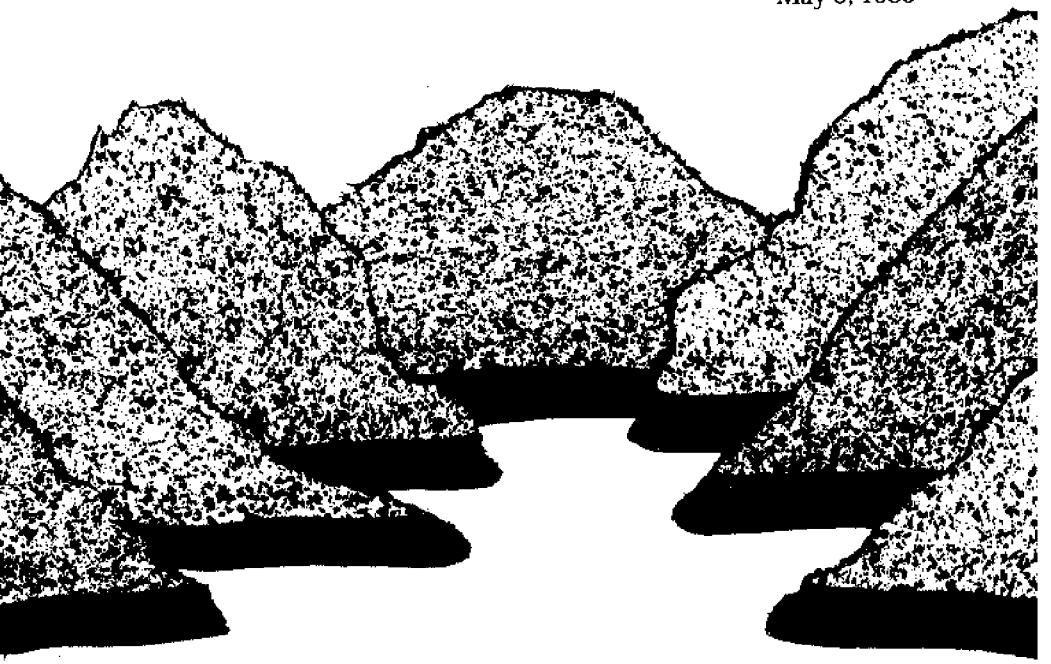
Are We Prepared for the Next Drought?

Managing Low Water Year Emergencies

Editors:
Charles F. Broches
Michael S. Spranger
Bill H. Williamson

Proceedings
of a workshop
Airport Sheraton Inn
Portland, Oregon
May 6, 1983



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Preface

Twice in the past decade, the Pacific Northwest has faced low water emergencies. Most recently, in 1976-1977, drought conditions cost the regional economy millions of dollars in lost resource and production and renewed conflicts between agencies and among states. Yet, little anticipatory planning has taken place since then to help us cope with the next drought. This program assisted water resource user groups, government officials, tribes, attorneys, engineers, project managers, academics and others interested and affected by low water years.

The program focused on the background of regional water resource management systems, anticipated impacts, likely actions to be taken by affected user groups, and sources of conflict between groups and agencies during low water years. Also examined were the development of interagency and intergovernmental mechanisms to deal with such emergencies, including the role of the recently created Northwest Power Planning Council.

The conference was held at the Portland Airport Sheraton Hotel on May 6, 1983.

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Charles F. Broches
Michael S. Spranger
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Introduction: Common Threads

To those who live outside of the Pacific Northwest, it is an area of the nation where it always rains. Indeed, a popular nickname for the western half of Washington State is the "wet side of the mountains." And while western Washington and Oregon do have their share of wet days, the region also has its share of dry ones. Similarly, while we have wet years, we also have dry years and their impact on the region was the subject of this conference.

A common misconception is that droughts only occur in the dust bowl of the 1930s. This is untrue. The Pacific Northwest experienced three drought years during the decade of the 1970's (1973, 1976-1977). And there have been 19 droughts in the region since 1900, approximately one every four years. The last major drought caused major problems for all sectors of the Pacific Northwest's economy and cost an estimated $655 million in lost production and income in Washington State alone. Regional losses exceeded 1 billion dollars.

Droughts are an unnoticed fact of life for the region and the purpose of this conference was to examine what the region was doing to prepare for the next drought. Common threads learned in preparation for and during the conference can be summarized as follows:

(1) The region has conducted limited planning activities and maintains marginal management authorities to cope with the next drought.

(2) Many federal and state agencies which were active during the 1976-77 drought have not maintained an active posture or ability to

competently respond to the next drought.

(3) The region's institutional memory for responding to such emergencies is quickly being lost as those familiar with the last droughts change jobs, retire or move.

(4) Few, if any, efforts have been taken into account to address lapsed emergency authorities, changes in law, and new institutional arrangements. Major changes in legal and institutional arrangements have taken place since the last drought, significantly affecting old contingency plans which existed in 1976 and 1977. Congress has also been active, passing the Northwest Power Act, which has profoundly affected in-stream water use.

(5) Federal monies which provided significant assistance in the prior drought cannot be relied upon by water user groups and the states.

(6) Treaty tribes have won major law suits affecting their fishery and water rights.

(7) Expectations of how things worked in 1977 may no longer apply to the realities of the middle of the 1980s.

As a result, many key agencies lack experienced staff with any recollection of management decision-making and options during the last drought. Personnel are not being trained to respond to the next drought. We learned from the speakers, whose papers follow, that while no consensus exists on what should be done, several points of commonality do exist. Once the region finds itself in the midst of a drought it will be too late. Actions and training must take place prior to the next drought if they are to be successful. Management awareness and an effective response must be in place and work before a drought occurs. Knowing whom to call, what agencies are involved, what decisions must be made, and avoiding surprise are essential ingredients in managing such emergencies. Affected agencies cannot expect to solve problems in isolation and must continue to investigate how to deal with this problem while adequate water conditions permit a rational examination.

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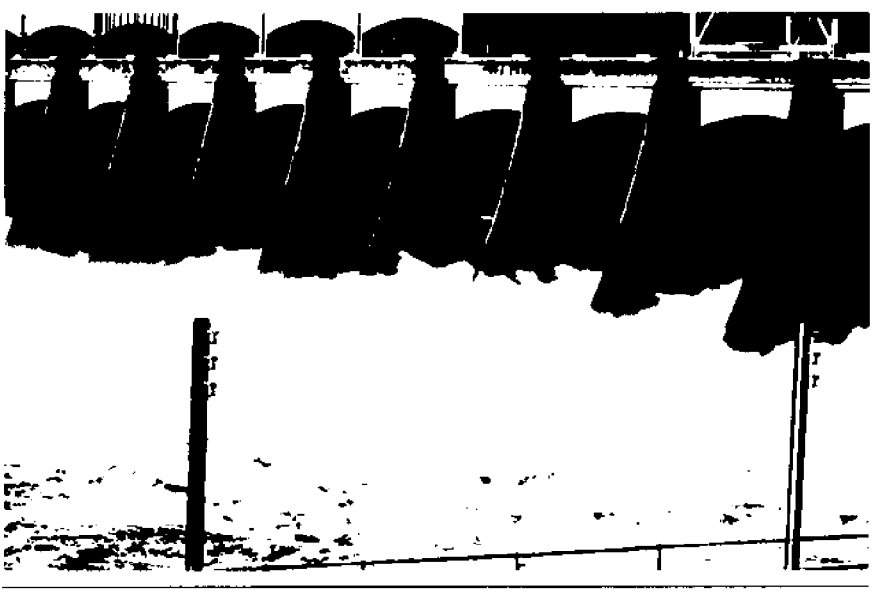
Seattle, WA
September 1983

PANEL I.
Background

Michael S. Spranger
Washington Sea Grant



The title of today's conference is Managing Low Water Emergencies: Are We Prepared for the Next Drought? Essentially, the topic that we are dealing with today is water resource management in a drought year. There are many definitions of water resource management. What I feel is a good definition of water management can be stated simply as "providing the right amount of water at the right place at the right time, having the right quality and having the right cost." Today, many feel that we are not doing a very good job of water management and that we are on the brink of a water crisis, both internationally and nationally.

According to Gerald Steinwell, who was the Director of U.S. Water Resources Council in 1979: "Water is the most serious long-range problem now confronting the nation - potentially more serious than the energy crisis. By 2000 about every section of the country faces water shortages unless we recognize that we cannot waste and mistreat this precious, finite resource."

For the most part, the public feels that we have no water problems in the Pacific Northwest, particularly on the west side of the mountains. We are blessed with an abundance of water; the water supply is infinite and inexhaustible. In fact, upon this premise, we developed our water system. In harnessing the Columbia, early developers saw unlimited hydroelectric potential. They saw a never-ending supply of water to meet all our needs. But in 1973 and 1977, we suddenly realized we too faced "drought conditions" in the Pacific Northwest. Not only did we come to realize that there was no longer a surplus of water, but we realized that there was much conflict and competition for the water among its users. We realized the Columbia had more demands placed on it than could be accommodated.

The addition of the second powerhouse at the Bonneville Dam has exacerbated this problem. Now, every drop of water in the Columbia

can be used to turn turbines in the dams for electric production. What about the other uses, such as irrigation, navigation, recreation, municipal and industrial, and the fisheries? If we use all the water for hydroelectric production, this naturally means there will be less for the other uses. Clearly, today we face serious trade-offs on who gets what portion of water for their use. This presently is being debated during a surplus year of water. What happens in a low water year?

We are finally becoming aware that when we discuss water resource management, we are dealing with a dynamic system. Most of you are aware of this, but this concept really is not new. Heraclitus, a Greek philosopher,over 1000 years ago said: "You never step in the same river twice" - simple words, but profound. So it is with the Columbia River; it is always changing. We are dependent upon adequate amounts of precipitation and various climatic factors to ensure adequate water each year. These factors are hard to predict; this means that we never really know when a drought condition might occur.

Knowing how to adequately manage our dynamic water resources is crucial to the Pacific Northwest, especially in these drought years. Witness the last drought in 1977 - these conditions cost the regional economy millions of dollars in lost resources, in production, and caused much strife and conflict among private and public agencies and institutions and the major users of the system.

Did we learn a lesson from the last drought? To date, it appears that we have had little planning since then to help us cope with the next drought. What has been done has been fragmented with very little coordination. With the demise of the Pacific Northwest River Basin Commission, there is no longer a coordinated regional planning mechanism for the Columbia River System, although the Regional Power Council may now be filling this void.

In looking at this issue, we need to ask what plans do we have which will help us cope with low water emergencies; what goals and objectives have we set for our water resources; what alternative actions do we have available to meet present and future demands for our water resources, and what institutional mechanisms have been set up to deal with a drought condition? In the course of today's discussions, I hope we will address some of these issues. With the present surplus of water, I hope that we are not falsely assured that our water resources are adequate to meet all of our future needs.

To begin our program today, our first panel has been asked to give us some background and historical perspectives on the issue of low water management in the Pacific Northwest. Our first speaker will be Janet W. McLennan, Assistant Power Manager for Natural Resources and Public Services, Office of Power Management Bonneville Power Administration. She will give us some insight into western water law and its usefulness or non-usefulness in drought conditions. She also will supply us with a perspective of the events and activities that occurred in the Pacific Northwest during the 1977 drought. Next. Dale R. Evans, Chief, Environmental & Technical Services Division, National Marine Fisheries Service, will provide us with some comments on federal/state

institutional relations during low water years and what problems we find in this area. Finally, Michael C. Blumm, Associate Professor at Lewis and Clark Law School, will provide us with a summary of the development of the hydroelectric system now in place in the Pacific Northwest. He will review the 1980 Power Planning and Conservation Act, providing us with observations on how this new legislative act may affect the future management and development of the hydroelectric system.

Having reviewed each speaker's presentation, I know that we will receive an excellent introduction into the issues and concerns of "managing low water year emergencies." They also will provide us with several thought-provoking questions which, I hope, we will address during the course of the day's discussion. Let us begin...

Water Law and Water Policy

Janet W. McLennan
Bonneville Power Administration

In addressing the topic assigned, I want to discuss with you today two essentially quite different subjects. First I will discuss the broad outlines of water law and some of the policy implications that either drive it or are driven by it. Then I want to reminisce very briefly on the droughts of the 1970's - particularly that in 1977, when I was Assistant to the Governor of Oregon for Natural Resources and served as Oregon State Government Drought Chairman. I think that you will then conclude as I have, that water law - while by no means irrelevant - is not the dominant means of providing societal or governmental response to most of the problems caused by occasional, seasonal scarcity of water.

What is implicit in the title we've been given to address?

Are water law and water policy distinct or are they a composite?

Given water law, is there room for any other water policy?

Within the law of water use, how much latitude is available for the development of discrete water policy applications; for response to abnormal physical or atmospheric circumstances; for prioritization among beneficial uses; to respond to human or livestock emergencies ?

I claim no expertise in water law, but a general outline of the concepts underlying Western Water Law is fundamental to our discussion and understanding of the framework within which citizens and governmental entities respond in a period of drought.

As most of you know water law in the eastern portion of the United States is generally derivative from English law and is identified as the Riparian Doctrine. To oversimplify a great deal, under that doctrine streamside ownerships simply take and use the water as it goes by their land. By the time the stream

or river reaches the ocean, under one theory it has been all used up. Alternatively, under the majority theory, there is a societal right to maintenance of the stream.

In the arid west, water law developed under the cloud of scarcity, and finds it origins in part in the law that developed as a means of claiming discovered mineral resources in western mining districts. Frontier justice, initially simple, direct and arbitrary, forms the basis for allocation. The time of claim becomes of paramount importance in what is known as the Appropriation Doctrine. First in time is first in right. Registry or recordation is a necessary companion, which requires governmental involvement and recognition. In turn this requires a measurement of the withdrawal amount that can be beneficially used on a particular ownership of land. The right attaches in that amount to that land rather than to the original claimant. Generally, the right persists and survives changing ownerships, but is subject to cancellation or abandonment for failure to make continuing beneficial use of the appropriated amount of water.

Priority of right in time then becomes the determinant of allocating scarce water. Presuming that appropriation goes unchecked, sooner or later each stream may become over-appropriated so long as agricultural lands may be serviced, or other beneficial use claims for municipal or industrial uses of the water are filed.

However, any appropriation - even gross over-appropriation - serves some purpose so long as it allocates water in the wettest year of record. The rub, of course, comes in the many years which are not wet, and the situation is especially aggrieved in those years that are inordinately dry, that is, the drought years. It is worth noting at this point that there can be very significant variations in the expected levels of flow in western streams. For example, prior to impoundment the Columbia River at Revelstoke in Canada could vary by a factor of 100 over the years of record. On a stream or river like that, the expectations of a senior water right holder can be substantial; the expectations of a very junior holder should be minimal. The problem is they seldom are. And so the junior holder may have made investments and planted acreage on the expectation of least average water. In theory then, half the time he should expect sufficient water for his purposes. Unfortunately, rarely does his planning include the fact that he is likely to have less then he needs or even no water by right at all, the other half of the time.

Conflict is heightened by the fact that the status of a senior right is so great as to discourage efficiency in his use. The senior user can literally squander water while his junior neighbor parches. Parenthetically, since the water is free, it may be that only increasing power costs may lead to greater efficiency in use.

Another problem is occasioned by changing land use patterns. Priority rights are apt to be attached to the agricultural lands that represented the pioneer usage. Subsequent urbanization and industrialization mean that those municipal and industrial water rights are junior to the historical agricultural usage. Unless the municipal or industrial entity has the legal ability and the courage to purchase such senior rights away from the agricultural lands - which often would be tantamount to destroying the agricultural potential - what may be perceived by the majority of citizens as the greatest good for the greatest number in the long run will not be secured.

In addition to these kinds of problems, there are many others associated with satisfying a broad range of societal values. In-stream uses of water - fish and wildlife, recreation, aesthetics, pollution dilution, recharge compete at some legal disadvantage with the uses that are attended by withdrawal of the water, and for the most part were not recognized as valuable in the infancy of western water law - when senior rights were claimed and recognized as property.

