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CONF. ON NORTHERN CA. FISHING 1960

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CONFERENCE

ON

NORTHERN CALIFORNIA FISHING

PROBLEMS

NOVEMBER 15, 1959

OFFICE OF
CONGRESSMAN CLEM MILL
FIRST DISTRICT, CALIF
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H. Res. 472

IN THE HOUSE OF REPRESENTATIVES, U.S.,
March 30, 1960.

Resolved, That pertinent testimony and research material developed in connection with current problems of the sports-fishing industry of California and the Pacific Northwest be printed as a House document.

Attest:

RALPH R. ROBERTS,
Clerk.

FOREWORD

Historically, the salmon and steelhead fisheries on the Pacific coast have been among the Nation's greatest natural resources.

But the resource has steadily deteriorated as man has destroyed these species' natural upstream spawning areas by building dams and powerplants and by pollution. The threat to survival of the species within the next 5 to 10 years is real.

The responsibility of government—both State and Federal—to help conserve this valuable resource was the subject of an all-day conference at San Rafael, Calif., in November 1959.

This document is the transcript of that conference.

It constitutes a unique symposium of scientific papers and other expert testimony by some two dozen fishery scientists, State fish and game officials from Oregon, Washington, Idaho, and California, and U.S. Fish and Wildlife Service and Bureau of Reclamation officials, as well as spokesmen for the commercial and sport fishing industries.

The Federal responsibility to mitigate or compensate for direct damage to fisheries caused by Federal projects has long been recognized. Our Federal fish hatcheries and fish ladders are examples of this. But this useful work has proved insufficient; the species continue to decline.

There are two other Federal responsibilities which have not always been recognized. This conference record emphasizes the urgency of implementing two recent Federal statutes by which Congress spelled out these responsibilities: Public Law 86–359 (73 Stat. 642), and Public Law 85–624 (16 U.S.C. 661 et seq.) which is the 1958 amendment to the Fish and Wildlife Coordination Act of 1934.

Public Law 86–359 authorized and directed the Secretary of the Interior to conduct and coordinate basic research on the migratory marine species of sport fish—which include salmon and steelhead.

The 1958 amendment to the Coordination Act authorized Federal agencies planning water development projects to provide for enhancement of fish and wildlife. Previously they had specific authority to provide only for mitigation or replacement of direct loss.

This record clearly shows the following consensus:

1. The Federal Government has a well-established responsibility for basic research having broad application to fishery resources. The reasons are obvious. The unanswered "why" questions in this field are regional and national in character—and, in the case of the salmon, even international. The State agencies' facilities and funds are necessarily too limited to do the job in most cases. The States have

their hands full in fulfilling their responsibilities to manage their fish and game and to conduct applied research applying to their own special problems.

2. The Federal Government also has a responsibility to provide the leadership and coordination and encouragement in both research and good conservation practices.

3. In regard to the Pacific coast's deteriorating salmon-steelhead fisheries, a real problem of great magnitude exists.

4. Basic research is the key to this problem. There is vital need now for an expanded program of basic biological research on these species, especially on all phases of propagation, natural and artificial; manipulation of streamflows to create effective spawning and survival environments, diseases, nutrition, improvement of hatchery techniques, and related questions.

5. Time is of the essence. As one conference participant emphasized:

> With the virtually exploding population and development of this area (the Pacific coast), time is running very short. It will be of little avail if * * * we do too little too late * * *. We may find that we have no fishery resource to protect.

It is hoped that this document will prove useful to all concerned with getting on with this urgent task in an orderly and timely manner.

CLEM MILLER,
Member of Congress, First District, California.

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CONFERENCE ON NORTHERN CALIFORNIA FISHING PROBLEMS

The conference convened at 10 a.m., November 15, 1959, at the Marin Rod and Gun Club, San Rafael, Calif.

Representative Clem Miller, Member of Congress, First District, California, presided.

Mr. MILLER. I am very delighted to see so many of you gentlemen present this morning. I would like to stress the fact that this is not a formal proceeding of the U.S. Congress. It is a meeting or conference in the form of a hearing to give our proceedings more coherence, and also to give us a record that we can use next year for the purposes of the States represented, for the purposes of the Federal Government, and for our use in Congress. What gave impetus to this meeting was the passage of H.R. 5004,[1] which is a bill to provide assistance to the sports fishing industry. It was felt that it would be an excellent idea to hold a proceeding of this sort to give point and purpose to congressional activity, to cooperation between the States, and between the States and the Federal Government.

As you know, H.R. 5004 authorizes the expenditure of $2,700,000 per year for research on the biology of the migratory marine species of game fish, which include salmon and steelhead. However, securing appropriations for this is another matter. In a recent discussion with the Bureau of Sport Fisheries in Washington, D.C., they said that if funds were available, and one of the principal purposes of this hearing is to help supply background for securing such appropriations, first, that they propose a long-range $500 million program to enhance sport fisheries. They hope to have this program drafted by February 1960.

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[1] H.R. 5004, as amended, was approved as Public Law 86-359 on Sept. 22, 1959. Representative Alton Lennon (North Carolina) was the author of H.R. 5004; cosponsors included Representatives Robert L. F. Sikes (Florida), George P. Miller (California), Clem Miller (California) and Thomas F. Johnson (Maryland).

See H. Rept. 974, S. Rept. 987, and "Miscellaneous Fish and Wildlife Legislation" (hearings before House Merchant Marine and Fisheries Committee's Subcommittee on Fisheries and Wildlife Conservation, 1st sess., 86th Cong.).

The text of Public Law 86-359:

"AN ACT Authorizing and directing the Secretary of the Interior to undertake continuing research on the biology fluctuations, status, and statistics of the migratory marine species of game fish of the United States and contiguous waters.

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of the Interior is hereby directed to undertake a comprehensive continuing study of the migratory marine fish of interest to recreational fishermen of the United States, including species inhabiting the offshore waters of the United States and species which migrate through or spend a part of their lives in the inshore waters of the United States. The study shall include, but not be limited to, research on migrations, identity of stocks, growth rates, mortality rates, variations in survival, environmental influences, both natural and artificial, including pollution, and effects of fishing on the species, for the purpose of developing wise conservation policies and constructive management activities.

"SEC. 2. For the purpose of carrying out the provisions of this Act, the Secretary of the Interior is authorized (1) to acquire lands, construct laboratory or other buildings, purchase boats, acquire such other equipment and apparatus, and to employ such officers and employees as he deems necessary; (2) to cooperate or contract with State and other institutions and agencies upon such terms and conditions as he determines to be appropriate; and (3) to make public the results of such research conducted pursuant to the first section of this Act.

"SEC. 3. There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act: *Provided,* That no more than $2,700,000 be appropriated for this purpose in any one fiscal year."

Secondly, as they have in mind, they plan to make an economic survey of the value of marine sport fisheries by the end of 1960.

Thirdly, they hope to have a small staff which will be able to contact universities and other agencies to assist them in securing information within this area, and drafting a priority list of the most pressing problems, also by 1961.

So, the purpose of this meeting, you might say, is threefold: First of all, it is to give the basis upon which to secure appropriations for H.R. 5004. Secondly, it is to provide a basis for cooperation in the field of research between the States and the States and the Federal Government. Thirdly, to supply some of the direction and data gathering that we should do to implement H.R. 5004.

I would like at this time to welcome my colleague in Congress, who is a newcomer as I am, who joins with me in hoping to secure from these hearings some valuable information that will assist us to go to Congress next year and secure these funds. I would like to introduce Congressman Harold T. "Bizz" Johnson of the Second District of California.

Mr. JOHNSON. Thank you, Congressman Miller. I merely come down here to get an education, knowing very little about this particular item and yet representing an area that does have something to do with the salmon population. I thought I should come to hear what you gentlemen who are experts in the field have to say. It is very necessary that we develop a record so that we can support the legislation that has been authorized in the way of appropriations. So, Clem, I am here to listen and learn as we have all of the experts here.

Mr. MILLER. Thank you very much, Congressman Johnson. I regret that other Congressmen who planned to be here are unable to do so. Perhaps they will be available later on. Congressman George P. Miller particularly sent his regrets. George Miller is a former executive secretary to the California Department of Fish and Game, a senior member of the House Subcommittee on Fisheries and Wildlife Conservation, and chairman of the House Special Subcommittee on Oceanography. He is keenly interested in the problems we will be discussing today. Unfortunately, he is out of the State at the present time. As you know, he is also a cosponsor of H.R. 5004 along with myself.

At this time I would like to introduce Director William Warne of the California State Department of Fish and Game who, on behalf of the State of California and for our mutual assistance, will introduce the witnesses.

Mr. WARNE. Congressman Miller, Congressman Johnson, let me say that I, too, am a newcomer as you two gentlemen are, and it is my great pleasure to have this opportunity to help present some of the problems of fisheries in northern California and the Northwest of the United States to you gentlemen. I do not know how we can express our appreciation to you for coming here on a Sunday to listen to us in this matter, but I assure you that each and every one of us here does appreciate your attention to this matter.

All of the continental States of the Nation which have direct and parallel interest in the matters before us here today are represented on this occasion at this meeting with you, Mr. Miller, and it is our pleasure that it may be so.

RESPONSIBILITY OF STATE AND FEDERAL GOVERNMENTS IN THE FISHERIES FIELD

(By William E. Warne, director, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. WARNE. Congressman Miller has asked me to lead off in the discussion and to present the speakers who will express in some detail the views of California concerning the matter before you today.

First, let us examine the respective responsibilities of State and Federal Governments in the fisheries field. My remarks bear on all interstate fisheries, but because of the great number of problems facing the future of the salmon, they are focused primarily on that species.

The salmon problem calls for the best efforts of everyone concerned. There is a great problem area here and it constitutes a field so vast that there is room in it for everyone willing to work. But there is no room for bickering and jealousy among agencies. There is no time for any unnecessary duplication.

The States are responsible for the actual management of their fishery resources, including the setting and enforcing of regulations, maintenance of the environment, carrying on artificial propagation, and the like. They are responsible for the investigations on which management actions are based. The State governments are answerable to the prople as guardian of their resources.

As I see it, Federal responsibility in this area is of several kinds. Most obvious is in the case of Federal water, flood control and navigation projects wherein the National Government is obligated to protect and maintain the fisheries.

Another Federal responsibility, not always recognized, is to conduct, or at least finance, the basic research on the interstate resources.

A third countrywide responsibility is the compilation, publication and dissemination of information on fishery research and conservation. Room for improvement exists in this field.

Fourth is the seldom mentioned but sorely needed responsibility to provide leadership and coordination—not the assertive, dominating taking over of all the glory, but the everyday friendly guidance and cooperation that calls for so much skill and patience.

The responsibility for the conduct of foreign affairs and the vesting of the treaty-making power at the Federal level places a fifth, and at times a dominating responsibility on the National Government, especially in connection with some of our fishery resources, such as the salmon.

The Federal Government as represented by the Fish and Wildlife Service could do everyone a great service and save us all a lot of time and money by entering into a planned program of basic salmon research. We all need basic answers on the dynamics of the salmon. What makes abundance fluctuate so widely? What are the relative effects of different forces and conditions causing mortality? At what stages in its life history is the salmon most vulnerable? What is the salmon's reaction to changes in its environment? What are the factors that limit salmon abundance? How best can artificial propagation contribute to increasing salmon production?

With the Federal Government obtaining answers of this kind, and disseminating the information to the conservation agencies, the States

local problems. Instead of picking away at the fringes and having to spend money and effort on piecemeal basic and applied research, the States could do a lot better job of salmon conservation.

This State, for one, stands ready and willing to pull its share of the load in a coordinated fisheries conservation program. This State, both individually and through its membership in the Pacific Marine Fisheries Commission, is ready to exert such leadership as it can in coordination and planning. In short, California will do its utmost for the future of salmon and other interstate fishery resources.

I believe Congressman Miller has already indicated the manner in which he would like to see this hearing progress; that is, we would get some information before the discussion gets widespread.

The witnesses represent commercial and sport fishing interests and the California Department of Fish and Game. I am sure that what they have to say will be of real significance to the Members of the Congress.

Written copies of these presentations have been submitted for the record. You will find in these yellow envelopes here on the table copies of the formal statements from the people of the California Department of Fish and Game.

Mr. MILLER. Director Warne, I might say that I hope witnesses appearing here will submit written statements for the record. But I also hope this evidence will be highlighted in their own words, so that we can comment on it rather than the reading of the statement itself. It would add a great deal to our proceedings. I might add that everyone will be entitled to receive a copy of these proceedings if they so desire.

Mr. WARNE. Most of these statements are going to be very brief and touch upon the main points. The first speaker is Richard Croker, chief, Marine Resources Branch, California Department of Fish and Game. He will report on the status of the fishery resources of northern and central California. Mr. Croker, please.

Mr. MILLER. Mr. Croker, will you identify yourself for the record, please.

Mr. CROKER. I am Richard Croker, chief of the Marine Resources Branch, California Department of Fish and Game.

STATUS OF THE MARINE FISHERIES OF NORTHERN CALIFORNIA

(By Richard S. Croker, chief, Marine Resources Branch, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. CROKER. The marine resources of central and northern California continue under intense exploitation by the commercial fisheries, and are receiving increasing attention from the sport fishermen of the Nation.

Some resources are receiving much greater use in respect to their productive potential than others, particularly those close to harbors. Some are being utilized hardly at all.

With few exceptions the take of strictly marine species is governed by their natural abundance and availability. Those that are subject only to marine environmental controls such as ocean currents, temperature and salinity, plus fishing pressure, are, in general, in a less precarious position than the anadromous species that are subject to man's influence on the fresh water environment.

The laws and regulations are designed to provide a continued yield and to distribute the available crop equitably among both sport and commercial fishermen. They take into account the effects of fishing upon the resource as well as environmental and biological factors.

The strictly marine fish and shellfish, such as rockfish, lingcod, anchovies, sablefish, sole, crab, clams, and others are in generally good shape and are receiving adequate protection under laws that restrict damaging practices. Locally, some species subjected to heavy fishing pressure are feeling the strain, but scarcity is not widespread.

Generally speaking, conservation for these marine species consists of research to establish their abundance and potential yield, enactment and enforcement of necessary regulations, and a close watch on fluctuations due to natural and fishing pressures.

This is not sufficient for the anadromous species. Encompassed in the salmon and steelhead we have all the accelerating bad effects of a burgeoning population on both the fish and their environment.

Annually, more people fish for salmon in more rivers and out of more ports. The same people and their friends create more pollution, divert more water for irrigation, use more gravel for construction, build more dams for electric power, straighten more rivers to prevent floods, and use more water in their homes.

This all adds up to a greater harvest of fish accompanied by a lessening of amount and quality of spawning area. Unchecked, this trend can lead only to disaster.

Commercial salmon catches off the California coast dropped from a record high of 10,300,000 pounds in 1956 to 5,100,000 pounds in 1957, and a miserable 3,700,000 in 1958. Catches in 1959 will probably run around 7 million pounds. At the same time, escapement of adult king salmon to Central Valley streams plunged from an average of 493,000 in the years 1953–55 to 189,000 fish in the 3-year period of 1956–58. Although too early to tell, the current run appears to be substantially larger.

Are these and previous drops just natural fluctuations? Or are they the result of man-inflicted damage? We are inclined to believe that both are involved, but that the accumulating effects of man are playing an increasing part.

As Mr. Warne said, unless all concerned take positive action, the end could be disastrous.

Mr. MILLER. Mr. Croker, do you fee that the States of California, Washington, Oregon, and Idaho and other interested States are cooperating sufficiently one with another to develop means of dealing with the problem you have just outlined?

Mr. CROKER. I would say they are doing their best to.

Mr. MILLER. What mechanism do they have for such cooperation?

Mr. CROKER. They have two, Congressman. The first is the one that Mr. Warne mentioned; the Pacific Marine Fisheries Commission, which is a compact between the three coastal States, and to which Alaska, Hawaii, and Idaho have been in a sense invited. The mechanism has started rolling so they can become members.

Mr. MILLER. You indicate there will be more cooperation in the future than in the past.

Mr. CROKER. A wider scope.

Mr. MILLER. Do you see the need for such cooperation between such geographic agencies to deal with this problem?

Mr. CROKER. Oh, very definitely. At the last two meetings of the Western Association of Fish and Game Commissioners, which includes all the Western States and Canada, the resolution was passed calling on all the States' agencies, member agencies, and the Federal Government and the Canadian Government to work closer together in this matter of coordinating their fishing problems. That is going forward, but at a slower pace than we would like.

Mr. MILLER. Why is such cooperation necessary?

Mr. CROKER. It is necessary for several reasons, Congressman Miller. Salmon is interstate; in fact, international. The fish don't know boundaries. Fish produced in the Sacramento River, for example, are taken as far as Canada, and in large numbers in Oregon and Washington. Just the reverse is true for the Columbia River, and so they are taken as far south as California. So, there has to be cooperation. Furthermore, the opinions underlying salmon conservation and other fisheries conservation are more general in any one State. That is why Mr. Warne highlighted the need for Federal participation in the basic research, which then can be used by the States together and separately as needed to do local research on particular local problems.

Mr. MILLER. Without putting you on the spot, Mr. Croker, do you feel that the cooperation between the States and the Federal Government has been at the highest level of efficiency in the past years?

Mr. CROKER. It is getting better all the time, but——

Mr. MILLER. This does not mean any invidious comparison with respect to the Federal Government. This is just because there had been no money and no way in which such cooperation can be affected. Is this not correct?

Mr. CROKER. That plays a part in it. Washington, the Capital, is a long way from the States of Washington and California and other States. And we suspect, and I have a feeling that some of the coast-wide Federal people also suspect, that we are so far away that our problems, theirs and ours, are not recognized in Washington.

Mr. MILLER. Might we say that Congress has not appreciated its responsibilities with respect to anadramous fish. And as you pointed out, that fish go out with man and civilization; this impact of population.

Mr. CROKER. I would prefer to say that we haven't convinced Congress that they should pay more attention to it.

Mr. MILLER. That is the job that Congressman Johnson and I have.

Mr. CROKER. I would like to look at it that way.

Mr. MILLER. Congressman Johnson, do you have any questions that you would like to ask of Mr. Croker.

Mr. JOHNSON. I have been greatly concerned about the situation at the Coleman Hatchery and the tributaries to the Sacramento River that are under study at this time. When I made inquiry in Washington, the sportsmen hearings there, we were told by the fish and wildlife people that the California Fish and Game Commission had not requested any more consideration at Coleman, and they figured there were enough hatcheries in the State dealing with the salmon problem. I would like to hear from you on that.

Mr. CROKER. We do have a witness on hatcheries, but I will answer that. For a long time there was a feeling of jealousy, shall we say, between all the States and the Federal Government over hatchery operations, and everything else. It took a lot of healing of old scars to bring about improvement in that situation. That has taken a long time, but I believe it has happened. We are now meeting in the same room, as we are, with our colleagues from the Federal Service. And we can break bread with them, which was not always possible. For a long time the State was jealous of its rights and felt that the Federal hatchery at Battle Creek, of which you spoke, being designed only to pick up the losses of Shasta Dam, should confine themselves to that and no more. However, there has been some change in feeling and the Commission and the Department are now supporting any move that will bring about an up-to-date modernization of the Coleman Hatchery. And we have so informed the Fish and Wildlife Service.

Mr. MILLER. Is there a question?

Mr. DONALDSON. Donald Donaldson, Marin Rod and Gun Club. I would like to ask Mr. Croker a question.

Do you attribute this 7 million pounds of assumed catch during 1959 to the fact that the same number of fishermen are catching a higher percentage of fish, or are there more fishermen catching a lesser percentage of catch?

Mr. MILLER. Will you answer the question, Mr. Croker.

Mr. CROKER. In other words, is the run per amount of effort better this year as well as the total catch. That I cannot answer, Don. Only 2 days ago we got the total catch and we haven't analyzed it yet. But from all accounts, fishing was much better this year. However, it was confined only to the area within just a few miles of San Francisco and three-fourths of the catch, perhaps, was made between Bodega Bay and San Francisco. We have no way of knowing. Some of the other witnesses will, I think, bring out the need for continued or accelerated basic fundamental research on the salmon to find out why some of these things happen so we can answer your question.

Mr. MILLER. If there are no other questions, Mr. Croker, you are excused. Thank you very much. Mr. Warne, will you call your next witness.

Mr. WARNE. The second witness is John Gilchrist, executive secretary, Northern California Seafood Institute, and delegate to Salmon Unlimited and Aquatic Resources Committee. He will speak on the importance of the fishing industry and its needs for a vigorous and coordinated research program.

Mr. MILLER. Mr. Gilchrist, we welcome you here because, as you indicated to us in Sacramento, this problem is the problem of the survival of the species and there is room for everybody in this; commercial, sport, lumber, and all of the people concerned with this matter, we are very happy to have you this morning. Would you identify yourself for the record?

Mr. GILCHRIST. My name is John Gilchrist. I am the general manager of the Northern California Seafood Institute. I am also a member of Salmon Unlimited, and I hold the honor of being a visitor to the Pacific Marine Fisheries Commission.

Congressman Miller and Congressman Johnson, I too am simply delighted to have the privilege of being here to discuss this particular problem.

We are strongly of the opinion that the problem in itself far outweighs any possible personal difference of opinion. Furthermore, we think that the problem is of such great importance, particularly to our industry, that we think all factors should be very clearly brought out at this hearing so that not only you, who are members of the congressional delegation, but all others have the opportunity to look at this problem in its true light. If for that reason and no other, we think that this meeting is of prime importance.

IMPORTANCE OF THE FISHING INDUSTRY AND ITS NEEDS FOR A COORDINATED RESEARCH PROGRAM

(By John Gilchrist, general manager, Northern California Seafood Institute, 2677 Larkin Street, San Francisco, Calif.)

Mr. GILCHRIST. The representatives of the commercial fishing industry, those producers who have the responsibility of providing food for public consumption, have long clamored for the type of scientific information upon which we could base, with a reasonable degree of accuracy, our marketing programs. If reliable data were available showing the true status of the salmon resource, such data would be invaluable to industry planning.

As an industry we are often forced to accept certain concepts relating to the status of the fishery, knowing full well that such concepts were not derived from a proper research program.

Our scientists are the first to admit that in this field conclusions are often expedited, and are not final for the simple reason that basic research has never been completed. Too many unknown factors exist to allow for final conclusions.

And again, to depart briefly from my prepared statement, we are very much concerned, Congressman Miller, that there is an appalling lack of coordination between not only the State and the Federal Governments but between other State and other agencies. Now, we know—we have first-hand information that a considerable amount of basic data does exist in the Northwest, Oregon, Washington, and California, and to our knowledge there is no sound coordinating program existing at the present time.

Mr. MILLER. Mr. Gilchrist, could you give us any reason as to why this situation exists?

Mr. GILCHRIST. Congressman Miller, I think it is sort of a situation that has been ignored. I don't think truly anyone has been at fault. I don't think anyone has duly recognized the overall problem and took the time and effort to put a coordinating agency into effect.

Mr. MILLER. Is there any mechanism that you could suggest to this committee that would improve this situation?

Mr. GILCHRIST. There is now a trend toward that end. We, of course, are going to heartily subscribe to any such effort.

Mr. MILLER. Would you be concrete about it? Specifically, of what does this trend consist?

Mr. GILCHRIST. I, for one, would like to see the Pacific Marine Fisheries Commission take this thing on as a coordinating committee.

Mr. MILLER. What would the Pacific Marine Fisheries Commission consist of?

Mr. GILCHRIST. I am not really in a position to answer that question since I don't know just exactly what the policy of the Pacific Marine Fisheries Commission would be in regard to any type of coordination.

Mr. MILLER. In other words, you are just calling for such cooperation with such a commission?

Mr. GILCHRIST. That's right; or any other agency. I do not specifically say that the Pacific Marine Fisheries Commission should do it. I point out the fact that here is an agency that possibly could do t.

Mr. MILLER. Should this be a quasi-legislative commission at the Federal level, or should it be a cooperative venture between the States? How should the organization of such a commission be set up in your estimation?

Mr. GILCHRIST. I would like to refer that to Mr. Croker, as he is the expert. However, it occurs to me that here you do have the mechanics established. It seems to me that the PMFC, from what I know of it, is highly regarded. Now, it is very possible that if their policy does not now allow them to engage in such a coordinating program, it may be that that could be expanded to allow for such a thing. Then, under the circumstances, you would be able to channel not only all of the existing data into one agency which would be available to all of us, but I can't see any reason for possible conflict of interest or jealousy existing in such a setup.

Mr. MILLER. Since you have brought the subject up, I would like you to describe for the record in a little more detail as to what you mean by the fact that you must proceed with your marketing on a basis of unreliable data. What is it in your marketing that requires this reliable data?

Mr. GILCHRIST. Congressman Miller, may I finish this statement, and then I will come back to that question. I think my statement may cover it.

While we certainly cannot condone this lack of research, by the same reasoning we cannot condemn, for we recognize the problems faced by those who must conduct research. Today, and unfortunately, much of our research is subject to public and political pressures. And when public pressure demands an answer to a problem, too often is the answer "expedient" rather than scientific.

We cannot afford expedient answers to our problems. In northern California 1,200 boats, averaging 35 seasonal deliveries per boat, fish for salmon; 1,600 fishermen are engaged in delivering an average of 3,000 pounds of salmon per boat per season. During the 1958 season 3,700,000 pounds of salmon were caught in California waters, and the long-time average is approximately 5 million pounds. According to the information received from Mr. Croker this morning, this year, 1959, we have caught in excess of 7 million pounds.

At the height of the salmon season it is estimated that no less than 8,000 people are directly affected. This figure excludes restaurant personnel. It includes fishermen, processors, wholesalers, jobbers, brokers, shippers, and retailers. It does not include allied industry personnel who are indirectly affected; lettuce, lemon, cooking oils, and that sort of thing. But by the time the salmon reaches the consumer the value of this catch—I have had to revise my figures, but I can assure you they are considerably accurate—the value of this

catch alone for California is conservatively estimated at $12 million per year." That is based on the 1959 figures.

Without reliable scientific data available, this entire economy is vulnerable to unreasonable demands which could conceivably destroy the value of the resource. It is not difficult to draw a parallel as to what could happen to us and what did happen to the cranberry industry. There is a reasonable basis for this statement. In the past unqualified assertions which confuse the public have had a serious and detrimental effect on the industry. This is not the proper place to discuss such problems. It is mentioned only to demonstrate the vulnerability of the industry.

We do not advocate basic research and ignore other problems of immediate concern. The California water plan has, and will have, a direct bearing on the resource. Salmon are affected by improper and unplanned water releases from our water storage basins. Pollution is highly destructive and we are concerned about indiscriminate dumping of atomic waste material in the ocean. We are concerned about the fact that both State and Federal legislative bodies have, to date, failed to include fishery resources in the priorities granted water users. Time will eventually prove that the harvest of the sea is equally comparable to the agricultural harvest of the land.

On our part we subscribe to the theory that conservation means proper utilization, and we are willing to accept scientific findings if we can be assured that such findings are truly accurate.

Recent Federal legislation cosponsored by Congressman Miller and relating to a Federal program of basic research on salmon and steelhead offers considerable hope. This legislation strikes at the very heart of the salmon problem.

We do not now have basic research and we must have it. We must have it on a continuing basis and on a basis under which the research cannot be subject to interruptions and political pressures.

Our State fish and game department is not the proper agency to conduct basic research. And this is not a reflection on the inability of the Department to do so. Obviously industry cannot research. We do not have the funds and we do not have the personnel.

Since neither the State nor industry can or should undertake a basic research program, it becomes the responsibility of the only remaining agency, the Federal Government. We do not advocate any particular agency to conduct research at this time. However, if and when consideration of an agency to conduct research reaches the planning stage, we would like to be consulted. We would like to see Congressman Miller and Congressman Johnson—we would like to see our California delegation accept this problem as a delegation, because such a program is certainly in the public interest, and in such a program you will have a large unity of purpose. We feel that if you gentlemen who do represent us in Congress see fit to take this program on, I think then, under the circumstances, we will get somewhere.

