordinarily, salmon should reach their spawning grounds on the McCloud and Little Sacramento by the 20th of August. As will be seen by the statistics heretofore stated, the catch was never so great as during the past fishing season. At the commencement of the close season, 1st August, the river was filled with fish, yet they were not permitted to reach their spawning places. Mr. Myron Green, the deputy in charge of the United States fish hatching establishment on the McCloud, reported 15th September, that there were ten salmon in the McCloud in 1876, to one in 1877. Up to that time but 5,000,000 eggs had been taken, while nearly 10,000,000 had been taken in a corresponding period in 1876. The fish were, in the Lower Sacramento, more numerous than ever before, but they were caught, canned, salted and smoked, in defiance of the law. It is estimated that the "canneries" took 50,000 after the 1st of August, and that there were salted and smoked on the banks of the sloughs and other bye-places, at least 100,000 more. If this is to continue, the Government hatching works will have to be removed to the Columbia, and we will be compelled to import eggs from some other State, even to keep up a partial supply of salmon in the Sacramento river.

23. In addition to making the penalties more severe for violations of the law, we would recommend that the law be so amended that it shall be made a misdemeanor to fish for salmon with nets or traps between sunset on Saturday and sunrise on Monday of each week. This would give the salmon the freedom of the river one day in the week, do no injury to the fisherman, and go far towards continuing the supply in our rivers.

Whitefish (Coregonus alba).

24. In January last we received from the United States Fish Commissioner a donation of 300,000 eggs of the whitefish. These were successfully hatched under the superintendence of Mr. J. G. Woodbury, at the State hatching house at Berkeley, and the young fish were distributed as follows: 75,000 in Donner lake; 50,000 in Sereno and other lakes near the Summit, in Placer County; and 175,000 in Lake Tahoe. Including 25,000 placed in Clear lake in 1873, and 25,000 in Tulare lake in 1875, there have been planted in the waters of this State, 350,000 of these valuable food fish. We believe they have lived in Clear lake, also in Tulare. It was reported in a Lake County paper, that a whitefish was taken in Clear lake on 10th April, 1876, which measured a foot in length. We have no positive information that they have found a congenial home in Tulare lake, but have heard reports that a few have been seen. As these fish can only be taken with a net, and as these are rarely used on these lakes, their waters will have an opportunity to become fully stocked before they are extensively fished. There can hardly be any doubt but they will succeed in Tahoe and other lakes near the summit of the Sierra—the climate, water, and food being not dissimilar to those of lakes Michigan, Huron, and Superior, in which they are indigenous. These fish live upon small crustacea, found on the rocky and gravel bottoms of lakes. They grow to weigh an average of one and a half pounds, and constitute the most important food fish of the people living near the great lakes. Professor Baird, in his report to Congress, says: "Few fishes of North America will better repay efforts for their multiplication." We are promised a further supply of eggs during the present winter, and shall continue receiving eggs, and hatching and distributing these fish to all the mountain lakes that are accessible during the wintermonths.

Catfish (Pimelodus cattus).

25. The seventy-four Schuykill catfish imported in 1874, and placed in lakes near Sacramento have increased to a vast extent. They already furnish an important addition to the fish food supply of the City of Sacramento and vicinity. From the increase we have distributed 8,400 to appropriate waters, in

the Counties of Napa, Monterey, Los Angeles, Fresno, Tulare, Santa Cruz, Shasta, Solano, Alameda, San Diego, Yolo, Santa Barbara, and Siskiyou. These, should they thrive and increase as they have in Sacramento, will furnish an abundance of valuable food in the warm waters of the lakes and sloughs of the interior, and replace the bony and worthless chubs and suckers that now inhabit these places. It may be proper to call attention to the fact that these fish have become so numerous in the lakes near Sacramento that they can now be obtained in any quantity for stocking other appropriate waters in any part of the State.

No. 35.

Dr. HECTOR to Professor BAIRD.

DEAR PROFESSOR BAIRD,— Wellington, 27th April, 1878.