Naturally, to address these and other similar issues, the appropriation doctrine as it is evidenced in state statutes has been embroidered and embellished with legislated means of attempting to accommodate the 20th century. Transferability, cancellation, establishment of minimum flows and possibly recognition of them in the priority chain, prohibitions on further appropriation, water resource planning and priorities among beneficial uses, are among numerous means legislatures have explored in an effort to provide more flexibility in water law. And to some extent the courts have in recent years provided more flexibility in interpreting existing law. Adjudications of rights preexisting recordation statutes have surfaced and recognized Indian claims, for example, and these may comprehend in-stream use. Other potential Indian and historical Federal claims abound, some of which have been frustrated in recent decisions, others of which await their day in court.

Well, how does this all fit with planning for a drought?

Obviously, there are benefits and burdens of a fairly definitive and arbitrary scheme. "Them that has the water" knows it. "Them that doesn't" or whose right is so junior as to be almost meaningless should also know that. A drought then, as a matter of law, is not the occasion for a great allocation of scarcity, because that took place as the appropriations were made over time.

But what of the burdens ? Is there any legal means of immediate relief in sight for the holder of a junior right ? Not much - except for some humanitarian protection of enough water to drink for him and his family.

For the latter day incidents of urbanization and industrialization, the people in cities downstream from heavy

agricultural use and the factories that provide their jobs - not much relief except what political pressure will force.

And similarly for the in-stream uses - not much hope in the short term for legal redress.

If there is not much that can be accomplished by application of water law and the policy choices it expresses in time of drought, how much of an inhibition is it to constructive governmental actions that may be required?

In thinking about that question, I tried to refresh my mind about all the major and minor crises that came to our attention during the 1973 and 1977 droughts, and some of the governmental responses that may or may not have been mitigative or at least reassuring to a concerned populace.

The 1973 drought was a foretaste and of course was accompanied by the OPEC oil embargo, which focused attention primarily on energy issues. The Oregon legislature enacted a statute providing the Public Utilities Commission with authority to set a curtailment tariff and implement it. The governor of Oregon was provided with special energy emergency powers. And the Legislature authorized an abortive effort to recodify - or topically revise - (i.e. not substantively) the Water Code. That year a half legislative effort was never enacted.

But that was a relatively minor drought compared with what was to come in 1977. What follows is merely a partial listing but it indicates the diverse nature of the problems presented in 1977:

- Municipal water supplies along the Oregon coast, dependent upon natural underground reservoirs, evidenced depletion due to excessive industrial use.

- Ski resorts in inopportune locations, lacking snow as they should have expected at least one third to one half the time, pled for subsidies.

- The top quartile of electrical service to BPA's Direct Services Industries was restricted causing layoffs, due to unavailability of nonfirm energy. This of course, is a planned-for acccommodation of low water years. The cost of such service is priced in contemplation of occasional restriction, and the existence of such loads provide reserves to the regional electrical system that would otherwise have to be provided by standby resources.

- Domestic wells went dry in certain isolated rural areas - and emergency efforts to haul water were undertaken.

- Municipalities curtailed non-essential use of water - lawn watering, swimming pools and so on.

- Industries sought relief from onerous pollution control standards in order to increase parts per million of pollution to water dilution.

- Release of water from Federal Willamette River dams was carefully coordinated with state water resources, pollution control and fish and wildlife agencies to attempt to accommodate conflicting demands for spring fish migration, summer pollution dilution, refill goals, and appropriation.

- Experiments with land disposal of industrial wastes enjoyed some success, and introduced a new appropriate technology.

- The state purchased and trucked water tanks to ranch locations in eastern Oregon where they could be filled from water tankers and provided to thirsty - and sometimes near-expiring livestock. Efforts to provide food to supplement very limited grazing opportunity were less successful. A good many cattle were killed because they could not be fed.

- For the first time, BPA working with Corps of Engineer and the states provided for the release of storage to aid the spring migration in the Columbia. Each spring since those agencies and the federal fishery agencies have worked to improve on a fishery operation plan. And of course, now, with the Regional Council's Fish and Wildlife Program, a water budget to satisfy some of those concerns has been institutionalized as a firm constraint on the system.

- Balances were struck respecting Federal reservoir levels, attempting to accommodate existing water rights while at the same time keeping boat launches wet and marinas in business.

- Cloud-seeding became the preoccupation of the legislature, with as many opponents from all sectors as proponents. The potential ill-timed rainfalls posed as much of a threat to some farmers as it suggested needed moisture to others. As I recall, the eventual legislative draft was more regulatory than enabling. It didn't pass. Idaho sued Washington and Oregon, but before definitive law could be made, the natural rains began.

- Heightened forest fire danger was anticipated, budgeted for, and didn't happen.

- More support was evidenced for additional up-stream storage, not only to augment agricultural and municipal supplies but also to mitigate high temperature levels damaging to the fish resource. But of course, the pathway to hell is paved with those good intentions that are not realizable without significant and timely public investment.

- Farmers whose water rights were junior to minimum flows the state had established in the John Day to protect the fishery sought to override those minimum flows to withdraw water for newly planted orchards.

Looking back over that admittedly partial list, how were effective solutions to problems crafted - when they were?

To the extent that accommodation was found, by and large it resulted from the thoughtful and creative participation of a multitude of Federal, State and local bureaucrats using their authorities as reasonably as they could. Reasonably aggressive coordination was the necessary hand-maiden, and active, outspoken political leadership on the part of elected as well as appointed officials was the spark that gave all the efforts a sense of direction and the public validation without which a democracy can not respond to emergency or unforeseen circumstances.

For those emergencies that the appropriate government could not ameliorate, was water law the cause, or were unjustified hopes and unwise investments the root of some citizens' problems? Frequently, the latter.

Indeed, were citizens willing to accept the realities of western water law, namely, that it is not "fair" in an egalitarian sense, that its allocative ability is historical and not responsive to changing circumstances, then those citizens would not make the investments that leave them in such pickles as 1977 dealt out.

On the other hand, all that is not to say that both legislative and litigative means should not be sought to improve the adaptability of western water law, and to encourage public planning and investments which will improve the life style of more people and the habitat of more fish, as well as provide many other societal benefits. But such efforts should be a continuing citizen concern. Rarely in the midst of a drought can appropriate and comprehensive legislative remedies be crafted. Litigation, even if successful, is likely to provide only retroactive relief. The standards which need to be met to secure injunctive relief are usually insurmountable. And failure in a litigative forum, and often in a legislative forum as well, is as good as twice damned. Bad law - from whatever your perspective of what's good - can be made. That will simply increase the burden and the unlikelihood of future reform.

Federal-State Relations in Low Water Years

Dale R. Evans
National Marine Fisheries Service

Some relationships, in a time of stress, are as likely to fall apart as they are to solidify and survive the crisis. Agency relationships in a low water emergency will include all levels of government, all jurisdictions, because everyone has an interest and everyone will be affected. Unfortunately, I'm afraid this may be as likely to weaken as to strengthen the relationship.

All of these interests, however, must be recognized by each other as legitimate participants in planning for low water emergencies and in the way we organize ourselves for society's response to these conditions. I am not here to suggest that anyone's water right or appropriation would be taken in this process. Indeed, the only way to protect legitimate rights is to make sure everyone's needs and expectations are on the table, understood, and recognized for what they are well in advance of the emergency.

Lack of clearly defined policy and an agreed upon plan allows parochialism and exploitation of poorly represented needs in a time of shortage. The noise level of a presentation is not always proportional to its legitimacy, its representation of public interest, or value to society.

Some features of water availability in the Northwest tend to overshadow others and perhaps create a distorted view of where the squeeze would come from in a low water situation. The Columbia River, for example, is clearly the dominant hydrologic feature of the region. Let's briefly look at some of the characteristics of the Columbia River and how this might color our perceptions of water availability.

In terms of hydropower, the time of peak runoff in the Columbia River does not coincide with the period of peak power demand for the region. Almost three quarters of the normal natural flow of the Columbia River occurs during the six summer months, while little more than a quarter of the runoff occurs in the winter months, when power needs are greatest. Historically, the spreads of

record flows in the lower river have ranged from a high of 1,240,000 cfs in June to a low flow of 36,000 cfs in December, a difference of more than thirtyfold.

Most Columbia and Snake River dams were developed primarily for hydropower, are essentially run-of-the-river. They provide little storage capacity. Construction of the three Canadian storage projects in the early 1960's under the treaty approximately doubled the storage capacity of the system, but even so, the total storage capacity of the Columbia Basin is only about 22 percent of average runoff, compared to 310 percent and 386 percent of the Missouri and Colorado river basins, respectively.

In terms of system management for hydropower, this requires planning based on worst-case conditions, on the amount of firm energy that would be available during the period of historical lowest stream flows. This "critical period" planning also assumes a 95 percent certainty that the reservoirs would refill each year following these low flows.

The point that I want to make from this example is that since by definition the critical period of low water does not occur nearly as often as do median climatic conditions with higher precipitation and runoff, many water users become accustomed to a set of circumstances that lead them to expect and depend upon a greater availability of water than they would if they understood the planning constraints.

It is encouraging to me, however, that apparently the effects of lower water conditions of the 1970's have not faded from memory, and that a number of jurisdictions are now actively looking at the characteristics of water supplies. Hard on the heels of a wet winter and spring with more than its share of high water and floods, a number of issues related to the limited availability of water are being discussed. Various levels of government, including the legislature, are reviewing items such as the status of ground water supplies affected by excessive withdrawals from wells for agriculture, competition by municipalities for runoff in adjacent water sheds, minimum flows for instream purposes, and concerns about land management and pollution control practices affecting water quality, etc. Keep in mind that a low water emergency can exist in wet conditions if the available water is not suitable for use.

It also is encouraging that the 1983 Oregon Legislature passed Senate Joint Resolution No. 3 calling for the Columbia River Compact Commission to resume informal discussions, looking at means to reconcile competing demands and improve the management of a finite resource.

There is another recent development emphasizing the need to clarify rights and expectations among and between interests and jurisdictions. In the Mono Lake ruling about 6 weeks ago, the California State Supreme Court found that even a long-held water right must, in times of low water, recognize and give full

consideration to a common law right of the State called "public trust." What this might mean in practice to us in the Northwest isn't clear to me, but it is quite clear that in planning for low water emergencies, we ought to think out the implications, not the least of which perhaps is renewed interest in out-of-basin transfers of water to the south.

Finally, let me give you one more example of where some long-held tenets are being reexamined. This has to do with the need for the Columbia Basin water and power managers to accommodate an additional "hard constraint", the fisheries "water budget", in reservoir system planning and management. In this case, we need to determine in advance the degree of hardness that the fisheries water budget will have, compared to other hard operating constraints, in a low water situation. This is not an easy question to answer because the concept of hard operating constraints is not clearly defined and depends to a large extent on previously unchallenged practice for its precedent.

To date, flood control, firm energy, and reservoir refill have been the principal hard operating constraints being massaged as water and power managers seek to accommodate the fisheries water budget. Needless to say, we are extraordinarily fortunate that this learning process can occur in a time of energy surplus and abundant runoff.

In summary, I would suggest that the problems that must be faced in preparing for low water years will never become easier, they can only become more difficult. One has to wonder why we delay.

The Northwest's Hydroelectric Heritage*

Michael C. Blumm
Lewis and Clark Law School

Although the region's hydroelectric system was an offspring of the New Deal, its philosophical underpinnings can be traced to the Progressive conservation movement. Progressive notions about the public nature of streamflows and the opportunity provided by basinwide waterways developments to promote social equity, present economic monopolies, and preserve the rural way of life had enduring influence on New Deal thought. The economic crisis that ushered in the New Deal provided the impetus to marry Progressive social philosophy with large-scale, federal public works projects to stimulate economic recovery. Water projects not only put people to work, they produced electricity which provided competition to private utilities, whose excesses in the 1970s resulted in high rates, poor service, and rural areas with no electricity. Federal power as a "yardstick" for private utility rates and service reflected not simply a distrust of private utilities, which were often controlled by large holding companies far removed from local consumers. It also was a product of a fundamental lack of faith in the ability to control utility excesses through regulation. With the passage of the 1935 Public Utility Holding Company Act and the emergence of state rate regulation in the post-war era, it is not surprising that the public power movement declined.

The chief regional legacy of the New Deal was, of course, the Bonneville Power Administration, established to market wholesale power from federal dams and to promote public agencies as retailers of federal power. BPA's limited charter was the product of a compromise between New Dealers -- who sought a TVA-like authority to plan and operate a basinwide federal power system -- and private utility interests -- which wanted to see their allies, the Corps of Engineers, provided with power marketing authority. Although a BPA without authority to expand the system was viewed by public power advocates as a temporary step along the road to a more comprehensive mandate, the subsidence of the public power movement during and after World War II made an expanded mandate impractical. In a very real sense, this settling of institutional arrangements around a BPA without purchase authority necessitated congressional intervention in 1980.

In the postwar era, the system expanded rapidly through the Corps of Engineers planning and congressional appropriations. The rejection

Adapted from "The Northwest's Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act", Vol 54, Washington Law Review, pp. 175-244 (1983). Available from Oregon Sea Grant, OSU, Corvallis, OR 97331.

of the New Deal paradigm of centralized national water planning left the shape of the Northwest hydroelectric power in the hands of regional planners and congressional logrollers. While this arrangement produced more regional control, it also allowed key decisions to be made in low visibility technical reports and appropriations hearings, largely out of the public spotlight. With Congress willing to bankroll a hydroelectric system that surpassed the region's immediate needs, BPA employed its marketing authority to maintain and expand electric consumptive industries first lured to the region by defense contracts in World War II. Just as important, the agency forged institutional links with the region's private utilities to coordinate demand forecasts. High forecasts induced more water projects; more projects meant that BPA could market power to industries and private utilities after supplying the needs of its preference customers. Cheap federally produced power became the engine driving regional economic growth.

The partnership era of the 1950s solidified the role of private utilities as an integral element of the regional power puzzle. The private utilities gained long-term BPA power contracts and took advantage of a moratorium on new federal project starts to secure licenses for their own hydroelectric projects. Diversity of project ownership induced BPA to broadly construe its authorities to wheel nonfederal power in order to increase regional efficiency. Of even greater long-term significance, private and public utilities collaborated on financing arrangements that enabled the equity-short public utilities to construct a number of projects, most notably on the mid-Columbia. This kind of cooperative financing would become a keystone of the region's approach to thermal plant construction in the 1960s and 1970s.

The "golden age" of the 1960s witnessed maturation of the hydroelectric system. Ratification of the Columbia River Treaty doubled the basin's storage capacity and promoted a series of contractual arrangements that increased system coordination and interregional power sales. In a classic example of achieving short-term gains at the cost of long-term losses, power surpluses were dissipated by a coupling of power sales to industrial customers. Coupled with an expansion of the planning horizon, increased industrial power sales produced forecasts of power shortages. With large hydroelectric sites all but exhausted, the region formulated plans to develop thermal power plants.

The transition to an integrated hydrothermal system proved to be a difficult and controversial one. The initial Hydro-Thermal Power Program foundered when rising construction costs overtaxed BPA's financing scheme and the IRS limited the tax advantages available to project sponsors of federally backed plants. Phase 2 of the program, financed without federal guarantees but still with significant federal responsibility for manipulating streamflows to meet peak power demands, was even shorter lived. Formulated by Bonneville and its customers without public involvement, the program was enjoined by the courts for violating NEPA, which proved to be perhaps the most cost-effective decision of the decade. In effect, the court rulings reflected the program's lack of political legitimacy. The considerable

costs of thermal plants, both in terms of increasing rates and their spillover costs to the environment and the region's fish runs, made it clear that decisions about expanding the electric system could not be made by technical experts alone. A broader regional consensus was necessary.

That consensus produced the 1980 Power Planning and Conservation Act, with its commitments to open processes, shared powers, and enterprise liability. But while the Act's emphasis on conservation, environmental quality, and fish and wildlife protection constitutes a rejection of some of the premises of the Hydro-Thermal Power Program, it maintains long-standing principles of utility diversity, public preference, and industrial power sales. However, none of these principles will be quite the same in the post-Act era. For example, utility diversity has been assured largely by what amounts to an expansion of preference to include the residential and small farm consumers of private utilities. The costs of this preference expansion are to be recouped through increased rates paid by existing industrial customers, who agreed to increased rates in return for the planning certainty that came with new long-term contracts.