Again, I want to repeat that I am honored to be here, and I truly hope that something constructive will come out of this meeting. Thank you.

Mr. MILLER. Thank you, Mr. Gilchrist. I am sure that Congressman Johnson will join me in saying that the California delegation is only too happy to act where there is unity of purpose in the industry. One of the things I have been doing for the past 2 months is urging various industries to combine and use their combined resources to get behind certain specific programs. If there is such unity, you can rest assured that the California delegation and those of Oregon, Washington, and Idaho, will also get behind such legislative purposes.

I would like to ask you to return to this question, if I may. I would like you to assist me by being as specific as you can, because it is on the basis of concrete examples that we can demonstrate to Congress our needs.

Can you give us any indication as far as your marketing of fish is concerned why reliable data is essential?

Mr. GILCHRIST. I think the answer to that, Congressman Miller, would be this: To my knowledge the fishing industry is probably one of the only industries in the world, or certainly in the United States—the world is a little too big for me—that does not have continuing and proper information with regard to the availability of its resources. In other words, there are numerous fluctuations far beyond that you will find in agriculture, in the supply itself. Now, if we had proper basic information upon which we could forecast our future's——

Mr. MILLER. That is, the fishermen?

Mr. GILCHRIST. That is correct. You can see, then, that it would lead us into a field in which we could begin to plan not only employment, but we could begin to plan marketing programs, advertising programs, public relations. In other words, it would open up a complete new door for us. As of today, for instance, if we intended a program that would begin at the start of salmon season next year, next salmon season, it would be hopeless. We know we are going to catch some salmon; we know they are there. But we have absolutely no idea, if you exclude the weather, of what that catch might be. There is no way of planning it.

Mr. MILLER. That is very valuable information. Are there any other instances that you can give us as to where reliable data would help you in the marketing of fish?

Mr. GILCHRIST. I want to stress this point just a little bit, Congressman Miller. I pointed out one thing that is highly dangerous to our industry; that is, public pressure or public demand acting upon inaccurate scientific data. Again, as you can see, it is a rather foolish thing, but you can see what happened in the cranberry industry. I am not about to criticize the Federal Government for making what I personally think an ill-timed statement. However, if that sort of statement should ever be made in the salmon industry—and I can think of a couple that would blow the industry sky high overnight—we would find ourselves in the exact predicament that the cranberry people are in right now. The only reason that such a thing is possible is the fact that we do not have proper information. And no one has. We could not say, "That is not so, and here are the facts."

Mr. MILLER. Do you have any questions, Mr. Johnson?

Mr. JOHNSON. No, I have no questions.

Mr. MILLER. Thank you, Mr. Gilchrist, for appearing here. We appreciate it very much. Call the next witness, Mr. Warne.

Mr. WARNE. George Difani, who is also a director of National Wildlife Federation, will make a statement in connection with the sport fishery and the cooperation between the sportsmen and the industry.

Mr. MILLER. Mr. Difani, we are very pleased to have you here this morning. Would you state your name and association for the purposes of the record?

Mr. DIFANI. Thank you, Congressman Miller. My name is George Difani, executive secretary of the California Wildlife Federation, the California affiliate of the National Wildlife Federation.

The California Wildlife Federation is a statewide organization consisting of nine regional councils aggregating over 800 sportsmen's clubs with an individual membership of over 100,000 sportsmen.

IMPORTANCE OF SPORT FISHERY AND COOPERATION BETWEEN SPORTSMEN AND THE INDUSTRY

(By George Difani, executive secretary, California Wildlife Federation and director, National Wildlife Federation, 6816 Stanley Avenue, Carmichael, Calif.)

Mr. DIFANI. We appreciate the opportunity to make a brief presentation on the importance of the California sports fishery.

Sport fishing in California is a big business. At this time we have over 1,400,000 licensed fishermen, plus those youngsters who are not required to purchase licenses, and along with thousands who can fish without a license. We are proud to point out that the California ocean anglers pay $3 per year for the privilege of fishing in the ocean. Our State was the first to require an angling license to fish in the ocean. To get an idea of how much these 1,400,000 California license buyers ante up to the economy of our State, I checked into a national survey made by the U.S. Fish and Wildlife Service in 1955.

The national average fisherman took eight trips, fished 9½ days, traveled 319 miles, and spent $91.98. These were 1955 figures. I am sure we can all agree that the 1959 fishing season costs were a great deal higher for the national average fisherman. At least we in California go more often, travel farther, and have to pay more. But for easy figuring at $100 per year, California sports fishermen alone would spend $140 million yearly.

I am very happy to report that there is very close cooperation between the sportsmen, the commercial fishermen, the industry in general, and the California Department of Fish and Game, along with a helping hand from the U.S. Fish and Wildlife Service. We have come to realize that our problems are common, the conditions of the resource affect each of us, and to improve the resourcewe must and are working together.

In closing may I also report the very close cooperation between the National Wildlife Federation and the National Fisheries Institute on many national issues both before Congress and over the country generally.

I would also like to mention, Congressman Miller and Congressman Johnson, that we hope that we can get the sportsmen of Oregon, Washington and Alaska, who are all members of the Wildlife Federation, get better organized, as we are being organized in California, from the sportsmen's point of view, to implement your bill and provide what is necessary to get congressional approval of additional funds for the Federal and State agencies which will cooperate on research that is necessary to bring about the answers to the problems John Gilchrist mentioned, and which I am sure all of us agree are very, very necessary, to take care of the ever-increasing number of people going fishing, particularly in our State.

I might mention that, apart from what I have in my written statement, we have literally tens of thousands of people from the Los Angeles area traveling anywhere from 100 to 500 miles on a weekend for fishing purposes. It is interesting also to note that statistics tell us that the large majority of the fishermen who fish for salmon and steelhead are southern Californians and, of course, as we must recognize, they travel a great many miles. The more miles you travel the more you pay for meals and hotel-motel accommodations.

I would also like to point out, as John Gilchrist mentioned, the cranberry situation, for the benefit of you two Members of Congress, that it is high time that the chemical people who are experimenting and producing chemicals for every kind of a purpose in agricultural problems, it is high time that they were being put under some congressional supervision. They are producing chemicals and selling them to farmers, pressuring them as they did on the deldrin application, to the point where we lost nearly every egret. The bird life in the valley was seriously impaired by the application of the deldrin.

Mr. MILLER. That is not the subject of this hearing, Mr. Difani. You may be grateful to know that a bill passed Congress this year authorizing expenditure of funds to study this matter, offered by Congressman Metcalf and supported by myself and others. This report will probably be out in 1961, we hope.

Mr. DIFANI. Yes. We were very solidly behind your bill. And we think it is high time that these chemicals are tested before they are ever given to the public or to the applicators for use.

Mr. MILLER. You would say that the commercial fishermen and the sports fishermen are together in a unified group on behalf of doing something about basic research?

Mr. DIFANI. That is true. And after hearing the evidence today, as the other witnesses present their statements, I am sure you will be convinced that we are working very close together. I think we are all agreed that we must cooperate.

Mr. MILLER. This is gratifying in view of some of the statements that are made from time to time as to the disagreement which may exist between sports fishermen and commercial fishermen. I am very happy to have both you and John Gilchrist supporting the needs for such basic research. One other question, Mr. Difani. Is it possible for you to specify with any concrete example as to how basic research would be helpful to the sports fishermen?

Mr. DIFANI. Well, I think basic research is the basis, you might say, to attempt to determine the abundance of the resource, habitat improvement, and all the other things that go along with it. For instance, we have our troubles on diversions and dams, and other things that impair and affect——

Mr. MILLER. Warm water?

Mr. DIFANI. That is right. Plus the fact that we are probably losing more fish out of diversion from the Sacramento River than we are producing in artificial ways. But I think that with basic research and the cooperation that can be brought about with the Fish and Wildlife Service and the States cooperating, with the sportsmen being informed with the information that can be produced from an educational point of view, we can begin to lick our problems with reference to fisheries.

Mr. MILLER. Do you have personal knowledge of the operation of the Fish and Wildlife Service in California?

Mr. DIFANI. Well, actually there has been a split between the sports fishing group and the Fish and Wildlife Service and the commercial fishing interests. And I don't think—at least, I am not well informed as to how that agency is going to cooperate—or are they cooperating? I hope that will be brought out today by the witness representing the Department.

Mr. MILLER. I just wondered if you had seen any indication of the results of Fish and Wildlife activities, either the Bureau of Sports Fisheries or Bureau of Commercial Fisheries, in the State of California.

Mr. DIFANI. I can say this from personal knowledge: That we are getting splendid help and advice and counsel in a cooperative way from the river basin people who are working on fish and wildlife on the basic problems; what has to be done, particularly in the river basin development.

Mr. MILLER. Might you say that some of the difficulties that have existed in the past might have something to do with the lack of funds?

Mr. DIFANI. Absolutely. I don't think the fishery men ever had the amount of funds to lick the problems that are facing us. And those problems are multiplying much faster than we are attempting to catch up with them.

Mr. MILLER. Could this have anything to do with what Mr. Croker referred to as pressures of population, pressures of man on natural resources that have to use a common river?

Mr. DIFANI. There is no question that that basic problem gets worse as the population increases. We are going to have to redouble our efforts to meet the issue to be able to survive.

Mr. MILLER. Do you know that we are doubling our population in California every 27 years?

Mr. DIFANI. Yes. I was told in Sacramento, which is where I live, that we are getting 1,100 new people per month. That is something to contend with.

Mr. MILLER. Mr. Warne, would you call your next witness, please?

Mr. WARNE. First, I would like to call attention to the fact that with us is Paul J. Lunardi, who is an assemblyman of our State. Mr. Lunardi is also a member of the fish and game committee of the assembly, and a member of the interim committee.

Mr. MILLER. Mr. Lunardi, please join us.

Mr. WARNE. The speaker is William Fairbank, assistant director, the department of water resources.

Mr. FAIRBANK. Mr. Chairman, I am William Fairbank, assistant director of the State department of water resources.

May I say that it is a pleasure to be here. Mr. Harvey O. Banks, director of water resources, wanted me to tell you personally that he regrets he is unable to present some thoughts in relation to the California water plan and water development that we contemplate here in California.

Mr. MILLER. Mr. Fairbank, we will receive your written statement in the record, if you wish, and you can proceed to summarize it in your own way—or as you see fit.

CALIFORNIA'S WATER PLAN IN RELATION TO FISH AND WILDLIFE RESOURCES

(By William H. Fairbank, Jr., assistant director, Department of Water Resources, State of California, Post Office Box 388, Sacramento 2, Calif.)

Mr. FAIRBANK. The California water plan has been mentioned by previous speakers, and perhaps it would be well to start out from that point. I wish to state that certainly salmon and steelhead fisheries and the fishery problems in general have been of great concern, as well as interest, to the department of water resources in its work over the years in planning the California water plan, and in going forward with the water development program that is before the people of this State at the present time. This is a subject which has been of major concern to us during the past several years. Furthermore, although we fully appreciate the complexity of the many problems involved, we feel that the problems can be largely solved by well coordinated planning efforts.

I would like to first say a few words about the California water plan so that you might better appreciate the magnitude of the problem.

The plan, which was completed in 1957, is a master plan to guide and coordinate the planning and construction by all agencies of works required for the control, protection, conservation, and distribution of California's water resources for the benefit of all areas in the State and for all beneficial purposes, including fish and wildlife resources. It is well to emphasize that the California water plan is an ultimate plan, one that will meet the requirements for water at some unspecified but distant time in the future when the land and other resources of the State have essentially reached a state of compete development.

I think we have to understand this in context. I believe there is some thinking existent today that the California water plan now approved by our legislature is a construction plan, and it is certainly not. It is a guide for future plans. And I believe the legislature has accepted it on that basis.

The California water plan does envision, again, by all agencies—local, Federal, and State—over the period of time in the future of the possible construction of more than 250–260 dams, major dams, and reservoirs, with an aqueduct and distribution system running virtually the length of the State.

The natural distribution of water in California is such that most of the resources, as you all well know, are in the northern part of the State. It follows, then, that many of the works to develop and store water will also be in this area. This same area, again, because of water availability, is where the bulk of California's salmon and steelhead populations occur.

It becomes apparent, then, that we do have real salmon and steelhead problems in the development of water resources in California.

We all know that construction of a series of large reservoirs on a river will remove that section of the river from natural anadromous fish production. How, then, can we hope to save these resources if their spawning grounds are removed or rendered useless? Several methods are available, and probably a combination of all possible methods will be used.

First, large hatcheries might be built to replace losses of certain runs. Precedent for this method has been established by the operation of Coleman Hatchery to replace lost spawning areas above Shasta Dam, and Nimbus Hatchery below Folsom Dam to assist the American River salmon and steelhead runs. A large modern hatchery is soon to be constructed at Lewiston to accomodate the runs blocked by the Trinity Dam. An adequate supply of water of suitable quality must be available, and proper topographic conditions must exist for this method of propagation to be used.

Second, artificial spawning channels might be constructed to replace losses due to upstream developments. This method has never been tried in California, so positive forecasts about its suitability cannot be made. However, it is being used and evaluated in the States of Oregon and Washington and in British Columbia, where it shows great promise. We fully intend to get into an evaluation program of this method in California within the very near future. This method would, like hatcheries, require suitable water supplies and topographic conditions.

A third method would be the construction of streamflow maintenance dams on streams not scheduled for other developments. Several of California's coastal streams now contain salmon and steelhead runs that are limited by low summer flows. Most of these streams contain potential sites for upstream reservoirs so that water could be stored in the winter and released in the low flow period to provide a more suitable habitat for fish and more desirable recreation areas.

In planning such streamflow maintenance projects, a damsite near or above the upstream limits of steelhead migration should be selected. Sizing of the dam and reservoir must take into consideration the quantity of streamflow desired in downstream areas, and the amount of holdover storage required to retain the recreational characteristics of the reservoir.

Altogether, 13 such streamflow maintenance projects have been included in the California water plan. They would greatly enhance the salmon and steelhead habitat in 416 miles of coastal streams, and provide other benefits as well. They are located on the Gualala, Garcia, Navano, Big Bear and Mattole Rivers, Redwood Creek, and on tributaries of the Eel River. The projects would be operated to augment low summer and fall flows, and would add from 10 to 55 cubic feet per second to naturally occurring flows.

The legislature has authorized a feasibility study on one of these projects, Branscomb Dam and Reservoir in the headwaters of the South Fork Eel River. A dam at the Branscomb site could develop enough water to provide a 100-cubic-foot-per-second minimum flow along the South Fork of Eel River. This would greatly improve the salmon and steelhead habitat during summer and fall, and would benefit the established recreation areas along the stream. The reservoir itself adjoins Admiral Standley State Park, and could be attractively developed for recreational uses.

Mr. MILLER. You can be no more encouraging than that.

Mr. FAIRBANK. I am emphasizing that all of the department is prepared to do so, to prepare the feasibility study. This we are doing. It is not only a possibility, but we know today that it is very definitely a possibility to develop a dam on this portion of the South Fork of the Eel, and to make available for streamflow maintenance on downstream areas a significant contribution to the enhancement of the fisheries, and along the South Fork Eel.

In order to accomplish the objectives of the California water plan and give full consideration to the State's fisheries resources, our department has had a very close working relationship with the State department of fish and game. That department has provided the services of fisheries biologists throughout all of our planning activities, and we look to them for technical advice at all of the projects we investigate. We will continue to use these services at all projects engaged in by the State, both in the planning and construction stages. Only in this manner, when our engineers can be kept advised of the most acceptable features and methods of operation of each project, can we truly say we are practicing the "multiple purpose" concept.

Of immediate concern is the possible effect of the presently authorized State water development system on the salmon and steelhead fisheries. As you know, construction work is well underway in relocating the highway and railroad in the Feather River Canyon preparatory to construction of Oroville Dam, the first major storage and flood control reservoir in the State development system. We have worked very closely with the department of fish and game on the fishery problems associated with Oroville Dam. In this case, we expect the salmon and steelhead problem to be solved by the installation of proper facilities; either a large hatchery or artificial spawning grounds. In fact, we will probably be able to enhance the anadromous fisheries in the Feather River downstream, particularly the steelhead fishery.

Water control structures in the Sacramento-San Joaquin Delta are a vital part of the physical system to transport surplus water to the west and south of the delta. In order to transfer water across the delta and provide for water conservation, flood and salinity control and water supply in the delta, master levees, channel improvements and control structures will be required. Since all salmon and steelhead entering the Sacramento and San Joaquin Rivers must pass through the delta, provisions must be made to protect these fish to the maximum feasible extent. The department intends to continue its joint efforts with the department of fish and game until an acceptable fish preservation plan is developed.

Fisheries and other recreational resources at local water projects can be enhanced under the program adopted by the legislature at its last session. It is now possible for the department to grant State funds to local agencies for the part of construction costs properly allocated to the enhancement of fish and wildlife incidental to the primary functions of the project. Grants can similarly be made for the part of the construction costs of the dam and reservoir properly allocated to recreation functions of statewide interest. It is anticipated that this legislation will provide a good many new fishing and outdoor recreational opportunities in California.

I think it is significant to note that this is the first general water program which recognizes that it will cost money to rebuild our fishery resources and provides funds therefor.

In summary, let me say that the department of water resources fully appreciates the magnitude and complexity of salmon and steelhead problems involved in the development of water resources in

California. We believe, however, that the problems can be solved through proper planning and the close cooperation of all concerned agencies. In fact, through wise planning and construction, we believe that the fisheries resources of the State can be actually enhanced beyond their present levels. To believe otherwise is to indicate lack of confidence in the ability of fisheries biologists and engineers working on these problems, and in the people of California to accept their responsibilities.

Mr. MILLER. Thank you very much, Mr. Fairbank. That is a very encouraging report. My question touches on something that you mentioned at the close of your remarks—the need for cooperation between all agencies. Your report dealt with the cooperation between the California Department of Water Resources and the California Department of Fish and Game. In the matters you brought up, notably, hatcheries and suitable water for them, artificial spawning, the construction of flow-regulating reservoirs, do you see the necessary involvement of the Federal Government in any of these enterprises, as well as the State of California?

Mr. FAIRBANK. In line with your introductory remarks on the program, Congressman Miller, I would certainly say that there might be an opportunity for Federal-State cooperation in this matter of research. As indicated by these remarks in relation to water development, there is tremendous room for additional research. There is the possibility here that a State-Federal program in this regard might be entirely appropriate and extremely worthwhile.

Mr. MILLER. I do not want to put words in your mouth, but you say "might" and "possibly." Do you feel that the Federal Governemtn should be involved in the development of research, for example, artificial spawning, or is this more properly a function of the State of California?

Mr. FAIRBANK. My personal observation would be that the information to be derived from such a study would be extremely helpful to the Federal Government in its work in water resource problems. I would say it would be entirely appropriate.

Mr. WARNE. I would like to help answer one of these questions.

Mr. MILLER. Certainly.

Mr. WARNE. I would like to have considered the possibility of a combined State and Federal approach on the research to necessary problems that relate to anadromous fish, and the impact of big dams and other waterworks on them. We in California obviously are not the only ones struggling with this project, as every State that is represented here today—Idaho, Oregon, Washington, and Alaska, which is not represented here, but also has the same kind of problem—and the Corps of Engineers, the Bureau of Reclamation, the Fish and Wildlife Service, the Federal agencies that are represented here, are in the same boat on this particular problem. And I am confident that as earnest as Mr. Fairbank and his Department are, earnest as they are—and I know they are earnest as I meet with them every week on this subject—and as earnest as our Department of Fish and Game here in California is to work on the cooperative program of the Sacramento River, that we do not command the resources that are commanded by all of those who are really interested in this problem. I think that the problem is great enough to require the focusing down of all of the resources that are available to all of these agencies.

Otherwise there are going to be failures in the future as there have been in the past. And they are costly.

Now, if that is a question, all right. I feel quite strongly on this. I have been engaged in it on both the State and Federal level, and so I thought I ought to make a contribution on it.

Mr. MILLER. Mr. Warne, as you know, being a former Federal employee, Congress is going to avoid every responsibility it can. There are many people, evidently, in California who believe the Federal Government has not been assuming its proper responsibility with respect to anadromous fish. If the State of California believes that it can handle this problem itself, the hatcheries and dams, then certainly Congress is going to give them every right to do so that it can. Do you want to comment on that, Mr. Fairbank?

Mr. FAIRBANK. May I just comment on that in this regard: that water development in California must be, as it has in the past, a combination of effort on the part of local entities, the Federal Government, and the State. We believe that it must go forward on that basis. The Federal Government, through the Bureau of Reclamation and Corps of Engineers, must be involved in the future in our water development program in the State. Consequently, it seems to me, it must share in this kind of effort, because we simply do not have all of the answers at the present time in this matter.

Mr. MILLER. Particularly with respect to basic research such as the flow of warm water on the resource?

Mr. FAIRBANK. Yes.

Mr. MILLER. Mr. Johnson, do you have any questions of Mr. Fairbank?

Mr. JOHNSON. I would like to ask one question. As you stated, the California water plan is going to entail the State government, Federal Government, local agencies, as well as private enterprise. We see some very fine examples of what happens when this is not well thought out as to fish and wildlife in some of the private developments and some of the local agency developments. While the State legislatures recognize this and have made money available in the way of grants to local agencies, how well do you place that in the early stages of planning? I have reference to some developments. We hear a lot about the Oroville Dam and the State project. There are going to be several developments that will affect the flow of water to a great extent on the South Fork project. How well does the State go into that in the early stages when you people approve the project as being within the State water plan?

Mr. FAIRBANK. In developments of that nature, Congressman Johnson, there is a tremendous amount of work. I think, primarily by the department of fish and game working with these local entities. The State is involved, certainly, if there are any State figures on the stream systems that are involved. We are involved primarily through the State water rights board in granting permits for these entities to go ahead. I believe, personally, that there has to be a lot more done in this field in the future than has been done in the past. The local assistance program that I spoke about a moment ago is a new program. We contemplate that by this program, if the local entity constructing the project expresses concern and interest in the fish and wildlife resources and the recreational opportunity here, we can be of tremendous assistance through this grant program in assisting.

Mr. HOSMER. I do want to ask that question for the reason that you stated that your agency, the California Department of Water Resources, takes into consideration this fish and wildlife. But as it applies to local agencies, you are there only to assist, I assume. You are of no real force and effect to say to the agency, "Here, you have to do this."

Mr. FAIRBANK. Not on this program. As I say, it seems to me that through the mechanics of this new program, that we are in a real good position to assist. We have no powers of control at all, however.

Mr. MILLER. You have testified eloquently about the cooperation between State agencies. Have you had any dealing with the Federal Fish and Wildlife Service in your duties?

Mr. FAIRBANK. I am not intimately familiar with this. But I am certainly of the opinion that in the past, on work that both our department in cooperation with the department of fish and game have done in this field, that there has been a contact with the Fish and Wildlife Service.

Mr. MILLER. Do you look to greater cooperation in the future?

Mr. FAIRBANK. I can answer that only in this way: That we must; it is this important. It is mandatory in our view that the type of cooperation you are pointing to and insisting on be much more of a reality in the future than it has in the past. It is this important.

Mr. MILLER. Thank you very much, Mr. Fairbank. Are there any other questions that are to be directed to Mr. Fairbank? If not, Mr. Fairbank, thank you very kindly for appearing here.

Mr. WARNE. The next speaker is Ray Welsh, chairman of both Salmon Unlimited and Silver Salmon Committee. Mr. Welsh will speak on the lay effort in behalf of the resource.

Mr. MILLER. Mr. Welsh, will you please identify yourself for the record.

Mr. WELSH. My name is Ray Welsh, Mr. Chairman. I am chairman of Salmon Unlimited.

STATEMENT OF LAYMEN'S EFFORTS TO SAVE A NATURAL RESOURCE

(By Ray Welsh, chairman of Salmon Unlimited and Silver Salmon Committee, Post Office Box 825, Fort Bragg, Calif.)

Mr. WELSH. Several years ago it became apparent to the fishermen, particularly in the north coast area of California, that the salmon resource was headed for trouble, and if some drastic actions were not instituted it could possibly fall to a level beyond the point of return.

After surveying the picture among the fishermen along the entire Pacific coast, we found the same conditions as ours, and the feeling that something should be done immediately. All we lacked was a starting point.

Thus was formed the Silver Salmon Committee, composed of a couple of sport fishermen, a couple of commercial fishermen, and a couple of fish dealers. Next came meetings with the State department of fish and game leaders, during which a joint program was formulated to attempt to rebuild the silver salmon populations in the coastal streams of California. Eggs were taken from local streams, hatched and reared in State hatcheries to 1 year of age, then released in plants of 40,000 in each of 8 streams, plus the brood stock stream. This will continue in this same stream for 3 consecutive years, or a full cycle, and then a new series of streams will be started. This program is now paying dividends by the return of 2-year-old fish in large numbers.

After a year of work by the Silver Salmon Committee, and the department of fish and game, and the successes found therefrom, it was felt that the larger field, that of king salmon, could now be ventured into and a committee formed to help get a crash program underway before it became too late. The major hurdle in setting up such a committee was to bring the commercial fishermen, sport fishermen, fish companies, and the department of fish and game together into a solid working group. Relationship between sport and commercial fishermen had not always been at a high level. Much study and planning went into the formation of this committee, and finally in January of 1958, "Salmon Unlimited" was born. This committee is dedicated to one thing, the rehabilitation of the king salmon resource. To this end the committee has worked for the past 18 months, and in complete cooperation with the department of fish and game. It seems that our elected representatives in both State and Federal Government are happy to find the two groups, who were formerly so divided, now welded together into a single unit and jointly working for a common goal.

Many reasons were found to be the cause of the decline of salmon. However, in view of the scarcity of studies that have been completed, it is impossible to place these reasons categorically in order with regards to their importance in destruction. Much more research is needed to finalize the answers. The need for the correlation of the research work that has been done in the three States and Alaska is paramount, and the Federal research program, which will now be started, should certainly compile the results of the several States into a composite form.

We have found a decided difference in policy between branches of State government, branches of Federal Government, and between Federal and State agencies. These should all be resolved into one uniform basic policy, and Salmon Unlimited is working toward this end.

The composition of the committee of Salmon Unlimited not being attached to any branch of government, allows it to work freely with all branches and agencies of both Federal and State, thereby making it possible to be the correlating group for all these policies.

We must continue to give this resource all the assistance we possibly can during the period of time while we are learning the answers so that nature can resume the job it was intended she should do.

Hatcheries must be operated at full capacity. New hatcheries must be built below all dams and constructions placed in streams bearing runs of anadromous fish. Much stream improvement work must be done. Ways to determine the home habitat of salmon once they are schooled in the ocean would be of tremendous help in determining what watersheds needed help.

Certainly a clear-cut statement of policy concerning the resource that could be the guide of all agencies, both State and Federal, would be a major factor in helping to speed up the entire program. We hereby call upon you Congressmen to survey your existing laws, programs, and policies, and how they are working in the several agencies involved.

We of the Silver Salmon Committee and Salmon Unlimited stand ready to assist you at any and all times in any way we possibly can. It is hard to express to you the urgency to place into operation a full-scale program in both research and action on this resource.

Now, to summarize the topic which is before me; that is, the layman's effort to save the natural resources of salmon.

It became apparent several years ago to the fishermen, particularly in the north coast area of the State of California, that we were headed for trouble or were in trouble, and that a program of action was necessary. A point of starting was the key to the whole organization; the whole setup. So we formed a Silver Salmon Committee, composed of two sportsmen, two commercial fishermen and two fish dealers. After this committee was formed, we went to our Department of Fish and Game and jointly worked out a program, enjoined by several local groups, including the County and Fish and Game Committee, to institute a program of action, a crash program, you might say, and confine it strictly to the silver salmon at this time.