I have been away for the last two months, and find that you have not been informed of the result of the "whitefish" shipment of January last, which arrived in Auckland on the 15th February.

I enclose a copy of my report to Government of 5th March, which you should have received by last mail. You will see that the experiment has been so far successful as to prove that these fish *can* be introduced, with proper care, into the most distant part of the colony.

The partial failure must be attributed to some error during the transit. If due to over packing with moss, as suggested by some, I don't see how any could have survived. On looking through the papers, I find that Mr. Creighton states as follows :—

"The entire shipment of whitefish ova for California and Nevada, from Northville, Michigan, packed precisely as those for New Zealand by Mr. Clark, and coming in the same car, were spoiled in transit. On being opened by Mr. Woodbury and myself, they stank and were putrid. They had been placed near the stove by the express agent to prevent them freezing. Ours had been less considerately treated, and arrived (in Frisco) sound and lively, as I had proof, every box having been opened and examined by Mr. Woodbury in my presence. We then ascertained their temperature, and *gave them a drenching with water at a similar heat*, screwed them up, reversed their position, and placed them upon and under ice in the Pacific Mail Company's icehouse."

It is evident, therefore, that the ova were all right so far, whether the treatment I have underlined was judicious, you will be able to judge.

My own impression is, that the mischief commenced towards this end of the journey. Don't you think it would be better to pack them in tin boxes inside the wood, The wood boxes were quite sodden and rotting, and four of them had the lids loose.

The holes top and bottom seem also a mistake, as they promote drainage of the melting ice water through the ova, and may cause them to hatch. Holes in side and bottom would be better. Also I would suggest that each piece of scrim carrying ova, should be stitched on a light frame resting on corner pieces, so as to take the weight off the bottom layers and to prevent sagging in the central part.

But I hope to get authority to ask you to repeat the experiment, when I will write all my suggestions at length.

I have, &c.,
JAMES HECTOR.

No. 36.

Mr. R. J. CREIGHTON to the Hon. the COLONIAL SECRETARY.

SIR,— San Francisco, California, 15th April, 1878.

I have received the enclosed letter from Mr. Clark, and in reply explained that the Government of New Zealand had not put me in funds to meet the payment of 500dols., but that I had forwarded his claim and a reply could not possibly be expected before the incoming mail arrived. I trust this matter will have been attended to. I regret to learn through the newspapers that the last shipment of whitefish failed. I think it was unfortunate that an attempt was not made to hatch them out in Auckland. In all probability sufficient would have been saved to stock the lakes. All experts here declare that the eggs should be hatched out where the ship first touches. The young fish can be fed on blood and taken anywhere over the country. It is a mistake to suppose that whitefish will not thrive in Taupo or Waikare. They are thriving in Lake Tulare, Southern California, the water of which is at least of as high a temperature as either of the Auckland lakes; and they thrive at San Leandro, Alameda County, which is quite as warm as the central heat of the North Island. There should be no local jealously or feeling in a great national enterprise like acclimatising food fish, and I cannot divest myself of the idea that the order of the Government for the distribution of eggs after such a perilous journey was given with the view of conciliating local opinions. Doubtless it would be very agreeable for gettlemen in every important section of the country to have an opportunity of hatching out these fish, and watching over them until their waters had been fairly stocked, but the risk of failure is too great. The acclimatisation of whitefish is still a difficult problem. Their acclimatisation in New Zealand would be a feat, apart from its economic results, of which the country might well be proud.

Should the Government resolve upon testing the experiment next year, I will take precautions against failure such as the fish-packing establishments of the Union suggest.

I have, &c.,
ROBT. J. CREIGHTON.

The Hon. the Colonial Secretary,
Wellington, N.Z.

No. 37.

The Hon. the Colonial Secretary to Professor S. F. Baird.

Sir,— Wellington, 20th June, 1878.

