

**Skýrsla**  
**um för á þing International Council**  
**for Bird Preservation**  
**De Koog, Hollandi, 8. sept. 1970**

eftir  
Jakob Björnsson

Reykjavík, október 1970

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Okt. 1970 JB

Skýrsla um ferð  
Jakobs Björnssonar  
á þing International Council  
for Bird Preservation  
De Koog, Hollandi  
8. sept. 1970

Eg undirritaður heimsótti hinn 8. sept. s.l. 15. heimsþing International Council for Bird Preservation (ICBP), sem þá stóð yfir í De Koog á Texel-eyju í Hollandi. Þann dag var Þjórsárveramálið til umræðu á þinginu.

Heimsókn mín á þing þetta er þannig til komin, að Iðnaðarráðuneytið bauð Landskor Íslands í ICBP (Inceldic National Section) að Orkustofnun sendi virkjunar-sérfræðing á þingið til að skýra þar frá hinu virkjunarlega baksviði Þjórsárveramálsins, þ.e. gera grein fyrir virkjunarhugmyndum í Þjórsárverum og á Þjórsár-Hvítársvæðinu yfirleitt og þætti þeirra virkjana í heildarnýtingu vatnsaflsins á Íslandi. Landsskorin lagði til við ICBP, að þetta boð yrði þegið. Það varð, og var ég sendur í för þessa.

Á þinginu mætti dr. Agnar Ingólfsson, líffræðingur, sem fulltrúi Landsskorar Íslands.

Í upphafi fundar þess, þar sem Þjórsárveramálið var til umræðu, bað prófessor S.D. Ripley, forseti ICBP, mig að flytja íslenskum stjórnvöldum þakkir þingsins fyrir að senda þangað mann til þess að gera grein fyrir virkjunarhugmyndunum varðandi Þjórsárver.

Þessu næst gerði dr. Agnar Ingólfsson grein fyrir sjónarmiðum íslensku Landsskorarinnar varðandi náttúrufræðilegt mikilvægi Þjórsárvera. Kom þar fram, að Landsskorin telur Þjórsárver um margt einstæð frá náttúrufræðilegu sjónarmiði, og telur, að þau beri að friðlýsa og engin mannvirki gera þar, a.m.k. engin mannvirki, sem raski náttúru veranna á nokkurn hátt.

Strax á eftir greinargerð Agnars flutti ég ávarp það til þingsins um "The Power Background of the Thjórsárver Problem", sem hér fylgir með. (Fylgiskjal 1)

Að loknu ávarpi mínu endurtók Ripley, sem var í forsæti á þinginu, þakklæti þingfulltrúa til íslenskra stjórnvalda fyrir för mína, og bað mig færa Orkustofnun þakkir þingsins. Hann vék því næst að umhverfismálum almennt, og taldi, að nú færðist mjög í vöxt að hanna mannvirki hvers konar með hliðsjón af um-

hverfinu í heild ( total environment design ), þannig að tillit sé tekið til annara atriða en efnahagslegra.

Nokkrar umræður yrðu. Þau sjónarmið, sem þar komu fram, tel ég mega draga saman í eftirfarandi :

1. Æskilegast er að engu verði nokkru sinni hreyft í Þjórsárverum.
2. Verði einhver mannvirki gerð þar, er æskilegt að þau verði gerð eins seint og framast er unnt.
3. Reynt verði að haga þeim mannvirkjum, sem einhverntíma seint og síðarmeir yrðu gerð í Þjórsárverum á þann veg, að þau trufla umhverfið sem minnst.

Sem sagt : Helzt verði ekkert gert í Þjórsárverum, en fáist það ekki, þá sem seinast og sem minnst.

Sérstaklega var áberandi óskín um að því yrði frestað í lengstu lög að setja Þjórsárverin undir vatn, með því að velja aðra staði til virkjunar á undan. Menn festu í því efni einkum sjónir á Austurlandsvirkjun, en einnig á Hvítá. Mönnum virtist eðlilegt, að þar sem svo lítið er ennþá notað af vatnsafla landsins, hljóti að vera unnt að velja aðra staði til virkjunar á undan Þjórsárverum. Ávinning við þetta sáu menn einkum í tvennu :

(1) að góður tími myndi gefast til rannsókna á Þjórsárverunum áður en þau yrðu sett undir vatn, og (2) að kjarnorkan kynni að "bjarga" verunum, þ.e. að raforka frá kjarnorku kynni að vera orðin ódýrari en úr vatnsafla áður en að virkjun í Þjórsárverum kæmi.