We set up equipment, took eggs, placed them in State hatcheries, and undertook to rehabilitate the silver salmon in the north coast streams in the State of California. After a year of working on this, and in complete cooperation with the Department of Fish and Game, it was felt that we could venture forth, then, into a much larger field; that of king salmon. As Mr. Croker said, a program of action was mandatory or the end was in sight, and we saw it.

The silver salmon members undertook a survey of the fishermen along the west coast from Vancouver Island through California as far south as Monterey, the area that basically produces the majority of the salmon in the Pacific Northwest. We talked to these people, and we found the same problems and troubles in all areas, and the urgent need to form some kind of an organization to get a program of action going; the big hurdle actually being the resolving into a solid working unit of sports fishermen, commercial fishermen, fish dealers, and our departments of fish and game, something that before had never been accomplished. Something that had been—well, it was taboo. After a lot of trouble in planning and many thousands of miles of travel, this was resolved. In January of 1958 Salmon Unlimited was born. It is composed equally of commercial fishermen, sport fishermen, and their leaders in their field from every area in California that has the resource of salmon.

After 18 months, I wish to say to you, Congressman Miller and Congressman Johnson, that this organization has functioned beautifully. They are no longer commercial fishermen or sport fishermen. They are members of Salmon Unlimited dedicated to a single purpose; that of saving a resource. They all have their eye on this goal. And from my experience in the past years you people who are elected officials are gratified to see us come together before you jointly, working for the same programs. Well, it just gives one a good feeling. And we are progressing a lot further this way than when we were at "loggerheads" as before.

I do wish to stress the need for clarification of policies between various State agencies, Federal agencies, and Federal and State agencies. I do wish to stress the need for research, basic research, and it is my feeling, as chairman of Salmon Unlimited, and I think the members of the committee will back me up, that the Federal Government has to be involved. They must correlate the studies that have been made into composite form to be used if we maintain this resource. You people have to do something back in Washington. In my opinion there has been an apathy in Washington for a long time, a dragging of the feet, and not wishing to recognize the problems of the fisheries. And I can understand why, with so many Congressmen being from other areas. Maybe we haven't pushed hard enough. Maybe we haven't come to you strong enough. But certainly up until recently it has not begun to jell. Now it appears, with the new legislation and the work you have done, that this can be jelled into a working program.

In closing I would like to say to you, Congressman Miller and Congressman Johnson, that we call upon you to survey our existing laws, programs and policies and how they are working, and the several agencies involved in this resource. We of the Silver Salmon Committee and Salmon Unlimited stand ready to help you in any way possible that we can at any time. All you have to do is to call upon us. We cannot express the urgency that we feel necessary to get a full-scale program into operation in both research and action on this resource.

Mr. MILLER. Thank you very much, Mr. Welsh. We will call on you on a continuing basis to point out what these areas are that Congress and Washington should avail itself of to improve the resource because, as Congressman Johnson has said, we are not experts. We must be pointed in the right direction before we can be of real assistance to you.

I have one question. What do you mean by your statement that there must be a clarification of policies between the various agencies and between the Federal Government? Do you mean by that that the objectives of the agencies involved in the salmon resource must be spelled out more specifically?

Mr. WELSH. That is right.

Mr. MILLER. Can you help us out by indicating as to where the State obligation leaves off and the Federal obligation begins, and things of that kind?

Mr. WELSH. Well, that is a big one that you toss at me, Congressman Miller. But I will say this: In my capacity as chairman of this organization for the past 18 months, in many, many instances we have called upon various members of the agencies, groups and commissions, both the Federal and State Governments, to discuss the overall programs with them. In listening to all of the discussions, it has become apparent to me that the same policy does not govern all of these various groups. It is my feeling that there should be a correlation of policy or a clear-cut statement of policy that could be used as a guide.

Mr. MILLER. Do you mean coordination?

Mr. WELSH. Right. Or a clear-cut statement that could be a guide for both State and Federal agencies, for all concerned in this resource, would be of paramount importance.

Mr. MILLER. Do you have any questions?

Mr. JOHNSON. No questions. I congratulate you on your statement, Mr. Welch.

Mr. MILLER. At this time we will take a recess for lunch. We will begin very promptly at 1:30. We are quite a ways behind, but this does not disturb me a bit. I think that our testimony this morning has been to the point. I think it is fruitful. As I said before, we are

[illegible] how long it takes.

We will recess until 1:30 o'clock.

(Whereupon, a recess was taken at 12:45 p.m.)

AFTERNOON SESSION

Mr. WARNE. In order that we may proceed, I suggest that we take two or three witnesses out of order while the crowd is regathering. I suggest that we call on Earl Leitritz. Will Mr. Earl Leitritz please take the stand.

Mr. MILLER. Mr. Leitritz, we are very happy to have you here this afternoon.

Mr. LEITRITZ. Thank you, Congressman Miller.

Mr. MILLER. Would you identify yourself for the record, please.

Mr. LEITRITZ. My name is Earl Leitritz, with the department of fish and game, inland fisheries branch. I have been with the department for 34 years. During the period 1931 through 1939 I was in charge of the department's salmon program on the Klamath River.

SALMON AND STEELHEAD HATCHERIES

(By Earl Leitritz, fisheries management supervisor, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. LEITRITZ. I have been asked to speak on salmon and steelhead hatcheries here today.

The State of California is now operating two hatcheries, the Nimbus Hatchery in Sacramento County and the Cedar Creek Hatchery in Mendocino County, which are devoted entirely to the propagation of salmon and steelhead. In addition, some salmon and steelhead are propagated at the Mt. Shasta, Crystal Lake, and Moccasin Creek trout hatcheries. Humboldt County operates a small hatchery at Prairie Creek, tributary to Redwood Creek. Nimbus Hatchery was built by the U.S. Bureau of Reclamation to replace spawning areas lost when the Government built the Folsom project. The Bureau also defrays the cost of operation.

The number of salmon and steelhead raised each year depends entirely on the size of the spawning run and the number of eggs produced by it. Salmon and steelhead hatcheries are not exactly like trout hatcheries where brood stock is maintained and the egg supply is fairly certain. During the past 5-year period, State-operated hatcheries produced a combined total of 22,093,953 salmon and steelhead.

In addition to the State and county operated hatcheries, the U.S. Fish and Wildlife Service operates a large salmon hatchery at Coleman Station, Shasta County. The Coleman hatchery was built by the U.S. Bureau of Reclamation to compensate for the loss of spawning grounds due to the construction of Shasta Dam. At that time three old Federal hatcheries were abandoned: Mill Creek, Tehama County; Battle Creek, Shasta County, and Baird Station on the McCloud River, Shasta County. The latter site is now inundated by Shasta Reservoir.

Coleman Hatchery came into being in 1943. Advances in hatchery technique since that time, such as incubator hatching, feeding methods, and the like have made the plant somewhat obsolete.

More progress has been made in the last 10 years in hatchery techniques and methods than in the preceding 50 years. For this reason an evaluation of the different ways of doing things, including present procedures, should be made now and the best course followed in the future.

For example, the size and time of releasing young salmon and steelhead appear to be very important, but precise information is meager. Modernization and future enlargement of hatcheries hinge on an appraisal of what is needed.

At our Nimbus Hatchery, on the American River, we are plagued by high water temperatures resulting from the operation of Folsom Dam, and we are unable to hold the mature salmon for spawning purposes. It is necessary to trap and haul them to a cold-water pond near Donner Summit. This is costly and not as satisfactory as handling the entire operation at the hatchery. We are receiving excellent cooperation from the Bureau of Reclamation and plans are being put in final form which will provide the hatchery with water of suitable temperatures for handling the early runs of salmon. This will require additional Federal funds and your support of this program is urgently requested.

At the Trinity River Dam, being built by the U.S. Bureau of Reclamation, a modern fish trapping facility is now operating its second season. Trapped fish are hauled around the construction zone and allowed to spawn naturally in the river above the damsite. When Trinity Dam is completed a modern hatchery, provided by the Bureau of Reclamation and operated by the State, will go into action. Here, again, the support and cooperation given by the Bureau of Reclamation is beyond the call of duty.

Trinity River, a stream having excellent runs of anadromous fish and having been previously untampered with, offers tremendous possibilities for an evaluation program not only as to the role of salmon hatcheries but other forms of fisheries management as well. In fact it should be the responsibility of our Federal Government to evaluate the entire salmon and steelhead program nationwide to find out why good hatcheries are good and others not so good.

Mr. MILLER. May I interrupt you at this point. I ask you whether or not there is any present Federal program for the evaluation of our salmon program at Trinity?

Mr. LEITRITZ. I don't believe there is any present Federal program.

Mr. MILLER. You have just testified that there should be such a program?

Mr. LEITRITZ. Yes.

Mr. MILLER. Would you define in your own words why you feel that this should be done and why it should be particularly a Federal program.

Mr. LEITRITZ. One reason that it should be done is the stream supports an excellent run of anadromous fish. It has been previously untouched by man. A good portion of the spawning area is being cut off. The ancestral spawning ground is being cut off for these fish. As a substitute the Federal Government will provide a fish hatchery. This is a good time to evaluate the results, to gather information, as to how efficient this hatchery will be in maintaining runs.

The project is a Federal project; Trinity project is a Federal project. For that reason, or rather, one of the reasons, the Federal Govern-

Mr. MILLER. Excuse me for interrupting you. You may proceed with your prepared statement.

Mr. LEITRITZ. Questions needing answers include: What are the best rearing and stocking practices? Can hatcheries replace or supplement natural reproduction? What are the economics of salmon hatcheries? There is need for much basic research on hatcheries so we can realize the ultimate from their potentiality.

Mr. MILLER. Thank you very much, Mr. Leitritz. I appreciate your appearing here today and giving us the benefit of your good testimony. Are there any questions of Mr. Leitritz?

UNIDENTIFIED SPEAKER. Mr. Chairman, I would like to ask a question of Mr. Leitritz. If the Trinity Hatchery is to be used as an evaluation gage, would that have any bearing, for instance, on any other hatcheries, such as Coleman?

Mr. MILLER. Will you answer that question?

Mr. LEITRITZ. Certainly. Any evaluation made at Trinity River, any information gained there, would have at least some application in other streams. Anything that we can get on the salmon and steelhead should have application, not only on the Trinity River, and not only in California, but perhaps in other neighboring States as well.

Mr. MILLER. Then the Federal dollars spent on Trinity are going to be helpful to the broad problem of salmon research everywhere, Washington, Oregon, California, Idaho, wherever we have such problems?

Mr. LEITRITZ. Yes, indeed.

Mr. DIFANI. Mr. Chairman, are the experiences that are taking place on the Columbia River taken into consideration in the hatchery that is being built in Lewiston?

Mr. MILLER. Would you answer that question, Mr. Leitritz?

Mr. LEITRITZ. In designing our hatchery at Trinity River we have in mind making it the most modern hatchery yet built. But in the basic design and in our artificial program for the Trinity River, we are certainly drawing on our neighboring States, Oregon and Washington. And the material that has been gathered for the Columbia River, we are drawing on that to help us in our Trinity operation.

Mr. MILLER. You are drawing on the experience of the State fish and wildlife services of Washington and Oregon for this assistance. Is that correct?

Mr. LEITRITZ. We are, as well as the Fish and Wildlife Service.

Mr. MILLER. Of the Federal Government and its experiments on Columbia River?

Mr. LEITRITZ. That is correct.

Mr. MILLER. In other words, this might be construed as a working out of a cooperative effort on the basis of the States of Washington and Oregon, and the State of California and the Federal Government with its operations in other States now coming to fruition in the State of California at Trinity?

Mr. LEITRITZ. That is correct.

Mr. MILLER. This is a desirable result?

Mr. LEITRITZ. Yes.

Mr. MILLER. And this is one which should be encouraged in future developments?

Mr. LEITRITZ. Right.

Mr. MILLER. Are there any other questions?

Mr. GILCHRIST. John Gilchrist. I would like to know if there is any coordination or data being obtained for this new hatchery, together with the experiments that are now being conducted in Canada which are entirely radical to our present type of existing hatcheries?

Mr. MILLER. Would you be able to answer that?

Mr. LEITRITZ. I don't know to what experiments in Canada Mr. Gilchrist is referring.

Mr. MILLER. Could I generalize on the question and ask whether or not there is a cooperation or an understanding between the Federal Government on our part and the Canadian Government with respect to the development of basic fish resource data?

Mr. LEITRITZ. Certainly we will take into account any information, any resource data that we can obtain from Canada.

Mr. MILLER. My question is: Is Canada supplying you with such data? Are we exchanging information with Canada on basic fish data?

Mr. LEITRITZ. Indeed we are.

Mr. MILLER. Is there room for improvement in the exchange of such data?

Mr. LEITRITZ. Well, let me say this: I don't believe Canada has any salmon hatcheries, so there is not an exchange of information on hatcheries. And in this case, in my instance, I am engaged in the hatchery department operation and coordination. I do know that we exchange research information with Canada. Whether or not there is a basis or room for betterment of those conditions, I don't know.

Mr. MILLER. Mr. Gilchrist, does this answer your question?

Mr. GILCHRIST. Not entirely, Congressman Miller. However, I will be satisfied. I do not want to prolong the hearing.

Mr. MILLER. Mr. Gilchrist, do you wish to explain?

Mr. GILCHRIST. I would ask for a more specific answer in the construction of this new hatchery. Are you taking into consideration the experiments which are being conducted right now at the Nimo and the Frazer Rivers with regard to their experiments in hatching and raising fish in darkness and the direct releases by holding tanks into the stream?

Mr. MILLER. Will you answer that, Mr. Leitritz?

Mr. LEITRITZ. We have for some time ourselves conducted experiments in raising fish in darkness. I might say that at the new Trinity River Hatchery it will be the first hatchery building in the United States that does not have windows. Any light in the hatchery will be artificial entirely. We are taking that into consideration.

Mr. MILLER. Are there any further questions from the audience? Mr. Johnson, do you have any questions?

Mr. JOHNSON. I have no questions. Thank you.

Mr. MILLER. Thank you very much Mr. Leitritz. Mr. Croker, do you have an observation to make on the previous testimony?

Mr. CROKER. In answer to Mr. Gilchrist's question about obtaining Canadian research data, I would like to mention that through the Pacific Marine Fisheries Commission we have a mechanism of exchange of information. But Canada, of course, cannot belong. Although the States may not deal directly with the Canadians on international matters on an official level, the scientists do attend all

the tri-State meetings, as they will tomorrow, and there is that informal mechanism for interchange of information.

I would also like to state on this matter of basic research that the Canadians are so far ahead of the Americans that it is really shameful. The Canadians, although under the gun in conservation, are not so close to the ragged edge as we are. They have been able to withstand some pressures to the point that many of their best scientists are working strictly on basic things, as Mr. Gilchrist knows, having visited them, and are trying to lay a firmer foundation for management research. I think they are benefiting from our mistakes of omission here in the States.

Mr. MILLER. Could I extend that just a brief bit and ask you, aside from whatever the Canadian Government may be doing on its own, are there any grounds or bases upon which we might offer more cooperation with the Canadian Government?

Mr. CROKER. The United States now is a party to two treaties with Canada which involve salmon, in addition to others. And through that mechanism perhaps the relationships have become both close and good on exchange of data. The scientists are working together continuously.

Mr. MILLER. Do you have any suggestions on extending this cooperation, as far as Congress is concerned?

Mr. CROKER. I am not sure I have a suggestion, but I do have a lament: That there at the southern range of salmon we are so far away geographically from the Canadians and others in the Northwest that we see a real need for some kind of mechanism, whether through the Pacific Marine Fisheries Commission or under the guidance of Federal Fish and Wildlife Service. Somewhere we can have better access to Canadian and Alaskan results and experiments so that they can benefit from our research. That I think is the undercurrent running through all the testimony; that geography is against us.

Mr. MILLER. We are seeking ways and means to implement things, and without suggestions we will be more or less helpless.

Mr. CROKER. Somebody has to be made responsible for this type of coordination as a full-time job rather than as an assignment in addition to other duties, which we all have in this room.

Mr. MILLER. This is very helpful. What department should this be?

Mr. CROKER. It should be vested in the Federal Department; in the Department of Interior.

Mr. MILLER. Thank you very much, Mr. Croker. Mr. Warne, will you introduce the next witness.

Mr. WARNE. We will now hear from Prof. Paul Needham of the University of California and scientific adviser to Aquatic Resources Committee, who will discuss the cost of fishery research and the dividends that we may expect from it. Dr. Needham.

Mr. MILLER. Dr. Needham, we are very grateful to have you here this afternoon. Would you please identify yourself for the record, and speak to the audience.

Dr. NEEDHAM. My name is Paul R. Needham. I am a professor at the University of California. I teach fisheries there. I also have been employed by the State. I was chief of fisheries in Oregon, and for 14 years I worked for the Federal Government before that.

THE COST OF FISHERY RESEARCH AND ITS DIVIDENDS

(By Dr. Paul R. Needham, University of California, and scientific adviser to Aquatic Resources Committee, 925 Relicz Station Road, Lafayette, Calif.)

Dr. NEEDHAM. My subject, "The Cost of Research and the Dividends That It Can Pay," is a difficult question to answer. Research will cost a lot. We know that. It is very expensive. But it has got to be done, and I think the outstanding example of what research can do was World War II with the development of atomic energy. The bomb ended the war. I think that is one reason why we have no trouble today in selling research, basic research, to organizations, to industry, to anybody who may be concerned.

Mr. MILLER. May I interrupt and ask you whether you feel that the fish industry is capable of undertaking basic research as distinct from marketing research and other types?

Dr. NEEDHAM. Yes, I think the industry is capable of it. But I think it is a type of thing that probably the industry should not have to do. I think it should be done as a normal function of the State and Federal Governments.

Mr. MILLER. Please proceed.

Dr. NEEDHAM. Mr. Leitritz, in his testimony, said that there were no salmon hatcheries in British Columbia. The reason for that is that they did some basic research starting in 1925 and running to 1936. Dr. R. E. Forest and his coworkers at the Pacific Biological Station at Nimo, British Columbia started a thorough analysis in 1925 with the return of natural propagation as contrasted to the returns from artificial propagation. On alternate years they would take eggs artificially and hatch them and return them to the ocean and return. In other years, they would let them go spawn naturally. As a result of that research, which extended for a period of 11 years, the Provincial game department decided to abandon all hatcheries in British Columbia. Why? Because they thought natural propagation was much cheaper; they proved it. They considered it cost a great deal to put one salmon into the commercial fisherman's catch or the sportsman bag. They considered it was too expensive, so they abandoned it This is British Columbia; this is not California.

Down here where we have salvage problems, where we have dams. The Feather River project, the Folsom Dam on the American River, those are strictly salvage problems. They are problems that have to be taken care of. I was in charge of the salvage at Shasta Dam from 1938 to 1944.

Mr. MILLER. For the benefit of the record, would you explain the salvage operation?

Dr. NEEDHAM. The salvage operation is an operation, I would define, where the ancestral spawning grounds of a race of fish are blocked by a major water development project, and you have got to take care of them. That is why I use the term "salvage," Congressman Miller.

To get back to British Columbia, they proved conclusively through their basic research that they didn't need any salmon hatcheries. And they abandoned them. We used to operate salmon hatcheries in Alaska. Now I am not aware of any being operated in Alaska. What we are trying to do, basically, with hatcheries is to replace spawning grounds. If spawning grounds are obliterated, then you

have to provide some substitute. That is where salvage comes in. That is why salvage in California is extremely important to water development programs.

Now, to answer this question of costs, I could only say this: That the cost will vary with the breadth and width of the project. There is no set price for research. You cannot put a price tag on it. When Thomas Edison was working with carbon filament he was not trying to make an electric light. He was doing pure research, but he accidentally discovered electricity. From that basic research we have our electric lights today. We have got to have a strong basic research, I believe, both from the standpoint of the Federal Government and the standpoint of the State department of fish and game.

There are two types of research. I think I should define them. The first might be called strictly basic research. That is the research that may have no practical application whatsoever. It may be research on the bottom of a remote lake, say, in the High Sierra. Maybe it is a study that will eventually help the management of that lake, that in time will become applied research. And to attempt to draw a line between applied research and basic research is extremely difficult. However, in terms of our present subject today, salmon and trout of California, there are types of research that I would designate as "management research." That is the day-to-day factfinding that the department of fish and game, that Alex Calhoun and Dick Croker have to do every day. That type of research should remain in the department of fish and game. They have to find those facts from year to year to modify their programs as they go along.

On the other hand, there is another type of research that I term "basic." And that might be this, to use an example: What do we know about the spawning of salmon? We see them on the spawning bed, but do we know the details of that spawning process? Do we know the size of gravel selected? Do we know the amount of water that is to flow through that bed to keep these eggs alive? Do we know what function temperature plays in the location of the bed? Even at this late date we still do not know the details of the natural spawning of either salmon or trout. That is what I term as basic research. There will be some point in that program where they will suddenly come upon an extremely practical factor, and that practical factor which will come out of that research will pay for all of the money expended.

Mr. MILLER. On the entire rest of the program?

Dr. NEEDHAM. On the entire rest of the program.

Now, by this statement I am not advocating that we abandon all salmon hatcheries in California. We cannot do it because we are faced with salvage. I do urge and hope you will consider basic research as probably being the most necessary research needed for the conservation of salmon in the State of California.

I do want to mention one thing that is of interest, and that is the San Francisco Tyee Club scholarships. Four years ago they set up the first scholarship for research on salmon. They put up the sum of $1,200 for each year for 2 years for a man while he gets his master's degree. I have had the scholarship for students of mine. It was awarded the other day to Charles Seeley, and he is going to work on a salmon problem; probably on helping the State department fish and game work up their back scale data. He will do that for his master's thesis. We know of more basic aids of this type, not only at Stanford, but Chico, Humboldt State, and Southern California. There is no better way to get research done than by young graduate students who are burning with enthusiasm; who want to study. Eventually they can get jobs with the Wildlife Service, or possibly they are now operating on fishery problems.

Mr. MILLER. Do you see this as a State problem or a Federal problem?

Dr. NEEDHAM. I think they are all in the picture. I don't think we can really separate the—we can separate it functionally, of course. If the Fish and Wildlife Service is going to tackle the problem of natural spawning of salmon, the work should not be duplicated by the State. There should be a free flow of information between the agencies.

Mr. MILLER. I am talking about the specific problems of the need of additional marine biologists at State universities. Do you see a Federal involvement in such scholarships that you have mentioned?

Dr. NEEDHAM. No, I cannot; unless they should start giving fellowships for work in fisheries.

Mr. MILLER. We, of course, have the National Defense Education Act. You see the extension of this to other fields?

Dr. NEEDHAM. I think it could well be extended, and would be of great help if there were Federal aid of that nature.

Mr. MILLER. The casual information floats through my mind that 12 years ago there were only six or eight highly qualified marine biologists on the whole west coast. There is a demonstrable need within recent years that that should be multiplied many, many times.

Dr. NEEDHAM. That's right.

Mr. MILLER. Do we get this solely by the State of California, Oregon, or Washington working independently, or is this a much broader problem?

Dr. NEEDHAM. I think it is a much broader problem. I think it is one that can go a long way toward solving some of our basic problems. It is a matter of training and manpower. I don't think it is a matter of appropriating so much. Money is not going to solve all of our problems by any means.

Mr. MILLER. Dr. Needham, I have found your testimony extremely valuable because it relates to the desperate need for basic research. And yet, a total inability to assess a strict cost value to, say, applied research, or some other kind. Could you, however, be more specific as to the need for Federal assistance in basic research than you were in your testimony?

Dr. NEEDHAM. I think that the best place where the Federal Government can assist in these broad conservation problems is on interstate rivers and international problems. There is their logical function, because, for instance, the State of Washington cannot make a separate agreement with the Dominion of Canada. That is an international problem. That is a normal Federal function. The Columbia River runs through a number of States. That is an interstate problem.

Mr. MILLER. Have you found in your personal experience, and without any invidious comparison, that the Federal Government for one reason or another has not been able to approach this problem to the depth and degree that it should have?

Dr. NEEDHAM. I think they are, but I don't think they have had adequate funding to do it. I think they do need more money.

Mr. MILLER. Do you believe with additional funds that they would be willing and able to do it?

Dr. NEEDHAM. I think they would be most willing to do it. They have a competent staff. I know many of them personally. I have worked for 14 years with them, and I have no doubt in my mind whatsoever that a very strong, cooperative program could be drawn up between the Federal and the State agencies on the basic research problems.

Mr. MILLER. You probably heard Mr. Warne say at the outset of our hearing today that the States have not exchanged information, possibly, to the extent that they should. Does this conform to your experience in this field?

Dr. NEEDHAM. Well, no. I think that the researchers generally exchange information very freely.

Mr. MILLER. Is there a lag?

Dr. NEEDHAM. There is a lag; there is bound to be, because we get together only once or twice a year.

Mr. MILLER. Is there a potential for machinery to decrease this lag?

Dr. NEEDHAM. Of course. That could be done very easily. At present the Sport Fishing Institute in Washington, D.C., serves as a kind of melting pot; they issue a regular bulletin.

Mr. MILLER. That is an interesting point you raised. Do you feel that fishermen all over this State, California, and other Western States, might support such an institution as the Sport Fishing Institute?

Dr. NEEDHAM. I think their main source of support comes from the tackle manufacturers in the Middle West.

Mr. MILLER. During the noon recess I was asked by a reporter what the garden variety sportsman can do to assist the objectives we have been talking about here today. I think that is very important. Do you have any suggestions to offer on that score?

Dr. NEEDHAM. No. I think the sportsmen generally would be very glad to contribute to a melting pot, if I may use the word, of information that could be—could go to all the agencies and people concerned in the conservation problem.

Mr. MILLER. You do have something to add. My answer to the reporter was that the individual fisherman could get behind some of the important national lobbies—the citizen associations, leagues, federations, institutes, societies, and so on—that are working on this problem to stimulate Congress to action. That is a tremendously helpful and productive way of doing this, and the dollar they put into that is well worth spending.

Dr. NEEDHAM. I fully agree, Congressman Miller.

Mr. MILLER. Mr. Johnson, do you have any questions?

Mr. JOHNSON. No questions.

Mr. MILLER. Mr. Lunardi, do you have any questions?

Mr. LUNARDI. No questions.

Mr. MILLER. Is there anyone in the audience who has any questions to direct to Dr. Needham?

Mr. SWIERLIN. Casper Swierlin, Tyee Club. I would like to ask the professor, inasmuch as he is conversant with the publication known as California Agricultural, where each month experiments

before they are completed are reported in addition to various stages as they progress. It keeps me informed, being an agriculturist myself, as to what is going on in various departments of agriculture and before the final report comes out. In the case of salmon, investigations are a matter of 3 or 4 or 5 years after the program is instituted. Now, if more of these interested parties were kept informed as to what is going on in the other States as well as within our own and Canada, probably such a program or such a publication through a coordinator, a field coordinator, let us say, who would have the power to combine all of these things, and then through a publication every month report on the stages of completion of various projects as they apply and as to where they are being tried out. And they may even apply to our local conditions. I would like to ask the professor whether such a publication would be of sufficient value to keep us informed as to what is going on and to allow to bring our own conclusions to our own local conditions faster than by waiting for the completion of those individual problems.

Mr. MILLER. I would ask Dr. Needham to answer the question if he can. I think it is very pertinent.

Dr. NEEDHAM. I think, as Mr. Swierlin has proposed, a publication of that sort would be highly useful. On the other hand, I am not sure it is needed. We have the American Fisheries Society, the Wildlife Society; we have a whole group of societies. We have the bulletin put out by the Sport Fishing Institute and other media where these experimental works are reported. I agree that if we had one source that it might be simpler than to have to go to a number of sources. However, it comes to my mind that the Fish and Wildlife Service puts out a very excellent tome once a year called "Sport Fishery Abstract." It comes out every year. In that are embodied all of the results.

Mr. MILLER. The answer to the question is, that you do not feel an additional publication by the Federal Government is necessary?

Dr. NEEDHAM. I am not sure that it is.

Mr. MILLER. Do we have a question?