Mr. Creighton informs Government that the sum of 500dols. is due on account of the transshipment of whitefish ova, and the matter is also referred to in your letter to Mr. Creighton, of January 5th, but no account has been sent for the amount. Mr. Creighton, in his letter to the Government, states "Mr. Clark did not send any accounts, so I infer that the 1dol. per thousand mentioned by Professor Baird covers the cost of package. This may not be the case, however, and if so 500dols. is due to the Fish Commission in Northville."

Under the circumstances it is desirable that the payment should be made through you, and I beg, therefore, to enclose Bill of Exchange for the amount—500dols., with a voucher form, and request that you will be good enough to pay the money, and procure a receipt from the person to whom the money is due, as it is not clear if "Mr. Clark," and the Fish Commission in Northville are one and the same.

Apologising for having to trouble you in this matter,

Prof. Spencer F. Baird, Washington, D.C.U.S. I have, &c.,

G. S. Whitmore.

No. 38.

The Under Colonial Secretary to R. J. Creighton, Esq., San Francisco.

Sir,— Wellington, 20th June, 1878.

I have the honor, by direction of the Colonial Secretary, to acknowledge the receipt of your letter of the 15th April, in which you enclose one from Mr. F. N. Clark, of Northville, and ask that a sum of 500dols. may be remitted to that gentleman.

As you name no one in your letter, and as it is not clear on what account and for what service the 500dols. is claimed, the Government have, in order to avoid any possible mistake, remitted the money to Professor Baird in a letter, a copy of which is enclosed for your information.

I have, &c.

G. S. Cooper.

No. 39.

Mr. J. C. Firth to the Hon. the Colonial Secretary.

Sir,— Auckland, 7th June, 1878.

Referring to your letter of 11th October, 1877, asking me to undertake the transhipment of half a million Salmon ova expected by the next San Francisco mail steamer from Professor Baird of the United States Fish Commission, and authorising me to incur the necessary expenditure to ensure the success of the importation, and having now received final accounts, I have the honor to inform you that the total expenditure incurred in this behalf has amounted to the sum of £195 17s., minus £22 5s., cost of sending ova to Sir Samuel Wilson, = £173 12s.

These charges are heavy, but I am happy to learn from various sources, that perfect success has been obtained, which would not have been secured under a less liberal expenditure.

Having taken the keenest possible interest in the great work of establishing American salmon in this colony from the first, my personal services have been most cheerfully rendered, and I beg you will permit me to present the above sum of £173 12s. as my contribution to the good work of introducing so valuable a food fish into New Zealand.

I have further the honour to inform you that I have frequent reports of the success of the experiment, young salmon in various stages being reported to me as seen in nearly all the rivers in this Provincial district, in which I placed the ova or fry.

I have, &c.,

The Hon. the Colonial Secretary, Wellington. J. C. Firth.

No. 40.

The Hon. the Colonial Secretary to Mr. J. C. Firth.

Sir,— Colonial Secretary's Office, Wellington, 20th June, 1878.

I have the honor to acknowledge the receipt of your letter of the 7th instant, reporting the perfect success which has so far attended the last importation of Salmon ova from America, and informing me that your total expenses in connection with the ova amounted to £173 12s., which sum you desire to present as your contribution to the good work of introducing so valuable a food fish into New Zealand.

I can only again tender you my thanks on behalf of the Government for your very successful exertions in this cause, and, at the same time, say that while they regret your refusal to allow them to re-imburse you for the expenditure you have incurred, the Government feel that the colony is deeply indebted to you for your generous aid in the introduction of American salmon.

I have, &c.,

J. C. Firth, Esq., Auckland. G. S. Whitmore.

No. 41.

Professor Baird to Dr. Hector.

United States Commission Fish and Fisheries,

Dear Dr. Hector,— Washington 12th June, 1878.

Yours of the 27th April is to hand. I had been prepared for the account of the failure of the whitefish eggs, having been previously advised to that effect.

If you wish to renew the experiment this year, I will send Mr. Clark through to San Francisco in charge. He can then see that they are properly packed in the vessel.

If you want any more salmon eggs, let me know in time.

I have, &c.,
SPENCER F. BAIRD,
Commissioner.