More fundamentally, the Act represents a dramatic departure from the New Deal model of broad charters to federal administrators. Throughout the post-war era, electric policymaking was made largely by BPA and its customers, coupled with congressional acquiescence and appropriations. The detailed provisions of the 1980 statute indicate that Congress wished to narrow considerably the agency's statutory mandates. While there remains considerable administrative discretion, it seems clear that this discretion will be subject to more active congressional oversight in the future. Moreover, in creating the Power and Conservation Planning Council and directing it to chart the region's energy future, Congress made a significant reallocation of power to the states. Although BPA has indicated it does not believe it is bound by the Council's directives, it remains to be seen whether the agency will attempt to test this interpretation.

Finally, in addition to greater congressional oversight and more authority to the states, the Act promises public involvement in all regional power decisions. While the public nature of streamflows has not been seriously challenged since the Progressive conservation movement, regional hydroelectric policymakers frequently sacrificed public involvement in the name of administrative expertise. Unfortunately, the practical effect of unfettered administrative discretion has been an emphasis on the short-term at the expense of the long-term, and utility and industrial customer access to decision-makers at the expense of the general public. The Act's commitment to open processes is a recognition that the region can no longer afford to make policies that are not informed by public comment and that cannot withstand public challenges in the courts. Although public comment and judicial review have been attacked as dilatory and inefficient, it seems clear that the benefits of ensuring sound administrative decisionmaking far exceed the costs of delays. The lessons of the past indicate that the long-term costs of poor decisions are simply too high for the region not to encourage active, vigorous, and critical public debate on the region's electric future.

Questions and Answers–Panel I.

In the Question and Answer period, Professor Michael Blumm commented on the water budget concept which was adopted by the Northwest Power Planning Council in November 1982. He stated that this was a new constraint which was placed on the systems operation of the hydro-electric system. In answering Dale Evans' query on how hard a constraint this was, Professor Blumm stated it was not as firm as such non-power constraints as Flood Control, but it appeared to be more of a constraint than the refill and secondary generation constraints. He suggested that the efficacy of the water budget should be studied by the Northwest Power Planning Council to insure that it is meeting its objective of permitting the smolts (young migrating salmon) to reach the ocean, with minimal loss of the run.

Addressing the question of what priority instream users of the river (e.g., fisheries) have in a drought year, Ms. Janet McClennan stated that the instream uses generally get short-changed. Under western water law, she stated that the senior users have first right to the water. If the river or stream is heavily appropriated, the instream uses will probably be last in line for the water. She maintained that this would have dire consequences for fish and wildlife, in a low-water year. She also suggested that recreational use of the river would be impacted, and navigation could be affected if the low-water condition was severe, and of long duration.

Also addressing this question, Professor Blumm stated there needs to be a much clearer picture of the priorities of use, in a low-water year for the Columbia River. He suggested a study might be in order to evaluate the efficacy of the entire system and how it is operated. This study could investigate the legal basis, the history and the effectiveness of all the constraints on the system in order to determine if the flexibility of the system was being utilized to maximize the benefits for all competing water users.

Elaborating on this proposed study, Professor Blumm stated the study could describe the constraints, purposes, and administrative discretion that is now being exercised in operating the system on an annual basis. It could evaluate the costs and benefits of exercising administrative discretion under different flow regimes, and could suggest environmentally preferable alternatives. The study could also analyze mitigation measures, and could propose changes in the operation of the system, on a system-wide basis, if it proved necessary. This study would be subject to substantial public review and comment.

In other words, Professor Blumm suggested that a "systems operational environmental impact statement" was needed. By scrutinizing the system, he maintained that a more flexible system could be developed. He thought this type of study might show that more water would be available for use in average water years, and that the water might be better used in critical water years than in the past. The study would also involve more people in the decision-making process, and would expose the administrative discretion that is now being exercised to public comment and review.

A question was raised regarding the "national obligation" to augment the water supply of the Colorado River, and how this "obligation" would fit into the priorities of water usage for the Columbia River. Professor Blumm pointed out that Senator Henry Jackson (D-Washington) had imposed a moratorium regarding any inter-basin transfer of water regarding the Columbia River until 1997. Thus, this would be a moot point until then, unless Congress reverses this decision.

Regarding the establishment of minimum instream flows, the question was asked whether or not this constituted a "taking of the irrigators' water (property) rights in a drought condition". Ms. McClennan stated that it could be considered a taking. She stated that, generally, the irrigator would be the "senior user" of the water and, under western water law, would have first right to the water. If the water, in a low-water year, was given to some other use, without any compensation, some legal recourse might be in order.

Professor Blumm interjected that there may be some movement away from this position. Referring to a recent decision by the California Supreme Court, National Audubon Society vs. Superior Court of Alpine County, Feb. 1983 (known as the Mono Lake Decision), he stated the courts suggested that the public trust doctrine forecloses the argument of "first in time, first in right". This decision maintained that the instream uses of the water, under California law, cannot be ignored. Professor Blumm did state that the Mono Lake decision did not fully address the question of compensation and that, being a California decision, it did not apply to other states. However, he did suggest that this exercise of the public trust doctrine has cast new light on appropriation of water among users in a drought condition.

Referring to the recent Fish and Wildlife Plan adopted by the Northwest Power Planning Council (Nov. 1982), a question was raised

on how much lost irrigation, lost production of energy and personal hardship can the public afford at the expense of maintaining and preserving the salmon resource. Professor Blumm stated recent research has attempted to quantify the cost of the region of this salmon resource over the past 20 years. He pointed that it still is not clear what we are losing. He emphasized studies should be conducted which would analyze and demonstrate the opportunities to operate the Columbia River System to maximize the competing resources. With a better informational base, better decisions can be made which will ultimately maximize the social welfare.

PANEL II.
Anticipating Impacts: What Are We Doing?

Charles F. Broches
Natural Resources Consultant

Regardless of availability, the management of water resources in the Pacific Northwest has faced three major problems. First, among the general public there exists a deeply held belief that water is an unlimited resource which can be used as a matter of right. Second, while many agencies and organizations plan for and exploit surface and ground water resources throughout the region, only a limited degree of coordination and even less joint planning take place. Therefore, we find areas of unintended overutilization and holes in our resource planning efforts. Third, when conflicts arise, no agency or commission short of the judiciary is empowered to settle disputes. This means that during times of crisis, important decisions may have to await free time on a judge's calendar, rather than more effective and efficient administrative remedies.

Given that we live in a region where much of the commercial activity is either directly or indirectly linked to our water resources, these three problems are paramount to the economic viability of the region. When droughts come, as they have nineteen times since the turn of the century, these built-in constraints greatly exacerbate the problem of reducing the economic and social dislocation which mother nature has forced upon us.

From the perspective of anticipating the impacts of future droughts, we can learn some things from the past. The drought of 1976-1977 cost the economy of Washington State $650 million. Many of the decisions which were made during that drought were made on an ad hoc, trial-by-error basis. The region lacked a carefully designed and coordinated response. Yet through the hard work of many individuals and agencies and the opportune arrival of the rains, we managed to cope.

Six years have now passed and we still lack a regional response plan. Our ability to anticipate the impacts of future droughts and avoid possible disaster has been improved in some ways. Plans exist to provide adequate flows of water during the spring to insure that the spring salmon escape into the ocean and to provide the region with a rational development of electricity over the next twenty years. Yet, we now lack institutional actors like the Columbia River Basin Commission or the Northwest Federal Regional Council, which can bring various parties-at-interest together. We are also placing greater pressure on the finite supply of water we have through increased urbanization and industrialization. Last, many agencies have lost their institutional memories as personnel who experienced the last drought changed missions within their agency or changed jobs or left the issue area altogether.

To complicate what is already a difficult policy issue, three additional variables need to be factored into any analysis of the region's water use formula. First and foremost is a total lack of serial correlation between water years. The amount of water available in any one year has little relationship to the amount of water in any second year. During the decade of the 1970s we had three drought years, two flood years and five "normal" years. Variability is the pattern and the question is one of anticipating when a non-normal year will occur and what impacts it will have.

A second variable exists within the composition of the community of water users. Too often we identify classes of users (including irrigated agriculture, fish and wildlife protection and mitigation, pollution, abatement, power production, recreation and transportation) and pretend that all individuals or groups under that class have identical interests. This, of course, is untrue even when the interest seeks to prevent a unified case supporting its unique contributions to the regional economy. For example, all irrigated agricultural interests are not the same. Great conflicts exist between junior and senior appropriators. Another area of latent conflict exists between publicly owned and investor owned utilities. In point of fact, great variance exists within user group communities making the validity of any policy preference questionable.

A final source of variation is the direct result of activities within the political process. The Northwest Power Planning and Conservation Act (PL-96-501) is only the most recent example of how new legislation can alter existing relationships between and among user groups as well as congressionally mandated definitions of desirable public policy. Congress, state legislatures, and the courts should not be viewed as static actors who

only validate the status quo. Great changes have been brought about by all three institutions and more changes should be anticipated.

The papers which follow address some of the issues related to anticipating the impact of future low water years, as well as applying the lessons of the past to our current efforts.

The first paper by Joel Haggard* addresses institutional considerations faced by water managers. Mr. Haggard posits two important questions for analysis. First, "Do We Know What We Are Dealing With?" Second, given the vagaries of the water management system, "What Are We Going To Do About It?"

The next four papers represent the views of specialized groups impacted by droughts. Merrill Schultz explains how the regional power system operates and the manner of the power industries' response to the last low water emergency. Mr. Schultz concludes with some observations on how power planners are responding to the Fish and Wildlife Program adopted by the Northwest Power Planning Council. These concluding remarks serve to partially introduce Peter Willing, who served as the fish and wildlife consultant to the Northwest Conservation Act Coalition during the development of the Power Council's Fish and Wildlife Program. Dr. Willing urges the development of fishery sensitive criteria in any low water program.

While much of the region's attention has focused on fish and wildlife concerns versus the generation of electricity, during low water years the region's productive industries suffer greatly. Two of great importance to the regional economy are agriculture and aluminum. James Trull of the Sunnyside Valley Irrigation District addresses the problems faced by agricultural water users. The last speaker representing a specific user is Bruce Mizer, who addresses the role of the direct service industry (DSIs)**. Mr. Mizer explains how the DSIs operate and addresses their ability to respond to power cutbacks resulting from low water conditions.

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*Due to conflict, Mr. Haggard was unable to attend the Conference. He prepared this paper for delivery at the Conference.

**The DISs are a group of 15 industrial customers who purchase large blocks of power directly from Bonneville Power Administration.

The problems of droughts are likely to be regional in nature and the last speaker, Dr. Peter Beaulieu, explains that water resource conflicts similar to those found on the Columbia are likely to appear in Central Puget Sound too.

Institutional Considerations

Joel Haggard
Haggard, Tousley, and Brain

"Institutional Considerations in Managing Low Water Year Emergencies." The lofty description of "Institutional Considerations" may be easier handled by breaking it down into two issues: Do we know what we are dealing with? And what are we going to do about it?

I. Do We Know What We Are Dealing With?

There are many types of data that relate to low water year emergencies. At first glance, it might appear that we have ample information for dealing with low water year emergencies. Historic data on stream flows have been accumulated. Tributary and main-stem flow relationships have been modeled. Impoundments, withdrawals and return flow rates have been studied. Numerous water-related state agencies and the various operational and resource-oriented federal agencies have conducted many quantification studies. And certainly the Pacific Northwest River Basins Commission's work provides an integrable framework for a decisional matrix. So it would appear that the informational basis for water allocation and utilization decisions is more than adequate.

The apparent adequacy of information for allocation decisions in non-crisis years, however, may disappear when the crisis comes. Low water years are reality, not a probability function of historic flow rates. The natural volume of water flow in any one year is virtually independent of prior years in the Northwest. In the 70's there were only two flood years on the Columbia (1972 and 1974). During that same period there were three drought years (1973, 1977 & 1979). The predictability of future flows, so necessary in managing our present resources, may be but a discomforting illusion when faced with the reality of a drought.

We have all heard about an irrigator with water rights in excess of actual use. Do we know how many of these irrigators there are, or what would be the result on all irrigators if there were a pro-rata reduction in allocation rather than a junior/senior cut off? The junior/senior cut off does not account for the fact that a junior appropriator has often made as much of an investment as the senior and, in terms of bankruptcy and human misery, the junior's plight will be just as bad, for mortgage payments unfortunately continue even in drought years. Can pro-rata reductions for future appropriations allow everyone to exist on an emergency basis, or will they just double the bankruptcies? We don't have the data to know. Similarly, do we know the economic or ecological effects of cutting the power generator to benefit the anadromous fish or vice versa?

We cannot even say with certainty what water is legally available to us today. Many water rights are unadjudicated. The quantity of legal claims potentially available to the Indian nations or the Federal Government is undecided. With such uncertainties and claims, what residual authority do our states, individually and collectively, really have over the water resource? Should uses be limited in light of these uncertainties? Limitation of uses assumes that we accept as a constraint the existence of a minimum base flow in a river and then permit diversions only as actual flow is available above that. Does this require a no-growth management philosophy for our people and their land use? Is this what we want for our region today and tomorrow? If so, what is the effect upon people, the economy and the quality of life of our area? Is this concept consistent with our perspective of our water resources and their relationship to the maintenance and enhancement of the quality of life in our area? Should more water be made available? We cannot make new water, but perhaps we can use the water we have more efficiently.

Without a proper data base, we are limited in efforts to formulate a coherent policy. For example, suppose we respond to the plight of the junior appropriator with short-term legislative relief actions like loan payment moratoriums or government support. This may trigger responsive actions by other affected political constituencies. Hence the usual legislative response is predictably to hasten granting well-drilling permits and making temporary allocations of surface waters. But this in turn can affect natural recharge and withdrawals in the ensuing years, or can deplete the water resource so it is unable to support a viable

fisheries resource during the drought. Short-term responses predicated upon the immediacy of a drought create their own set of problems, the data base for which is uncertain at best.

An adequate data base is only the first step. All the information in the world is useless unless the institution wants to and can develop and implement a plan of action.

I suggest that the priorities for and support of resource agencies are presently destructive of informed, quality decision-making in low water years. Consider by example the utilization of ground water resources in Oregon. In many instances we learn that pumping is outpacing the natural recharge of the aquifers. While Oregon law requires the prevention of unreasonable ground water declines, Water Resources Director James Sexson was reported in the April 10, 1983 Portland Oregonian as saying he "has been hamstrung in efforts to halt the decline by budget cuts, loss of staff members and the lack of administrative rules to guide enforcement actions." These real institutional constraints operate restrictively during non-emergency periods in planning for and developing information and procedures necessary to handle low water years when they occur. The problem is exacerbated in drought years. What this example indicates is that such institutional constraints practically inhibit our present ability to determine actual rights to water use and the effect of temporary actions under drought conditions.

We are faced in a low water year with an informational base which does not adequately nor accurately establish what rights exist or what the consequences are of cutting back on different users or uses.

Protection against unforeseen or adverse reductions in water availability is usually predicated upon a margin of safety, a reserve ratio, a contingency factor - however it be phrased. What is a proper margin of safety? How is it effected - increasing minimum stream flows, across the board reductions in appropriation requests, or what? Here, our data fall short of adequate. At present, we deal with low water years by cutting off the junior appropriator to ensure water to the senior appropriator. Viewed slightly differently, we maintain a "reserve" equal to the flows in excess of historic lows, with the rights to the excess (used by the junior appropriators) treated as an interruptible right. Although I believe that this rule should be maintained for existing appropriators, I also recognize

that we simply do not have the data to evaluate alternatives, particularly during the immediacy of a low water year and for future allocation requests.

Unless unduly conservative margins of safety are built into our appropriation system, then it is safe to predict that crisis decision-making will be necessary to allocate and enforce water resource availability in low-water years. The intensity and geographic scope of such decision-making may be mitigated by the margin of safety - but what margin do we now have?