Mr. KOHLHAUF. My name is Edmund Kohlhauf. I would like to ask that if we are able to get additional Federal funds for scholarships, couldn't we get two instead of one where there is a shortage of manpower in the field; that is, to have biologists attend the university on a scholarship?

Mr. MILLER. Would you answer the question?

Dr. NEEDHAM. We can handle six such scholarships without any difficulty at all. We presently have one.

Mr. MILLER. Are there any further questions from the audience?

Mr. DAVISSON. E. A. Davisson. I would like to ask a question relative to the question that the gentleman brought up here. Isn't the Commercial Fisheries Review, which is published by the Fish and Wildlife Service, doing just what the gentleman was talking about, the carrying on of progress reports of all sorts?

Mr. MILLER. We will let the Commercial Fisheries Review answer that question for itself. Is there another question?

Thank you very much, Dr. Needham. I consider your testimony very, very valuable in stressing the importance of basic research, whether or not it can show a direct and immediate effect on other types of research such as applied research and management research.

Dr. NEEDHAM. Thank you very much, sir.

Mr. Chairman, we [illegible] for reasons that the witnesses must go elsewhere, we would very much like to hear from representatives of other States. I would like to ask Director Warne if he would call such witnesses.

Mr. WARNE. I would be pleased to, Mr. Chairman. I would like to ask Al Day if he would like to make any contribution to this hearing at this time.

Mr. MILLER. Mr. Day, we are very appreciative of having you here this afternoon.

Mr. DAY. Thank you, Mr. Congressman, and my friend Bill, and others. I am Albert M. Day, presently director of the Oregon Fish Commission. I grew up in the U.S. Fish and Wildlife Service. I was formerly head of the Pittman-Robertson program, later assistant director, and for 7 years I was director of that great agency.

ALBERT M. DAY

(Director, Oregon Fish Commission, Portland, Oreg.)

Mr. DAY. It has appeared to me as I listen to this testimony that perhaps we are in better shape as to Federal-State cooperation than has been stated today. I do not think we are very far apart between the State and the Federal Government. While I was director, I thought our cooperation between the State and the Federal agency which I headed was very good. Since I have become a State director, I can see where the boys can improve, but in general, it is very good.

In the Pittman-Robertson program, which is the division and the spending of 10 or 11 percent—it is an excise tax on arms and ammunition—that money is allocated to the various State Fish and Game Departments for use in wildlife improvement, research, management and buying of refuges, and so forth. The Dingell-Johnson program, which is a 10 percent excise tax on sport fishing tackle, is distributed throughout the State, and is a very well coordinated program. Its performance has been evidenced over the years. Some of the finest research has been done in the wildlife field as a result of those two programs in both basic and management research.

We have a very excellent example of Federal-State cooperation on the Columbia River. In 1947 a program was designed for the development of the salmon and steelhead fishery aimed largely at the lower Columbia, but since extended to the upper reaches of the Snake whereby the Federal Government appropriates funds every year to the Corps of Engineers, which transfer it to the Fish and Wildlife Service, and then is allocated to the States. In general those three programs bring together the resources, the brains, the knowledge, the efforts of the State and Federal agencies into a coordinating group. And they are working excellently. I have felt, since I have been director of Oregon, that the service could expand that same general type of cooperation more fully to the so-called Saltonstall-Kennedy funds which are derived from import duties on fishery products. I think many of the States could do an excellent job under contract with the Fish and Wildlife Service for the use of those funds. To my knowledge, very few States are participating.

My own State of Oregon, the Fish Commission, last week signed a contract for $40,000 which was the first of these moneys allocated to any State in the West to do basic research on fish passage problems at dams. But in general, I think the cooperation is good. I think if you gentlemen see fit in Congress to appropriate additional moneys for research by the Fish and Wildlife Service, and maybe with a little admonition on the side to work with the State boys, too, we could get along with a very forthright program.

Mr. MILLER. That is what I drew from your testimony: That the cooperation was excellent to the direct ratio of the amount of dollars that were available.

Mr. DAY. That is correct. In general, the cooperation is good. And in the Columbia River we have a well-coordinated program between the State and the Federal Government in the technical and administrative field on these various problems.

Mr. MILLER. Do you feel that the exchange of data between Washington, Oregon and California is sufficiently expeditious that it can be regarded as satisfactory?

Mr. DAY. Perhaps we can always improve, but I think it is very good.

Mr. MILLER. Can you describe for the record any way in which we might improve this exchange of data other than those which have been previously described by witnesses, such as the Pacific Marine Fisheries Commission?

Mr. DAY. No. We all work through the Pacific Marine Fisheries Commission. Our annual meeting is coming up tomorrow at which all of the various problems are reported and explored and discussed. In general, if there is a falling down, I think it is our own fault. I think we have the media to do it.

Mr. MILLER. I think you are in the position to explain how this Commission works. It has been my view as an onlooker that possibly the Federal Government might act as a coordinator, but from your testimony this may not be necessary. I wonder if you would describe for the record just how this Commission does operate its mechanical details.

Mr. DAY. Well, we have with us here the paid coordinator for the Pacific Marine Fisheries Commission, Mr. James. It might be more appropriate for him to do it.

It is made up of representatives of the States of California, Oregon, and Washington. And later there will be Alaska and Hawaii. We have representation from the game departments also. Mr. Ross Leonard is here from Idaho who also attends the meetings. We discuss largely the coordination of research, of regulations and of problems. These meetings are held at least once a year, and many times more often.

Mr. MILLER. How much detail can a Commission of this sort get into with respect to research?

Mr. DAY. They get into a great deal of details. They are undertaking a study now of the returns of tagged and marked fish from Alaska to California, coordinating the returns of various marks and designations. They are doing a great deal of work in that field.

Mr. MILLER. Suppose Dr. X of the State of Washington discovers a brand new way of taking eggs out of salmon. How soon is it before Dick Croker of California finds out about that method?

Mr. DAY. It depends upon whether the chap wishes to publish the method immediately or not.

Mr. MILLER. Do you feel the Federal Government has any responsibility in relating Dr. X's finding to Dick Croker?

Mr. DAY. I don't think so; no more than they are doing. I think much more could be done if more adequate funds and manpower were available in many areas, but I don't see any need for any new organization or new system.

Mr. MILLER. I do not want anybody else to do this, but as the chairman of this meeting I feel that I can do it; that is, as a Congressman I hear continually in my district about how the State of Oregon gets all that Federal money to do all those wonderful things for fish, but we don't get a nickel down in California. Now, could you tell me how come you get all that money?

Mr. DAY. I think, Mr. Congressman, with all due respect, you are badly misinformed. In Oregon we have never half enough to do the job that needs to be done. But we are making a little progress. As I said, we are getting some aid from the Saltonstall-Kennedy program. The Portland General Electric, which built Pelton Dam on the Deschutes, has come up with some $80,000 for a 3-year study on fish passage problems.

Mr. MILLER. That is private money?

Mr. DAY. Yes. We are also going to get a similar amount from the same company for a study of the North Fork of Clackamas. In fact, we are setting up an organization dedicated to collecting money from wherever we can get it for furthering research in fishery problems.

Mr. MILLER. We certainly appreciate your being here today, Mr. Day, and with your Federal experience and your State experience you are well qualified to jump over the fence.

Are there any questions of Mr. Day?

Mr. DONALDSON. Donald Donaldson, Marin Rod & Gun Club.

Mr. Chairman, Mr. Day had made the statement that $40,000 was received for basic research for his department of fish and game. I assume that the department is to do this research. Is it Mr. Day's opinion that the department of fish and game, or any department of fish and game, can do a better basic research job than an independent agency?

Mr. MILLER. Do you mean an independent Federal agency?

Mr. DONALDSON. Regardless of whether it is State, Federal, or any other type of agency.

Mr. MILLER. I am not sure that I understand the question, Mr. Day. If you do, please answer it.

Mr. DAY. I think the finest research done in fish and wildlife has been done by the various State fish and game departments. About a third of the Pittman-Robertson, which amounts to $12 million a year, and perhaps a third or a half of the Dingell-Johnson, which comes to $5 to $6 million, has gone into some basic, some management research, and they have done a fine job. Our total fish and game program in the United States has been advanced materially in the last 10 years through these programs. The work is done by the State fish and game departments with general guidance and direction by the Federal Government.

Mr. MILLER. Just so there is no confusion here on the record, that does not mean that you feel there is no room for Federal Government participation in basic research?

Mr. DAY. If I left that impression or implication, I want to apologize. I do not. I think there is room for all of us. I think we are so far behind in this total program that there is no use of bickering and quarreling between the State and Federal Government.

Mr. MILLER. You were here at the time Dr. Needham testified as to the useful necessity of management research and applied research, and the fact that the fishing industry cannot be expected possibly to do this basic research which must be a Federal responsibility.

Mr. DAY. I agree with him wholeheartedly.

Mr. MILLER. Are there any other questions from the audience with respect to Mr. Day? We are delighted to have you here this afternoon, and I hope that we are going to turn up something profitable for the U.S. Government and the State of Oregon.

Mr. DAY. Thank you for the privilege.

Mr. WARNE. I would like to call Milton C. James, research coordinator of the Pacific Marine Fisheries Commission. Milton can answer some of those questions that were asked a moment ago.

Mr. MILLER. Would you identify yourself for the record, please?

Mr. JAMES. My name is M. C. James, research coordinator of the Pacific Marine Fisheries Commission, with headquarters at Portland.

DESCRIPTION OF THE PACIFIC MARINE FISHERIES COMMISSION

(By Milton C. James, research coordinator, Pacific Marine Fisheries Commission, 741 State Office Building, Portland, Oreg.)

Mr. MILLER. Mr. James, could I ask you to give us a very brief description of the commission.

Mr. JAMES. Yes, indeed. The commission is set up under a compact approved by the Congress and by the three member States, Oregon, Washington, and California. And as has been pointed out, legislation is now underway to open membership to the States of Alaska, to Idaho, and to Hawaii, if they see fit to adhere.

The terms of the compact, which are agreed to by enabling legislation passed by each one of the States, are fairly specific as to the functions. Without going into the detail of the language too much, the basic functions are to promote uniform regulations on management of those species of fish which are interstate. Those, of course, would be primarily marine species.

Mr. MILLER. Would those be some that we are concerned with today?

Mr. JAMES. Yes; salmon. And there are various specimens of bottom fish.

Mr. MILLER. What are the names of some of those?

Mr. JAMES. The rockfish, ocean perch, the various species of flounder, and a number of other marine species such as the sable fish or black cod. Almost any of the marine fisheries which either migrate from the offshore waters from one State to another or are fished by fishermen from various States come under this covering provision. Secondary to that, or possibly not secondary but parallel to it, is the duty of coordinating the research which is intended for the basis of these regulations and management practices.

Mr. MILLER. Between the three States?

Mr. JAMES. Between the three States. After having served in this capacity for several years, I thought it might be a good idea to try to find out what a coordinator was supposed to do. So I referred to the dictionary and got the illuminating definition that "coordination" is the act of coordinating. That is about all I know in the formal sense of what a coordinator is supposed to do. But from a practical standpoint it is clear that it is intended to do many of the things which have been discussed at this hearing today.

Mr. MILLER. How is the commission supported financially?

Mr. JAMES. It is supported financially by contributions assessed against each State on the basis of the value of the commercial fisheries of that State.

Mr. MILLER. What are the components of the commission? How many members are there?

Mr. JAMES. The commission is made up of seven commissioners. The makeup of each State's representation is determined by the enabling act under which the State joined. In the case of California there are three commissioners. Oregon has three commissioners. And in the State of Washington there is one commissioner who is ex officio, the director of the Washington Department of Fisheries.

Mr. MILLER. How often does the commission meet?

Mr. JAMES. It meets annually and holds such additional meetings as may be called to meet some particular problem.

Mr. MILLER. What powers does the commission have to enforce its decision?

Mr. JAMES. None whatever. Whatever action is taken in response to the recommendations of the commission are voluntary. They may be put into effect by actions of the legislatures. Or in the case of Washington, for example, or Oregon, where the commission has certain powers of its own, why, the director of the Washington Department of Fisheries or the Oregon Fish Commission may promulgate whatever action is taken. But it is entirely voluntary, and that is one point I would like to emphasize; that this act of coordinating as carried out through the Pacific Marine Fisheries Commission is a combination of persuasion, recommendation, and solicitation. In other words, trying to bring about common thinking on the part of the component States, and then they individually bring about the actions which the Commission recommends.

Mr. MILLER. There has been considerable discussion of the exchange of information on research between the coastal States. Do you feel that such exchange has been reasonably diligent and that the results have been reasonably satisfactory?

Mr. JAMES. I feel that your phrase "reasonably diligent" is a fair evaluation of what has been done. It is certainly imperfect, and there could be some better performance in that respect.

Mr. MILLER. Do you feel that the Federal Government has a role to play in this increased cooperation between the States?

Mr. JAMES. Yes. As a matter of informal practice and policy, I act as the entire staff of the Pacific Marine Fisheries Commission; that is, paid.

I have occasion to come in contact with the Fish and Wildlife Service for the purpose of securing information, and also occasionally in supply information on the work performed by the States. That, again, I want to emphasize is done on a voluntary basis and through cooperation which works fairly well. But again it is imperfect, and I suspect the reason it is imperfect is that because it is done by human beings, and all things done by human beings show signs of imperfection.

Mr. MILLER. That is understandable.

Mr. JAMES. There is one other point which I think needs to be considered, which is, some expanded type of coordination. And if it is to be a program having certain mandatory features to it, someone has to be given rather final and absolute authority. Otherwise you have a system of voluntary exchanges which is effective to the degree that those who are working in it make it effective.

Mr. MILLER. And that is not quite satisfactory?

Mr. JAMES. I think it is imperfect at the present time; yes.

Mr. MILLER. Mr. Warne, I did not mean to interrupt you. Did you have some questions you wished to direct to the witness?

Mr. WARNE. I was going to expand on the introduction and note that I have had the pleasure of working with him also in Washington for a number of years. He has a vast experience that he brought to this particular job.

Mr. MILLER. Mr. James, I did not mean to interrupt you with these questions. If you have some more general observations to make for the assistance of this hearing, we would be very grateful to hear them.

Mr. JAMES. No, Congressman Miller. I think that the previous witnesses have emphasized, brought out rather clearly, the fact that coordination among the rather numerous agencies, including the Canadian organizations which are working on this salmon problem particularly, such coordination is desirable; is going to contribute greatly.

Mr. MILLER. At this point could I ask you, do you feel the coordination between the Canadian Government and the United States is extensive enough and complete enough, or could it be improved?

Mr. JAMES. There are various stages of coordination. Of course, where the Canadian research, and the people in administration are publishing their information as they do, there is no problem there in the day-to-day work that is going on. Familiarity with their work is essential to get the benefit of the information which they have gotten and apply it to our own problems. That has to be done now on a strictly informal basis. One of the unwritten functions of the Pacific Marine Fisheries Commission's staff, again, myself, is to try to keep continuous contact with the Canadian personnel who are working on these problems, get their information to our own people, and for that matter, follow through on the reverse of that. Again, it is an informal voluntary information operation, and I doubt very much that setting up any machinery through which one would have to go through the more or less cumbersome relationship of international protocol would be any better than that.

Mr. MILLER. Suppose we could satisfy these cumbersome demands, would you like to see some attempt in that direction?

Mr. JAMES. If it was a question of preference, I would like to see the Canadian Government have membership to the Pacific Marine Fisheries Commission. It is a very logical outcome.

Mr. MILLER. Your preferences are quite important. There are a number of witnesses here who testified today, Mr. Ray Welsh for one, as to the urgency of doing something about the salmon species. Would you second his testimony?

Mr. JAMES. Heartily, heartily.

Mr. MILLER. Mr. Johnson, do you have any questions?

Mr. JOHNSON. Yes. This is a Commission that is set up by enabling legislation that reaches these three States as it relates to your research program. I suppose you see to it there is no duplication of research, that the moneys that are being spent for research in the various States are not duplicated?

Mr. JAMES. That problem is attacked in this way, Congressman Johnson: The Commission arranges for a meeting of the research staff personnel of the three States at least once a year at which time the various programs are thoroughly reviewed jointly, and the people who are doing the work get an opportunity to become familiar with what everyone else is doing. To that extent we tried to avoid duplication or overlapping. The information, of course, is taken back to their respective States and presumably reflected in whatever planning they do for their own program. However, I would like to take this position: That a certain amount of duplication is not necessarily bad; that it may be necessary to get a complete answer on a problem which is as diverse as the salmon problem, running from Alaska to Monterey; that work of a particular nature done in one area is not necessarily conclusive and is to be applied throughout that vast coastal area.

Mr. MILLER. Thank you very, very much, sir. We do appreciate your being here. Do we have any questions from the audience?

Mr. GILCHRIST. John Gilchrist.

Congressman Miller, to rather point up this one particular problem, and speaking only now on salmon resource, may I ask Mr. James this question: Is there any agency or organization now established and charged with the responsibility of gathering written scientific data with regard to the salmon resource from all agencies; that is, the three States, the United States Government and Canada, that would be available to the general public if needed?

Mr. MILLER. Would you be able to answer that question, Mr. James?

Mr. JAMES. I am trying to think of any such organization, and nothing occurs to me now. I can't recall any.

Mr. MILLER. This seems to be a very, very important question. Would you say that such was necessary or desirable?

Mr. JAMES. I think it would be desirable; yes.

Mr. MILLER. Is there any question?

Mr. DAY. I am Mr. Day. I would like to ask Mr. James a question in connection with this distribution of information. The Western Association of Fish and Game Commissioners urged a year ago—passed a resolution urging that all pertinent data on Chinook and silver salmon in particular be gathered and published. A committee was set up, reports have been submitted, and that is now in the process of publication. I would like to ask Mr. James specifically if he does not feel that this is a step in this direction?

Mr. JAMES. Yes; that was intended to fill one of the needs that I believe Mr. Gilchrist has mentioned. It possible has lagged considerably more than those who are sponsoring the movement would like to see. But for various reasons it still remains to be made available for public distribution. It is expected that compilation of general information will be provided within a reasonable time.

Mr. MILLER. [illegible] splitting hairs here. I think we are indebted to Mr. Gilchrist and Mr. Day for pointing up this vital area. Mr. James, thank you very kindly for appearing here this afternoon. You have been very helpful to us in understanding this problem.

Mr. WARNE. I would like to call Mr. Phil Schneider, director of the Oregon Game Commission. We are very fortunate in having these visitors come to California to participate in this kind of hearing.

Mr. MILLER. Will you please identify yourself for the record.

Mr. SCHNEIDER. Congressman Miller and Congressman Johnson, my name is P. W. Schneider. I am director of the Oregon Game Commission.

P. W. SCHNEIDER

(Director, Oregon Game Commission, Post Office Box 4136, Portland, Oreg.)

Mr. SCHNEIDER. The comments of my colleagues in the fisheries field in Oregon have covered much of the remarks which I would make. In connection with this problem I think that it is very heartening that this hearing is being held.

The problem of coordination is a difficult one. It is not only confined to the specific phase of resources which we are discussing here today. We have it in all fields of renewal resources. I believe that the salmon-steelhead, the anadromous fish resource is probably the most serious contemporary resource problem in North America today. It is occasioned by a lot of factors beyond our control; the general impact of water development, the extensive land-use practices which influence water, all have an influence on this situation. Anything that we can do in terms of tying together the various areas of information, the efforts of Government, and of industry too, will be a movement in the right direction.

Mr. MILLER. Could I ask you how successful you have been in Oregon in getting cooperation between the fishery industry and the lumber industry in advancing your mutual objectives?

Mr. SCHNEIDER. Congressman Miller, I think that is one of the encouraging factors that we have observed in our work with the lumbering industry over the last, say, decade; particularly the last 5 years. We are getting a lot of help from them.

Mr. MILLER. What do you see is the basis for such cooperation?

Mr. SCHNEIDER. One of the problems that we have is that of debris. For example, of lumbering operations in blocking streams, in depositing silt and debris as a result of their operations in our coast streams, design in their road construction, access roads, and so on. Our work with the lumbering industry has been a direct personal contact with them, both with the large and small operators. Although there are exceptions, we are getting a tremendous amount of help from them.

Mr. MILLER. How do you get them to identify their interest with your broad research and development program in fish? Ordinarily you would think they would be antipathetic.

Mr. SCHNEIDER. I think that has been the case on occasion in the past. We, through a development of standards as guides, the discussion of those with the lumbering industry, with the professional foresters, the road designing engineers, have seen quite responsive attention to that in their operations. The same thing is true with the

Federal land management agencies, such as the Forest Service and Bureau of Land Management and so on.[1]

Mr. MILLER. Would you care to say anything as to the comment that Oregon gets all the funds and California gets nothing?

Mr. SCHNEIDER. I would say that our present receipt of those funds are woefully inadequate at the present time. The only additional comment that I might make is this very basic point, that this is an international problem. It is one that we cannot treat entirely locally. It is one that we cannot treat entirely on an interstate basis. And it is one where an effort of coordination becomes very important. There are, in my opinion, some possible deficiencies in the present Pacific Marine Fisheries Commission in that in Oregon all of the agencies are not members. For example, the Oregon Game Commission is an adviser. The point has been made that Alaska, Hawaii, and Idaho will be solicited to associate themselves formally with the organization. I think that is very good. I would like to go a step further and include both of the additional fisheries agencies in Oregon and Washington.[2]

Mr. MILLER. In connection with cooperation and with the need for intrastate cooperation, we have talked a great deal here today about the need for Federal participation. Would you give us some observations from Oregon's point of view as to the need for additional Federal participation, say, in the salmon resource. Or contrary, if that is your view?

Mr. SCHNEIDER. I feel that the Federal-State relationship is, and specifically in the anadromous field, excellent.

Mr. MILLER. The relationship is excellent. I am asking about participation.

Mr. SCHNEIDER. And coordination. We have, for example, the Columbia fisheries river development program to which Mr. Day previously referred. It is probably the best type in this specific phase of fisheries work. It is my impression and experience that our coordination between the Federal Government and the respective State agencies is very outstanding.

Mr. MILLER. This is as to coordination and cooperation. Now, as to the extent of participation; would you care to comment on that? In other words, does the Federal Government have more of an obligation to participate in the salmon resource program or does it have less?

Mr. SCHNEIDER. I see nothing wrong with the present arrangement, Congressman Miller.

Mr. MILLER. In other words, we are spending enough Federal money on the resource and the present arrangement is satisfactory?

Mr. SCHNEIDER. Not necessarily so far as funds are concerned. But I believe the strong liaison and the established procedures which we have underway between the various agencies in the Federal Government and State agencies are very good.

Mr. MILLER. I now go to the question of participation. Is the degree of participation by the Federal Government sufficient or is it insufficient?

Mr. SCHNEIDER. Speaking now of the Columbia River, with which I am most familiar, I believe that the extent of Federal Government participation, particularly in research on existing and authorized projects, is inadequate.

[2] In Oregon and Washington management of sport fish resources is assigned to the State game commissions. The Oregon and Washington State fish commissions are concerned with commercial fisheries.

Mr. MILLER. Do you have [illegible] questions from the audience?

Mr. DIFANI. George Difani. Congressman Miller, the question of money for Oregon and Washington, of course, relates to the Columbia River fishery development program. I don't think that has been stated for the record. Those are the funds that we in California are rather envious about. The amount of money that is spent by the Federal Government on the Columbia River development program is something that we hope for on, say, the Klamath River.

Mr. MILLER. In other words, you have a statement to make in this respect and not a question to ask of Mr. Schneider. If you would like to go on the stand again, we would be very happy to have you testify on that fact. But I think we have Mr. Schneider here for the purpose of answering questions. Let us not put anyone on the spot. We are all appreciative of every bit of help we can get and we are not going to take away from one and give to another on any basis at all. If you have a question, you may ask it.

Mr. DIFANI. I would like to ask Mr. Schneider to tell us something about the additional funds for salmon and steelhead work in Oregon as related in the last monthly bulletin which I received.

Mr. MILLER. Do you know of any additional funds Oregon is going to get to assist in salmon resource?

Mr. SCHNEIDER. Yes, Congressman Miller. I believe that question refers to action taken by the last session of the Oregon Legislature in which there will be imposed an additional $1 fee on the Oregon sport anglers for the taking of salmon and steelhead; a salmon-steelhead card will be required.

Mr. MILLER. That is an Oregon State tax?

Mr. SCHNEIDER. Yes. This will arise from the $1 fee, and the moneys accruing therefrom are earmarked, as the statute words it, "research and management on salmon and steelhead."

Mr. MILLER. But this does not involve any Federal funds?

Mr. SCHNEIDER. No, sir.

Mr. MILLER. Are there any further questions to ask of Mr. Schneider? Thank you very much, Mr. Schneider, for appearing here this afternoon. Mr. Warne, would you invite the next witness, please.

Mr. WARNE. I would like to ask Mr. Ross Leonard, director of the Department of Fish and Game, Idaho, to come to the stand. Mr. Leonard is a very active member in the Western Association.

Mr. MILLER. Mr. Leonard, we are very grateful to have you here this afternoon. Would you please identify yourself for the record.

ROSS LEONARD

(Director, Idaho Department of Fish and Game, 518 Front Street, Boise, Idaho)

Mr. LEONARD. Congressman Miller, distinguished gentlemen. I am Ross Leonard, director of the Idaho Fish and Game Department, Boise, Idaho.

I have been very interested in the proceedings today because our problems are so common. Even though we in Idaho find ourselves living up on the headwaters of the Columbia River, the problem has developed today that we are a very important part of the salmon and steelhead fishery program. In fact, approximately 50 percent of the

[illegible] We counted over 10,000 steelhead going over the Washington Water Power Dam on the Clearwater River during this last season. So it is a rather important activity.

I would like to comment that it is very impressive to me to see the sports fishermen and the commercial fishermen sitting down side by side and going over some of these basic problems that we are all faced with. In my opinion it was probably a step backward when the Fish and Wildlife Service was split into two bureaus.

In Idaho today the 308 Report, which was put out by the Corps of Engineers, outlines a development program which is going to have an impact on California, Oregon and Washington. This program will have an effect on the fishery resource up and down the Pacific Coast because fish which are spawned in the Salmon River in Idaho are taken off the shores of California.

Mr. MILLER. What you are emphasizing, Mr. Leonard, is the interstate nature of this program. Would you be able to generalize and say that the Federal Government has much more of a responsibility than it has been willing to exhibit in the past?

Mr. LEONARD. Yes; very definitely. With these construction programs which are proposed in Idaho, they are going to affect you Congressmen directly just like they affect the Congressmen in the State of Idaho. I am very glad to see your interest in this. At the present time there is being considered at Lewiston whether we should build a high or small dam, or whether two or three dams on the Snake River. So at this time these problems are facing us.

And our biggest problem is this: When those dams come up before the Congress of the United States for authorization or before the Federal Power Commission, or whoever has the responsibility for approving such construction projects, money should be placed right in the bills of authorization authorizing studies to protect, promote, enhance or rehabilitate or prevent the destruction of the fishery resource. We have built dams in the past, and we are trying to benefit from some of the mistakes of the one built on the lower Columbia. We have built some of these dams and possibly put our heads in the sand. We have objected to the construction of the dam, but we have gone ahead. We are far behind as to what steps can be taken to restore or mitigate the loss.

Mr. MILLER. This is closely allied to the problem we are dealing with here today. It is just a touch removed, but it is very closely allied; that is, the question of the entire recreational use of these man-made structures and how this recreational use must enter into the basic planning of the man-made structures. I am glad to see you bring that up. Salmon and other fish resources are involved. However, I do not think we want to get into that too much, but I am glad you touched upon it very briefly. I think Congressman Johnson will agree with me. We are much, much more concerned with this now than we were 2 or 3 years ago. And I might offer the gratuitous advice that it is essential that all lobbies get involved in pushing for this before the Federal Government. Excuse me for interrupting you.

Mr. LEONARD. Certainly. The only point that I do wish to emphasize is that when these programs are in the formulating stage, when people are designing plans and programs for dam construction, money should be made available through the Corps of Engineers, Fish and Wildlife Service, whoever has their responsibilities, right on the ground floor with the research problems and find out what to do about it.