Dr. James Hector,
Wellington, N. Z.

No. 42.

Extract from private letter from Mr. R. J. CREIGHTON to the Hon. JAMES MACANDREW.

Mr. Clark made a proposal to me, which I consider highly favorable to the colony, and I promised to submit it, which I do through you. It is this:—"He is willing, if an order be received by him for several million whitefish eggs, jointly from the New Zealand Government and the State Fish Commissioners of California and Nevada, to furnish the eggs, carefully packed, at 65 cents per 1000, and further, to ensure their safe delivery at San Francisco, for shipment to the colony and deposit in our lakes and rivers here; he would come across the continent in charge, on receiving his travelling expenses to and fro, asking nothing whatever for his time—this extra to be borne proportionately by the colony and California and Nevada." I think the proposal is an extremely liberal one. New Zealand might procure 1,000,000 whitefish eggs in this way for a trifling sum, under conditions which would ensure the absolute success of the experiment. I have no doubt I could arrange matters with the Fish Commissioners of these States. I should state that Mr. Clark explained that to ensure success, the order for the eggs should be in by October, or early in November. The order passing through Professor Baird, came at a time when the eggs were in a too advanced state. The ova should have been packed, at least, a month earlier. As it was, the Pacific Coast shipment all went back *en route*, and I saved our lot by the best of good luck.

No. 43.

The Hon. the MINISRER for PUBLIC WORKS to Mr. R. J. CREIGHTON.

Public Works Office, Wellington,
New Zealand, 17th August, 1878.

DEAR SIR,—

Referring to your private letter to me of 8th July, in which you inform me that Mr. Clark has offered to supply whitefish ova at sixty-five cents per 1000 f.o.b. at San Francisco, and that Mr. Clark undertakes personally to superintend the shipment at that port, provided his actual expenses across the continent are defrayed jointly by the State Fish Commissioners of California, Nevada, and this Colony.

The Government of New Zealand will be glad to be a party to this arrangement, and will take 1,000,000 ova on these terms.

If Mr. Clarke will forward his account along with the ova the amount will be remitted to him in due course.

Thanking you for the interest and trouble which you have taken in this matter,

I have, &c.,
J. MACANDREW.

R. J. Creighton, Esq., Evening Post Office,
San Francisco.

No. 44.

Professor BAIRD to the Hon. the COLONIAL SECRETARY.

United States Commission Fish and Fisheries,
Gloucester, Mass., 29th July, 1878.

DEAR SIR,—

I have the honor to acknowledge the receipt of your letter of the 20th of June with the accompanying cheque for £104 3s. 4d. being the amount of indebtedness to Mr. N. W. Clark for eggs of whitefish furnished by him at my request for the use of the New Zealand Government. The charge was for the cost of collecting and keeping in the hatching house one month, so as to bring forward the embryo, and for packing and shipping; and of course the price of one dollar per thousand was merely nominal.

I greatly regret that, after all, the eggs arrived in an unsatisfactory condition; but, if you desire to renew the order, I think I can promise better results.

I have sent the account to Mr. Frank N. Clark, a son of the deceased N. W. Clark, for his signature, and on receiving it will forward it promptly to you.

I have, &c.,
SPENCER F. BAIRD,
Commissioner.

The Honorable the Colonial Secretary,
Wellington, N.Z.

No. 45.

The Hon. the COLONIAL SECRETARY to Professor SPENCER F. BAIRD.

SIR,— Colonial Secretary's Office, Wellington, 21st October, 1878.

I have the honor to acknowledge the receipt of your letter of the 29th July, and to thank you for your offer to endeavour to procure a better result than was before obtained, should this Government think fit to renew the order for whitefish ova.

An order for 1,000,000 ova had been sent to Mr. Clarke, through Mr. Creighton, an old New Zealand colonist who is settled in San Francisco, before your letter arrived, and it will, therefore, be unnecessary that the Government of this colony should avail itself of your kind offer to send a shipment of ova this season.

I have, &c.,
G. S. WHITMORE.