As good as our informational base is about actual flows, we can only suspect the dimensions of the paper over-appropriation problem. I do not mean to say, and I am quick to correct any misimpression, that paper over-appropriation has been done by design or by neglect. What I do mean to say is that conservativeness in predicting needed water supplies dictates the response of applying for rights which may be in excess of projected use. The passage of time tends to blur records if in fact records are available for all appropriations or use by custom or riparian right. A primary emphasis in our institutional inquiry must be to develop the data that answer the questions: Who is using how much? How badly do they need it? And, What happens if they are cut back? Such data base need not be exhaustive or complete - but its quality should be symmetric with the quality of the decisions which must be made. Only with those answers can institutions begin to plan for crisis low water years.

II. What Are We Going To Do About It?

Earlier I stated that I do not support abandoning the junior/senior appropriation distinction for present allocations. This does not mean, however, that more innovative methods of allocation might not be used in creating water appropriation rights in the future. And I do hear more frequently of such methods. Institutions may distinguish between that which has been done and that which is yet to be done. What I suggest is that reliance upon our existing legal base for water rights would indicate that institutional efforts should be less directed at the rights already granted (but not as to how much they are for) and more at future allocations where financial investments based upon possession of water rights have yet to be made.

One often-heralded approach is to conserve our present resources. The Regional Conservation & Electric Power Plan - 1983 (Draft) articulates throughout such an

approach. BPA is directed to select resources for acquisition starting with conservation. Fish and wildlife resources are not just to be protected, but enhanced. Power - Fish -- both place differing demands upon the water resources, and future permits may indeed reflect environmental or resource protection conditions not previously seen in permits. The implication to the irrigator, for example, could be immediate - in terms of a condition to use certain types of water-conserving practices or equipment. The effect could be more systemic in that requests for water might be denied or granted only upon pro-rata or total interruption of water supplies.

Such a concept of enforcing conservation goals through permit conditions, is consistent with NEPA's instruction that we act as a trustee of the environment for future generations. The concept is not inconsistent with water law dictates to consider maximum net benefits and the social justice goal of opportunity for all. What then do we do institutionally to prepare to respond to these approaches prior to the immediacy of a drought?

This does not suggest that emerging governmental actions to plan responses to future droughts will be limited to restricting or conditioning new appropriation in the broad sense of withdrawals, or impoundments or minimum stream flows. Given adequate institutional directions or pressures, it is conceivable that recapture efforts will be initiated. Failure to put water to a beneficial use for required periods, unless excepted by statute as for drought, is a presently available basis for increasing the availability (but not the quantity) of water. We hear of requirements for monitoring and reporting actual water usage to provide a governmental decision basis for recapture. Are such institutional steps the forerunner of recapture efforts?

The policy dimensions of these and other administrative tools now available may give us a margin of safety within the present law. But we may still find our choices restricted by the vagaries of seasonal stream flows. Restrictions in water availability may be more severe for future users who find it impossible to finance a development when a banker observes that water availability appears 90% predictable only every 4th year or so. How do we provide the food, the power, the recreation and fish for expanding populations if we view water as a limited resource? Must the competition between instream flows for anadromous fish, diversions for irrigation and hydroelectric power production be

resolved to the absolute detriment of anyone? Can there be a reasonable compromise?

We must do more than simply ask questions; we must seek answers through informed judgments. Choices will become necessary. For the logical result of resource limitation is conflict.

> Conflicts among river uses are already occurring in our increasingly severe and low water years. If demands on the available resource continue to grow as projected, the competition for the existing storage supplies will increase substantially in the next decade. Past flexibilities are fast disappearing. Decisions on the use of existing supplies for hydropower irrigation in supplementing minimum instream flows will involve a definite limit in allocation to one or more of the competing uses.

United States Army Corps of Engineers, Columbia River and Tributaries Review Study - Planning Issues - Columbia and Lower Snake Rivers, V-16 (1976).

Conflicts can and do occur whenever two parties desire the same object; but, the conflict resolution is easier when the parties recognize that they share the same objective. What perspective of our water resources can we all share which will direct us to a common objective? The perspective which I believe we all share is that our water resources are a single natural resource with interdependent relationships between the land and the people which are affected by the water use. This perspective suggests a goal for all work on water resource allocation, whether in flood or drought years: that being to maintain and enhance the quality of life for the people, the industry, the animals, the birds and the fish which depend upon or relate to the water resource.

Each of us has a different perspective as to water's value, worth, advantages, and uses. Our perspectives are fashioned by our individual histories - particularly personal, educational, occupational, and recreational. But regardless of our individual perspectives of water and its uses, there is but one supply of water.

The use of our water resource, particularly acute in drought years, when each use or user may not be capable of coexisting with each other use or user, requires a system of allocation which would preclude systematic

limitation of politically or legally weak users. An effective allocation system must account for a diversity of interests and demands because of the pluralistic interests, federal, state, and local, in our water resource. Such a system must take into account the relationship of demand to supply, varying with seasonal, annual, and local fluctuations, where one use impinges upon another. It must be based upon the concerns, perceptions, decisional rules, and mechanisms for change commonly accepted by all water users and other affected political constituences.

The choice of an allocating system is a political one, not an economic one, although the two viewpoints obviously interrelate. The problem we share is when and how to establish a system which provides for consensus, and for constraint when consensus fails. No politically responsive entity can afford to improve another entity at its own expense. The political issue, therefore, may depend on whether our elected representatives and their constituents perceive drought planning to be better or worse than piecemeal response to specific drought conditions. No present governmental entity has authority symmetric with the interrelated water resources of our region. Institutional rearrangements may be necessary to provide a framework for decisional planning.

An institutional system to deal with our water resources should build upon what we know and accept. It should provide a generic method of dispute resolution that recognizes the reasonable claims of each party without sacrificing the interests of uninvolved or politically inactive users. A reasonable accommodation must be made between instream and out-of-stream water users, and among users in each category. Recognition should be given to future needs and the reality that present perceptions of reasonable uses will vary. All users should be represented. Non-participation or nonresponsiveness should be discouraged. While these ideals suggest the desirability of continued innovation within existing law, it may suggest all of us broaden our perspectives to recognize other viewpoints.

Three drought years in the 70's - a reality which will recur. Should we not understand, plan and act to avoid the immediacy and distractions - financial, human and political - that will buffet our institutions ?

Concerns of Power Managers

Merrill S. Schultz
Intercompany Pool

Twice, almost three times, in the last ten years the Northwest has experienced potential shortages of electric energy serious enough to have required Regional appeals for voluntary cutbacks of usage. After an unbroken string of almost twenty years of good hydro, combined in each of those years with a system which had critical-water surplus energy capability, 1973 brought utilities and civil authorities a sudden awakening. In that year a conjunction of low runoff and poor performance of thermal power plants created a perilous situation, and there was no emergency management plan in place; the possibilities of electric energy shortages had been realized, evaluated and discussed earlier, but no formal action had been taken until the crisis was upon us. The first Regional plans, in cooperation with the States, were initiated in the summer of 1973 and implemented, somewhat chaotically, during the fall. After record-high precipitation in the winter of 1973-74 washed out the emergency, work on a regional electric energy emergency plan continued, but at a much reduced pace. The unprecedented drought of 1977 once again sparked feverish work on a Regional management plan, this time with good groundwork already in place, and a formal set of Regional guidelines was adopted by the Governors of Washington, Oregon, Idaho and Montana. The plan and the necessary legislative actions were established in time to be effective; the mandatory steps of the plan were never tested, however, because the responsive cooperation of the citizens of the four States allowed the crisis to be met fully within the first phase of the plan, voluntary curtailment.

Although the Regional Guidelines are explicitly tied to the 1977 situation, and the authorizing legislation has expired at least in most States, I believe that the

same structure will serve in the future, and it can be reinstituted on relatively short notice.

It is important to note at the outset that the electric utilities of the Region intend to manage adverse hydro conditions by provision of adequate resources to meet customer demand under those conditions, without reliance upon emergency management devices. In other words, the industry plans on the basis of being able to meet forecasted load with recurrence of the worst historical streamflows and reasonable performance of other resources; by itself, occurrence of streamflow within the historical range should not constitute an emergency. It is only when the industry cannot achieve this intent, or when one of the factors of the balance is outside the defined range, that low water will result in a perceived emergency. Practically speaking, though, whatever the basic cause might be, there will not be an electric energy shortage in the Northwest unless there is low water.

The Power Supply System

Understanding the nature of an electric energy shortage in the Northwest, and the mechanism necessary to deal with it, requires a grasp of the basic characteristics of our unique power supply system:

1. A Regional System -- The electric utilities of the four-State area, whether publicly owned, investor owned or Federal, plan and operate their resources on a Regional basis. This situation came about largely as a result of our hydro-electric base. Reliance upon hydro plants, generally located far from major load centers, has led to the construction of a true transmission grid over the Region, rather than a group of self-sufficient concentrated areas connected by limited interties. Northwest electric utilities commonly participate in generating facilities without regard to the plant's location in the Region. As a result, there is no practical way that a deficient utility or political subdivision can be electrically isolated from the rest; we must act Regionally.

2. An Energy-Critical System -- Although the marginal resources of the Region are not hydroelectric (and much attention is focused on them), the Region's power supply system is still based on hydroelectricity. In the current operating year, 1982-83, even with adverse water, more than 75% of the electric energy consumed in the Region would have been generated at hydroelectric plants. In this unique system, the critical factor in the power supply balance

is energy, rather than peaking capability. Peaking capability can still be augmented by adding more units at existing dams, but the energy capability of a hydroelectric facility is limited by water; additional units do not produce additional Kilowatt-hours.

3. A Storage-Dependent System -- Natural streamflows in the power streams of the Northwest vary enormously within a year. These flows peak in the late spring and summer, as the winter snow melts, and they are at their lowest levels in the winter, when even the heaviest precipitation normally remains frozen in the mountains. On the other hand, Regional electric energy requirements have precisely the opposite pattern, peaking in the cold weather and having their lowest levels in summer. Electric utilities have become highly dependent upon reservoir storage to match hydro generation to load. Reservoirs are normally drafted starting in the early fall and are filled in late spring and summer. During the coldest months more than half of the observed flow of the Columbia River, as measured at The Dalles, is provided by releases of water from upstream reservoirs. If the system were to exhaust its reservoir storage at such a time, the power system would be physically unable to serve between one-third and one-half of its customers' energy requirements.

4. A system Dependent on Variable, Unpredictable Flows -- The volume of streamflow in the Columbia River from year to year is extremely variable, over a range of about three-to-one. The range of energy potential represented by that spread is enormous, well over 100 billion killowatt-hours. The reservoir storage has some ability to move naturally occurring runoff from one year to another, but that capability is limited. Total storage in the Columbia River drainage is about one-third of the average annual runoff; in contrast, both the Colorado and Missouri systems have storage capability amounting to several times the annual average runoff of those streams. And despite the long-term efforts of all the expertise which could be mustered, no way of forecasting a year's runoff in advance of the year has been found. There is essentially zero serial correlation from year to year, and no reliable independent index for prediction appears to exist.

Nature of the Emergency

The nature of an electric energy shortage in the Northwest, together with the method of treating it, is dictated by the system characteristics described above. The shortage will not wait until reservoirs are actually empty; if that point should be reached, there would be no choices left to the manager. Energy production would be limited to the equivalent of the water flowing into the system, and in mid-winter that would require load curtailments of one-third to one-half the total demand. That would be a disaster. Avoiding it calls for rationing of electricity usage well in advance of that time, on the basis that the first increment of lost energy has a disproportionately lower cost than higher increments. That is, a 10% curtailment for ten months has a much lower Regional cost than a 50% cutback for two months, even though the Kilowatt-hours are the same.

Thus, the earlier that rationing is started, the less hurtful it is -- if it turns out to have been necessary. But the earlier curtailment is begun, the greater is the risk that rains will come and show that the cost, however low, was unnecessary. In addition, "crying wolf" too frequently will reduce the people's willingness to respond in future, possibly real emergencies. Effective management of an imminent energy shortage therefore calls for comprehensive understanding of the power supply system and extraordinary sensitivity to the tradeoffs involved in any decision.

General Form of the Management Plan

Before the 1973 crisis occurred, there had been much discussion of the likelihood of electric energy shortages, but no one had done much work on the development of a shortage management plan. The most recent model available to the industry, when the situation became apparent in 1973, was the program employed by the British Central Electricity Generating Board during the coal miners' strike in that country a year or two earlier. That program was effected through "rotating blackouts," the sequential opening of distribution feeder lines. A schedule was determined and published, showing the time and duration of disconnection of each feeder, and the people were expected to reorganize their lives around these periods of interruption.

Work began on the provision of such a scheme in this Region through the Northwest Power Pool, but it was not long before the concept was abandoned, for several reasons:

- Except for the symbolic value of maintaining public awareness of the crisis, it is not a very effective means of rationing energy. People merely scheduled their heavy uses of energy around the schedule of interruptions.

- It was extremely disruptive to the economy and inequitable in its effects. Some continuous-process customers had to shut down completely, and competitive commercial establishments had unequal losses due to the diversity of the schedule.

- Personal dislocation through total interruption was often severe.

- Through exemption of feeders serving "critical" facilities (hospitals, police and fire stations, etc.), a surprisingly large portion of the populace would not share in the burden -- in some utilities in the Northwest, 30-40% of the interruptible circuits were found to have "critical" facilities.

- There were serious questions of liability, if someone were damaged by a utility deliberately cutting off service. The CEGB is an arm of the British government and, acting as agent for the government, was immune from such charges.

- There were major concerns about inequities due to jurisdictional diversity. State public service commissions generally have no jurisdiction over publicly owned utilities, and no State agency has authority over BPA. It appeared impractical to put together a uniform program in which utilities were mandated to open switches. In Britain, the CEGB is not only an agency of the central government, but it is also the only utility.

- CEGB crews, who had to go from substation to substation to open and close switches on a rigid schedule, were totally exhausted after one month of the program, and we were expecting a shortage of much longer duration.

We proposed, instead, a rationing program imposed by Regionally-coordinated civil authority (the States, through the Governors) directly upon the individual customer. The customer would be required to reduce his usage below a defined base-period quantity, and it would be left to the customer to decide how to manage this requirement. The utilities would step out of the line

of authority but would supply the necessary information to the States regarding customer compliance and would advise the States on the power situation. It would be left to the States to determine the allocation of burden among customer classes, together with an appeal mechanism for exemption and adjustment of base-period usage.

This concept was generally accepted in the 1973 crisis, but there were notable lapses in Regional coordination. Following that emergency, and particularly as the magnitude of the 1977 drought became apparent, the States in cooperation with the utilities developed the scheme more fully. From the standpoint of the utility industry, I believe the process worked quite effectively in 1977, and it will work the next time.

The major problem remains determining how much to do and when. If this kind of scheme is expected to play a frequent role in future power management, it is important that the States each maintain a staff of career people who are intimately familiar with the power system. The complexity of the power system, the nature of risks involved and the range of options available militate against making management decisions concurrently with acquiring an education about the system.

Fish & Wildlife Considerations

The electric utilities of the Northwest plan and operate the power system within a set of non-power requirements, which are treated as hard constraints, once established. These requirements are generally imposed by license, in the case of non-Federal facilities, or authorizing legislation, for Federal Projects. Frequently, the actual quantification of these requirements is accomplished through interpretation, negotiation or judgment of an intent expressed more generally in the statue or license. Although there might be debate about the need for a particular measure, once the measure is adopted by the entity having authority, it is treated as a first-priority constraint in all power matters. This holds true for all such measures, whether adopted for fish, flood control, recreation, navigation or irrigation. This concept is stated explicitly in the Pacific Northwest Coordination Agreement, the basic guide to hydro operation in the Northwest. And these requirements take priority over power, regardless of the energy situation; the first "fish flush" was ordered in 1977, during the worst runoff in history.