Í greinargerð minni eru rakin þau rök, sem ég taldi geta bent til þess að virkjun í Þjórsárverum yrði aðkallandi tiltölulega snemma. Í því sem ég sagði í umræðum, endurtók ég það, en lagði að öðru leyti áherzlu á, að hér væri fremur um að ræða að breyta tímasetningu innan svo sem 20 ára bils, fremur en að hætta alveg við miðlunina í Þjórsárverum, sem ég taldi Ísland alls ekki geta fallist á, af efnahagslegum ástæðum. Varðandi kjarnorkuna lagði ég áherzlu á, að hún væri keppinautur við vatnsafl okkar; því fyrr sem útlit virtist fyrir að hún yrði samkeppnisfær við vatnsafl, því styttri tíma hefðum við til að nýta vatnsafl okkar, og því fyrr yrðu miðlunarvirki í Þjórsárverum tímabær. Markmið okkar hlyti að vera, að hafa virkjað helzt allt vatnsafl okkar áður en kjarnorka verður samkeppnisfær við það.

Af því sem einstakir ræðumenn sögðu, er þetta helzt :

Mr. S. D. Ripley (forseti ICBP) lagði, eins og fyrr segir, áherzlu á hönnun með tilliti til "total environment", eins og hann komst að orði, og ræddi málið þannig á mjög almennum grundvelli án þess að víkja mjög að Þjórsárverunum og aðstæðum þar sérstaklega.

Mr. C. V. T. Matthews ( Director, International Wildfowl Research Bureau ) lagði áherzlu á, að Þjórsárveramálið væri milliríkjavandamál.

Mr. G. Harmsen frá Hollandi og Mr. O. J. Merne frá Írlandi ræddu báðir möguleikana á að taka önnur svæði til virkjunar á undan Þjórsárverum; einkum Austurlandsvirkjun. Það kynni að bjarga Þjórsárverum, sögðu þeir.

Í sama streng tók dr. Hoffmann frá World Wildlife Fund.

Dr. R. Warner frá Kanada ( Nýfundnalandi ) taldi ekki mikla eftirsókn í stóriðju, og nefndi dæmi frá Nýfundnalandi því til stuðnings, en fylkisstjórnin þar væri haldin "mania for hydro", eins og hann komst að orði.

Dr. K. Curry-Lindahl frá UNESCO ræddi almennt um viðhorf UNESCO til mannvirkjagerðar og umhverfismála. Kvað hann stofnunina líta á "conservation and ecology" í sambandi við alla mannvirkjagerð. Hann gat þess, að Þjórsárveramálið hefði verið rætt innan UNESCO af vísindalegum ástæðum, en vísindalegt gildi veranna væri mjög mikið.

Mr. Peter Scott, formaður World Wildlife Fund, bað fyrir "firm message" til Íslenskra stjórnvalda : "We do not wish the Thjórsárver to be flooded. There can be no compromise on that". "Veljið heldur Hvítá", sagði hann.

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Um kvöldið, að loknu fundarhaldi, ræddi ég málið við allmarga þátttakendur. Þær viðræður gengu mest út á að menn báðu um nánari útskýringar á ýmsu, sem ég hafði sagt í ávarpi mínu, auk almennra spurninga um Ísland. Þar var einkum mikið spurt, hvort ekki mætti velja aðra staði til virkjunar á undan Þjórsárverum.

Meðal þeirra, er ég ræddi við um kvöldið, var Peter Scott. Ég lýsti þeirri skoðun minni, að á því gæti enginn vafi leikið að gerð yrði miðlunaruppistaða í

Þjórsárverum fyrr eða síðar ; frá því væri ekki hægt að falla af efnahagslegum ástæðum ; til þess mætti ekki ætlast af Íslandi. Annað mál væri hitt, að reynt yrði með öllum tiltækum ráðum að draga úr skaðanum af því. Peter Scott sagði, að mjög yrði lagt að íslenskum stjórnvöldum í framtíðinni að friða Þjórsárver.

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Ég vænti þess að för mín hafi orðið til þess, að þeim, sem þing ICBP sátu, sé nú ljósari en áður sú efnahagslega þýðing, sem miðlunaruppistaða í Þjórsárverum hefur fyrir Ísland, og að þeim sé nú ljósara en áður, hvað krafan um friðlýsingu veranna í raun og veru tákna fyrir Ísland. Vonandi verður það til að auðvelda lausn málsins, og gera mönnum ljóst, að "compromise" er það eina, sem hér kemur til greina, gagnstætt því sem Peter Scott segir.