Mr. MILLER. I think you made that point very well. Do you have any other points? If you do not, I have several questions. I am sure we would like to hear what Idaho has to say. First, do you believe that the Federal Government has more of a responsibility than it has exhibited heretofore? I think you touched on that very briefly, but would you like to comment on that point?

Mr. LEONARD. As to migratory fish, I do think that the primary responsibility rests with the Federal Government because there are so many State involved. Under the Coordination Act they have been assigned by the Congress of the United States the responsibility for designing and carrying out these programs, and there is a definite lag at the present time in getting the job done.

Mr. MILLER. That brings this other point up. Do you feel there is a great urgency with respect to the salmon species to do something immediately about this particular problem?

Mr. LEONARD. Very definitely. For instance, Bruces Eddy Dam on the Clearwater has not been authorized by Congress of the United States. But appropriations have been made for engineering studies, which have been passed by the past two sessions of Congress. Over a million and a half dollars have been appropriated for studies. They are practically going ahead with the construction of the dam even though it has not been authorized. We at the present time are not doing anything. We have no money available to see how to mitigate the loss of the salmon and steelhead should this dam be constructed. We do not know how to mitigate the loss; what we are going to be faced with.

Mr. MILLER. As Dr. Needham said, this is management research. Is that also true of basic research?

Mr. LEONARD. I think it is a basic research problem.

Mr. MILLER. Would you agree with Dr. Needham about the need of this study for basic research with respect to what you have been talking about in connection with Bruces Eddy Dam?

Mr. LEONARD. Yes.

Mr. MILLER. Mr. Johnson, do you have a question to ask?

Mr. JOHNSON. Is there any more coordination with respect to dams that are built by public agencies than those that are being built by private agencies? Sometimes the other agencies of State government do not know too much about the applications to the Federal Power Commission.

Mr. LEONARD. We are made aware of all applications that are presented to the Federal Power Commission at the present time. They do advise us.

Mr. JOHNSON. They do advise you. But, then, the planning that goes into that private enterprise, certainly you do not follow that too closely until such time as they actually ask the Federal Power Commission for permit?

Mr. LEONARD. We do follow those. For instance, the Pacific North power people want to build a High Mountain Sheep Dam. At the present time they have their request pending before the Federal Power Commission.

Mr. JOHNSON. are they cooperating in the State of Idaho as applies to fisheries with the State fish and wildlife?

Mr. LEONARD. Yes, they are cooperating. There are six agencies involved.

Mr. JOHNSON. You say that the public projects in there are not cooperating with you, then?

Mr. LEONARD. No; I wouldn't say that.

Mr. JOHNSON. As I understood you, you said that although Congress has made an appropriation for planning money there that you people are not too much aware of what is going on; there is no real study of the effect to fisheries.

Mr. LEONARD. That is very true. The fish and game department such as Idaho, has a rather limited income. We do not have money from the license buyers to inaugurate these research programs. We are taking the position that any agency, whether public or private, who creates the problem or interferes with the natural resources should be responsible for making money available to take care of the losses and to improve the facilities wherever possible.

Mr. WARNE. May I ask a question? Would it be appropriate to ask Mr. Leonard whether he believes that at the same time money is made available to a Federal agency to do the preliminary engineering work that Congress should also make available money to do the preliminary planning on the biological research that will be necessary?

Mr. LEONARD. Very definitely; that is our position. In general, we have been far behind the construction in our evaluating and getting information to mitigate the losses.

Mr. JOHNSON. I don't think you have been any further behind with public than you have with private.

Mr. LEONARD. Congressman Johnson, I want to make this position as to public versus private power: We don't want to get into it.

Mr. JOHNSON. It has been my experience in our own State here in California when I served on the legislature that there was not too much in the way of coordination between private development and the State agencies as related to fish and wildlife, but there was a better participation on the public projects.

Mr. LEONARD. In general, that has been very true. Ten years ago the fishery resource and the wildlife resource have had no recognition whatsoever. They were not considered when the Hells Canyon Dam was first started, but now when they start to build a dam they hold hearings and ask us to participate and let us give our views. That has just happened in the last few years.

Mr. MILLER. Are there any questions the audience may have of Mr. Leonard of Idaho?

Thank you, Mr. Leonard, for appearing here this afternoon. We are very grateful to you. We will take a brief recess now.

(Recess taken.)

Mr. MILLER. Mr. Warne, will you please call the next witness.

Mr. WARNE. I would like to call Mr. Clarence Pautzke, assistant director of the Washington State Department of Fisheries.

CLARENCE F. PAUTZKE

(Assistant director, Washington State Department of Fisheries, 4015 20th Avenue West, Seattle, Wash.)

Mr. PAUTZKE. My name is Clarence F. Pautzke. I am assistant director of fisheries for the State of Washington.

Congressman Miller and Congressman Johnson, many of the points that I was desirous of covering have been covered already. However, there is one point that we feel very strongly about in the State of Washington. May I say at this point that it is unfortunate that Mr. Moore, the director, had a previous engagement and could not be here today to attend this hearing because he would further reiterate this point.

We can foresee Federal funds to more adequately bring into being this extra research with relation to our anadromous fish. There has been a good working relationship between the State and Federal agency. However, as additional funds are made available I believe it would be well to consider the factor of where the problem lies and what proportion of this research money to permeate to the State level to adequately support State-level research. And I will tell you the reason why.

Mr. MILLER. Before you do, sir, are you saying to us that the Federal Government should turn over some Federal money to the States for study? Or are you saying that the States should have their own programs State funded 100 percent?

Mr. PAUTZKE. I am saying that the Federal Government should turn over additional money to the States for State research.

Mr. MILLER. All right. Proceed to the question of why you think that is so.

Mr. PAUTZKE. The maintenance of trained personnel at the State level cognizant of the problems within the State allows that research to be maintained and continued. We have found that oftentimes fragmentary research being conducted is lost by reason of the fact that the individual may be transferred to another portion of the country.

Mr. MILLER. You are talking about Federal research?

Mr. PAUTZKE. I am.

Mr. MILLER. You are talking about basic experience?

Mr. PAUTZKE. That is right.

Mr. MILLER. Do you see any possibility in the future that there might be more constant research at the Federal level with sufficient funds to do so?

Mr. PAUTZKE. I believe that there is, Congressman Miller, a status of State research and Federal research. There are many problems that cannot be covered under State research as they involve high seas fisheries which is interstate, international. That subject has been covered by Mr. Day and others.

Mr. MILLER. Does this also go to basic research as distinct from what we might call applied research or market research?

Mr. PAUTZKE. Of course, all research, in my estimation, should have an end product, more fish.

Mr. MILLER. I think we have got to draw a distinction here as to basic, market, and applied, or can we? I am asking you now.

Mr. PAUTZKE. Will you state your question again to me, Congressman Miller?

Mr. MILLER. You contend that all research has the objective of more fish. That is a good resounding phrase. I am asking you now whether or not we can distinguish between the research the Federal Government should do and what the State should do?

Mr. PAUTZKE. No; you cannot differentiate between basic and applied and the others. We will participate on that and the Federal Government will participate on that.

Mr. MILLER. On all levels?

Mr. PAUTZKE. That is right.

Mr. MILLER. Excuse my interrupting you.

Mr. PAUTZKE. What I have reference to is the research specifically carried on within a stream system lying completely within the State, and that type of research. That is, rather than to superimpose additional research bodies into an area, which requires necessary funds, to be able to carry on the same work.

Mr. MILLER. So that we won't get a cross purposes, do you feel that any witnesses here today have called for such research at a Federal level that might apply, say, to a single watershed line within a State?

Mr. PAUTZKE. I have heard no witness declare that; neither have I heard any witness say that there should be a greater contribution to the States' research effort.

Mr. MILLER. I think that is the definite contribution that you have made; that is, the contention that more Federal resource should be placed at the disposal of the State, say, on a matching basis, some thing of that kind. Do you have something like that in mind?

Mr. PAUTZKE. Personally, the Washington State Fisheries Department does not have access to the funds on a matching basis such as the game department. Mr. Snyder referred to the Dingell-Johnson program. We do not have that. We do not have sport licenses for the taking of salmon in the State of Washington. Therefore, we do not participate on that type of a matching fund situation.

Mr. MILLER. I am not trying to be difficult here. I am trying to elicit the position of Washington with respect to the use of Federal funds; whether there is a State license in Washington is irrelevant. Do you believe that more Federal funds should be made to Washington in the form of grants for Washington State research?

Mr. PAUTZKE. Yes; I believe they should; that is my point.

Mr. MILLER. Do you have any questions?

Mr. JOHNSON. No questions.

Mr. LUNARDI. No questions.

Mr. MILLER. Are there any questions from the audience with respect to the statement made here today by Mr. Pautzke of the State of Washington? Thank you, Mr. Pautzke, for being with us. We appreciate your appearing. Mr. Warne, will you please call the next witness?

Mr. WARNE. I call Mr. Charles Bohrmann. Then we will call the Federal agency representatives and finish up with these others, if that is satisfactory.

Mr. MILLER. That is very satisfactory, Mr. Warne.

Mr. WARNE. Mr. Bohrmann of the Associated Sportsmen of California, and a delegate to Salmon Unlimited, will discuss the effects of water projects on migratory fish.

CALIFORNIA WATER DEVELOPMENT PROJECTS AND THEIR EFFECTS UPON THE MIGRATORY FISHERY RESOURCES

(By Charles H. Bohrmann, 1017 Vermont Street, Gridley, Calif.)

Mr. BOHRMANN. I am Charles H. Bohrmann. I live in Gridley. I am retired from the State highways, and for years I have been chairman of the Associated Sportsmen of California Committee on Engineering which, this year, is designated as water projects and engineering.

Mr. MILLER. Mr. Bohrmann, if you have a formal statement for the record we will be glad to receive it and, if you would like, you may proceed informally to summarize that testimony.

Mr. BOHRMANN. I have this for the purpose of ready reference for questions. I will call off the numbers as I have identified them.

1. With our long dry season each year and variable annual rainfall, California cannot support increased population without abundant water storage.

2. To date such storage has been accomplished principally by large-capacity reservoirs in the lower elevations. In wet years they overflow and waste water. In dry years they do not fill, so we are water-short that year because we lack cyclic storage.

3. Only Fairview Dam on the Trinity approaches cyclic storage. Its 1,800,000 acre-feet are about 163 percent of the average annual water yield of its drainage area. On this basis, Shasta Lake, with an annual average water yield of about 5½ million acre-feet at Keswick needs 9 million acre-feet of usable storage in that watershed to attain cyclic storage instead of the present 4 million.

It has been a constant fight. But thanks to our Congress to date our migratory salmonoids appear to have fared pretty well below Federal projects in California, except below Friant Dam. There a large and valuable fishery has been exterminated by drying up the San Joaquin River. The damage goes further. Without the San Joaquin flow the waste products of our civilization lie in that dead streambed of the southerly delta area. The resulting low oxygen content of that water is destroying spawning striped bass and other important game and food fish, also creating an area health problem. Without early flushing rains, fall-run salmon, spawning in lower San Joaquin tributaries, may also be oxygen-blocked, while waterflow restoration litigation drags slowly through our courts. Congress might well examine this damaging situation and the Federal law which caused 10 percent destruction of Central Valley salmon. The Keswick copper pollution problem appears to be solved by the U.S. Fish and Wildlife Service Report dated August 1959. (See exhibit A attached.) Here Congress can help by affording a prompt appropriation to protect salmonoids from further poisoning below Shasta Dam.

5. With additional water projects planned, more thought must be given to the future status of salmon and steelhead trout. They are migratory fish dwelling in the ocean, ascending their native streams for spawning. While dwelling in the ocean they move up and down

Washington to Oregon and to California. They also dwell outside of our national territorial waters where they are protected against foreign commercial fishing by international treaty. They appear to be an interstate and international resource like our migratory birds. As such, they appear to be entitled to more Federal consideration, assistance, and study.

6. Until cyclic storage is attained on all California water projects affecting our migratory salmonoids, and an adequate flow of water needed for successful fishery propagation is assured by law, we can consider our migratory salmonoids headed for extinction. We need Federal storage at high elevations of runoff from Federal lands, which can be allocated for such spawning by law. Release this water all the way downstream into the delta for all fish life, thus also aiding wild trout habitat. Then this water will be available to the Tracy or similar pumps, after serving our stream fisheries, also having helped toward flood control and forest fire repression.

7. Power and water projects have cut off 95 percent of the former salmon spawning area in Central Valley. Therefore, funds must be available as part of any project cost (not only Federal) to acquire and improve the remaining spawning area below the project by making the necessary physical changes in the streambed whereby more spawning fish can be accommodated upon the remaining area. Such spawn bed improvement would be utterly futile under private ownership of land.

8. Besides Federal water projects, California presently has power corporation, irrigation districts, and municipal water projects also affecting our migratory salmonoids. In these three types of water projects, the waterflow needs of the fishery are only met very reluctantly, if at all. In fact, we have a policy statement from the California Irrigation Districts Association in their resolution adopted at their Fresno convention in 1958. (See exhibit B attached.) In the spring of 1959, after a dry winter, water releases for spawning fish were curtailed severely by one irrigation district and one municipal project, allegedly for vested right storage. Perhaps this was tried to see if California water law would condone this alleged fishery damage

9. Irrigation districts and municipal water projects generate electricity for project cost amortizing revenue. It is possible that there have been instances where the fishery was deprived of water which was not needed for the vested rights of actual irrigation or actual municipal use, but which may have been stored merely for additional power profit. Since our State does not seem to be able to stop this alleged practice, perhaps we need Federal law which will charge the Federal Power Commission with protecting the public resources of migratory fish against such alleged destruction for profit of all electric projects.

10. And last, but not least, we need a centrally coordinated program of basic salmonoid fishery research on a coastwide scope between the United States and Canada. When these primary needs for the perpetuation of our migratory salmonoids have been assured, we then must set up some other means of financing effective fish screens on all diversions from streams utilized by these migratory fish. It is simply an economic impossibility to finance one-half of the cost and maintenance of all screens from fish and game preservation funds.

Gentlemen, I really believe that in the State of California we can take a leaf from the book of the State of Idaho where they require that every project contribute or finance the necessary fish and wildlife studies as that project affects the fish and wildlife.

Today our California license money is spread so thinly on this that our other resources are actually suffering, because it appears to be the basis that our license money must protect our wildlife resources against all comers, and the claims are becoming so multiple it simply becomes an economic impossibility to do so.

EXHIBIT A

GRIDLEY, CALIF., *November 7, 1959.*

MR. DAN SLATER,
River Basin Studies, U.S. Fish and Wildlife Service,
Sacramento, Calif.

DEAR MR. SLATER: The U.S. Fish and Wildlife Service report on the "Effect of Mine Waste Pollution Upon Anadromous and Resident Fish in the Upper Sacramento River," along with the report of the Philadelphia Academy of Sciences and the Leeds, Hill & Jewett engineering report to the State water pollution control board have been read with interest.

First I would like to register an amicable and minor disagreement; paragraph No. 4 states: "* * * pollution from mine wastes in Spring Creek caused * * * losses of fish before Shasta and Keswick Dams changed the natural regime of the Sacramento River."

I respectfully propose the insertion of the two words "very minor" in above quotation where I have placed the two figures, because:

(*a*) Prior to Shasta Dam the principal spawning effort was above said dam. Thus, principally, only the adult fish in transit would be affected. They appear to tolerate and/or avoid these lethal waters better (No. 25).

(*b*) Spring Creek, before Shasta Dam, emptied into a fast moving and turbulent Sacramento River with heavy flow from the same freshet causing the increased Spring Creek flow. This afforded immediate dilution and intermingling of these lethal waters with the heavy Sacramento River flow, permitting the buffering qualities of the Sacramento River water (No. 29) to act quickly in neutralizing the lethal salts. Thus the water was quite neutral and within the increased tolerance of the Sacramento to salmonids, before these waters reached the minor spawning area below Redding, which is now the principal spawning area after Shasta Dam Fishery relocation.

(*c*) Since the construction of Keswick flow equalizing dam, this condition has been aggravated. During the period when there is practically no flow from Shasta Dam, the Keswick Reservoir current past the mouth of Spring Creek is very slow. In that way there is very little intermingling of this poisonous flow with the remedial buffering waters from Shasta Lake. A solid volume or mass of this undiluted lethal water builds up in the vicinity of the mouth of Spring Creek. Then when Shasta power generation meets its peakload, the resulting current moves this accumulated large body of lether water en masse downstream through Keswick Dam and we have another fish kill.

(*d*) Retarded current in Keswick Reservoir also created the lethal 500,000 cubic yard delta at the mouth of Spring Creek. Prior to Keswick Dam these solids were carried off effectively and well dispersed downstream by the fast-moving river current.

However, we appear to be in general agreement with the proposal of your report for remedial action.

1. You propose dividing Spring Creek into three separate flows:
   (*a*) The reasonably harmless water of Spring Creek above Boulder Creek.
   (*b*) The lethal 17 percent of the total drainage coming from Boulder and Slickrock Creek which carry nearly all of the heavy pollutants of that watershed and supply the poisonous aggregates in the delta deposits.
   (*c*) The reasonably harmless flow of the South Fork of Spring Creek.
2. It is your proposal:
   (*a*) To dam upper Spring Creek above the mouth of Boulder Creek and to divert this relatively harmless water via tunnel into Flat Creek. This

to avoid having it intermingle with the lethal flows below, thus creating too large a volume of lethal waters for metering storage and dispersal handling. Also to avoid passing this additional volume of water past the mouths of Boulder and Slickrock Creek, where it will pick up lethal solids and increase the delta (No. 38).

(*b*) To dam the bed of Spring Creek just above the mouth of the South Fork of Spring Creek. This will stop the downstream movement of the lethal solids which are now a problem in the delta. This will concentrate the lethal liquids for properly metered dispersal, preferably into the fast-moving and turbulent waters of the river below Keswick Dam, perhaps via perforated pipe across said streambed, thus providing good dispersal into the buffering waters of the river (No. 38). It may be possible that some commercial metal recovery may become feasible in the concentrated impoundment of flow from Boulder and Slickrock Creeks, thus further reducing pollution.

(*c*) With the above two diversions from Spring Creek watershed, the remaining flow from the South Fork should be harmless.

3. Your report agrees with others, that the principal cause of this periodic poisoning is the oxydization of these heavy metal compounds, whereby they become water soluble.

4. It has been proposed that the sealing of mine tunnels just with dirt by a bulldozer will reduce the metal content of the drainage water due to lack of air-oxygen which makes these compounds water soluble.

5. Then, perhaps, some of the large offending mine dumps can also be sealed off from oxydization by bulldozing dirt over them, and thus further reducing the heavy metals solutions to be dispersed into the river.

6. After the above reduction of inflowing poisons, it may be possible to move the presently dangerous Spring Creek Delta slowly to the bottom of Keswick Reservoir, or perhaps cover it with an air-excluding seal.

We thank you for the fine work in this study.

Now we very respectfully recommend an early appropriation by Congress to stop these periodic fish kills by heavy metals poisoning in the principal spawning area of our Sacramento salmonids below Keswick Reservoir.

Sincerely yours,

CHARLES S. BOHRMANN

(For Associated Sportsmen of California, Inc.; Salmon Unlimited of California, both members of California Wildlife Federation).

EXHIBIT B

IRRIGATION DISTRICTS ASSOCIATION OF CALIFORNIA,
San Francisco, Calif.

RESOLUTION ON PRIORITIES FOR WATER USE

Whereas the State of California and the United States of America are engaged in the planning, development, and operation of multiple-purpose water projects throughout the State of California; and

Whereas the State of California requires the development for agricultural, municipal, and domestic purposes of the water supplies of this State so that same may be preserved and put to beneficial use; and

Whereas the executive committee of the Irrigation Districts Association of California recognizes the need of planning and operating such projects in such a way as to put the water of the State of California into use so as to provide the greatest benefit for the people of the State of California; and

Whereas it has come to the attention of the executive committee of the Irrigation Districts Association of California that the Department of Fish and Game of the State of California is and has been attempting to secure the release of water which is needed for irrigation, municipal and domestic uses for the propagation of fish and other wildlife; and

Whereas the executive committee of the Irrigation Districts Association of California recognizes the benefit to the State of California to the multiple use of water, including the propagation of fish and other wildlife, at such times and in such places that such use does not interfere with the use for irrigation, municipal, and domestic purposes, but further recognizes that the use of water for propagation of fish and other wildlife is not to the best interests of the State of California when such use deprives agricultural, municipal, or domestic water users of all or any portion of the water needed for such purposes: Now, therefore, be it

Resolved, That the executive committee of the Irrigation Districts Association of California does hereby recommend to the State of California and all of its agencies and to the United States of America and its agencies that in the development, operation, and planning of projects for the development and use of waters of the State of California that the first priority of use be given to agricultural, municipal, and domestic purposes; and that no water which is necessary for such purposes be released from such projects solely for the purpose of propagation of fish and other wildlife; and be it further

Resolved, That the secretary of the executive committee of the Irrigation Districts Association of California is hereby authorized and directed to send copies of this resolution to any and all State and Federal agencies engaged in the planning, development, or operation of water projects in the State of California, including but not limited to, the State water rights board which is presently holding hearings on the San Joaquin River for storage and diversion of water at Friant Dam, at which hearings the department of fish and game is attempting to secure the release of water necessary for agricultural, municipal, and domestic purposes from Friant Dam for the sole purpose of the propagation of fish and other wildlife.

Adopted by the executive committee of Irrigation Districts Association of California on August 22, 1958, at Fresno, Calif.

ROBERT T. BURBROW,
Executive Secretary.

Mr. MILLER. Mr. Bohrmann, you also follow the testimony of Mr. Leonard with respect to the need that recreation and allied purposes be taken into consideration in the development of all Federal projects?

Mr. BOHRMANN. Of all Federal projects and State projects, but they are not too well covered on the municipal power and irrigation projects. But in view of the fact that all of these other three, where they are not so adequately covered, must apply to the Federal Power Commission for license, it is felt that there is a possible entry for the Federal Government to help protect the resource which so far the State does not appear to have been able to protect. It is on the basis of either it being protected or it is going to go, as our evidence substantiates.

Mr. MILLER. Mr. Bohrmann, you testified of the damage to the resource. We have had a number of witnesses here today who have indicated that this damage is an obligation of the Federal Government in addition to State governments and local governments. Would you affirm that to be a fact, or would you deny it?

Mr. BOHRMANN. I would affirm the fact, having reference to the San Joaquin River, which was actually dried up by Friant Dam, but this Congress certainly should examine the law which caused the 10 percent destruction. I have information from the California Department of Fish and Game that the fishery destroyed by the dried-up San Joaquin River amounts to approximately 10 percent of the salmon that were propagated in the Central Valley. That is a hard loss to take under one project.

Mr. MILLER. In your personal experience in your very wide background in this entire field, do you feel that the Federal Government has carried its share of the load in the past? And I am not trying to point a finger of any kind.

Mr. BOHRMANN. I believe they definitely have in connection with Federal projects. And the reason that they have is because our representatives in Congress have listened and have helped us attain this.

Mr. MILLER. I do not believe the record is clear as to what you mean by "Federal projects." Our fundamental concern at this hear-

[illegible] Federal project, then your answer stands. But if you are talking about the mechanical contrivances and construction that is necessary to cope with diversion, then I think you might want to reconsider.

Mr. BOHRMANN. I would definitely like to reconsider that, because I did not mean that the Federal Government has contributed the necessary basic research, but they have afforded the facilities which have been produced by the research we have had so far. The quality of these facilities, while they are better than what we have on the other types of projects in California, still probably leave a lot to be desired, because we haven't the basic knowledge to make the basic determinations, and that can only be obtained through competent basic research.

Mr. MILLER. That is, the Federal participation in the past?

Mr. BOHRMANN. Very frankly, I will have to plead ignorance as to how far the Federal basic research has helped. However, we do know that we need more basic knowledge before we can adapt our migratory salmonids to the impact of the water developments needed by our increased population.

Mr. MILLER. Does the Federal Government have a greater obligation?

Mr. BOHRMANN. I claim it has for this reason: If this were merely a native fish of the State of California it would be up to the State of California to make the necessary studies, but where, as I have pointed out, the salmon is an interstate and an international resource, it would seem to me that the salmon would be entitled to the same amount of consideration by the Federal Government as has been accorded to migratory waterfowl.

Mr. MILLER. Also, due to your broad past experience, would you say that there is a situation of crisis with respect to the salmon resources as has been detailed previously by Mr. Welsh and others?

Mr. BOHRMANN. There has been a definite decline to a point where we have not had enough spawners return, and in many instances after the spawners have returned they didn't have enough water in which to spawn.

Mr. MILLER. Is there a state of crisis?

Mr. BOHRMANN. There appears to be.

Mr. MILLER. Would you say that additional revenues are necessary for the survival of the species?

Mr. BOHRMANN. Research and help costs money; yes.

Mr. MILLER. You mentioned, and I think very laudably, the need for coastwide cooperation between our several States and Canada. Do you have any specific advice to give as to how we can achieve this, other than that which has previously been suggested by other witnesses, notably that of Mr. James, calling for membership in the Pacific Marine Fisheries Commission, and so on?

Mr. BOHRMANN. The one to which I would like to give my strong support is Mr. Gilchrist's proposal of a central coordinating information disseminating agency.

Mr. MILLER. Thank you very much, Mr. Borhmann.

Mr. Johnson, do you have any questions?

Mr. JOHNSON. I have no questions.

Mr. MILLER. Mr. Lunardi?

Mr. LUNARDI. No questions.

Mr. MILLER. Are there any questions that the audience may have of Mr. Bohrmann? Would they identify themselves and address their question to me, please?

Mr. MCKEEHAN. I am Paul McKeehan. I am speaking now, Mr. Chairman, as chairman of the water committee of the California Wildlife Federation. I would like to ask Mr. Bohrmann if he agrees that the Federal Government accepted their full responsibility in the construction of Friant Dam in the Central Valley project without any provisions for the salmon run in the San Joaquin River?

Mr. BOHRMANN. I will answer that question by simply stating that they have fared well except below Friant Dam. At Friant Dam very obviously when a fishery was destroyed the Federal Government did not discharge its responsibility. I made that very clear exception in my statement, sir.

Mr. MCKEEHAN. Thank you.

Mr. MILLER. Are there any other questions from the audience with respect to Mr. Bohrmann? Thank you very much, Mr. Bohrmann.

Mr. BOHRMANN. In the name of the Associated Sportsmen, I certainly thank you and Congressman Johnson for your interest in this matter. It is a matter of such essence that we are very, very happy to see this interest.

Mr. MILLER. Thank you very much. Mr. Warne, would you call the next witness, please?

Mr. WARNE. Mr. J. T. Barnaby of the U.S. Bureau of Sports Fisheries and Wildlife. Mr. Barnaby.

JOSEPH T. BARNABY

(Chief, Division of Sport Fisheries, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Post Office Box 3737, Portland, Oreg.)

Mr. MILLER. Mr. Barnaby, we are very grateful that you are willing to appear here. We appreciate it a great deal. I hope we are going to have some fruitful results from this meeting, and I think you will realize from the tenor of our proceedings that we are not in any way trying to put anyone on the spot. We have similar objectives and goals, and we understand the difficulties under which the Federal Government labors. I, as a former nonelected Government official myself, realize those only too well, and certainly Mr. Warne does. We welcome you here. Would you identify yourself for the record, please?

Mr. BARNABY. My name is J. T. Barnaby, chief, Division of Sport Fisheries, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service.

Mr. MILLER. Mr. Barnaby, you may introduce a statement for the record if you wish, and then proceed informally to summarize it, or in any other manner you may choose to proceed.

Mr. BARNABY. Well, if it is all right, I think I will read most of this statement, because I think it is pertinent to this hearing.