I do not propose to debate here the need or desirability of any non-power requirement. The Regional Power Planning Council published its Fish and Wildlife Program in November, 1982; debate will continue before

that body as the Program undergoes its prescribed monitoring and modification. However, it is imperative to the rational management of the power system that non-power requirements be comprehensively defined in advance. This does not mean that such requirements have to be expressed as constants, but their variable levels must be related to measurable, physical indexes -- rather than wide-ranging ad hoc decisions.

Conclusion

The electric utilities of the Northwest believe that the most effective way of handling the power impacts of low water years is to provide sufficient resources to be able to supply customer demands routinely in low water years. The occurrence of low water is a statistically predictable event, and the utility industry believes that its customers desire a high probability of uninterrupted electric service.

Either because of an inability to provide the intended level of resource installation or because of extraordinary circumstances, a plan to manage shortages of electric energy must be available. Whatever the basic cause of the shortage might be, the shortage will only be manifested under low water conditions. Because no individual utility can be isolated, the plan must be Regional in scope and effect. Such a plan has been developed, starting in 1973 and placed into effect in 1977; it should be expected to be the basis for any future plan to manage electric energy shortages. It is a plan which depends upon the police powers of the States, and it imposes a requirement to curtail electricity usage directly on the customers. The plan's effectiveness relies on cooperation among the States and a high level of understanding of the Region's power system by State officials.

Non-power requirements, which take priority over all power considerations, may significantly affect the adequacy of the power system. In order to permit rational management of the system, these non-power constraints must be completely specified in advance.

Planning for Low Water with a Fish Constraint

Peter Willing
Whatcom County Water District 10

This paper makes the proposition that there is substantially more flexibility in the management and operation of the Pacific Northwest hydroelectric system than we have recognized or used heretofore. I argue that some of this flexibility can and should be used for the benefit of the anadromous fish resources of the Northwest, not just in below-average water years, but in routine operation every year.

The planning and operation of the core hydroelectric system have, since the inception, been a very conservative proposition. The system has been designed with a risk-free ideal in mind. In other words, within the range of hydrologic behavior we have observed in the past half century, we do not wish to take any risk of not meeting the system's firm electric load. We do take, of course, the risk of hydrologic behavior outside that range. The implicit reasoning is that the consequences of any shortfall in meeting firm electric load are socially and economically unacceptable to the ratepayer, the user of electric power. Mr. Schultz's description of the British coal strike offers some insight into those discomforts, which we do not wish to risk. But the risk-free ideal does not apply in numerous other respects. Customary utility practice has entailed huge risks of other kinds on behalf of the ratepayer: open-ended financial exposure for the sake of building thermal power plants; signing the region's autonomy in energy management decisions over to distant bond brokers and rating agencies; commitments of resources to "dry hole" energy prospects; and irreversible destruction of the life support systems of the Columbia River's anadromous fisheries. These past decisions about allocating kinds and amounts of risk have had a potent political legitimacy, even if they did not make complete sense from the point of view of rational resource management. The political scene has been

shifting rapidly, however, and these kinds of decisions are being subjected to unprecedented questioning. We used to believe that growth in electric energy consumption and growth in economic productivity were causally linked, in a one-to-one relationship. The past decade has thrown some doubt on this notion, so we can dare to look less emotionally at a finite supply of electricity. We have also learned more about the environmental costs of single-mindedly maximizing energy supplies at the expense of fish resources. It has now become reasonable to think about allocating risk in a new way.

There are specific sources of conservatism in the power planning enterprise which can be relaxed for the benefit of anadromous fish, without imposing undue distortions on the power supply. These sources were all extensively debated during the process of preparing both the Columbia River Fish and Wildlife Program and the Regional Energy Plan.

A conspicuous source of conservatism has been the use of "critical year water" as a planning criterion. Both the Corps of Engineers and the Pacific Northwest Utilities Conference Committee have argued that a change in favor of planning the system around median water conditions would produce devastating results, and therefore any departure from present practice is unwarranted. The discussion did not benefit from an incremental approach, which would show the results of shifting in the direction of median water planning without actually reaching it: the analyses that were done were "all-or-nothing" in concept. There are other practices, such as energy exchanges and inter-seasonal shifts of load, that partly span the gap between critical and median water. We should continue to examine how such options could be used to benefit the fish resource.

The argument is often advanced that we cannot depart farther from the critical water criterion because we do not have enough storage in the Columbia basin: there is only enough storage for approximately one-third of the annual runoff. The analogy is drawn with other river basins such as the Missouri and Colorado, which can store several times their annual runoff. This analogy is extremely misleading. The long-term average annual runoff of the Colorado is less than 15 million acre-feet, whereas the Columbia yields approximately ten times that. Put another way, the Colorado has a slightly larger average yield than the Skagit. Storage on the Colorado is four times the annual runoff. Storing a comparable proportion of the Columbia's flow would take reservoir capacity equivalent to the whole State of Washington, over ten feet deep. The real questions about increased storage are where it is to be built, what are its total

social costs, who is to pay for it, and what would its benefits be?

The power planning activity has recently shifted to the implementation phase. The important point has now become not so much whether critical or median water is used, but the extent to which water for fish will be considered a hard planning constraint instead of a commodity that is subject to annual bargaining and re-negotiation.

Another source of conservatism that could be relaxed is the timing of maintenance schedules for the region's thermal power plants. If the down-time schedules were more concentrated in the spring, the hydroelectric system would be carrying a greater part of the load and would thus be passing water down the Columbia at a time when it would benefit migrating salmonids. This change would tend to return the river to something approaching the runoff pattern it had before the construction of the hydro-electric system. The Power Council has recognized the value of this measure, but did not specify a performance objective.

The Bonneville Power Administration's sale to California at non-firm bargain prices, in order to assure easy recall, is a conservative practice. BPA's reaction to suddenly finding itself in a surplus condition as a result of erroneous load forecasting has been to cut back on its conservation and renewable energy resource programs. These actions have not recognized the possibility of selling surplus power on a firm basis at higher cost, and using the revenues generated to fund conservation and renewable initiatives. Dialogue between the California Energy Commission and the Power Planning Council indicates that this approach may be possible. Firm sales of surplus power may prove a substantial benefit to fish and wildlife, provided we make sure of the adequacy of bypass and spill measures for fish protection. Energy conservation is preferable to new generation from an environmental point of view, even if the need for new generation capacity is only deferred. Needs that are met now through conservation measures will not have to be met later with generation, whereas if we meet a load now with generation, we have incurred a sunk cost and have foregone an energy conservation opportunity. Under surplus conditions, conservation should not be deferred because of the long lead-time and consistent gradual accumulation of small increments which are necessary to make a substantial contribution to the energy resource base.

Flexibility in the regional power system could be achieved and put to work for fish, through incentive

systems for dealing with low-water-year conditions. In the same way that the direct service industries have had advantageous rates in return for interruptibility, we could make it worth everybody's trouble to closely examine their power use in a water-short year. Low-water surcharges can be used to prompt energy demand curtailments in proportion to the degree of shortage. Low-water energy shortages do not develop instantaneously; they can be planned and shaped over a period of months. Price incentives to modify demand could be instituted at a far lower cost of social disruption and misplaced investment, than the cost of over-ambitious plans to make sure of meeting all loads.

The Pacific Northwest should explore and exploit all sources of present conservatism and future flexibility in its electric system. We should squeeze more fish flows out of the system than we have before, and we should find the least expensive ways, in terms of dollars and power, of doing so.

A final point relates to the flow of information, rather than water or power, in the "electric power establishment" of the Pacific Northwest. The utilities and their service organizations have had a near-monopoly on technical information about the system. The Power Planning Council has made a step, in creating "Water Budget Managers," to develop an institutionalized alternative focus of information. The region needs an authority independent of the power establishment, with professional staff who think like fish biologists but have the technical understanding of power managers. Political leverage consists partly of information. With enhanced flows of information, at least the anadromous fish resources of the Columbia may stand a better chance of protection than they ever have before.

Managing Droughts by Working Together

James. W. Trull
Sunnyside Valley Irrigation District

With the exception of sunshine, nothing is more essential to the production of food and fiber than an adequate water supply. On the western slopes of the Cascade Mountains rainfall provides the needed water to support plant growth. East of the Cascades arid climates permit little but cheatgrass and sagebrush. The construction of large irrigation projects in much of the West has brought water to fertile soils and warm climates to form a combination that has led to agricultural production the modern world has never before witnessed.

Such an area is the Yakima Valley, termed by some the "Fruit Bowl of the Nation". The Yakima Irrigation Project was designed by the Bureau of Reclamation to ultimately supply irrigation water for approximately 500,000 acres of land in South Central Washington. The irrigated area includes Yakima Valley lands extending from the town of Easton to Kennewick, a distance of about 175 miles. The Project consists of six (6) irrigation divisions: Kittitas, Tieton, Sunnyside, Roza, Kennewick, and Wapato.

The theme of this conference, "Managing Low Water Year Emergencies," suggests a plan of action we would do well to consider. Management is defined as controlling, directing, guiding, or administering. Managing low water year emergencies must be more than anticipating droughts and developing a contingency plan so as to endure. This is particularly true if there are recognizable solutions that can be attained. The message that I would like to leave with you is that through a cooperative effort the problems that have occurred due to droughts in the last decade in the Yakima Valley can be minimized, if not completely eliminated. Before that can be addressed, it is necessary to give some background information on the Yakima Valley.

By 1905 the waters in the Yakima River were over-appropriated and shortages were occurring. Considerable irrigation development had taken place and more was anticipated as a result of the creation of the United States Reclamation Service in 1902. The

United States undertook the process of quantifying and limiting existing water rights so as to determine the water available. This was necessary before the feasibility of additional irrigation projects could be determined. The existing claimants had to agree to restrict their water to beneficial use and equitable distribution, particularly in the late summer period. Once this was complete, storage reservoirs were constructed, making possible the irrigation project as it now exists.

Irrigation districts without adequate natural flow rights obtained their water supply by executing a contract with the Bureau of Reclamation. Of the major districts, Roza and Kittitas have no natural flow rights. Their entire supply is provided by contract, in which case they pay a proportionate share of storage dam and reservoir costs based on acre feet used. This contract water is furnished under the terms of the Warren Act of February 21, 1911, which authorized the United States to contract for the sale of water. The older districts needed only a supplemental supply and entered into contracts with the Bureau of Reclamation for a portion of their total supply.

The 1945 Consent Decree, handed down by the Federal District Court, sets forth the basis on which waters are allocated in the Yakima Basin. This document defines quantities of water that are to be excluded from proration among water users in water short years. The districts with senior water rights have the non-proratable supplies and those with junior rights have proratable supplies.

The Bureau of Reclamation uses the term "Total Water Supply Available" to identify the quantity of water available in the Yakima River Basin. This was defined in the 1945 Consent Decree as "That amount of water available in any year from natural flow of the Yakima River, and its tributaries, from storage in the various Government reservoirs on the Yakima watershed and from other sources, to supply the contract obligations of the United States to deliver water and to supply claimed rights to the use of water on the Yakima River and its tributaries, heretofore recognized by the United States."

The average total water supply available for the Yakima Basin is about 3.5 million acre feet. The average demand for irrigation, regulation, and flood control totals about 2.59 million acre feet on a 100% normal basis. Additional demands have been placed on this total by fisheries, which will be discussed later. Storage capacity from the six (6) major reservoirs is 1 million acre feet, leaving the balance to be stored in the form of snow pack. Shortages can occur, obviously, if the total annual precipitation is below demand. Water shortages can also occur during a year when the total precipitation is normal, or above normal, if the snow pack runs off rapidly and can not be utilized, or the reservoirs are full and it can not be captured for later use.

The disparity among districts concerning water supply was

not apparent until the 1970's. There were few short water years prior to 1945 and there were fewer irrigation districts to demand water during that period. The United States must have felt supplies were adequate, as evidenced by a brochure printed in the 1940's which noted, "Severe droughts are unknown in the valley because of the dependable water supply available in the Yakima River and tributaries which tap the snow fields of the nearby Cascade Mountains." The irrigation districts with the junior water rights must have also felt that the storage was adequate because they were willing parties to the terms of the Consent Decree. In fact, there was little reason to doubt that the existing storage was not adequate; the total water supply for the period 1945 - 1972 averaged 3.45 million acre feet per year. However, this misconception was made apparent by a water supply in 1973 of only 2.35 million acre feet, followed in 1977 by 2.03 million acre feet, followed in 1978 by 2.65 million acre feet, and 2.63 million acre feet in 1979.

In those water short years, most waterusers experienced water shortages to some degree. Of the major irrigation districts, none have water rights that are 100% non-proratable. The water rights are a mixture, with some proratable waters and some non-proratable waters. At the other end of the scale are the Roza Irrigation District and the Kittitas Reclamation District with 100% proratable water supplies.

To suggest that all water users should share and share alike during periods of drought is a failure to grasp the last 100 years of history in the Yakima Valley regarding irrigation and water rights. These rights are as they seem - rights acquired by title and protected by force of law. One must also recognize the fact that in water short years, no matter how it is allocated, supply will not satisfy demand.

I have been requested to discuss the impacts of drought upon the agricultural community. My perspective is viewed from my roll as the manager of an irrigation district which supplies water to the landowners within the district boundaries. If I were an individual landowner, a farmer, earning a living by a commercial farming practice, I would have a considerably different perspective on the drought impacts. I would be able to relate in a very individual and first-hand way what it is like to face a year with most of the ongoing expenses of running the business, while knowing that an inadequate supply of water would restrict or eliminate my ability to produce crops to be sold to meet those expenses. I could also relate to you the millions of dollars that were spent by me and my neighbors to drill deep wells, install pumps, and do such other measures as were possible to minimize the impacts of the droughts that occurred during the 1970's. However, as a manager of an irrigation district I can relate the impacts that are encountered by those charged with bringing water through a delivery system to the individual farm lands.

The difficulty in supplying water when shortages exist is

that it is not possible to be as efficient in conveying and distributing the partial supply as it is the full supply of water. Water in the major irrigation systems is conveyed through large, open-channel canals and laterals. There is a given amount of seepage and evaporation loss, whether the canals are running at 50% capacity or 100% capacity. Further complicating problems, the distribution systems are normally designed to operate at near capacity so that check structures, turn-out structures, and other water measurement or control structures do not operate properly at the low flows.

Water being the precious resource that it is instigates a lot of controversies and ill-will during times when it is in short supply. Neighbors are pitted against neighbors, irrigation districts against irrigation districts, irrigators against fisheries people, and on and on. Unfortunately, such controversies and feelings run deep and are not easily forgotten.

As mentioned earlier, demands for the existing supply are irrigation, regulation, and flood control. Little did the residents of the Yakima Valley realize that litigation in Western Washington in 1974 would have a tremendous impact on the utilization of the waters in the Yakima Basin. In United States vs. Washington, (384 F.Supp. 312) a decision was handed down by Judge Boldt in which the court held that the Indian treaty fisherman were entitled to the opportunity to harvest 50% of the fishery resource plus an allocation for their on-reservation, ceremonial, and subsistence harvest. In 1975 the Ninth Circuit upheld the District Court's opinion in virtually every major respect. The second half of the United States vs. Washington case, Phase II, was assumed by Federal District Court Judge Orrick. Judge Orrick held that the treaty right encompassed hatchery produced fish and that there was an implied right to protection of the fisheries habitat. While that decision is still on appeal, it had a substantial impact on the Yakima Basin. In Kittitas Reclamation District vs. Sunnyside Valley Irrigation District, in the Eastern District of Washington, in November of 1980, the Yakima Indian Nation, claiming 1855 Treaty rights, secured an order from Federal District Court Judge Quackenbush providing that additional water should be released by the Bureau of Reclamation from the reservoirs on the Yakima River to insure protection of redds, or salmon egg nests. It should be noted that the impacts on the agricultural community that occurred in the 1970's were without the added claim of Indian fishery treaty rights.

One result of the droughts of the 1970's was a suit filed by the State of Washington in Superior Court to adjudicate all of the claims to the water supply in the Yakima Basin. There has been considerable legal activity to determine whether all claims, including Yakima Indian treaty rights, will be quantified in State Court. That must be answered before the adjudication can proceed.