## THE POWER BACKGROUND OF THE THJORSÁRVER PROBLEM

This presentation will try to describe the power development schemes which have created the Thjorsárver problem as we know it today, and to relate these developments to the Icelandic economy in general. The purpose is to elucidate the background against which this whole problem will have to be viewed if it is to be properly understood.

### Introduction

The economy of Iceland is to an overwhelming degree based on fishing and fish-processing industries. Food products from the sea account for more than 90% of the country's export. This industry has so far been almost the only support of a standard of living for Iceland's 200 000 inhabitants which compares well with that of other countries of northern Europe.

There is a growing evidence that this cannot continue for a very long time to come. The fishing grounds around the island already show signs of overfishing. Although measures like better resource management coupled with international agreement to preserve the stock plus improved processing of the fish brought ashore will undoubtedly prove very valuable in this respect, it is nevertheless widely realized in Iceland that some additional supports are needed for the national economy to secure in the future a rate of economic growth comparable to that of the neighbouring countries. A further reason is that an economy based mostly on fishing is liable to unpredictable, large fluctuations due to variations in the fishing stocks. Such large alternate booms and recessions obviously make it difficult to maintain a stable, growing economy.

### Power-consuming Industries as Additional Supports of the Icelandic Economy

Apart from the very rich fishing grounds around the island, Iceland possesses only two natural resources of importance. They are a large potential of hydro-electric and geothermal energy. The country is practically devoid of fossil fuels or minerals.



The two energy potentials, hydro and geothermal, are believed to be of a similar order of magnitude. Only a few percent of each has been utilized to date; hydro to supply the country's electricity requirements; geothermal energy mainly for space heating which is an important energy sector in Iceland, for climatic reasons.

Studies have been going on in Iceland for some time of the possibilities of large-scale industrial exploitation of the two energy potentials. Although geothermal heat undoubtedly can be utilized for many industrial processes where the requirements of temperature correspond to geothermal temperature, hydro-power is probably more versatile as far as industrial utilization is concerned. Especially, the so-called power consuming industries appear an attractive possibility to convert untapped hydro into economic realities.

These studies have indicated that power-consuming industries may well contribute at least some of the badly needed "additional supports" of the Icelandic economy. In fact, development along these lines has already started. Last year, an aluminium reduction plant, the first to be built in Iceland commenced operation. Several other industrial projects are presently under intensive study by the Icelandic Government. It is the policy of Government to encourage development along these lines to the extent consistent with interests of the Icelandic people.

### The Hydro-Potential

It is estimated that the hydro-potential of Iceland, which could be utilized economically is somewhere between 25 000 and 30 000 million kilowatthours a year, or between 25 and 30 terawatthours a year, to use a somewhat more convenient unit. For our purpose here, let us for sake of simplicity assume a single figure within these limits, say 28 TWh. By 1973 when the aluminium plant just mentioned has reached full capacity, total consumption of electricity in Iceland is estimated at 2.2 TWh or about 8% of the economic potential.

The sketch map I just gave you is intended to show schematically the geography of Iceland's hydro potential. It may be seen from this map that the hydro potential is mainly located in two parts of the country, viz. the Southwest and the East. In fact, about 57% of the total is represented by the clusters of circles in the Southwest, about 30% are found in the East, chiefly in a single site, shown by the large circle there, with the remaining 13% in other parts of the country.

The large percentage of power located in the Southwest is advantageous in so far as the greatest concentrations of population are also found in the same area. Between 60 and 70% of Icelanders now live in the Southwest. The East, on the other hand, contains only about 4 percent of the population of Iceland.

Studies to date of the probable cost of power from the various sites clearly indicate two principal low-cost areas viz. (1) the cluster of large circles in the northeastern part of the Southwest and (2) the East ( see sketch map ). Power costs will probably be very nearly the same in these two areas, while the remaining areas may show up to 50% higher costs. Of the two, the area in the Southwest is the most important one, due to its proximity to the main centres of population.

Hydro-electric power in the Southwest is mostly confined to two river systems, the Thjórsá and the Hvítá. These two rivers flow roughly parallel in a south-southwestern direction from the central part of Iceland to the western part of the south coast.

Of these, the Thjórsá with its tributaries is the most important. It is shown on the sketch map by the larger of the two rows of circles shown in the Southwest, the one to the right. The other row represents the Hvítá. The coloured map, which you also received, shows the now proposed scheme of development of these two rivers.