Congressman Miller, Congressman Johnson, and gentlemen, I am pleased to have the opportunity of appearing here today to present a statement on the activities of the U.S. Fish and Wildlife Service in this area.

The U.S. Fish and Wildlife Service, with its two bureaus, the Bureau of Sport Fisheries and Wildlife and the Bureau of Commercial Fisheries, is the agency primarily responsible at the Federal level for the protection and maintenance of the fish and wildlife resources of the Nation. My discussion today will be limited to the fishery resource and to the Service's activities in California.

While time does not permit mention of all authorizing legislation, reference to a few acts is desirable.

The Joint Fisheries Resolution of 1871 (approved Feb. 9, 1871, 41st Cong., 2d sess., Res. 22) authorized the President to appoint a Commissioner of Fish and Fisheries, whose duties included studies of the abundance of the fish of the coast and lakes of the United States.

Subsequently other legislation was enacted from time to time relative to the Federal Fish and Wildlife organizational pattern, culminating in the Fish and Wildlife Act of 1956 (70 Stat. 1119), under which we are now operating.

The Black Bass Act of 1926 (61 Stat. 517) made it unlawful to transport across State lines any fish which, contrary to State law, are caught, killed, taken, sold, purchased, processed, or transported.

The White Act of 1930 (46 Stat. 371) provided for construction of fish hatcheries, fishery laboratories, and experimental bass and trout stations, and also provided for the acceleration of the fishery research program of the Federal Government. Numerous subsequent acts have been passed to supplement the original White Act.

The Coordination Act of 1934 (48 Stat. 401), as amended in 1946 (60 Stat. 1080) and 1958 (16 U.S.C. 661 et seq.), is probably the most important and far-reaching piece of legislation ever enacted in the interest of fish and wildlife. The 1958 amendment of this legislation entitled "The Fish and Wildlife Coordination Act" provides broad authority for cooperative efforts of Federal, State, and other agencies in the rearing, stocking, and increasing the supply of fish, and in developing a nationwide program of fisheries conservation and rehabilitation. This act clearly presents the policy of the Congress as to the value of the fish, shellfish, and wildlife resources of the Nation, and spells out specific provisions of the preservation and improvement of fish andwildlife resources as part of our national water development program.

One new aspect of the Fish and Wildlife Coordination Act is the enhancement feature. Prior to the 1958 amendment, the legislation provided only for mitigation of loss of fish and wildlife. We were seldom able to totally offset project losses under this plan. Figuratively speaking, we were taking one step forward while slipping back two. Now we have a different picture. There is clearly authority for Federal agencies and agencies constructing water-development projects under Federal license, to include enhancement along with mitigation of damages as features of the project plans. The opportunities under this legislation are tremendous. We must move forward and make the most of this new conservation tool so that the public interest will be adequately served.

Public Law 86-359, 86th Congress (73 Stat. 642) is an extremely important piece of legislation which was approved September 22, 1959. I will refer to this act later in my talk.

I believe it would be desirable to mention some of the past and current activities of the Service in California. Studies in connection with water development constitute a number of outstanding testimonials on what can be accomplished through cooperation.

The grassland study, carried on during the period 1947-50, though better known for its influence on waterfowl, exemplifies an all-out cooperative undertaking. The California Department of Fish and Game, California Division of Water Resources, and University of California, made valuable contributions. The Service and the Bureau of Reclamation worked hand in hand. The Air Force cooperated by making filmstrips of areas populated by waterfowl. This cooperative study resulted in reauthorization of the Central Valley project with fish and wildlife as one of the major purposes of the project.

When Shasta Dam on the upper Sacramento River was constructed by the Bureau of Reclamation, a plan was developed for the relocation of the runs of fish spawning upstream from the damsite, and as part of the plan the Coleman Hatchery was constructed and is still being operated by our Service.

The construction of Folsom project on the American River likewise presented a difficult fishery problem, and in cooperation with the California Department of Fish and Game a plan was developed for the maintenance of the fish runs, which included the construction of the Nimbus Hatchery, presently being operated by that department.

Studies are underway at present that will have far-reaching influence on our fishery resources. In 1954 the Service, in cooperation with other Bureaus of the Department of the Interior and State and local groups, initiated a study of fishery resources of coastal streams in northern California. Field work was completed during June 1959, and the report is about ready for release. This study is a forward step, since it has made possible planning for fish and wildlife requirements, along with and at the same time that plans for other water use needs are being made. Water requirements for the preservation and improvement of stream habitat for salmon, steelhead, and resident fish make up an important aspect of this report.

We have recently completed a study and a report, in cooperation with the Bureau of Reclamation and the California Department of Fish and Game on pollution problems on several tributaries to Shasta and Keswick Reservoirs. Remedial measures were developed and the Bureau of Reclamation is currently designing facilities required to mitigate the pollution which has been damaging salmon in the spawning areas near Redding.

We are carrying on studies, in cooperation with the Corps of Engineers, on the potential effect on the fish populations of various salt-water barrier plans for the San Francisco Bay area, so that the Corps will have the benefit of our views and recommendations in deciding which plan, if any, to recommend to the Congress.

Many other studies have been made in the past, and still other studies are presently being conducted on water-development projects in California that are important to the management of salmon and other fisheries, but I will not attempt to enumerate them all. My main point is that within the limits of available personnel we are cooperating to the fullest extent with our responsible agencies in the protection and enhancement of the fishery resources.

Of the total of about 100 federally operated hatcheries in the United States, only one is in California. This one, the Coleman

Hatchery was, as previously mentioned, constructed when Shasta Dam blocked upstream migration of anadromous fish. It should be noted, however, that Coleman is the largest salmon-producing hatchery in the United States. Annually, 20 million to 25 million eggs are taken at the station with as many as 40 million being taken during a peak year. An average of more than 150,000 pounds of salmon fingerlings are produced for release in California waters. The Coleman Hatchery fulfills an important role in the management of the salmon in California, as has been proved by returns from marking experiments. Future needs undoubtedly will justify additional Federal hatchery production in this State.

So far I have talked only about some of the work of the Service in the past and present. If I understand the purpose of this meeting, we are predominantly interested in the future. In attempting to point out needs of fishery conservation, I will again refer to past accomplishments, but will emphasize the aspects that need to be strengthened.

The paramount objective of fishery programs of the U.S. Fish and Wildlife Service is to provide the greatest possible recreational and commercial use of the fishery resource, consistent with the maintenance of the resource. This broad and basic objective may be gained through close coordination of Federal, State and local fishery programs.

The fishery resource is a natural resource which, if properly managed, will continue in perpetuity to produce wealth and food for California and the Nation, but which, if neglected, can be decimated, or even destroyed for all time.

Management requires the attention of specialists in many fields. Each body of water, whether lake, stream or marine environment, is a separate problem, and may require individual analysis and treatment.

Research provides the basis for successful fishery management. It constitutes the most effective key to the protection and expansion of recreational and commercial fisheries. It seems to me that this is a field where much greater Federal effort could and should be exerted. I would be one of the first to admit that we have not fulfilled our responsibilities in this phase of fishery conservation. Many of the States have been forced to carry a heavy load without much more than moral support from the Federal Government. Every effort should be made at the Federal level to provide leadership and guidance in the research program. As a general principle, research should be undertaken by the U.S. Fish and Wildlife Service in fields of broad application.

As has been stated, much is desired in our research program. It is not fair, however, to leave the impression that nothing has been accomplished. Investigations carried on by our Service and financed by the Bureau of Reclamation relative to the screening problem at the Tracy pumping plant resulted in savings of both fish and money and the information gained at that project has been of value at other water-diversion projects.

The Sacramento-San Joaquin River systems present a special challenge to salmon management because the intense utilization of water results in high temperatures, increased effect of pollution, inadequate stream flows, and loss of spawning area. Our Service is exploring methods of improving management of the fishery resource at the Mill Creek Fisheries Station on the Sacramento River. The work has been concentrated on the problem of [illegible] during the incubation period of king salmon eggs in the spawning and nursery stream. We have determined that approximately 95 percent of the potential salmon perish at this time. These losses, it has been found, are caused primarily by the direct and indirect influences of extreme flows, both low and high.

Direct losses of spawn result from erosion of stream gravel during flooding. Fifty-six percent of the eggs in a test stream area have been washed out and lost from this cause during the last 6 years. Indirect losses result from transportation and deposition of soil materials on the spawning beds by flood waters.

We have experimentally improved upon these conditions in a section of stream area by controlling flows. Survival of planted eggs and the subsequent production of young salmon has been approximately 70 times greater than that experienced in similar areas where the flows were uncontrolled.

Because of this success, we are expanding the investigations at Mill Creek, and are planning on carrying on belated research in a section of stream in the Trinity project. There Trinity River water will be transported through a tunnel to Clear Creek in the Sacramento drainage where experiments can be conducted under stabilized flow conditions. The results of the research at Mill and Clear Creeks will provide means of increasing natural salmon and trout production.

Much more research is desirable on all phases of salmon and trout propagation, both natural and artificial. Further information is needed in such special fields as measurements of fish production; importance of water depth and fluctuation of water levels; relation of stream stages to fish production; manipulation of stream flows to create suitable fish environment; control of fish diseases; improvement of hatchery techniques; fish nutrition; fish screening; methods of upstream and downstream fish passage at dams; and related problems. Investigations in some of these fields are being carried on by our Service in the Northwest, particularly on the Columbia River, but as mentioned, more research is needed.

There are approximately 12 million acres in the Nation's reservoirs. Many more reservoirs are planned, authorized or under construction. Yet we know little of the management required to assure continued production and yield of desirable fish.

Use of pesticides and herbicides continue to present new problems.

It is possible to go on and on, but suffice to say, despite the present high level of our knowledge in some fields of fishery management, we are woefully uninformed in others.

Another feature of our activities worthy of mention is called Fishery Management Services. This is a new endeavor for the U.S. Fish and Wildlife Service which is virtually in the embryonic stage. This activity will provide information to guide, develop and maintain improved fishing on Federal installations, coordinate and participate in fishery-management projects involving Federal, interstate and international waters, integrate Federal hatchery production and distribution with comprehensive fishery-management programs, and carry on other related duties.

Limited efforts have already been made in the fishery-management services field. An organization has been formulated, but only two

biologists for our entire Pacific region, which includes the six Western States. Much greater activity is needed in this field.

In discussing needs to insure preservation and improvement of the fishery of this area, I have tried to list some of the phases where we are short of information or where our efforts are inadequate. The deficiency exists in most fields of endeavor; hence, we need to expand our activities all along the line. The science of fish protection, maintenance and enhancement is relatively new, yet the population and development of the area is proceeding at an ever-increasing pace.

In brief, then, there is a real need for:

(1) Further research on all phases of salmon and trout propagation, both natural and artificial, as well as on fish-protective devices.

(2) A marked expansion in our Fishery Management Service's activities.

(3) An increased tempo in our basinwide approach to studies of water-development programs.

(4) A carefully considered and conservative expansion in the Federal program of artificial propagation of salmon and trout.

What is the answer? Obviously, there is no immediate panacea, but one thing can definitely be said. The problems are not insurmountable We can do the job if personnel are made available. We have a hard-core staff of devoted researchers and technicians; we have the support of the public who have indicated time and time again an interest in resource conservation. But this is not enough. The task is simply too large in relation to the manpower available. Furthermore, we must have time. And with the virtually exploding population and development of this area, time is running very short. It will be of little avail if, figuratively speaking, we lock the door after the horse is stolen. Or to be precise, if we do too little too late.

We can be second best in getting a satellite in orbit or in hitting the moon, and only suffer damage to our pride, but if we are second best in protecting our fishery resource we may find that we have no fishery resource to protect.

And now a word about Public Law 86-359. That legislation, enacted less than 2 months ago, directs the Secretary of the Interior to undertake comprehensive continuing study of the migratory marine fish of interest to recreational fishermen. Research carried on under this directive should go a long way toward filling the needs to which I have referred.

Thank you.

Mr. MILLER. Mr. Barnaby, thank you very, very much for that excellent statement. Practically all the questions which I wrote down here to ask you as you went along you answered in the course of your subsequent statement. What I would like to do, however, is just to high point some of the things that you said, to add emphasis and point them out.

You said that within the limits of available personnel you are doing the best job possible. In other words, what you need from Congress is additional funds to add to that personnel so that you can do a better job. Would that be a fair statement?

Mr. BARNABY. That is absolutely correct, sir.

Mr. MILLER. You have emphasized that your mission is the greatest use of the resource and the need for cooperation between Federal and State. Your statement certainly [illegible] demonstrates that you are willing to do that, particularly if you have the personnel to achieve it. Would that be correct?

Mr. BARNABY. Yes, sir.

Mr. MILLER. As to the Fishery Management Services, I think you have given some very excellent descriptive paragraphs regarding it, But just to assist me to understand it a little better, is this the kind of thing that we were talking about earlier in the day; that is, to supply responsible data for commercial fishermen on which to make their marketing conclusions? Is that what you have in mind with respect to Fishery Management Services, or am I missing the point?

Mr. BARNABY. No, sir. Within our Service we have set up a Branch of Fishery Management Services, as it has been called. It has no connection or relation to commercial fisheries. It is to carry on management studies, really, in regard to Federal waters such as military reservations, Indian reservations, and also to coordinate the activities of our Service with the State agencies in connection with management activities. Some of the fish, for example, from our hatcheries, are turned over to the State agencies for distribution. We do get together with the State agencies and decide each year just what the distribution from a given hatchery is going to be. I am speaking particularly now of sport—well, any of our hatcheries, but particularly the hatchery in Montana where we are raising trout. We work together with the State in that our Fishery Management boys work with the State boys and decide the best place to plant those fish, but it is in connection with recreational fishing on inland waters.

Mr. MILLER. Is there anything that you can add to the record which will be more helpful to us amateurs to know just what is meant by the phrase "Fishery Management Services" that you referred to previously—some other description of what it might undertake?

Mr. BARNABY. Well, the objective is to be the planning group for the distribution of fish from Federal hatcheries. And, of course, work in cooperation with the State agencies, because actually, in our operation of our Federal hatcheries we generally distribute the fish in accordance with the wishes of the various State departments of fish and game.

Mr. MILLER. You only have two biologists on duty on the west coast for this Service at the present time?

Mr. BARNABY. That is correct; for the States of Montana, Idaho, Nevada, California, Oregon, and Washington.

Mr. MILLER. Under an optimum reasonable program, what would you say was the need?

Mr. BARNABY. As a very minimum in this region we would like to have about 10 personnel, and that would be a minimum.

Mr. MILLER. I am very interested in this matter which you raised regarding the change of mission which occurred in 1956. Do you feel that has so altered the mission that now the Federal responsibility with respect to the salmon research will be greater than it was prior to 1956?

Mr. BARNABY. Very definitely. Pardon me, sir—1958. The amendment to the Coordination Act, I think, is what you are referring to.

Mr. MILLER. Yes.

Mr. BARNABY. Prior to that time, along with the State agencies—and, of course, they have a part in the responsibility under the Coordination Act—could only work on the mitigation of damages. In this new legislation it does open up a whole new field of getting the very greatest possible value out of water-development projects.

Mr. MILLER. I do not think enough can be made of that point, because many of us think a Federal agency should do this and that, and when we get back to checking the basic enabling legislation we find there is no authority or law for them to prescribe action, although individual members of that agency would want to undertake it and would feel it is necessary. So I am very grateful for that explanation, of which I had no knowledge, myself, and I am sure it is widely unknown in California among those who may have been critical of the agency in the past.

Do you feel any need for a correlation agency, such as has been suggested by a number of witnesses here, between the States and between Canada, and which service might be supplied by the Federal Government, or do you feel that an extension of the Fishery Management Service might adequately take care of this problem? I have given you a number of questions in one. First, do you believe there is sufficient correlation between the States and the Federal Government and Canada?

Mr. BARNABY. I feel that within the limits of available personnel, that the coordination is as good as it can be, and that it is fairly good at the present time, but if our Service had more personnel and manpower to do the job, that we could do a much better job than we are doing.

Mr. MILLER. Would this be through the Fishery Management Services?

Mr. BARNABY. In general; yes, sir.

Mr. MILLER. Then it is a problem of personnel and not structure?

Mr. BARNABY. Yes, sir.

Mr. MILLER. Those are all the questions I have at the present time. Again, I am very grateful, Mr. Barnaby, for this very fine statement. I had intended to ask you several questions about the specifics, but you already have gone into them in considerable detail, such as the understanding of the life history of salmon, the artificial spawning channels, so there is no need to belabor that point. I believe Mr. Warne has some experts who will give additional testimony on this score.

I certainly hope yourself or one of your staff will remain to the end, whether it is bitter or pleasant, to offer observations of your own with respect to whatever we may bring forth on this point. I would like you to feel free to comment at this time, or add an exhibit to the record on any previous testimony that has been given. Even the best of us, no matter how well we think we are informed, oftentimes may be beating a dead horse, when it gets down to the matter of specifics. Please feel free to have yourself or one of your staff comment on it as to its validity or nonvalidity. I would like to give you the opportunity at this time to comment on any preceding testimony that you may have to make.

Mr. BARNABY. Well, it has been very heartening to hear a number of the State representatives comment about the cooperation they have received from our Service. We, at least in our own small way, are trying to do the very best we can. Certainly, from our standpoint, we recognize that these fisheries, while they belong to the Nation as a whole, still are of vital importance to the local people. After all, we all live some place and are all interested in fish and wildlife in our particular area. As a Federal representative, as I say, we are doing the best we can. We certainly appreciate the comments which have been made today that the gentlemen at the State level feel that we are cooperating. I think that to the extent where our cooperation has not been quite as adequate as some would desire has simply been a case of inadequate personnel.

Mr. MILLER. I am interested in your reaction to Mr. Pautzke's remark that more Federal money should be made available to State agencies to conduct their own experiments, rather than be used by the Federal Government on basic research. Do you have any comment to make on that? I am not seeking to make a controversy between the Federal Government and any State government. This is a general observation you might make with respect to any statement.

Mr. BARNABY. There are, particularly in the West, the State agencies' very, very competent staffs. Having been in this business for almost 35 years, I am acquainted with practically all of the men in the State agencies and the one in Alaska. There is no corner on brains. There are a lot of capable people in all of the agencies who know that this job is a job too big for any one big agency alone. It takes cooperation and coordination on the part of every agency.

As far as turning over funds to the State, particularly in the Columbia Basin, for example, under the Columbia River development program all of the money that is appropriated for that purpose is eventually turned over to the Fish and Wildlife Service, and is then allocated to Washington, Oregon, and Idaho, and in part spent by the Fish and Wildlife Service.

Mr. MILLER. My question is: Would you like to see an extension of that doctrine, or do you feel that funds should be retained by the Federal Government for basic research?

Mr. BARNABY. As far as basic research is concerned, I do feel that a major part of that work should be carried on with Federal funds that are available and should be carried on by the Fish and Wildlife Service in view of the fact that the work has to be done and planned on an areawide basis, which would extend, say, from California to and including Alaska.

Mr. MILLER. You will notice that Mr. Pautzke commented that what he found objectionable, evidently, was that the project would get halfway through and then it would dribble off to nothing, and in Washington they felt they could take these funds—that the Federal Government did not seem to be able to continue with their objective. I realize this is suppositious.

Do you look to improving the situation in the future which would give us this continual research?

Mr. BARNABY. I definitely do. Public Law 86-359 (H.R. 5004) specifically states, "continuing research."

Mr. MILLER. As you said, you know probably all the people on the coast. Dr. Needham commented that we needed money for grants and scholarships in this field. Do you feel that this is a fruitful source of Federal endeavors so that you would have enough biologists so that you couldn't call all them by their first name?

Mr. BARNABY. First of all, a lot of the capable work has been done at the university.

Mr. MILLER. Not the work that has been done, but the need for scholarships and grants; that the Federal Government may appropriately do this?

Mr. BARNABY. Yes, sir; I think so.

Mr. MILLER. Those are all the questions I have. Are there any questions?

Mr. WELSH. My name is Ray Welsh. I would like to ask two specific questions of Mr. Barnaby. By whom and how was the size of the program at Coleman Hatchery, in order to replace the area lost by the construction at Shasta Dam, determined?

Mr. MILLER. Would you be able to answer that question?

Mr. BARNABY. I believe that was determined by a board of consultants who were appointed by the Secretary of the Interior who developed a program of mitigation of damages.

Mr. MILLER. Next question, Mr. Welsh.

Mr. WELSH. In view of my statement, Mr. Barnaby, with regard to the results of the Coleman Hatchery, would you, Mr. Barnaby, say that now is the time to place the Coleman Hatchery as originally intended by the Federal Government, at least until through this emergency?

Mr. MILLER. As it relates to resource. Would you be able to answer that?

Mr. BARNABY. I believe that the Coleman Hatchery has in the past fulfilled the needs, or the load, that was put upon it. The production from the hatchery has been increasing due to, we feel, better knowledge, better management. For the past 10 years the production at Coleman has been about 150,000 pounds a year. Of that 10 years, during the past 5 years the production has averaged 186,000 pounds a year. In other words, in the first 5 years of that 10 years, I think it was, we are in the order of 120,000-odd pounds. So the production is being increased. But at the present time there is a need for an expansion of facilities if we are going to take care of all the fish that come into that area.

Mr. MILLER. Off the record.

(Discussion off the record.)

Mr. MILLER. On the record.

In an off-the-record discussion we went into the problem of the Coleman Hatchery as it relates to its gross productivity as being adequate or inadequate and its relation to the subject at hand. If there are any questions with respect to the Coleman Hatchery relating to the need for research as to whether hatcheries are the best means or whether other means such as artificial spawning beds, let us have the question. But if not, let us defer to a later time.

Mr. WARNE. I would like to ask whether the Fish and Wildlife Service might look with some favor on a request from the department of fish and game and other State agencies to join in a coordinating research program with specific reference to the Sacramento River system?

Mr. MILLER. Does that include the efficiency of hatcheries?

Mr. WARNE. It definitely includes the value of hatcheries, artificial propagation, spawning beds, et cetera.

Mr. MILLER. Would you answer that?

Mr. BARNABY. We would certainly be quite happy to enter into such a cooperative undertaking.

Mr. MILLER. Do you think that it would be fruitful?

Mr. BARNABY. Yes, sir.

Mr. JOHNSON. You mentioned in your statement about the research and development that went into the fish screens at Tracy. I presume that you have had further research on that so that with these new pumping stations coming in on the Sacramento River, the one at Corning Canal and the other two or three that might come into being further on down the river, you have further perfected the type of screening that will be necessary to take care of those pumping stations?

Mr. BARNABY. We feel that we certainly know more about it than we did when we completed the project at Tracy. In other words, we have been taking on evaluation studies, and on a new design. We feel we could do even a little better job.

Mr. JOHNSON. At Tracy for quite awhile there was the necessary requirement to pump water. We lost a great deal of fish. With the installation of the others, we are ready to protect that.

Mr. MILLER. Are there any other questions?

Mr. DIFANI. I would like to ask Mr. Barnaby if he knows or can tell us approximately how much money is being spent on the Fish and Wildlife Service on the Columbia River.

Mr. MILLER. Would you be able to answer that, Mr. Barnaby?

Mr. BARNABY. That program has been underway since 1949. In other words, about 10 years. In that period of time the expenditures have been in the order of $15 million. The money has been spent or has been allocated to the States of Washington, Oregon, and Idaho, and some spent by our Service for various activities such as the construction of the hatchery stream clearance and that type of work.

Mr. DIFANI. I want to emphasize that your answer pointed out that the Federal funds were allocated to other States; is that correct?

Mr. BARNABY. Yes, sir; that is correct.

Mr. MILLER. Off the record.

(Discussion off the record.)

Mr. MILLER. On the record.

Are there any further questions to ask within the limit of what we have discussed in an off-the-record discussion? Would you identify yourself.

Mr. WELSH. Ray Welsh. Mr. Chairman, I hope I am not out of order, but I wish to go back to the Coleman Hatchery for a moment, and certainly it fits in with research, as we see it.

Mr. MILLER. Would you like to add to your statement with respect to that phase?

Mr. WELSH. I would rather ask the question. We in the fishery realize that many of our streams have been hit far harder than the Sacramento system, particularly on the outside in the shorter stream areas and in the densely logged areas. We feel that the Coleman Hatchery is the basic supplier of the king salmon resource in California. Until this research is done, how can we rehabilitate these streams? That is what I want to find out. Why under the new existing law which allows fish and wildlife resource enhancement we should not at this time complete Coleman Hatchery so we will not lose our resource while we are studying?

Mr. MILLER. Would you be able to answer that, Mr. Barnaby?

Mr. BARNABY. You say, "complete." I believe that the Coleman Hatchery was completed inasfar as a completion point is concerned quite a number of years ago. It can be expanded or the production can be increased, and we would like to have that done. We feel that we have approached the point where we can increase the output at that station by some additional facilities.

Mr. MILLER. And additional funds?

Mr. BARNABY. Yes. We would require additional funds to have that facility.

Mr. JOHNSON. Mr. Chairman, I would like to say this: We took that up with the Fish and Wildlife people in Washington and that is why we are going to take the trip to Coleman Hatchery, the idea being to look over the possibility of renovating the present site or possibly enlarging it, but we have to request additional funds.

Mr. MILLER. Are there any further questions?

Mr. PAUTZKE. Clarence Pautzke. Mr. Barnaby, you said that you only had two fishery biologists on the Pacific coast. Is that for all the services? Is that all you have?

Mr. BARNABY. Two Fishery Management Services biologists; two biologists in this field of Fishery Management Services. The Fish and Wildlife Service has a number of other biologists carrying on research work. Perhaps I didn't make it clear.

Mr. SWIERLIN. Casper Swierlin, Tyee Club. I would like to ask Mr. Barnaby who so little research has been directed to oceanography in the view of the fact that 99 percent, 99.9, of the dissemination of flow-going salmon takes place in the ocean. Has any work been done relative to determining what factor or factors may exist in the Davidson Current, that 50-mile wide current running from Mexico to Alaska, into which all salmon of every variety and species must enter after they migrate from their spawning grounds.

Mr. BARNABY. I would like to correct one point, and that is this matter of mortality. Rather than 99 or 99½ percent of the mortality taking place in the ocean, about 99 percent of the mortality takes place in fresh water. And so with the limited appropriations available, we have, therefore, directed our attention to the mortality or the conditions affecting the mortality of the fish in fresh water. Some work has been done in the marine environment, and more work should be done. But, as I say, with the funds available we have seen fit to direct our attention, restrict it, primarily to the fresh water.

Mr. MILLER. Are there any other questions to be directed to Mr. Barnaby from the audience? If not, Mr. Barnaby, thank you again for a very excellent statement and a very complete, thorough presentation. I am hopeful that some of the situations which you are so well aware of can be met by Congress this year and in succeeding sessions.

Mr. BARNABY. Thank you.

Mr. MILLER. We will take a 5-minute recess.

(Recess taken.)

Mr. MILLER. We will be in order.

Mr. WARNE. I call Mr. Samuel J. Hutchinson, regional director, Bureau of Commercial Fisheries, Fish and Wildlife Service, Seattle.

SAMUEL J. HUTCHINSON

(Regional director, Pacific region, U.S. Bureau of Commercial Fisheries, 1319 Second Avenue, Seattle, Wash.)

Mr. MILLER. Will you be kind enough to identify yourself for the record.

Mr. HUTCHINSON. Thank you, Congressman Miller. I am Samuel J. Huthchinson, regional director, Pacific region, Bureau of Commercial Fisheries, Seattle.

Congressman Miller and Congressman Johnson, we are very pleased to be here to enter into the discussions today. The report that was given by Mr. Barnaby is a joint report of the Bureau of Sport Fish and Wildlife and the Bureau of Commercial Fisheries. Therefore, I have nothing to add to his statement. We are very pleased to be here to answer any questions.

Mr. MILLER. The very fact of the joint statement indicates your close cooperation in this regard and your desire to continue such cooperation in the future?

Mr. HUTCHINSON. Yes; that is correct. I want to take this opportunity to thank the officials of the various State agencies for their very kind remarks with regard to our cooperation. It is our hope that this cooperation may continue in our research efforts. I thank you.