One could easily get the impression that the water right problems in the Yakima Basin are so complex and so awesome as to

defy solution. That is not the case. A major program that is under way is the Yakima River Basin Enhancement Study, a joint effort by the Washington State Department of Ecology and the United States Bureau of Reclamation. The Study Team is charged with studying the following: 1) provide supplemental water to presently irrigated lands, 2) provide water to new lands on the Yakima Indian Reservation, 3) provide water for increased in-stream flows for aquatic life, and 4) develop a comprehensive plan for the Basin to enable efficient management of the existing water supplies. Secondary objectives include increased hydroelectric power generation, improved municipal and industrial water supplies, new irrigation on non-reservation lands, improved flood control, enhanced water quality, enhanced wildlife, and increased recreational opportunities.

Another activity underway is the Northwest Power Planning Council's Fish and Wildlife Report, which is seeking ways of restoring the anadromous fish runs to the Columbia River. The Yakima River, as a tributary to the Columbia River, has been looked at as an off-stream mitigation area. Immediate relief would come in the form of fish passage facilities.

All of the above potential demands for water, whether for irrigation, fisheries, or recreation, can be resolved by construction of additional storage facilities. The average annual yield from the Yakima Basin is 3.5 million acre feet. Present water storage capacity is 1 million acre feet. Other solutions have been offered. These include conservation, water banking, and reallocation of supplies. However, none of these suggestions will provide an adequate water supply through both wet and dry years.

With the droughts of the 1970's still vividly in mind, and with the realization that new demands are being placed on supplies by fishery interests, the time to act is now. The many competing claims for water would cease to be significant if additional water supplies were available through the construction of new storage facilities. It would matter little who had first or last claim to the water, as long as there was an adequate supply for all.

What we face in the Yakima Valley is the threat of working at odds with each other, in which case nothing but continual litigation over existing water supplies will occur. Conversely, we have the opportunity of working together for the common good of all our citizens to provide additional storage that will solve these problems and result in a better place to live.

Role of a Direct Service Industry

Bruce E. Mizer
Intalco Aluminum Corporation

Intalco Aluminum Corporation operates a primary aluminum smelter near Ferndale, Washington. Intalco is one of Bonneville Power Administration's Direct Service Industrial Customers (DSIs). The DSIs are a group of 15 industrial firms with 20 plants in the Pacific Northwest. These firms produce aluminum ingots and fabricated products, nickel and ferro-alloys, chemicals, and other products. 1/

The DSIs have a special situation in the event of a low water emergency. Because Bonneville relies on streamflows in excess of critical to provide service to the DSIs top quartile for essentially 38 of 42 months of a four-year critical period; the DSIs likely already will have one-fourth (the top quartile) of their load restricted by Bonneville when a low water emergency occurs. 2/ In addition to the top

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1/ The comments in this paper are solely those of the author. The paper has not been reviewed or approved by other DSIs. Intalco Aluminum Corporation has the same contractual and power supply relationships with Bonneville as do the other DSIs and therefore, the thoughts of all DSIs on matters of managing low water year emergencies likely are similar.

2/ The word restrict refers to a Bonneville inability to deliver power to a portion of a DSI load. The word restrict is used when Bonneville cannot deliver as opposed to the word curtail which is used to reflect a DSI decision to not operate load even though Bonneville could make power available.

quartile perhaps two more quartiles may be restricted. The second quartile of the each DSIs' load is restrictable by Bonneville in the event of resource failure or delay. The third quartile is restrictable when it is has been used as collateral for prior service to the top quartile. Thus Bonneville may be serving only one-fourth of the DSIs' load during a low water emergency. A DSI may independently arrange for replacement energy at its risk and expense so that all or a portion of the load restricted by BPA may be operated, but during periods of critical water replacement energy may be difficult to obtain.

Through its rights to restrict DSI load and the ability to serve the top quartile of DSI load without planning or acquiring firm resources, Bonneville is able to serve more regional load with less regional resource. That is, the DSIs' top quartile are served without construction of any resources for such service. In addition, the reserves provided by rights to restrict DSIs preclude the need for standby facilities which otherwise would be constructed for the region. A recent study by Battelle Northwest indicates that these arrangements are conservatively worth in excess of $163 million per year. The DSIs receive credits of substantially less than $163 million per year of this regional benefit.

In viewing the DSIs role during low water emergency it must be remembered that the DSIs already provide substantial regional benefits and take substantial risks against the occurrence of critical water. Thus, any remaining load and any independent arrangements made by DSIs to acquire service to their load must be viewed as having a status at least equal to other electric loads in the region.

Further attempts to restrict DSI loads for the benefit of other regional loads may endanger the economics of the mutually beneficial relationship between the DSIs and the rest of the region. That is, the DSI's acceptance of their position in the regional power system depends upon recognition of that load as being firm at all other times and for all other conditions. The very economic ability of the DSIs to accept their existing power contracts depends on that recognition.

As noted above, the top quartile of DSI service is supplied from resources other than firm resources. The service is from a combination of nonfirm energy which may be available from better than critical water conditions and firm energy borrowed from future periods at the DSIs' risk. Generally this

is referred to as combination service. This combination service allows loads which are firm in all other power systems to be served in the Pacific Northwest without the construction and operation of firm resources. This technique provides more revenue to offset the fixed costs of the Federal system and benefits all customers.

This combination service involves a substantial element of risk for the DSIs. The borrowing of future period firm power to serve the first quartile means that in the event of critical water the first and third quartiles will not be served in those future periods from which the firm power was borrowed. Stated another way, one-half of the DSIs load will be restricted by Bonneville in the event of a recurrence of critical water conditions. The DSIs are already providing substantial reserves against recurrence of critical water conditions by accepting this relationship for their load.

Bonneville relies on its ability to restrict another fourth (the second quartile) of the DSIs' load in the event that a resource which has been planned and relied upon to meet regional load growth is delayed. In the event of such a delay, and Bonneville's need for the resource, Bonneville may restrict the second quartile. If this occurs simultaneously with critical water conditions, then fully three-fourths of the DSI load may be restricted. The second quartile can also be restricted in the event of resource failure, although such resource failure restrictions will be accompanied by a call for voluntary regional curtailment. Restriction of the DSIs loads is the first response to any power supply emergency in the region whether it be low water or a Bonneville resource failure. Indeed, it need not even be a Bonneville resource which fails provided Bonneville has a firm obligation to provide reserves for the resource which does fail.

Suggestions such as were made in 1977 that the DSIs provide even more reserves to the region are impractical. We can be reserves only to the extent we are recognized in power planning as reserves and compensated in Bonneville's rates. It is imperative for the region to plan adequate resources under recurrence of critical water conditions. If emergencies occur which exceed any planning criteria, the DSIs will already have provided tremendous reserves to the region. Beyond the fact that the DSIs are not compensated fully for the reserves they provide, that compensation to DSIs is spread to them on an annualized basis. During a year in which actual restrictions

occur, the operating cost to DSIs of the restriction are enormous--many times the compensation received. The incremental cost of further restriction at that time would be absolutely prohibitive.

In studies performed for the Regional Council, ICF Incorporated found that the region would be economically advantaged by interrupting 15 to 20 percent of the region's residential and commercial loads before any interruption of aluminum smelter loads. That is, the total economic impact to the region is less for interruptions of residential and commercial load than for DSI load. In actual practice at least 50 per cent of DSI loads, and possibly 75 percent, will be interrupted before any residential and commercial loads. It is illogical to presume that the balance of the DSI load should be interrupted to insure against yet another regional contingency.

In that regard it is important to note that the DSIs provide these reserves not because it is cost effective for the DSIs. Rather, the DSI loads are particularly suited to provide reserves because of their large power requirements. DSIs have high capital cost plants. This capital cost continues during power supply restrictions. Further, aluminum industry labor contracts tend to provide high levels of wage benefits in the event of layoffs. Thus labor costs also cannot be shed. Again, DSI loads are a good choice for restriction only because of the economics of restricting DSIs to the regional power system.

During periods of restriction the DSIs frequently operate with replacement energy. A DSI may purchase replacement energy in anticipation of a restriction or during a restriction. This replacement energy is purchased solely at the expense of the DSI. Additionally, when purchased in advance of a restriction it is stored in Bonneville's reservoir at the risk of the DSI; it may be spilled, lack of need, or inability to resell at the purchase or lower price. Any efforts to use this replacement energy as an additional regional reserve bear all of the problems of using additional DSI loads as a reserve.

Bonneville did for a while include the concept of "preemption" in contracts with DSIs providing for purchase of replacement energy. (Bonneville serves as a DSI agent in obtaining replacement energy and sets the terms and conditions under which DSIs may obtain such energy.) The Regional Act explicitly provides that Bonneville may establish such policies. Preemption, however, was never implemented to the satisfaction of the DSIs. The basic problem was an

inability to define an adequate benefit to DSIs which accept the risk and expense of acquiring and storing replacement energy in the event that the energy is preempted by Bonneville. Failure to provide adequate benefits means that no DSI would accept such risks if the probability were high that the energy would be preempted.

While preemption may be a beneficial technique for the region, the compensation to DSIs must be adequate to maintain an incentive for them to accept this risk and expense. Failure to provide adequate benefits not only means that DSIs will not purchase replacement energy creating additional reserves for the region, but also, DSIs will not have a backup supply during relatively short periods of restriction. Thus, when BPA does restrict, the DSI load may be off for an even longer time causing further economic harm to the region and to Bonneville and its other customers.

The rate reductions which DSIs receive pursuant to the rate directives in the Regional Power Act do not even approach the benefits the DSIs provide to the system. The value of reserves which DSIs are allowed in rates shares the value between DSIs and other Bonneville customers. In addition, the value itself is understated. The DSIs provide other revenues in excess of their costs of service to Bonneville. They pay the full opportunity cost of the power assigned to the top quartile (we have argued repeatedly that we pay more than the full opportunity cost). In summary, we provide both economic and power supply benefits to the region.

In summary, the DSIs are already in a unique position in the region during low water year emergencies. The DSI's acceptance of that position requires that the region plan adequate resources for a recurrence of critical water. Additionally, the region must view the remaining DSI load and any load to be served by DSI's own replacement energy as very firm load. Viewing such load as having a lesser status or quality then other regional loads would jeopardize the very ability of DSIs to provide the benefits to the region which are inherent in their existing contracts.

Concerns of Municipal Water Users

Peter Beaulieu
Puget Sound Council of Governments

INTRODUCTION

In balancing the competing uses of water, it is necessary to consider hydrologic, policy and legal dimensions together. While tradeoffs to be made on the Columbia River system have received greater attention and are more institutionalized through the Northwest Power and Conservation Act, those to be made in the Puget Sound region are similar. Among the issues are (a) marginal tradeoffs, (b) risk allocation and marginal costs of risk avoidance (especially in terms of burdens placed on competing needs), and underlying these (c) the low ratio of storage to annual streamflow.

The issues of water allocation in the Columbia Basin reappear in the Puget Sound Basin context, but with water supply agencies assuming a more important role (alongside of hydropower interests).

One additional complexity, however, is that the river basin (often offered as the frame of reference for mediating tradeoffs) is often too small to serve this purpose. Decisionmaking affecting different basins is increasingly interrelated. This is especially true with the possibility of serving metropolitan areas from more than one basin and with the added potential of intertying these water supply systems.

River basins in the Central Puget Sound region are indicated in Figure 1 together with present and proposed water supply systems. The accompanying text serves as a brief primer on water supply issues and their relationship to other streamflow uses.

USES OF WATER

Water resource regulation deals largely with the low flow periods and involves the allocation of streamflow between instream and out-of-stream uses, with minimum flows reserved for the preservation of instream uses (the State Water Resources Act does not require enhancement or restoration, a goal for the Columbia system set by the Northwest Power and Conservation Act).

Out-of-stream uses include municipal and industrial (M and I) supplies. The major wholesale water supply agencies in the region are municipalities. Instream uses for which minimum streamflows are reserved are fisheries, recreation, hydropower, wildlife, water quality, navigation, and aesthetics.

Allocation of water to these uses considers the following tradeoffs:

- Fisheries require spring and autumn flows, which coincide with the peak needs for M and I;

- Hydropower requires peak flows during the winter months, possibly conflicting with replenishment of M and I storage, flood control and fisheries;

- M and I requires early spring storage which tends to limit flood control capacity and in the summer competes with instream fisheries needs;

- Flood control requires reservoir evacuation in late fall, which can jeopardize fisheries if the winter rains are late in arriving. On the other hand, regulated flooding reduces stream scouring, a benefit to migratory fish.

Following an Attorney General Opinion, the Department of Ecology interprets the State Water Resource Act of 1971 as requiring that preservation of instream uses is to be served first, while M and I and other diversionary uses are to compete for the remaining flows. Water supply entities contend that the statute does not exempt instream uses from marginal tradeoff analysis, and that a broad balancing of all uses and all impacts is allowed.

Specific points of controversy can be the actual methodolgy for establishing the instream "needs," and resulting dollar costs of the remaining water supply alternatives.

PARTIAL OVERVIEW OF THE CENTRAL PUGET SOUND REGION

A. Governmental policies and actions at the federal and state levels affect project level water resources decisions. For example:

- Federal: Legislative decisions include funding and construction, guidelines and cost-sharing formulas (which are under review to provide more authority to states). Past work of the Pacific Northwest River Basins Commission did include the Puget Sound and Adjacent Waters Study (1970). More recently, and indirectly, the rate structure provisions of the Pacific Northwest Power Bill affect the price and demand for power in the region. This affects the feasibility of competing water supply proposals which increasingly are joined to hydropower development to enhance cost/benefit ratios (e.g., the Bellevue proposal is assuming a California hydropower market).

  Federal judicial decisions deal largely with water rights serving reserved federal interests, most notably streamflows to preserve Treaty fishing rights. Following the Boldt II decisions, the Ninth Circuit Court decision allocates a share of hatchery fish to the Tribes, but also relaxes preservation efforts to what is reasonable. (Another factor which might affect local projects is possible application of the fisheries enhancement requirements of the Northwest Power and Conservation Bill (Sections 4(e)(1) and (2)) to BPA-assisted projects outside of the Columbia Basin.)

- State: A major state action was the Water Resources Act of 1971, establishing the policy of "maximum net benefits to citizens of the state" (rather than single purpose goals). Water allocation in this region is determined administratively under the Instream Resources Protection Program (WAC 173-509), a fast-track program which does not include river basin management planning.

Water supply plans for major jurisdictions are approved by the Department of Social and Health Services, and if requested, can be developed under the Coordinated Water Systems Coordination Act of 1977 (which is narrower in scope than the 1971 Act, but which is constrained by the established instream flows).

B. Municipal and Industrial Supply (M and I).
Municipal and Industrial supply is provided at the local level, primarily by Everett, Seattle, and Tacoma. Major sources are surface supplies, often operated to serve flood control and/or hydropower to some degree. The Tacoma facility is linked to a flood control dam (Howard Hanson Dam on the Green River) and is proposed to be operated conjunctively with groundwater supplies, and to be intertied with the Seattle system. The Seattle system is served by impoundments on the Cedar and Tolt Rivers. A Bellevue proposal would serve part of the Seattle service area from a new dam on the Snoqualmie River (with hydropower as the primary project purpose). The Everett impoundment on the Sultan River is jointly owned with Snohomish PUD #1.

A detailed summary of major water supply systems (illustrated in Figure 1) is provided in Table 1.

C. Instream Uses -

Hydropower

- Snohomish Tributaries

Sultan River - 112 megawatt proposal on the Culmback Dam (jointly owned by Everett and Snohomish PUD). ($150 million)

Snoqualmie - 16 to 19 megawatts average output to be developed with Bellevue water supply. Competing proposals are Weyerhaeuser (10.3 mw) and Puget Power 12.8 mw). Puget Power existing plant output at Snoqualmie Falls is 29.2 megawatts.

Tolt - North Fork Tolt project to be done jointly by Seattle Water Department and Seattle City Light ($5 million saving to Seattle Water Department). The completed Tolt system will supply approximately 20 megawatts.