#### The Thjórsárver Reservoir

The Thjórsárver area, with which we are here primarily concerned, lies near the headwaters of the Thjórsá River, just south of the glacier Hofsjökull. It has been proposed as the site of a major reservoir in the Thjórsá-Hvítá development scheme. This reservoir is shown as a big blue area in the central part of the coloured map. Other principal reservoirs are also shown on the map.

The Thjórsárver Reservoir is a very important feature of the Thjórsá-Hvítá scheme. In the first place it is the prerequisite for the construction of the Upper Thjórsá power plant ( indicated on the sketch map by the circle marked "2880" ). This plant would not be economical without the reservoir. Secondly, the reservoir would affect directly the string of power plants on the main stem of the Thjórsá since the water from it would flow through all these plants.

Thirdly, since all the plants envisaged in the Thjórsá-Hvítá scheme would operate interconnected, i. e. feed their output into a common power grid, operation of the Thjórsárver Reservoir would affect the entire Thjórsá-Hvítá system. In a way, therefore, the Thjorsárver Reservoir is a key project in the overall scheme of development of these two river systems.

It is possible that an increase in the natural flow of the Thjórsá by diversions from other rivers may prove an economic proposition. If so, the importance of the reservoirs on the system will be greater still, since the diverted flow would be largely unregulated. The proposed diversions are shown schematically on the sketch map.

It is estimated that the total elimination of the Thjórsárver Reservoir would reduce the amount of economical power from the Thjórsá-Hvítá scheme by about 4 TWh, from 15.8 TWh to 11.8 TWh, or roughly 25 percent. Worse still, all this lost power would probably be within the lowest cost brackets.

### Schedules of Development

No definite time plans exist at the moment for the utilization of Iceland's untapped hydro power. The rate of development will, to an overwhelming degree, depend upon the rate at which power-consuming industries will be established in the country, since the power requirements for other purposes will remain very small in relation to the resources for a very long time to come. This latter rate i. e. that of industrial development, again depends on a number of factors most of which are very difficult if not impossible to predict.

In order to introduce some time scale into this problem, however, it may be mentioned that it has been tentatively suggested by some instances in Iceland that most of the country's hydro resources might be developed within the next twenty years or so. In want of anything better, let us keep to this figure, for the time being.

The next question which might be asked is: Which one of the two low cost areas will be developed first, or will both of them be developed simultaneously.

The power cost will probably be about the same in both. The Southwest area, as mentioned earlier, lies close to the main centres of population. The East, on the other hand is a thinly populated area, the economy of which lags behind

the Southwest. Thus strong political factors enter the picture. On the other hand most natural factors affecting siting of industrial plants are in favour of the Southwest. The chances are therefore that this area will come first although a more or less simultaneous development of the two cannot be precluded. In fact, most of the electric power generated in Iceland to-day comes from power plants in the Southwest, and the aluminium plant mentioned earlier is located there. Referring again to the sketch map, the circle marked "600" in the Southwest cluster is fully developed; that marked "3560" is approx. 50% developed. This latter plant will not reach the capacity indicated at the circle until after the reservoirs shown on the coloured map, plus the diversions have come into operation.

Assuming for the moment a continued development of the Southwest area, the next sites to be developed are probably the ones marked "1080" and "1980" on the sketch map. Again, they will not initially reach their full capacity, but only after the reservoirs and diversions have been constructed. At the present time the initial stage of the reservoir "Thórisvatn", shown on the coloured map, is under construction. Development of these two sites will probably be completed by the mid-seventies.

After this, the most attractive site for development would probably be the Upper Thjórsá plant (circle "2880" on sketch map) together with an initial stage of the Thjórsárver Reservoir. This development would then presumably be completed in the late seventies.

The final stages of the Thjórsárver Reservoir would thereafter wait for several years until more plants have been built on the main stem of the Thjórsá. This might happen in the early eighties.

This is probably the schedule of development of the Thjórsá, i.e. the low-cost area in the Southwest, which appears most likely at the moment, provided most of the industrial development takes place in the Southwest. But other courses are possible. Thus, the possibility cannot be excluded altogether that the Upper Thjórsá, with Thjórsárver initial storage, will be developed prior to the other two sites ("1080" and "1980"). This might turn out to be the most attractive selection if a customer requiring a fairly large amount of power comes along. This possibility does not appear very probable at the moment, however.