Mr. MILLER. Although oceanography has been mentioned, the primary function here has been to consider research in which man is involved. Do you have anything to add in respect to research that is being conducted in oceanography and anything to add with respect to your hopes for the future in this regard?

Mr. HUTCHINSON. As to the future, I wish to say that I certainly hope a great deal of effort can be put into oceanographic work. At the present time we are extremely limited as to oceanographic. We have one ocean vessel out. We have one working on the high seas. I would like to state that we do have this contract of the Scripps Institute of Oceanography. I believe that of these three contracts some $600,000 is going into oceanographic studies here on the Pacific Ocean.

Mr. MILLER. Do you feel that would benefit our fishing industry or benefit our ability to launch atomic bombs from submarines?

Mr. HUTCHINSON. I will answer it in this way: I feel any work that is being done in the ocean would be of great value to fisheries work in the Pacific Ocean.

Mr. MILLER. You will recall that Mr. Gilchrist earlier in the day testified to the need for data upon which to base their marketing plans in the fishing industry, reliable data. Do you feel that such a mechanism is now available or will shortly be available to assist the industry?

Mr. HUTCHINSON. I feel that there is a mechanism at the present time available, and we are working with the industry very closely in the system of their marketing. We have a market development organization. We also put out monthly reports, our Fisheries Review. And then there is the Pacific Fishery biologist reports that report progress in research. So, the mechanism is available.

Mr. MILLER. Do you feel that there is sufficient legislative authority to the agency to proceed with the job at hand? Do you feel that Congress has given you sufficient mission legislation to accomplish the job which you feel is necessary to be done?

Mr. HUTCHINSON. Yes, I do. In the last 10 years great strides have been made. Under the last revised Coordination Act we do have the implements to proceed and carry out the research work here in the Pacific.

Mr. MILLER. Are there any other questions to be directed to the witness concerning the Bureau of Commercial Fisheries? If not, thank you very much, sir, for appearing here this afternoon. We appreciate it very much.

Mr. HUTCHINSON. Thank you for this opportunity.

Mr. WARNE. Mr. Alex Pesonen, U.S. Bureau of Reclamation.

EVERETT A. PESONEN

(Conservationist, region 2, U.S. Bureau of Reclamation, Post Office Box 2511, Sacramento, Calif.)

Mr. MILLER. Mr. Pesonen, we are very gratified that you consent to come here and to be at our hearing. Would you identify yourself for the record?

Mr. PESONEN. My name is Everett Pesonen. My title is conservationist. I am in the region 2 office of the Bureau of Reclamation at Sacramento. May I say that Mr. P. H. Duggan, our regional director, regrets that he could not be here.

In connection with this subject on research, I might say by way of background that the Fish and Wildlife Service and the Department of Fish and Game representatives have pretty much described what reclamation has done. There is just one little bit of information that I might fill in. That is, that reclamation funds of about $2 million were used in the construction of Coleman Hatchery. And about $800,000 or so of the operation and maintenance fund before it was turned over to the Fish and Wildlife Service for management, which now manages it. The Nimbus Hatchery, which was constructed on the American River, cost about $1,200,000. For the Tracy fish collecting facility, better than $3 million. All of these have a plus; they are more than these amounts which I am giving, which represents very substantial funds as you can see.

All of this work, all of this money, is spent on the basis of the information that we have; the best information that we have. I think in all cases the fishery agencies and Reclamation both have felt that the information was somewhat inadequate and that a better job could have been done with more basic knowledge of the resource with which we were concerned. It may not be quite as evident in the case of Shasta, but take the Nimbus Hatchery, for example, which has not proved to be a very successful enterprise because our estimate of the water temperature proved to be wrong. The water has been too warm, really, to raise fish. So, we are now faced with the problem of correcting an error, shall I say, which really was a shortcoming in knowledge. Now we have to find some way of getting cooler water into that hatchery. I think it can be done, but it is going to add some more numbers running close to seven figures in the way of dollars.

In the case of the Tracy fish collecting facility, we had another case of insufficient knowledge of the problem. We spent almost—well, it was in the neighborhood of $800,000—just to get information, some of which was basic information, and really should have been acquired in basic research and not have been a project responsibility to acquire. Of course, the information acquired is valuable, say, throughout the scientific world, the fishery world.

Mr. MILLER. And will be available to them?

Mr. PESONEN. It has been published and is available to others now and, of course, everyone is glad to make it available. However, there is a reluctance to spend project money for research of this kind which is not confined to any particular area; that is, the value is areawide or is as wide as the resource.

Mr. MILLER. And is not properly a part of such construction?

Mr. PESONEN. It shouldn't be. The administrators in Reclamation feel that perhaps their spending that kind of money might be open to question when the auditors come around. This is one of the problems that we run into.

For example, they spent quite a lot of time on how fast do fish swim. That involves a one-inch fish, a two-inch fish and a three-inch fish. And the design of the structure is dependent on the swimming speed of the fish, we will say. That is just an illustration of the kind of basic information that is needed when you get to design problems. There are many other kinds of information, but that is a simple illustration.

Mr. MILLER. It is very interesting.

Mr. PESONEN. In general, we feel that this kind of basic research should not be a construction responsibility. We do not have the money for that kind of research until construction funds are available, and then we are under the gun. Then we are in a really critical situation, when you need answers and do not really have the time to get it.

Mr. MILLER. Mr. Pesonen, would you signify whose responsibility it should be in your estimation?

Mr. PESONEN. As far as the Bureau of Reclamation is concerned, we look to the Fish and Wildlife Service. They are a sister agency in the Department of Interior, and in these matters they are supposed to advise us and to furnish us all the information that is available. We consult with them on these matters and, of course, they were the ones who were employed to do both the basic and applied research in the case of Tracy, for example, We look to that agency. Whether we should change our minds and look to some other agency, I don't know, but this relationship seems to work out all right.

We need research for planning for the future of the fishery resources which are tied up in the projects that are on the planning boards today. One of the areas is in economics. The Wildlife Coordination Act makes fish and wildlife a project purpose right along with irrigation, power, domestic water supply, and other functions which a project may serve. The Fish and Wildlife Service is supposed to furnish us the information on which our plans can incorporate the fish and wildlife features that should be included in the project. They are supposed to furnish us with economic evaluations, and they do. The dollar is the yardstick, the common denominator that is used in deciding the resource development which is justified.

Mr. MILLER. Cost-benefit ratio enters as part of that consideration, is that correct? [illegible]

Mr. PESONEN. That is correct; to arrive at a cost-benefit ratio. So, we need not only the cost but the benefit values, and I do not think that in any field, particularly in the fishery field, we have economic information that can be used to justify clearly and without any doubt the value of the resource that we are dealing with as compared with other resources.

Mr. MILLER. You will recall from the introductory remarks I called attention to the fact that the Fish and Wildlife Service did have this high on its list of priorities for next year.

Mr. PESONEN. Yes, I recall that, but I felt it did need repeating.

Mr. MILLER. It certainly does.

Mr. PESONEN. Besides the economic field, or bio-economics, I guess it is called, we need better inventory information. I know that from the Bureau of Reclamation, from where I sit, we make requests on the Fish and Wildlife Service for information that requires a degree of basic knowledge that they simply don't have the resources to get in the time in which they have to get it. We will take the example of a dam which is to be located in a certain area. How much spawning area will be cut off? And how much would it cost to replace it in some way? That is, whether it is a hatchery or artificial spawning area or the location of another stream, or whatever you want to call it. Or whether it requires an additional flow of water, which also enters into the cost picture.

As I mentioned in the case of the Nimbus Hatchery, we need more basic information on water temperatures, and particularly the influence of these water control structures on temperatures.

Of course, we have mentioned pollution. We have some pollution problems which have been mentioned, particularly the one on Spring Creek. We should have had information on that pollution problem, perhaps, clearly. We needed it at the time Shasta Dam was built, which might have done quite a lot to at least prevent damage to the Sacramento salmon resource. I feel there is a need for a coordinated research program.

For example, the water control agency could have before them a program and have the knowledge that this is the salmon-steelhead research program that is underway, whether it is carried on by the States or by the Federal Government, or by independent agencies like the universities so that we would know in what areas information was being secured. We should also sometimes be in a position to indicate in which areas information will be needed in the event fish and wildlife agencies are not aware of the need.

Mr. MILLER. Will you elaborate on that a bit? Do you mean there should be some advance scouts looking for areas where research should be conducted and tipping off Fish and Wildlife as to what these areas are?

Mr. PESONEN. That is essentially what I have in mind. If someone puts his mind to it, they can realize what influences manmade developments on streams are going to have and in what areas information is going to be needed.

Mr. MILLER. And then proceed to get that information?

Mr. PESONEN. Yes; and proceed to get that information. I agree with this gentleman from the Tyee Club that it would be nice to have some publication that keeps us up to date on the status of research that is underway. Whether it be an annual publication or semiannual, or what, but something that would alert us to what is going on so we could get the benefit of the findings, even though the research may have not been completed. It might give us guidance when there is a project which is going to be built now and won't wait until the end of the research program.

Mr. MILLER. Some witnesses have attested to the fact that there is need for this kind of publication, and then there are some other people who say that it is in this or that publication, presumably professional publications. Frankly, I am unable to determine who is saying what and whether both are right and they are just operating on different levels of the mind.

Mr. PESONEN. I can't tell you, either.

Mr. MILLER. I think anyone who is present who has additional information to shed on this very important field, that is, the distribution of current research on a continuing basis in formal publications, or informal, should present to me an exhibit which we can append as part of this transcript.

Mr. PESONEN. Finally, it seems to me in the area of coordination that we have the Wildlife Coordination Act which, as far as the legal machinery for coordination is concerned, I think is adequate. We still have several agencies in the water conservation field and State agencies in the fish and wildlife conservation field, and we are all concerned with the same resource and in the same areas very often. But we have no coordinating group. We do not get together around the same table and talk to each other yet. We talk to each other, but it seems to be on an informal basis. We go to this fellow's office and he asks us this or that, or vice versa, and that is all to the good, and we will continue. However, there come times when major policy comes into consideration and, then, such coordination is inadequate to the need.

So I feel that we have demonstrated coordination, at least in the case of the Tracy fish collecting agency, where we had an advisory group which included the State of California Department of Fish and Game, the California Department of Water Resources, the U.S. Fish and Wildlife Service, and the Bureau of Reclamation. We had an advisory council which evaluated the findings as we went along; met as the need required, about a couple times a year.

Mr. MILLER. Would the Pacific Marine Fisheries Commission be a suitable vehicle for such coordination if it were given more definite concrete powers?

Mr. PESONEN. I imagine if it were given the powers that it could be. I don't know enough about it to be certain, but it would seem so just offhand.

Mr. WARNE. I would like to ask a question.

Mr. MILLER. Mr. Warne, will you ask your question of the witness?

Mr. WARNE. Mr. Pesonen, would you think that something like the proposal I made while Mr. Barnaby was testifying here; that a cooperative project in the Sacramento River system would be useful and would the Bureau of Reclamation find it opportune and would join in with the Federal and other State agencies in that proposition?

Mr. PESONEN. I can only speak from my personal point of view in the Bureau of Reclamation, and I feel that it would certainly be very valuable.

Mr. Miller. I get the impression that what we need here is a Pacific coast clearinghouse for research. Is that correct?

Mr. Warne. Mr. Chairman, one thing that has not been pointed out in the testimony that has been given here, but which is clear to me and maybe to some of the others who have worked in both areas, is that they have a much better coordinating facility in the Columbia River area than we have down here. This is because you have the State of Washington, and State of Idaho, State of Oregon, the Corps of Engineers, the Bureau of Reclamation, and the Fish and Wildlife Service all being brought together in a single river system. Several years ago they found out that they needed to have a common source of funds and an exchange of information. Here in our area, the area that particularly hits all of us in this room from California, has not had this obvious requirement for coordination, and as a consequence the coordination has not been provided either.

As we talk about the Coleman Hatchery, it is an individual project. As we talk about the Nimbus Hatchery and the problem temperatures out of the Folsom Reservoir, it is an individual problem. As we talk about the Tracy pumping plant, it is an individual problem of controlling that great diversion, whereas in fact we have got basic research problems that face us throughout the length and breadth of this vast Central Valley area that we are still approaching piecemeal. I would like to see us get together on a coordinated basis with the Bureau, which I know has got lots of resources in this field, with the Fish and Wildlife Service, with our agency, with the department of water resources, with the pollution control board to see if we cannot work out a program like that which apparently is giving a great deal more satisfaction in the Northwest. I think we could extend it to the whole Pacific coast. Then, the same coordination as between areas, do you see, might feasibly come under the Pacific Research Council.

Mr. Miller. Do you have anything further, Mr. Pesonen?

Mr. Pesonen. That completes what I have to say. I do not have a prepared statement. I am just speaking off the cuff.

Mr. Miller. I think you did it in a well-organized fashion and I certainly got a great deal out of it. In fact, to the extent that I have no questions. Are there any questions from the audience of Mr. Pesonen? Mr. Donaldson?

Mr. Donaldson. The Bureau of Reclamation obtains necessary research information from the Fish and Wildlife Service. If the Fish and Wildlife Service is unable to furnish this information, is the Bureau restricted from going to other sources for the required information?

Mr. Pesonen. I would say this: That we get information everywhere we can, but the information would be furnished to the Fish and Wildlife Service to evaluate along with other information that it had. We do not know how much information the Fish and Wildlife Service has, but they have more than we have. So, naturally, they should evaluate the information as to validity for any particular situation.

Mr. Donaldson. Does the Bureau have the authority to correlate information from different sources?

Mr. Pesonen. Certainly it has the authority to correlate information from all sources by the Coordinating Act. The State agencies are mentioned specifically as being agencies to be consulted, although as a matter of administrative practice we generally go through the Fish and Wildlife Service, but on an informal level where we get together all the time.

Mr. Miller. Are there any other questions from the audience?

Mr. Warne. I would like to ask one other question, Mr. Chairman, principally for the development of a thought, since I think one of Mr. Pesonen's statements might leave an inadequate understanding, at least with me.

The Bureau of Reclamation in meeting its basic information needs in such fields as stream gaging and rainfall, recordkeeping, at times has supplemented the basic research programs of the Geological Survey and Weather Bureau. Is there any reason why, if it needs basic fishery data, it could not supplement the programs of the Fish and Wildlife Service or other agencies testing, for example, how fast fish swim, and other such basic requirements?

Mr. Pesonen. As I said, that information was found 100 percent by reclamation in the case of Tracy. As I understand, at the present time the Fish and Wildlife Service budgets directly for the river-basin funds and does not come and ask the Bureau of Reclamation or the Corps of Engineers for a handout as they have done heretofore. But in the case of construction such as the Trinity River Hatchery, which is on the drawing board now, all the Fish and Wildlife Service can bill the Bureau of Reclamation is for costs of time that they spend on that, and they do to a certain extent.

Mr. Warne. How do you draw a distinction between the basic information needed in the fishery field and the basic information needed in the hydrology field for the design of a dam?

Mr. Pesonen. I find it difficult to do, and if the construction of the dam is what raises the biological question, I don't see that it is giving a handout if the Bureau or Reclamation finances that piece of research.

Mr. Miller. If there is a distinction, please make it.

Mr. Pesonen. I think that the Fish and Wildlife Service felt the need to be independent of the Bureau of Reclamation as to funds and this matter of continuity in program. When the Bureau of Reclamation had a specific problem with a specific request for funds, then we would get together and guess at how much it would take to do it. Sometimes you guess it right and sometimes you don't because you do not know the nature of the problem until you get into it. For continuity I think the Fish and Wildlife Service is better off if they have line items in their budgets rather than relying on the Bureau of Reclamation or some other agency to come through with the money, hoping that they have a program big enough to carry the staff that they have.

Mr. Miller. Are there any further questions? Mr. Gilchrist.

Mr. Gilchrist. Mr. Chairman, may I ask when projects such as the Trinity River project is planned, are any lay agencies, civilian or otherwise, ever consulted prior to final adoption of the plan?

Mr. Pesonen. Is Charlie Bohrmann still here? Charlie could probably answer that question better than I. He attended the hearings that were held, representing the Associated Sportsmen. The Associated Sportsmen have quite a file on it. Those hearings were certainly publicized. I did not get to all of those hearings. Perhaps George Difani may recall. Representation does get to the hearings

on the legislation field hearings and hearings before the committees in Congress also.

Mr. MILLER. Is there any further question of the witness? Thank you very much Mr. Pesonen, for your very fine statement.

Mr. PESONEN. Thank you for the opportunity.

Mr. WARNE. I call Mr. E. A. Davisson. Please come forward, Mr. Davisson.

VALUE OF RESEARCH TO THE FISHERMAN

(By E. A. Davisson, president, Central California Trollers Association, 3932 Oakmore Road, Oakland, Calif.)

Mr. MILLER. Mr. Davisson, will you please identify yourself for the record? And feel free to make whatever comment on your statement that you wish to make. We will be happy to receive it in evidence as it is written.

Mr. DAVISSON. Thank you. I am E. A. Davisson of the Central California Trollers and Aquatic Resources and Salmon Unlimited.

Mr. Chairman, I am glad to have an opportunity to present this distinguished and highly interested gathering a commercial fisherman's viewpoint on the fisheries maintenance effort, particularly in the field of research and how such research can and does prove of value to the fisherman.

My statement has to do with another field, which you mentioned awhile ago, oceanography. In order to build up a natural resource such as an ocean fishery we must first thoroughly understand the fish, their origin, habits, and migrations. A very great deal has been learned about salmon, and it is quite possible that through application of our knowledge by instituting a solid plan of action we may yet build a greater salmon resource than we have ever had before.

However, by comparison with the salmon program, our knowledge of the albacore resource is very limited. Even so, the California Department of Fish and Game was able to accurately predict for the last two seasons the general area in which the albacore would first appear. This is certainly a triumph for the small group of researchers working on the project, considering that so little is known about the albacore. That is one of the reasons that I picked on the albacore.

Mr. MILLER. Isn't that true, Mr. Davisson, of almost any ocean fish that you can name?

Mr. DAVISSON. No, sir, Congressman Miller.

Mr. MILLER. Name us one that is thoroughly known.

Mr. DAVISSON. I mean by comparison the albacore have been known as a mystery fish of the sea, and so very little has been known about them that it is amazing that any information was able to be deciphered. There is very, very little known about the albacore. Some very interesting things have come to light with the little knowledge available.

Mr. MILLER. Remembering that this is a hearing concerning the Federal Congress, have you got any suggestions to make with respect to oceanographic research?

Mr. DAVISSON. Well, naturally we feel that we have a tremendous resource as to the albacore fishery and there is so much to be learned that we want to learn about it before the hour is gone.

Mr. MILLER. What does your organization [illegible]

Mr. DAVISSON. That research money is well spent.

Mr. MILLER. Who should do it?

Mr. DAVISSON. We are lay people; we are not scientists. I don't know who should. We have had some very good suggestions here today, and I certainly couldn't question what has gone on before here.

Mr. MILLER. Would your experience indicate that the Federal Government has a substantial responsibility here?

Mr. DAVISSON. Yes, sir; because the nature of the fish involves the whole North Pacific.

Mr. MILLER. Has the Federal Government been performing this function in the past to any successful degree?

Mr. DAVISSON. The Federal Government through the Pacific Oceanic Fisheries investigations based in Hawaii has made some notable contributions to the temperature chart on a monthly basis. That is the Saltonstall-Kennedy.

Mr. MILLER. Did you find any degree of cooperation with respect to the States of Washington, Oregon, and California in this regard?

Mr. DAVISSON. Well, at the tri-State conference which will be coming up in the next 3 days in San Francisco——

Mr. MILLER. What is the tri-State conference?

Mr. DAVISSON. The Pacific Marine Fisheries Commission. The albacore situation is discussed at each meeting.

Mr. MILLER. Does this result in any advances in research?

Mr. DAVISSON. I think it does. It is an exchange of knowledge. Needless to say it resulted in a considerable gain for the commercial albacore fleet because it cut down on costly scouting in unproductive areas. The albacore fleet numbers upward of 1,000 boats, has in the recent past been as high as 3,000 boats, and has had an annual take of as high as $14½ million.

Albacore are the highest grade of all our tunas and rate as one of California's greatest fisheries resources. They have often been referred to as the "mystery fish of the sea" and rightly so because so little has been known about them. For many years fishermen have combed the coastal areas and high seas, and although many thousands of tons have been taken, nothing specific or definite was learned which might shed some light on their origin or habits.

About all that we knew about them was that they could be expected to appear in great numbers along the Continental Shelf, roughly 50 to 200 miles out, in midsummer and vanish into the ocean 3 to 5 months later. Chasing albacore was definitely a hit-and-miss affair. Frequently hundreds of miles were covered without locating any schools. However, the painstaking research efforts have established some facts which can be relied upon.

First, ocean temperatures are a definite factor in forecasting catch expectancy and migratory routes. Second, migratory routes are predominantly northward and westward from the point of first annual contact with the Pacific coast.

The California Department of Fish and Game has successfully tagged hundreds of albacore which in itself is no small accomplishment and without exception every recovery has been made to the northward and/or westward of the tagging point. A significant number of recoveries have been made clear across the Pacific, off Japan, thousands of miles away which seems to indicate a single

albacore fishery across the entire North Pacific. The POF albacore study under the Federal Bureau of Commercial Fisheries has also made some notable progress. This agency, from a base in Honolulu, has supplied a monthly temperature chart of the entire eastern half of the north temperate latitudes of the Pacific. This temperature chart has also been of considerable value to the fishing fleet.

Still, the greatest mysteries concerning the genealogy of these remarkable fish are still unsolved. We must continue to work toward a complete understanding of this great resource.

Mr. MILLER. Any questions? Thank you very much for taking the time to come here today.

Mr. DAVISSON. I would like to say, Congressman Miller and Congressman Johnson, that I think this is one of the finest meetings we have had. I know that our group has fully appreciated all of the efforts you people have gone to.

Mr. WARNE. I would like next to call Ed Kohlhauf, a delegate to Salmon Unlimited and Aquatic Resources Committee. He will discuss the needs of the sportfishing skippers.

NEEDS OF SPORTFISHING SKIPPERS

(By Edmund Kohlhauf, Golden Gate Sportfishers, Inc., 3837 26th Street, San Francisco, Calif.)

Mr. MILLER. Mr. Kohlhauf, will you please state your name and position for the record.

Mr. KOHLHAUF. Mr. Chairman, my name is Edmund Kohlhauf. I am representing the Golden Gate Sportfishers, Inc., an organization of boatowners, who for a fee transport sportsmen to the salmon fishing grounds.

Mr. MILLER. This is San Francisco?

Mr. KOHLHAUF. Our members are from Fort Bragg to Monterey. We average 100 members, part deriving their entire living from this activity and the rest working on weekends only. We believe we contribute substantially to the economy of the communities from which we operate. For example, let us take the most insignificant part of the fishing gear, the sinker, which is dropped off when a fish strikes. In the pursuit of salmon, sportsmen spend between $120,000 and $180,000 a year for sinkers alone, the amount varying with the abundance of fish.

Members of the Golden Gate Sportfishers have approximately $1,500,000 invested in their vessels. From $50,000 to $100,000 a year is being reinvested to replace obsolete craft. Yearly operating expenses by the members amount to about $300,000. Nonmembers and private craft add about 35 percent to above-mentioned expenditures in their efforts to catch salmon.

For the past 10 years our season has been and at present is 9 months, starting February 15 and ending November 15. For reasons not definitely known, the years of 1957 and 1958 showed a marked decline in the harvest of salmon over previous years. According to the Department of Fish and Game, today's available spawning grounds in the winters of 1956 and 1957 carried only 50 percent of the number of salmon necessary to the continuance of a healthy salmon resource. For this reason the Department of Fish and Game found it necessary in 1957 to recommend to the Fish and Game Commission of the State of California a cut of 2 months in the sportfishing season. Luckily we were able to avoid this cut in the season as we would not be able to make ends meet working only 7 months a year.

The very existence of the Golden Gate Sportfishers depends not only on the continuance of the present status of the salmon resource, but on an improved condition in the future. For this reason we need help and we need help desperately and fast, help especially in the form of finances for proper research to offset continued encroachment of civilization to the detriment of salmon propagation, help to find ways and means to aid nature step up production.

We feel certain this can be accomplished by the combined efforts of Federal and State agencies concerned with this problem, and all other parties interested in the salmon resources, be they sport or commercial, cooperating with these agencies. Thank you, Mr. Chairman for the opportunity to present this statement.

Mr. MILLER. Thank you very much, Mr. Kohlhauf. Do you have any views as to whether this research should be done by the Federal Government or by the State, or by combination of the two?

Mr. KOHLHAUF. I believe this research should be done by a combination. We feel basic research could possibly be better done by a different agency than the department of fish and game in the State, and allied management research being done by the department. Basic research might suffer if it is done by the department of fish and game for lack of funds and manpower if pressure groups like us come along and distract them.

Mr. MILLER. So, what you are saying is that this is probably a function of the Federal Government?

Mr. KOHLHAUF. To a great extent it is.

Mr. MILLER. Is there anyone in the audience who has questions of Mr. Kohlhauf? Thank you very much for coming here this afternoon. We appreciate it.

Mr. KOHLHAUF. Mr. Chairman, I would like to state that were a coordinated research program available, it would certainly please us very much. I have to write to Washington, to Oregon to find out this and that. Sometimes I like to find out things that are there, but I don't know how and where to get them. It would be useful to gather all this information that is being done in research, maybe the same as a broker, and publish this information twice a year or any time suitable, so it would be available to those people that are interested in conservation so that they could study it instead of running to the biologists and wasting their time.

Mr. MILLER. Thank you very much, Mr. Kohlhauf.

Mr. WARNE. Our next witness is John Mahoney of the California Department of Fish and Game. Mr. Mahoney will talk on artificial or controlled spawning areas.

CLEAR CREEK SPAWNING CHANNEL

(By John Mahoney, Fisheries Manager, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. MILLER. We are very happy to have you here this afternoon. Would you please identify yourself for the record?

Mr. MAHONEY. I am John Mahoney, fisheries manager with the California Department of Fish and Game.

Mr. MILLER. You may proceed with your statement or informally as you wish.

Mr. MAHONEY. I have a prepared statement which I would like to present.

The efforts of man to alter the natural flows and courses of California's streams have left little of the original spawning grounds available to salmon and steelhead. On the other side of the ledger, man's efforts to compensate for these losses have been insufficient and restrictive in methods. New, more effective ways to provide for loss of spawning areas should be sought so that the resource can be maintained despite the forthcoming adversities which face it.

A new means which holds potential in offsetting future losses of spawning areas is the artificial spawning channel. This would be a channel having controlled flow conditions, water of suitable temperature, and gravel in required sizes and quantities. Under these controlled conditions it has been shown that survival of salmon eggs and fry can exceed that of some streams and areas subject to fluctuation and siltation. By this I mean that we have put all our eggs in one basket on most occasions where we have had to compensate for these losses, the basket being the hatchery. The basis for this work, by the way, was performed by the Fish and Wildlife Service at Mill Creek in California.

Already this new method has been put to use in Canada for Pink Salmon, in Washington for Sockeye, and a channel for King Salmon is now in use along the Columbia River.

The need and opportunity exists in California for a test of the artificial spawning channel on a production scale. Clear Creek, tributary of the Sacramento River near Redding, affords an excellent possibility. Clear Creek, now a stream with abundant gravel but lacking water, will soon be receiving ample quantities of water to be diverted from the Trinity River. Project plans are for Trinity River storage in Whiskeytown Reservoir on Clear Creek; the Whiskeytown Dam will be provided with multiple outlets to insure water of temperature favorable to salmon spawning. The only dam on lower Clear Creek preventing fish passage problems was laddered last year and its diversion will be screened in the near future to prevent fish loss.