WATER SUPPLY (Fig. 1)

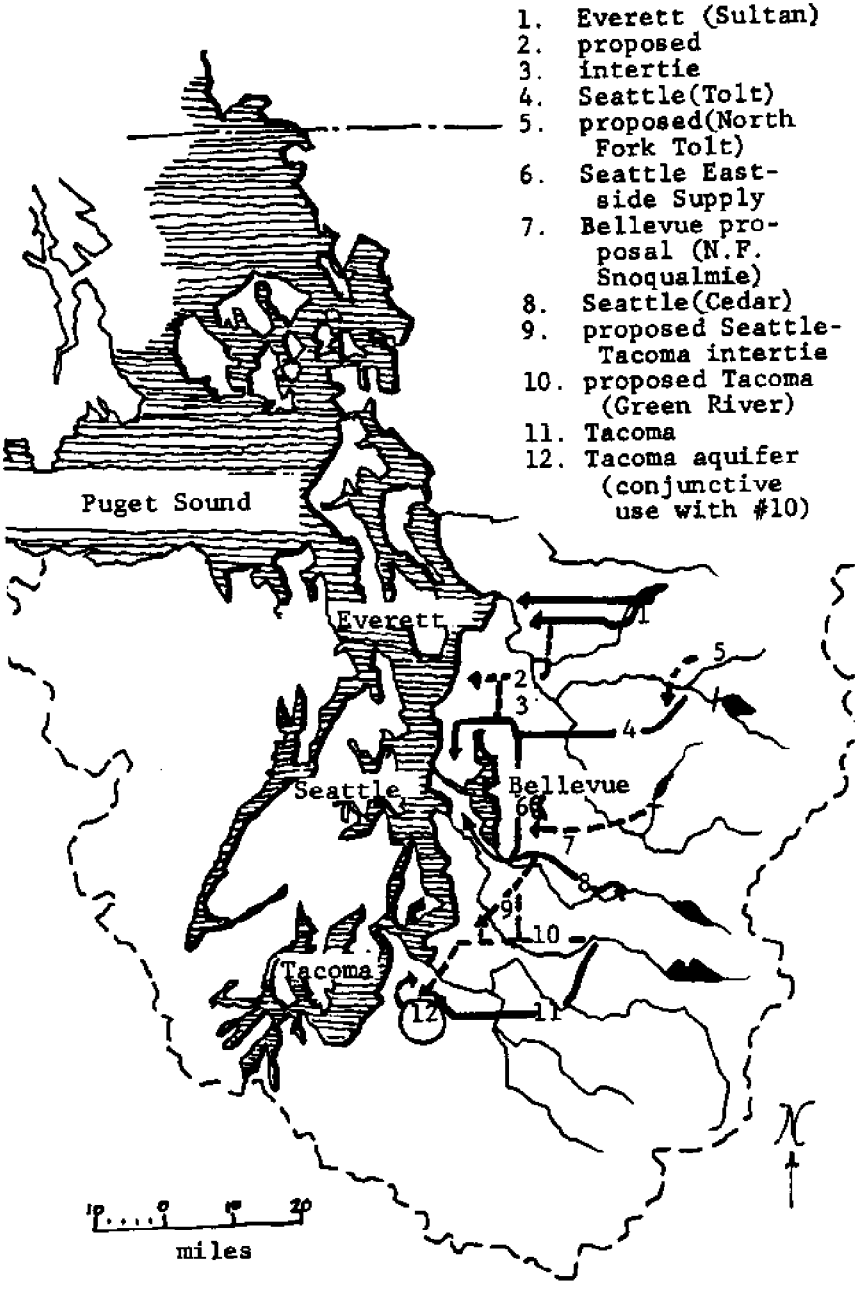


TABLE 1

MUNICIPAL AND INDUSTRIAL SUPPLIES

	SUPPLY CAPACITY	OWNERSHIP	COMMENT
Snohomish River			
Everett system (existing on Sultan River)	• 180 mgd(with 50 mgd surplus beyond 2000) • serving 250,000 pop. • delivering 115 mgd. • In 1979 some 50 percent of in-city consumption was for industrial	Culmback Dam jointly owned with Snohomish PUD #1	Possible south county aquaduct might be intertied to Seattle system. This was studied in Seattle SEAMWSS and COMPLAN. One issue is whether the intertie could be capable of supplying water in both directions, given the topography.
Bellevue (proposed for Snoqualmie River)	• 112 mgd. This is sufficient to meet needs of Bellevue Independent Supply Area in 2050	Bellevue	Source development phasing competing with North Fork Tolt tentative proposal of Seattle. More costly, but this is offset by hydropower benefits."Replaces" flood control dam proposal of the Mediated Agreement (which included service to the assumed water supply market in the Seattle area), rejected on basis of federal funding guidelines and site geology. Mediated Agreement flood control elements now include levees and excavation ($5 - $10 million) as compared to the original Snoqualmie Dam ($133 million in 1976 dollars).
Seattle (existing and proposed on Tolt River)	• 60 mgd existing on South Fork Tolt and 52 mgd proposed for North Fork Tolt (contested by Seattle)	Seattle (trusteeship relationship with purveyors for new projects	North Fork diversion would be operated jointly with the existing South Fork reservoir, allowing increased storage during high runoff periods (retained for summer months). This tentative proposal competes with the Bellevue proposal (above), although both may be needed in the long term.

	SUPPLY CAPACITY	OWNERSHIP	COMMENT
Cedar River			
Seattle system (existing)	• 155 mgd average delivery (with one-third supplied by the Tolt), and a capacity of 210 mgd upon renovation of the Chester Morse Dam. Serving a population of 1,000,000. • Chester Morse Dam is in a protected watershed and has a capacity of 56,000 acre feet. Dam improvements are necessary to keep the present 150 mgd capacity from being officially rated at only 85 mgd in the future. • Demand for 230 - 280 mgd in 2025 and 279 - 347 mgd in 2075. • Seattle serves one million people, or 80 - 85 percent of the King County population. The only major communities not served by Seattle are Issaquah, Redmond, Kent, and most of Renton, and that area south of 272nd (Auburn, Federal Way). In King County 30 mgd of groundwater is consumed outside the Seattle system.	Seattle (trusteeship relationship with purveyors for new projects	• Seattle COMPLAN identifies only a tentative new source and must be reviewed by King County for final source selection, and assumes an intertie with Tacoma Pipeline #5 to permit phased source development (shared surpluses) by Seattle and Tacoma. The intertie could also enhance reliability.* • The Seattle COMPLAN will be updated during the coming two years with special attention given to source selection and the south King County service area. • Groundwater supplies are heavily depended upon, particularly in south King County. These are under study by the purveyors (Water Supply 2000) and should be protected.

	SUPPLY CAPACITY	OWNERSHIP	COMMENT
Green River			
Tacoma (existing)	• 84 mgd existing (72 mgd from the Green and 12 mgd groundwater) serving a population of 200,000; with a 65 mgd proposed expansion to be supplied from the Green River when consistent with instream requirements and from groundwater during summer months. (will meet needs until 2015). • Hanson Dam is presently operated at 26,000 acre feet. The present wellfield aquifer has a recharge capacity of 12,000 acre feet, and comprises only 5 percent of the total recharge area (Over 300 square miles) • Tacoma serves 40 percent of the planning area population. Future demands for Tacoma water may increase more rapidly than the rate of population increase (however a system expansion of the Pipeline #5 scale is required to meet even conservative service area needs).	Tacoma	• The Tacoma Plan proposes conjunctive use of the Green River Supply (withdrawal of between 72 and 144 mgd) with the supply deficit systematically satisfied from the Pierce County aquifer. Supplementary water also possible from wintertime artificial aquifer recharge, the Seattle intertie*, offstream storage and local purveyor groundwater. • The Corps, King County, Tacoma and DOE are studying revised operations of Howard Hanson Dam.

*note: The Seattle and Tacoma water supply plans both contemplate an intertie in conjunction with Pipeline #5, which would allow the major supply expansions of these two systems to be jointly phased. Under this approach, the earlier Green River expansion would supply 20 mgd the Seattle service area between 1990-1995, to be followed by a sale of 25 mgd excess Seattle water to the Tacoma service area between 2000 and 2010.

- Cedar River - Approximately 30 megawatts. Dam safety modifications will add 7.8 megawatts.

- Green River - Hydropower in the form of turbines located on the supply line. Additional hydropower development at the dam is being studied by Tacoma Utilities.

Fisheries

- Cedar River - First Washington river to have flow "adjudicated" (revised from 75 cfs minimum to 120 cfs to support for pre-emptive lockage use).

  - fourfold increase in runs due to reduced scouring;

- Tolt River - North Fork, 52 mgd Seattle yield available (DOE minimum flows contested by Seattle, which seeks 70 mgd).

- Green River - Proposed water permit to Tacoma contested (72 mgd historic right and interruptible 65 mgd offered by DOE in 1981). Instream flow minimum of 110 cfs (72 mgd) at upstream gauge, with future rights not allowed to infringe on 150 cfs summertime instream regulation. (Existing Tacoma rights take precedence over instream natural flows when these fall below 110 cfs.)

  - The Duwamish flow fluctuates dramatically but has an average of 1360 cfs.

- Central Basin - Instream uses often dictate amount of groundwater that can be withdrawn by adjacent wells, because of the small size of the numerous drainage areas (and streams) in Kitsap County.

- Reserved Water Rights - Treaty rights to a proportion of anadromous fish imply rights to supporting instream flows.

Flood Damage Reduction -

- Cedar River - Incidental

- Green River - 1962 Howard Hanson Dam (64 percent of project benefits were to future development). Now the question is whether this flood control capacity is reduced by proposals to increase storage for instream or water supply purposes. The Corps of Engineers is seeking federal funds to study revised management of the Howard Hanson Dam and increased storage to meet growing needs.

- Snoqualmie River - Mediated Agreement and smaller-scale successor projects (North Bend levees, Snoqualmie streambank excavations, Snohomish diking coordination) with total capital costs of $5 to $10 million, and coordinated to some extent with the separate Bellevue hydropower/water supply proposal.

- Sultan River - Tradeoffs between flood control and hydropower are under study.

Recreation -

Closed watersheds reduce treatment requirements but have also been criticized for removing land from public recreational use. On the Cedar anadromous fish runs have increased dramatically over natural counts due to moderated flood flow. On the Green, low flows are somewhat higher and more reliable than prior to dam construction (1962). Future instream needs are addressed by the establishment of minimum instream flows.

Navigation - Port areas, especially proposed dredging of Duwamish.

- Ballard Locks (1915) which necessitated diversion of Cedar River into Lake Washington, reducing Duwamish flows.

- Following the Cedar-Green Basin Studies (RIBCO, 1972-75), the Corps of Engineers recalculated lockage needs (a priority use of water under Federal law) to show a 17-45 percent increase over

1970 uses by 2000, thereby forcing Seattle to choose between remaining alternatives for M and I: the Snoqualmie and North Fork Tolt.

OBSERVATIONS

The water resources projects for the central Puget Sound region suggest the following general observations relative to the four issues of (a) marginal tradeoffs, (b) risk allocation, (c) the low ratio of storage to streamflow, and (d) the relevance of the river basin as an integrating geographic unit.

A. Marginal Tradeoffs

The governing tradeoff is made administratively at the state level under the Water Resources Act of 1971, with the preservation of instream uses given priority to diversionary uses. Subsequent competition among water supply projects is based more on project feasibility than on predetermined geographic project boundaries, and is complicated by the addition of hydropower elements. In one case, the North Fork Snoqualmie, the proposed dam has changed sponsors and location, and has changed project priorities, with flood control moving from first to third, and hydropower gaining in importance behind water supply.

The identified need to first specify the constraints to hydropower or water supply development is satisfied where the Minimum Instream Flow Program is in effect. Water supply entities have raised the concern that instream requirements need not be expressed as constants and might be variable in response to measurable, physical indexes. During "critical low flow years" the shortage is shared between instream and diversionary uses by application of a predetermined instream regulation and suspension of water rights in reverse order of priority date.

B. Risk Allocation

To reduce the risks to instream uses on the Green River, and to other groundwater supplies, Tacoma

has proposed the conjunctive use of both sources, together with an intertie with the Seattle water supply system. However, questions have been raised with regard to the remaining long-term impact on the Green during low flow periods, and on the quality and quantity of the aquifer supply (which if it were inadequate could result in unacceptable withdrawal from the Green River supply).

Risk analysis in water supply planning is beginning to address the relative costs of providing 98 percent reliability, versus lesser level of reliability at perhaps considerably less cost (e.g., Seattle Comprehensive Water Supply Plan Update). Conservation programs should not remove all the cushion afforded by lower priority interruptible uses; however the limited effectiveness of repeated warnings of shortages is also a concern. The Seattle Water Department has recently instituted an old water new water pricing system which in itself may moderate future demand for Seattle water, thereby reducing otherwise costly projects to retain high reliability for increasing demands. In addition, a series of incremental and interim improvements, such as lake storage for seasonal stream augmentation (below the Cedar reservoir), is being investigated. This is similar in some ways to the electrical energy "rolling plan" prepared by the Northwest Power Planning Council. In the Tacoma system the largest customer is also on an interruptible service contract which theoretically enhances reliability to the remaining customers (65 percent of average use).

C. Ratio of Storage to Streamflow

Unlike the Columbia River System, the Puget Sound tributaries offer opportunities for enlarging the pie by developing additional rivers. The regional issue in the Seattle area is less one of cutting the slices according to new priorities (e.g., Northwest Power and Conservation Act) than it is one of deciding the sequence of new source development (specifically, should the Seattle Tolt expansion precede or follow the larger Bellevue proposal on the Snoqualmie which is also intended to provide water to part of the present Seattle service area).

D. Comprehensive Approaches

The hydrologic basin is often appropriately offered as the proper planning unit, capable of encompassing most tradeoffs and policy issues. In the Puget Sound region the basin is too large (the Puget Sound and Adjacent Waters Study of 1970 resulted in a catalogue), while the tributary river basins are too small.

What is the regional framework with multipurpose projects when the water supply service area is not in the basin, the hydropower market areas possibly are not in the state and municipal water supply systems in different river basins are on the threshhold of being intertied?

CONCLUSION

In terms of water resources management, the issue is not always one of working toward a more encompassing geographic unit. The problem may become less one of defining "the region" than one of countervailing risks and of overlapping regions served by multiple use facilities. This introduces an increasing entrepreneurial behavior and project packaging into the bureaucratic process, with service areas defined by favorable project feasibility, rather than the reverse.

Questions and Answers–Panel II.

Following the presentation of papers, a question and answer session was held. The following summary was prepared by the panel moderator from a tape recording of that session. Please note that this is a summary and not a verbatim transcript. For purposes of clarity, the ordering of questions may have been changed.

The first question focused on a perceived need to move away from critical water year planning to median water year planning. Mr. Merrill Schultz stated that hydroelectric generators prefer critical water year planning and have identified two specific problems with median water year planning. First, using a median water curve for planning purposes would create, by definition, low water years approximately one half the time. This in turn would create shortfalls of hydroelectric power during these low years and increase dissatisfaction among users over the system's inability to meet planned electric loads.

Second, Mr. Schultz noted that contract arrangements with agencies operating multipurpose facilities would block such use. However, if median water year planning were used, facility operators might need to divert water from other purposes to meet hydroelectric demand. One consequence of such actions could be the failure to refill reservoirs and should a series of low flow years occur (as in 1976-77), this would have severe impacts on both the following year's hydropower production and plans to flush spring salmon runs downstream.

Dr. Peter Willing was asked if fish and wildlife and conservation advocates would be willing to pay higher electricity rates to finance these programs. Dr. Willing answered that he would be willing to pay for a portion of these costs. He noted that other regions may also be willing to pay portions of the cost through the

marketing of surplus firm power to, for example, California. Determining the true costs of programs, it was pointed out, may best be determined through a marginal trade off analysis focusing on the best uses of the Columbia River.

Another question to Dr. Willing focused on the desirability of developing a comprehensive Columbia Basin plan beyond flow regimes and a water budget to protect fish and wildlife. He replied that development of the fish and wildlife program by the Northwest Power Planning Council had been very useful in identifying both what we do and do not know about the use and operation of the Columbia River. Dr. Willing concluded that the relative cost of information is cheap when compared to the cost of actions based on inadequate data.