## The Thjórsárver Problem

Both the National Energy Authority, the body responsible for the general survey of the energy resources of Iceland and adviser to the Government in the energy field, and the National Power Company which will actually construct and operate the power plants in the Hvítá-Thjórsá system, have for some time realized the potential conflict between power interests and nature conservationists on the Thjórsárver. Therefore, about two years ago, the National Power Company took the initiative and wrote a letter to the Nature Conservation Council of Iceland, suggesting that research be started into the Thjórsárver problem and offered a financial assistance to such research efforts. Unfortunately this letter remained unanswered, and nothing happened until later when the Icelandic Government took the initiative and had a joint committee established with representatives from the Nature Conservation Council, The National Energy Authority and the National Power Company.

This so-called Thjórsárver Committee held under my chairmanship several meetings last winter to discuss the problem. It quickly became evident that much more data than are presently available are needed to evaluate in any detail the effects of the proposed impoundment on the pinkfeet, or to appraise any suggested means for mitigating these effects. Therefore, the Committee unanimously recommended that research be started as quickly as possible into the various aspects of the Thjórsárver problem to obtain such data. The Committee's recommendations are now under consideration by the Government, and it is hoped that research will be started next summer.

To assist in suggesting the various kinds of research to be carried out, the Committee had an expert from the U.S. Fish & Wildlife Service come to Iceland last spring for consultation.

It would go too far to describe in detail the research program recommended. It relates to the Thjórsárver in general and to the pinkfeet ecology of the area in particular as well as to some other areas in Iceland where these birds are known to nest. Emphasis is on trying to find out just what factors make the pinkfeet prefer Thjórsárver to other areas in the country. Knowledge of this will be necessary to evaluate possible measures to make other areas more attractive as breeding grounds than they are now in order to compensate more or less for the loss of Thjórsárver or parts thereof. Among other variables that are unknown is the most economical level of impoundment, which still has

to be determined. This is obviously a very important variable, since on it will depend the amount of the present breeding habitat which will be lost. The level on which the map you received is based is the maximum level which is technically feasible. The most economical level will almost certainly be lower.

### The Standpoint of the Icelandic Government

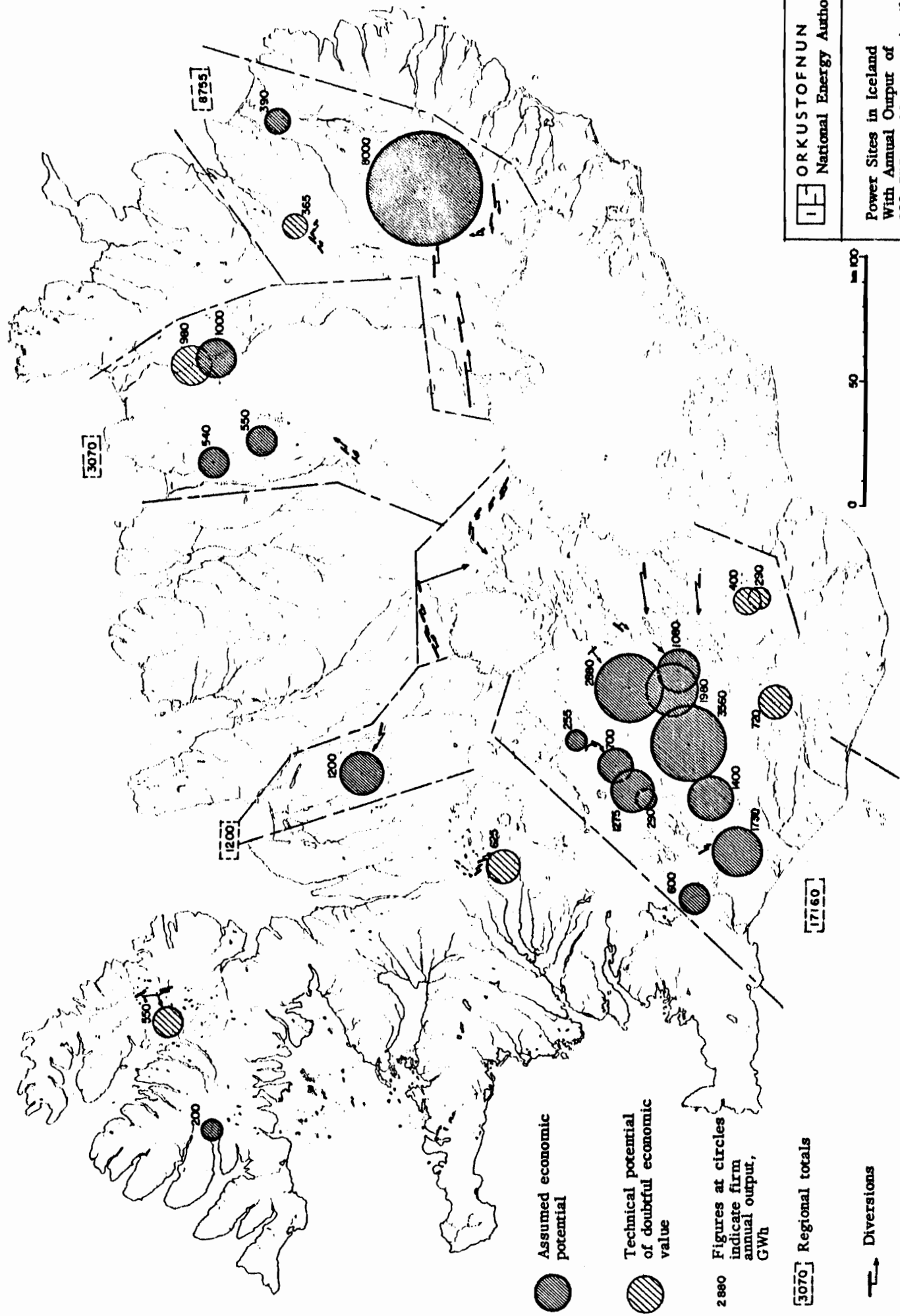
To end this presentation I will try to describe in a few words the standpoint of the Icelandic Government in the Thjórsárver problem. However, what I say here is not an official statement by the Government since I am not empowered to make any such official statement. Rather it is my own formulation of my impressions from numerous discussions of the problem with Government officials.