All of these conditions set the scene for what we believe would be an ideal setting for an artificial spawning channel. The abundant gravel and water and the means available to alter water temperatures and flows present research conditions under which the potential of a spawning channel to replace lost spawning areas can be tested under the variety of conditions that could be expected should it come into use in various parts of the State.

The basic research required to provide us with this information could very well be the responsibility of the Federal Government.

We are very enthusiastic about this Clear Creek site, but I do not mean to imply by our enthusiasm that this is the only good site in the State. There are others. However, nowhere else has such groundwork been laid to provide these conditions. Through the efforts of the Bureau of Reclamation, Fish and Wildlife Service and the Department to enhance the existing fishery we have indirectly provided these excellent conditions.

Mr. MILLER. I have no questions. Are there any questions from the audience?

Recommendations for the Clear Creek spawning area, has any consideration been given to the impact of the Eastern Canyon Dam on the Sacramento River?

Mr. MAHONEY. We are proposing here that basic research be done, and to determine the effect of that, of an artificial spawning channel, and replacing lost spawning area. Now, should this dam be built or any other dam be built, then this information would let us know how well the artificial spawning channel would be used in such a situation.

Mr. MILLER. Are there any other questions to be asked of Mr. Mahoney? Thank you very kindly for your very constructive bit of testimony.

Mr. MAHONEY. Thank you for the opportunity.

Mr. WARNE. Our next witness is Mr. Eldon Hughes, marine biologist of the Department of Fish and Game, who will present our ideas on determination of salmon stocks at sea and effects of oceanographic changes on salmon catches. Mr. Chairman, some of these presentations seem a bit out of order because we put other witnesses ahead in order to accommodate them.

Mr. MILLER. That is perfectly all right.

Mr. WARNE. Mr. Hughes.

IDENTIFICATION OF SALMON STOCKS THAT SUPPORT FISHERIES AND EFFECT OF OCEANIC PHENOMENA ON LANDINGS

(By E. P. Hughes, Marine Biologist, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. MILLER. Mr. Hughes, would you identify yourself for the record, please.

Mr. HUGHES. I am Eldon P. Hughes, marine biologist with the California Department of Fish and Game.

My subject is, as Mr. Warne mentioned, identification of salmon stocks that support fisheries and the effect of oceanic phenomena on landings.

Imagine a grizzly bear charging at you. To defend yourself, would you choose a high-powered rifle or a muzzle-loader filled with birdshot? You would choose the rifle, of course.

Similarly, demands of a mushrooming human population are threatening the very existence of salmon. To defend our stake in a sustained abundance of salmon, will we choose a high-powered, concerted attack on basic problems, or an assortment of small projects with short-range objectives? Attacking primary problems offers our best hope for success.

What primary problems must we solve? One major obstacle prevents us from maintaining salmon landings at a high level. Simply it is this: Any action we take to increase fishery yield should be evaluated in terms of net profit to all segments of the salmon fishery. But before this can be done, each major salmon stock contributing to that yield must be identified. Therefore, our primary problem now is, "How can major stocks of salmon that support our fisheries be identified?"

The extreme importance of solving this problem is best illustrated by an example. Farmers, foresters, animal raisers, and other managers of renewable resources are successful because they can observe their resource throughout a complete life cycle—from seed to harvest and back to seed, so to speak. As a result, they can measure the effect on survival of phenomena such as weather, predators, disease, to name a few. They can therefore devise and take corrective action and assess its effectiveness.

The direction that we in anadromous fisheries take should be based and assessed on comparable knowledge. The most significant of these is catch composition by stream of origin.

Now, which actions require evaluation? To name a few, when we can identify major salmon stocks that support our fisheries, we can assess the value of:

1. Manipulating spawning stocks to increase fishery yield.
2. Improving stream environment such that either
   (*a*) A maximum utilization of spawning area is realized, or
   (*b*) A consistently high production of downstream migrants is attained.
3. Supplementing natural spawning area by artificial spawning channels and hatcheries, or
4. Intensifying diversion screening programs.

What is the blueprint for progress? When we can identify major salmon stocks that support our fisheries, we will be able to increase yield by this orderly procedure:

1. Establish reliable measures of salmon abundance at key times in their life cycle.
2. Then we will relate variations in abundance with changes in environments.
3. Then determine importance to salmon abundance of each environmental factor.
4. Then we will concentrate on elimination of limiting factors, and enhancement of beneficial factors.
5. Finally, assess effectiveness of corrective action in terms of net profit to all segments of the salmon fishery.

Now, progress can be made, but we must solve problems in an orderly manner. The FBI, for example, concentrates on capture of the most wanted criminals, not all criminals at once. If we do otherwise, a prodigal dissipation of men, money, and equipment may result without real progress having been made.

Why do we need oceanographic surveys? The major, and perhaps most critical, phase of a salmon's life is spent in the ocean. For this reason, we need to know much more than we do about the ocean and how it affects salmon abundance.

Northern California is a "no man's water" as far as oceanographic surveys are concerned. No detailed continuous measurement of conditions has been made in this area. It lies on the extreme northern limit of surveys conducted by agencies of the California Cooperative Oceanic Fisheries Investigations, and on the extreme southern limit of surveys conducted by agencies of the International North Pacific Fisheries Commission.

However, one recent survey was conducted which did include this area. In August 1955, 7 United States, 1 Canadian, and 20 Japanese ships each surveyed a selected part of the North Pacific Ocean. The most important [illegible] separating warm, salty albacore water from cool, not so salty salmon water. At that time, it extended across the ocean and down our coast as far as central California. Undoubtedly, this boundary is shifted continuously by ocean currents. Measuring the effect on salmon abundance of shifts in this temperature-salinity barrier is one of the things we must do before we can understand why salmon abundance varies.

Our stake in a sustained abundance of salmon can be measurably protected by an undramatic, but essential determination of oceanic conditions that occur off our coast, and by an attack on the problem of stock identification. Let's agree to do this job right, once and for all.

Mr. MILLER. Mr. Hughes, who do you think should do this job?

Mr. HUGHES. This job or both? Stock identification and oceanographic surveys?

Mr. MILLER. Yes.

Mr. HUGHES. The Fish and Wildlife Service functioning in the International North Pacific Fisheries Commission, the treaty organization with the United States, Canada, and Japan participating, has made perhaps the major breakthrough in stock identification. That is good, but unfortunately for us in California where king salmon represents better than 90 percent of our landings, it is a minimum fish; minimum consideration was given to king salmon in the North Pacific where stock identification was done.

Mr. MILLER. Should it be done by the Fish and Wildlife Service?

Mr. HUGHES. That is correct.

Mr. MILLER. Both jobs?

Mr. HUGHES. With the assistance from any State agency, I would say.

Mr. MILLER. Do you find the cooperation about which we have talked so much today has improved between State agencies and the Federal Government recently or has it been at a high pitch all along?

Mr. HUGHES. I am not sure I am qualified to answer that, in that I have had very little occasion to be directly involved in a cooperative venture with Fish and Wildlife Service.

Mr. MILLER. Your testimony indicates that as far as the benefaction is concerned, there would be required cooperation between Federal and State agencies?

Mr. HUGHES. Yes.

Mr. MILLER. As a practicing marine biologist, do you have anything to say about the recommendation made here today by Dr. Needham, that is, that we have Federal scholarships and grants to assist students in this field?

Mr. HUGHES. I can but concur heartily and add my endorsement.

Mr. MILLER. Do you feel our supply of marine biologists is almost as inadequate as our knowledge of oceanography?

Mr. HUGHES. We can apply a qualifying phrase there of "good fisheries biologists or marine biologists"; yes.

Mr. MILLER. Do you feel there is a clear demarcation between Federal responsibility and State responsibility in this whole broad field?

Mr. HUGHES. I believe it was very aptly put to the effect that the problem is so large, so critical, that the imaginary or real boundaries

Mr. MILLER. Just to point that up, do you believe that the survival of the species is a critical matter?

Mr. HUGHES. A flat "yes."

Mr. MILLER. Are there any questions of Mr. Hughes by anyone in the audience?

Mr. GILCHRIST. John Gilchrist. I would like to ask a question but I would have to preface the question with a statement, and yet, I don't want to make a speech.

Mr. MILLER. Off the record.

(Discussion off the record.)

Mr. MILLER. On the record.

In an off-the-record discussion Mr. Gilchrist posed the question to Mr. Hughes as to whether danger to the species was very immediate or more in the nature of a long-range difficult problem that has to be coped with. Will you answer that question to the best of your ability, Mr. Hughes?

Mr. HUGHES. I perhaps should answer the question by asking a question for clarification; that is, what he means by "immediate." The threat to the species in the next 5 to 10 years is very great, but pushing a panic button is not a solution, as was intimated; preferably an orderly, reasonable approach to the problem is the only way out.

Mr. MILLER. Would it be fair to say that the costs of the effort thus far means that a greater additional effort must be made or we are going to slip behind?

Mr. HUGHES. Yes, we will slip further behind.

Mr. MILLER. Then, to go a step further, would you say that we are losing ground and that is why you are so concerned?

Mr. HUGHES. That perhaps is one of the reasons for my concern. I won't say "obviously," but we are losing ground, and have been.

Mr. MILLER. Thank you. Are there any other questions? Thank you very much, Mr. Hughes, for your most informative statement for the record. We appreciate your being here today in assisting us.

Mr. WARNE. Next we will hear from Donald Fry, senior research analyst of the department's salmon and steelhead investigation. Mr. Fry will discuss improvement of spawning stock surveys and predictions of water temperatures.

IMPROVEMENT OF SPAWNING STOCK SURVEYS

(By Donald H. Fry, Jr., marine biologist, California Department of Fish and Game, 987 Jedsmith Drive, Sacramento, Calif.)

Mr. MILLER. Mr. Fry, you may introduce your statement as an exhibit. It will be received. You may summarize it if you wish or highlight it, but proceed as you may wish.

Mr. FRY. My name is Donald H. Fry. I am a marine biologist with the California Department of Fish and Game.

To do the best possible job of managing salmon or any other livestock it is necessary to know the number of breeding adults as accurately as possible. In California, surveys are made each year to assess the number of spawning salmon, but the work could be improved both by the refinement of methods and in the extent of coverage.

In the Central Valley the coverage is adequate, but it would be highly desirable if we could work out more precise methods of estimation, especially in the main stem of the Sacramento River itself.

A study should be made of the main stem of the Sacramento and in some of the larger tributaries in which the size of the salmon run was estimated by several of the standard methods now in use, and by any new methods which could be dreamed up. This has not been done primarily because with the staff available it was never possible to survey a stream by more than one technique and still get the entire valley finished.

In the coastal streams the problem is considerably more difficult, and at present the coverage is confined to counts at fish ladders in a few widely scattered places. Many of the coastal streams have their headwaters in places which are practically inaccessible during the winter. The flows are subject to extreme fluctuation and the fish often enter during periods of high run-off and muddy water. Methods of counting fish in these coastal streams may have to include techniques that have not been given a thorough trial in California or any place else. This takes time.

Studies such as those described could be done by the Fish and Wildlife Service or as Federal aid projects. The important thing is to have men of real ability—these are not routine jobs.

PREDICTION OF WATER TEMPERATURES BELOW DAMS

(By Donald H. Fry, Jr., marine biologist, California Department of Fish and Game, Sacramento Field Station, 987 Jedsmith Drive, Sacramento, Calif.)

Mr. FRY. Salmon and trout are cold-water fish. Many California streams are too warm to support salmonoid and others are borderline. It follows that any water project that warms a stream may do severe damage and may even wipe out a fish population.

The temperature problem is not simple and is not the same for all species. For example, steelhead, silver salmon, and spring run king salmon require a cool water supply throughout the year. California's most numerous and valuable salmon are fall run kings which are the one form that can maintain runs in streams which get hot or even dry up during the summer. This is because most of the young fall run kings have left fresh water by the first of June and the adults do not appear until September, October, or later.

Temperature requirements are not the same at all stages in the life history of these fish. For example, both adults and young king salmon will die within hours if exposed to 80° F. water, but they will do fairly well if the summer water temperatures stay below 70° F. For the developing eggs even 58° F. will do severe damage, but 52° F. is ideal. This applies both to the ripe or nearly ripe eggs within the female or to those which have been spawned.

Storage dams can cause a severe change in the temperature regime in the stream below the project. Knowing the temperatures which will occur can be a tremendous help, not only because it will enable us to predict the effect on the fish, but because quite often a relatively minor change in the project will make a difference of several degrees at the critical time of year. If the need for such changes were learned in time it would be possible to save the run.

In a typical deep reservoir the surface warms up during the summer but the bottom stays quite cool. If water is drawn off from near the bottom the stream will be cool, it may be even colder than is necessary, but only for as long as there is cold water in the reservoir.

It can be a disaster for salmon if the cold water is all used up during the summer, and the stream then turns warm and stays warm during the fall spawning period. Usually this has happened every year below Folsom Dam on the American River. Most of the salmon spawn during November but the water stays too warm for the eggs until late November.

One method of preventing such a situation would be to construct the outlets of the dam so it is possible to draw the relatively warm water from near the surface during the summer and retain the cold bottom water for use during the spawning season when it is most desperately needed.

To plan such an operation intelligently it is necessary to know what the temperature of the reservoir will be at all depths throughout the year. Warm and cold water can then be budgeted to obtain the desired result. This is just one example. In some situations a single outlet may be adequate, in others an altogether different approach may be required, or no satisfactory approach may be practical. The important thing is to know in advance what temperatures to expect so intelligent planning can be done.

Methods of predicting temperatures in reservoirs are reasonably satisfactory at the present time and are steadily being improved as more and more work of this sort is being done. A cost of $10,000 would be a reasonable estimate for a detailed prediction in a large reservoir.

Needless to say, it would be a tremendous help to the men who manage the salmon, steelhead, and other trout if detailed temperature predictions by the best known methods were required for all future water projects which are at all likely to result in unsuitable temperatures.

Some projects may already be too far advanced to permit such studies without a budget revision. A Government allowance for temperature studies might be an appropriate way to get the predictions made in such instances.

This work could be done by the Federal Government or it could be done by the State. Federal funds would be a great help to the State. The important point is that the job be done by men who know how, that it always be done, and that it be done soon enough to accomplish its purpose.

Mr. MILLER. Thank you very much, Mr. Fry. I have no questions to ask you. You have covered anything that might have occurred to me. Are there any questions of Mr. Fry? Thank you very kindly, sir, for appearing here this afternoon.

Mr. WARNE. I have two more witnesses. I would now like to ask William Ripley, assistant chief of marine resources and the department's radioactivity officer, to make a presentation with regard to atomic waste. This is sometimes not as obvious as the problem of fishery research, but I assure you it has a distinct bearing on it.

ATOMIC WASTE DISPOSAL IN THE PACIFIC

(By W. E. Ripley, assistant chief, Marine Resources Branch, California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.)

Mr. MILLER. Mr. Ripley, would you identify yourself for the record?

Mr. RIPLEY. My name is W. E. Ripley, assistant chief, marine resources branch of the California Department of Fish and Game, 722 Capitol Avenue, Sacramento, Calif.

I should like to submit my statement and then summarize what essentially are the big problems in as short a time as possible.

Waste disposal of atomic materials has been taking place off the Pacific coast for a number of years. The material is generally what is referred to as low-level activity wastes.

When the department of fish and game was first made aware of this situation it was revealed that disposals had already been made off California for several years. One of the areas in which radioactive materials had been deposited was located in southern California in an enclosed basin with a depth of 1,050 fathoms surrounded by a shallow rim of about 200 fathoms of water. This is in the middle of an important commercial and sportfishing area.

Materials deposited in ocean waters are subjected to dilution and to eventual incorporation into the marine organisms existing in the ocean. So little is known about the interrelationships of organisms existing in the ocean, particularly in reference to their biology chemistry, and physiology, that it cannot be said with certainty that any material disposed will not find its way back through the food chains of the sea into those resources valuable to man.

From the limited knowledge of these processes in marine organisms it has been found that selective concentration takes place with certain species for certain materials. Relatively little work has been done in this respect with organisms of the marine environments of temperate zones. Much more needs to be known before quantities of radioactive wastes are deposited in areas where they might become incorporated into the marine resources.

Unlike ordinary domestic and industrial wastes, radioactive wastes are not necessarily rendered harmless by dilution. With domestic and industrial wastes, each additional volume of water serves to dilute the concentration. Eventually, if the volume of diluting water is sufficiently great, the wastes can no longer be detected in the environment. This is a nonreversible action. The wastes, once sufficiently diluted, remain harmless.

This situation is not the case with most radioactive wastes. Many radioactive substances, although diluted by the receiving waters, have a tendency to be reconcentrated by the plants and animals that live in that water. Some organisms are literally starving for certain of the radioactive chemicals and will go all-out to concentrate particular isotopes.

For instance, organisms will concentrate strontium 1,000 times over that present in the surrounding water. Fish will concentrate it up to 30,000 times in fresh water. Cobalt and iron can be concentrated 10,000 times and the phosphorus up to 2 million times.

It is because of the unique character of concentration and because of the vast area of our ignorance surrounding this mechanism, that we must be doubly cautious to apply safety factors that, if anything, will always err on the positive side of safety. We must not only prevent possible damage to the resource and the animals themselves by our acts, but we must also guard the economic, esthetic and social values that are also a very real part of our heritage.

Those agencies charged with the development of the use of nuclear energy with its consequent problem of waste disposal should "foot the bill" for the basic research necessary to insure adequate protection of the resources of the sea.

In a summary, first, I would like to preface my remarks by saying that there is no need for concern at present about radioactive levels of materials that we have in the ocean insofar as we know. So, we won't get into a condition of cranberries.

There is no knowledge that there is no contamination of the marine resource in the ocean. However, what we are looking for is a problem in the future. We have heard testimony today in reference to the amount of research that is necessary to solve the present problems within our present technology, you might say, in reference to the fish and wildlife resources, particularly the salmon.

Now, we have seen the areas of research that are necessary. We have heard testimony presented to that effect, and we can go back and look at the fact that the fisheries research as a science has lagged for about 40 years. We are still, you might say, in the very dark ages in reference to research that is necessary to solve our problems. When we take into consideration that the atomic problems and the atomic research that has precipitated some of these problems that come before us has come only in the last 10 years, the statements that have been made for the necessity of research, you might say, doubled in space for the atomic era. We are dealing with broader levels of ignorance and ignore critical basis of knowledge in reference to the relationship of the association of radioactive materials in the ocean field as well as the land field and its relationship to animals. We could get into a great deal of discussion on the specific effects of radioactivity upon the organisms, but I think they are briefly summarized here.

One statement I would like to make in reference to radioactivity that has to do with the technology that has created this additional problem in the fish and game resource field. We feel strongly that the technology that has created this problem should foot the bill to pay the investigations to solve these problems. As to who is to do this research, we feel there are many agencies, and that these agencies should be included in the field of study of this problem because the problem superimposesi tself on other aspects within their own respective areas.

With that I conclude my presentation. You may ask any questions you see fit.

Mr. MILLER. Thank you very much, Mr. Ripley. I think you have given us a very good condensation of this problem. As you say, we could get into the specifics and we would probably be here all night. You have posed the basic problems and also who you think should do it, and I think that is sufficient for our purposes. Is there any one in the audience who has any questions of Mr. Ripley?

Mr. WARNE. While it is your view and I might say, our view that the research ought to be conducted by those who have caused the problem, in the absence of some action on their part nevertheless the research and the need for it must be faced by us and other people interested in the fishery. Is that not true?

Mr. RIPLEY. That is true. I said the research should be conducted by the agencies that have the responsibility.

Mr. WARNE. But if they do not finance it someone has got to do it nevertheless?

Mr. RIPLEY. That is true.

Mr. DONALDSON. Donald Donaldson. Mr. Chairman, may I ask a question.

Mr. MILLER. Yes.

Mr. DONALDSON. Mr. Ripley, we have heard that cooperation between the various agencies involved is improving. Is cooperation in obtaining the required basic information from the Atomic Energy Commission adequate or is additional legislation needed to obtain adequate information?

Mr. RIPLEY. That is a double-barreled question. Such information is also improving with respect to atomic energy and also any agency that is dealing with this specific problem. It is a new field. Even the words that are used are still not in common usage so as a consequence the amount of information that is put out in a popular vien or nature is not too complete. So, we have to turn either to the agencies or to those specific scientific reports that deal with this area of technology. It is improving, though.

Mr. MILLER. Are there any further questions? Thank you, again, Mr. Ripley.

Mr. RIPLEY. It has been a pleasure.

Mr. WARNE. Mr. Chairman, the last witness I would call upon is Bruce North of Central California Trollers and Salmon Unlimited who will report on military closures of fishing waters.

MILITARY CLOSURES ON OCEAN FISHING WATERS

(By Bruce North, secretary, Central California Trollers Association, Monterey Bay Branch, 124 Plaza, Watsonville, Calif.)

Mr. MILLER. Mr. North, we are very happy to have you. Please identify yourself for the record.

Mr. NORTH. My name is Bruce North. I am a commercial fisherman and have been for 15 years in Alaska, Oregon, and California.

The restricted areas of California coastal waters have been established to protect shipping and fishermen against injury during military operations and, in the case of Point Magu, possibly as a security measure. It would seem to be the only sensible way to conduct the testing and actual operation of missiles and other weapons without endangering the general public.

There are four main closed areas. One small area in Monterey Bay is behind the target range at Fort Ord, where there is danger from overshooting the sand backstops. The Point Magu missile testing range, largest of the other three, is approximately 60 miles long and 50 miles wide at its extreme width. The Point Sal-Arguello area, bordering Vandenberg Missile Base, is smaller in size and ex-

tends a relatively short distance out to sea. The San Clemente Island naval training base restricts the waters around the island during certain maneuvers. None of these areas are closed at all times and tend to affect the commercial and sports fishing industries only casually.

No one knows what the future holds, but if military demands are such that many more areas have to be established, fishing could be seriously curtailed, since the major part of commercial and all sports fishing is conducted close to shore. Among all the considerations that must be made, we must insist that some thought be given to the effect on our industry. The military have a tendency to be somewhat highhanded, so a public hearing before establishing a new area would be advisable. This is not required at the present time.

At present we are not unduly affected, and unless future restrictions are more severe and on a more larger scale, I do not think they will be a serious threat. In passing, one beneficial aspect may be observed. Part-time sanctuaries have been established without anyone being able to cuss the California Fish and Game.

I didn't have the time or the knowledge previously to do much research on this. And, there are many more fellows that are better able to do the job than I am at present. However, in asking questions of them I came up with what I think to be the real crux of the matter, the stumbling block, that would prevent the military closed areas from being what would be of a size or nature so as not to interfere with the sports and commercial fishing.

At present the restricted areas established by the military do not unduly affect us mainly because the restrictions are not enforced at all times. If they were and future restricted areas are on the present scale, we could be in bad shape, both sports and commercial. What is needed are public hearings at which necessity must be proved by the military—if that is possible. I do not know whether a precedent has been set for this, but it is desirable. That, in essence, is what I have to say.

In practical application, fishing up and down the coast, I find that most of the restricted areas are not enforced, they are not traveled. Indeed, all the time I have been going in and out of various ports along the coast, mostly in southern California where these areas are located, I have never once been stopped or prevented from going through the restricted areas. I have heard cases of where it has happened and in conversations over the area I have listened to other situations, but on the whole there has been very little actual enforcement. But the point is that if they do choose to do so, we could really be in trouble. Thank you very much for your time.

Mr. MILLER. Thank you very much, Mr. North. Are there any questions that anyone has to ask of Mr. North? Thank you, again.

CLOSING REMARKS BY MR. WARNE

Mr. WARNE. Mr. Chairman, with your permission I would like to say just a word in closing in behalf of my appearing here.

The importance and wide variety of problems that must be solved to insure the future of the salmon and steelhead fisheries and the resources upon which they depend is obvious.

To meet future pressures on the resources, an expanded conservation program is needed urgently. This must include basic research, applied research, and management activities of all kinds on the part of all State and Federal agencies concerned. It must include planning for multiple use of water, recognizing fisheries values. It must include provision of large sums of money, both State and Federal, in amounts that previously have been considered out of reach. It calls for program planning on a high level. It requires close coordination of programs all the way from planning to execution.

This kind of program will succeed only if everyone involved knows what everyone else is doing or plans to do. This means developing precise methods for coordination and for dissemination of information on planning, research and management.

To summarize, I can say, first, that a real problem of great magnitude exists; second, that there is room and need for both State and Federal participation in reaching a solution; third, that a need exists for coordination of programs, and as programs are expanded this need will be even greater. And finally, I can say that it is essential that both State and Federal Governments prosecute the program to the fullest extent of their abilities.

As a parting suggestion, I would like to present an idea that has not been stressed. In planning its water projects, the Federal Government could accomplish something above and beyond mere maintenance of fishery resources. A bold plan of watershed development with the major objective of enhancing and increasing the fisheries is entirely feasible, and would be a concrete recognition of the important role played by the fisheries in the national economy. The tributaries of the upper Sacramento River provide an ideal situation. I propose a joint State-Federal development program in this area for fisheries primarily, with additional benefits for flood control and water storage.

The California Departments of Water Resources and Fish and Game are now commencing a study of the feasibility of such an improvement project. Although the costs will be considerable, it appears likely that a feasible plan can be developed.

An indication of interest by the Federal Government would give impetus to our preliminary planning. I, for one, stand ready to start the ball rolling by calling an exploratory meeting of appropriate Federal and State agencies with the idea of testing out whether a practical plan can be brought forth.

It has been our pleasure to meet with you here, Mr. Miller, and I think you can tell by the intense interest that has been given to this meeting all through this very long day that you have done us a real service.

Mr. MILLER. Thank you very kindly. It is my pleasure and that of Congressman Johnson to get this kind of information to give us a platform on which to attack the problem in Congress. I appreciate those closing remarks and the summation of the fine proposal with respect to the upper Sacramento River. I will join with Congressman Johnson in doing everything that I can to see that it is implemented.

Mr. WARNE. I would like to at this time recall Mr. George Defani who has a statement which he wishes to make.

Mr. MILLER. Mr. Difani.

Mr. DIFANI. I would like to make a further clarifying statement for the record. While Mr. Schneider of Oregon was on the stand, I made a brief statement attempting to clarify the question asked of Mr. Schneider referring to Federal funds allocated to Oregon. I believe the funds alluded to were funds for the Columbia River fisheries development. This was confirmed by Mr. Barnaby in his testimony.

Mr. MILLER. Thank you very much, Mr. Difani.

I would like to say at this point that it is abundantly clear to me, and I am sure it is to Congressman Johnson, that our salmon and steelhead resource is deteriorating. As Director Warne says, the extent of this is not absolutely certain but certainly it is losing ground. We have had ample testimony today of the need of cooperation between States and between State and the Federal Government. We have had ample evidence of the need of correlation. And I hope that all of those who are interested will see to it that this mystery surrounding just how much correlation we actually do have will be cleared up for myself, in any case. Do we have all the reports that are necessary, all the publications that are necessary, or do we not? On the one hand we have the eloquent testimony of Mr. Gilchrist, and on the other we have seemingly the excellent testimony of Mr. Barnaby to indicate some area of disagreement here as to a matter of fact.

I was impressed by the testimony of the changing mission of the Fish and Wildlife Service from one of mitigation to one of chancement. I think this is worth pressing in Congress. It is certainly one which should be widely disseminated to those sportsmen and commercial fishermen who are interested in this field. Certainly, as Mr. Warne has indicated, this new mission of enhancement can be properly employed in a given river basin in California.

I am happy to see that almost everyone recognizes the tremendous need for funds as an essential ingredient of any program that we may have. I am going to carry back to Congress a firm resolve to do everything that I can in this regard so that we can make these programs work.

I want to thank everyone here for the attention that they have given to this proceeding today. I can assure you that it is going to be profitable to Congress because we will be presenting this program to other congressmen and, as I said before, using it as a basis upon which to proceed in the coming session before the Appropriations Committees.

Thank you.

This proceeding is closed.

(Thereupon, at 6:55 p.m. the hearing was concluded.)

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