The Icelandic Government fully realizes the great significance of the Thjórsárver from the conservation viewpoint. At the same time it also realizes that the attainment in the future by the small Icelandic people of an economic growth rate comparable to the rest of Northern Europe is by no means an easy or straightforward task. It can probably only be attained if we effectively utilize all possibilities open to us. It was mentioned earlier that hydro-electric power is one of the few important natural resources of Iceland. Also that the Thjórsárver Reservoirs holds the key to a significant part of just the lowest cost portion of that potential. The economic value foregone by abandoning the Thjórsárver Reservoir once and for all while difficult to measure exactly, would be very high indeed. Great importance is today attached in Iceland to the development of the hydro-resources as a contributor to the national economy. The Government is therefore, understandingly, unwilling to forego once and for all the potential economic benefits associated with the Thjórsárver Reservoir. Any Government is bound to attribute a primary importance to the material well-being of its own people.

This should not be interpreted so as to mean that the Government is unwilling to listen to the conservation viewpoint. On the contrary, it is willing to give careful considerations to any plan or proposal aimed at mitigating the adverse effects the Thjórsárver Reservoir may have for the pinkfeet, and to support research for this purpose. Today we do not have the necessary data available to be able to evaluate the extent to which this is possible. This information must be obtained. The Government lays great emphasis on just this approach

to the Thjórsárver problem, viz. to try to combine the construction of the reservoir with an acceptable degree of preservation of the pinkfeet breeding habitat. Let us hope that this approach will lead to a solution that is acceptable to all concerned.

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ORKUSTOFNUN  
National Energy Authority

Power Sites in Iceland  
With Annual Output of  
200 GWh or More April 1969

Assumed economic potential

Technical potential of doubtful economic value

280 Figures at circles indicate firm annual output, GWh

3070 Regional totals

Diversions



THE INTERNATIONAL COUNCIL FOR BIRD PRESERVATIONXV WORLD CONFERENCEDE KOOG, TEXEL, NETHERLANDS. 6 - 11 SEPTEMBER 1970

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Mr. J. Björnsson,  
Head, Electric Power Dept.,  
Orkustofnun,  
National Energy Authority,  
Laugavegur 116,  
Reykjavik, Iceland.

29th September, 1970.

Dear Mr. Björnsson,

Thank you very much for your letter of September 21st and for so kindly sending me the text of your address at the meeting in De Koog, for which I am most grateful. We are very glad to have your complete address.

We were most grateful to you for taking the trouble to come such a long way to attend our meeting and I know your presence there was very much appreciated by the representatives of the 31 National Sections who attended. I am sure also you will have realised the keen interest and very deep concern of all these people from every part of the world regarding the Thjórsárver area.

Again many thanks both for your presence and for your kindness in addressing the meeting,

I am,

Yours sincerely,



Phyllis Barclay-Smith