Another question dealt with the success of voluntary curtailment in 1976-1977. Mr. Schultz commented that part of his job during that drought had been to coordinate curtailment programs. The Northwest Power Pool established a target reduction goal of 10%. This was supported by a public relations campaign designed to reduce water consumption and electricity use. Mr. Schultz noted that measuring voluntary actions is difficult and that the Power Pool estimated the results of public relations campaigns achieved a reduction of between 5% and 7%. This was considered to be successful. However, as soon as the first rains arrived, the signs of voluntary restrictions evaporated.

Peter Beaulieu noted that this behavior pattern was similar to experiences with petroleum shortages.

Last, James Trull took exception to an observation by Bruce Mizer that the aluminum industry was "just like farming" when concerned with the impacts of a drought. Mr. Trull noted that while both were businesses, major differences existed including the fact the DSIs can be shut down for up to six months and have production equipment and materials ready to return to work with on a very short notice. In farming, Mr. Trull explained, one needs to be in time with growing seasons and in the case of perennial crops, water is needed to maintain capital investment. Last, Mr. Trull noted that farm produce cannot be stored as easily or over as long a term as aluminum ingots.

Mr. Mizer replied that he thought some of the similarities were still useful.

KEYNOTE LUNCHEON ADDRESS

Donald W. Moos
Washington State Department of Ecology

Good afternoon. I am pleased to be here and to have attended the morning sessions. This conference is happening at the right time -- when we are not in a drought. We are not under immediate pressure to assess forecasts and figure out how we can provide water for all the uses that need it. Our heads are cooler. The urgency many of us felt back in 1976 and 1977 is not here now so we have time to plan and prepare ourselves for a drought.

The question this conference asks is a good one. Are we prepared for the next drought? It is much like asking if you are ready for the next eruption of Mount St. Helens. How do you know if you are ready? You have been through it before, but you don't know exactly what it will be like next time. It is hard to prepare for something when you don't know when it will happen, how severe it will be or what area it will affect. We don't know when a drought will occur, but we do know that one will happen. Since 1900, there have been about 20 droughts in the state. That averages out to about one every four years. Low water years and droughts are to be expected and we must plan for them.

We all remember the 1977 drought and how it affected us in the northwest. I was the Director of the state Department of Fisheries when it began. I only held that position midway through the drought. As you may recall, a number of us were asked to leave somewhat abruptly because of certain changes in state government.

When I left Fisheries, droughts stayed with me. In fact, I was placed in the midst of dealing with low water year situations as Fisheries Advisor to the three

Columbia River PUDs. I'd been in agriculture, fisheries, environmental protection and state lawmaking. The only area I hadn't worked in extensively was power. The experience I gained working in so many different areas helped me to develop a very good understanding of low water years and how they are best approached to benefit everyone.

The single most important factor in managing water is western water law. It is the fundamental approach to dealing with drought conditions. Using the law, early pioneers in the west dealt with shortages using the "first-in-time is first-in-right" doctrine. Over the years, that seemingly simple approach has not been an easy one. Since 1917, when that doctrine officially entered state law, many other laws, court rulings and agencies have come along to add to the complexity of water management. At one time, I counted more than 32 state and federal agencies responsible for water management on the Columbia River alone!

Most of the flow of the Columbia is controlled by hydroelectric dams, some not in the United States, with a wide range of water right claims under state and federal law. Under these conditions, there is little we can do to make dam operators provide more water than their operating licenses or congressional authorizations call for. But, then, no single agency has such power. We have provided some strong encouragement, though.

When I went to work for the mid-Columbia PUDs, I immediately became involved in consideration of low flow years and their impact on hydropower operators. As part of that work, I was a member of COFO, the Committee on Fishery Operation to the Columbia River Water Management Group. It includes a number of different interests. The U.S. Army Corps of Engineers and various fisheries agencies alternately chair the Committee, and it has a membership from federal, state and local governments, including PUDs and local utilities. In fact, I see some familiar faces here from that group. I must applaud the group because it has done much in the area of contingency planning for droughts.

The Committee was heavily involved in developing a set of recommended minimum and optimum instream flows for the Columbia River. One of the most notable recommendations, and one of which I am personally proud, is the idea of a "sliding scale" for instream flows which would require higher flows in above normal years and lower, but above minimum, flows in below normal water years. This provides a means of sharing the burden in low water years and sharing the surplus in abundant water years. It is very similar to the idea adopted by the Department

of Ecology in its Columbia River Instream Resources Protection Program (CRIRPP), but my idea expands it to include above normal years.

This sharing philosophy, promoting sharing of good and bad between all water users, is the kind of philosophy that is needed to deal with droughts. I am proud to be part of this type of thing not only through COFO, but also through the Department of Ecology.

The CRIRPP represents one way to prepare for droughts in the Columbia. I feel it is a model for other regulated or controlled river basins. It does not approach the problem of shortage from an all or nothing position. It is a plan for "sharing the shortage," so to speak, within the bounds of "first-in-time, first-in-right."

You probably noticed that COFO is made up of only a portion of the main water users in the Northwest. Unfortunately, there is no representation from out-of-stream users, specifically agricultural interests. They are a critical element in a drought.

It is important that we have a permanent, regional group that includes local, state, and federal water interests -- fisheries, power, agriculture, and the rest. The group must meet regularly and plan for ways to deal with low water years. It is foolish to have different water-managing agencies working in totally different and uncoordinated ways to solve drought problems. We need to combine our strengths and work out something agreeable to us all.

Looking back at how the drought was managed in 1976 and 1977 and how similar situations should be handled in the future, I think things need to be done differently. Again, we ought to begin preparing now! If a drought of the magnitude of the one in 1977 came along, we would be in even more trouble than we were then. More water is appropriated now and there isn't as much left over to provide for a "cushion." State and federal funds helped last time, but as you know, and most of you have felt, those funds are not as abundant as they once were.

While regulating diversions under western law, there are a number of things that can be done before cutting off diversions. Better forecasting, improvements in the delivery systems, conservation and water banking can keep us from having to shut off junior rights and can reduce the impacts of a drought. They need to be put in place years before a drought, not two or three months before.

Above all, I want to emphasize that we need to be able to put these measures in place without diminishing

any person's or entity's rights. We cannot expect cooperation if these things are done at someone else's expense. Tradeoffs are the inevitable result of shortages, but tradeoffs in water management can be in degrees and need not be absolute "I win, you lose" propositions.

Several low water year strategies were discussed recently by the Governor's Interagency Task Force on Water Resources. The group consisted of key state agencies that deal in one way or another with water in Washington. It included the departments of Agriculture, Ecology, Fisheries, Game, and Natural Resources and the state offices of the Governor, Attorney General, Financial Management, and Energy.

Governor Spellman's main goal in establishing a task force like this was to look at water resource management problems from the state standpoint and make recommendations on how to eliminate them. It was a water resources "brain-storming" group. Being the state's primary water managers, the Department of Ecology was very much involved. We provided staff support and I chaired the task force. The ideas that came out of that group are good "food for thought." They can serve as a starting point for establishing an effective response to low water year situations. Everyone can find things in the task force report that they can agree with and I am sure something they can't agree with. It discusses the pros and cons of changes in water right law or water right procedure that would help in conserving water and being better prepared for a low water year.

The task force discussed the concept of water banking by having a short-term exchange of water between sellers and buyers to minimize losses caused by a drought. The water would be redistributed during low water years. This is an idea I support in principle.

Conservation is another area addressed by the task force. I think just about everyone agrees that conservation is a good way to handle a drought before one happens. I must warn you, though, there are some pitfalls in conservation that we should consider before putting a program in place. Existing water rights relying on return flows from upstream water users may be affected if the person upstream becomes more efficient. If the upstream user is allowed to expand irrigated acreage and uses the amount saved, there could be less return flow for the downstream right. That could be a violation of western water law. Also, we must consider instream resources. Many are dependent on return flows and could be affected by more efficient water use.

In its consideration of conservation, the task force specifically looked at conservation in delivery systems. Much water is lost in delivery systems through seepage, leakage, and evaporation. There is no incentive for stopping it. Even if the loss was reduced, there is no provision for expanding the area that can be irrigated under the same right. A farmer who saves water by repairing the delivery system only makes that extra water available to others. That isn't much of an incentive to conserve. If a farmer could be allowed some way to use that water saved, he would have an incentive.

I have given this problem some thought and I have an idea. For example, suppose a farmer makes improvements in efficiency and leaves a portion of his or her water in the stream. In such a case, the conserved water left in the stream would be over and above any minimum instream flow requirements and could, therefore, be recalled for agricultural use in a low water year without decreasing protection of instream values. This would, of course, require some modification of our water laws, but it is worthy of further consideration if we are to provide an incentive for conservation.

At the Department of Ecology, we have included some conservation provisions in our recent regulations. Also, under the Columbia River Instream Resources Protection Program, we are letting water users know early in the season what their probability is for being regulated so they can take steps to lessen the impacts of a low water year. In issuing water rights under the program, my staff is also required to ensure that up-to-date conservation practices and delivery systems are used.

An effort that we at the Department of Ecology are especially proud of is the Yakima River Basin Water Enhancement Project. Many of you are probably somewhat familiar with it. It is a joint effort that involves the Department of Ecology and the U.S. Bureau of Reclamation. It looks closely at conservation and how to deal with a drought year. Through the project, we hope to provide firm water supplies to currently irrigated lands, water to new lands on the Yakima Indian Reservation and adequate instream flows.

Last August, we finished the first phase study and now we are in the second phase. In this phase, we are looking at conservation and drought preparation. We are investigating water banking, looking at water requirements for irrigation, and determining how low the flow must be before adverse impacts to water users are created. In all of this, we are looking very hard at conservation.

By now you have probably figured out my message. We need to deal with droughts before they happen and the time to begin is now. Programs to aid farmers during a drought are good and I support them, but I feel we should learn to conserve water and become more efficient in our operations so the need for those programs will lessen. Everyone agrees that we should not waste the resource, especially one as important to our state, region, and nation as water. By conserving water, we are better able to conduct business as usual in a low water year. We will be able to get by with less water because of our improved efficiency. On the other hand, if we enter a drought using water inefficiently, we will notice the impacts much sooner.

In conclusion, I would like to tell you what I think we can do to effectively deal with droughts. We can establish the group I mentioned before and we can implement some of the strategies I talked about, but along with all that, there are several things we can do to make more water available for a drought.

Recently, I came across some interesting figures. In the Colorado River Basin, four years of runoff is stored in reservoirs. In the Columbia, about three months' annual runoff is stored. I realize the situations are different. The amount of water in the Colorado couldn't even compare with that in the Columbia. And the benefit we get from our water is more diverse and nationally significant than the benefit Colorado gets from its water. But it looks to me like irrigators and others using Colorado River water will be less impacted than those using Columbia River water when a low water year occurs. I think we can look at the situation and see a solution to our drought problems.

We need two things. First, we need to build reservoirs for that water. Second, we need the courage to store the water so it can be used during a low water year and not appropriate it for out-of-stream uses. You may ask: "What can we do with this excess stored water in a normal flow year?" I propose releasing it for instream flows. We can provide optimum instream flows during normal water years, and when a low water year is upon us, we can release enough water for minimum instream flows. The water that would have gone for the optimum flows would be taken by other water users. That way, the water that is stored in the new reservoirs will be put to beneficial use each year with only the type of use being changed, according to whether it is a normal or low flow year. We could use specific cutoff points for the amount of water we will allow for instream flows and give to other uses. For instance, the more runoff

forecast, the more water fish will get. The less runoff forecast, the less water fish will get all the way down to minimum flow levels.

We are building a "cushion" much like this in the Yakima River Basin Water Enhancement Program, but that is only one basin. We need to use this concept in other basins and especially ones that will be developed in the future. It is extremely important that we do this in the Columbia!

Of course, the key element in all of this is our courage and ability to not use the water for anything but fish and low water year emergencies. If we do not have the courage, we will find ourselves back in the same place we are now, trying to figure out how to deal with droughts effectively.

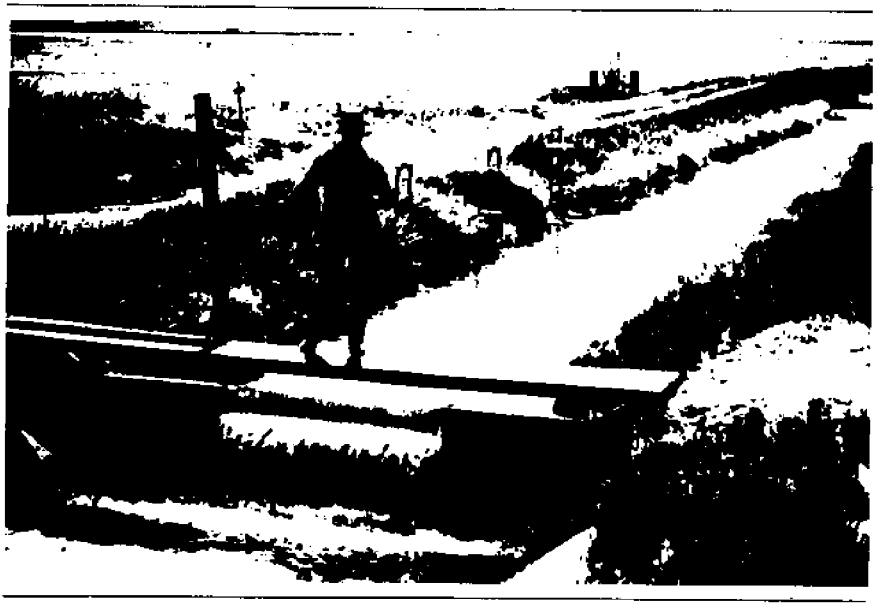
Another means of effectively providing more water is through improvements in efficiency (which are often quite painless) which will give us the opportunity to reduce or alleviate many of the problems we face during a drought. Water conservation programs -- whether they involve increased distribution system efficiency, better application of water to crops, or additional storage projects -- will result in a savings of water or the availability of more water annually. This in itself provides no water for a drought contingency plan. We must ensure that the water we save is available when the next drought occurs.

There will be extreme pressure to use the saved water for new projects during normal and above-normal water years. We must resist that pressure, because, if we don't, we may cause a low water year to be more devastating than any we have ever experienced. Before we answer the question, "Are we ready for the next drought?", we must answer another. Do we have the courage to prepare ourselves for a drought? Do we have the courage to develop a rigorous drought contingency plan that will provide for more storage, provide incentives for conservation, and probably preclude or severely limit new development in presently water short basins? I think we do. . . but any plan we develop must be a cooperative effort that promotes a sharing of the burdens among all water users.

If this conference is any indication of the interest in preparing for a drought before one happens, I am optimistic about the future.

PANEL III.
Designing Institutional Mechanisms

Bill H. Williamson
Smith, Brucker, Winn and Ehlert



Approximately nineteen (19) droughts have occurred in the Northwest since 1901. During "normal" hydrologic years with average rainfall and snow pack conditions, in-stream and out-of-stream uses of the region's river systems have existed within separate, yet compatible management systems at federal and state levels. However, during the last drought which occurred during 1976 and 1977, the region was unable to effectively resolve competing user conflicts and make comprehensive management decisions to mitigate drought-related impacts. The Conference's afternoon panel on Designing Institutional Mechanisms focused on likely actions to be taken by key resource players in the region and the adequacy of institutional and legal mechanisms to deal with drought-related impacts.

The inability of the Region to effectively respond to low water year emergencies has its roots in the development of western water law, including reserved federal and tribal rights, and fragmented federal/state roles and authorities that prescribe the use and allocation of water resources. To date, federal and state authorities and programs have in large part focused upon single-purpose objectives with limited regard for low water year decision-making. Even recent legislation, such as the Pacific Northwest Regional Power Act, contains no provisions for dealing with below "critical water" years in its regional energy plan and fish and wildlife program.

While low water years are subject to a variety of technical definitions, (e.g., "critical" water years for power planning purposes), the region's shortage during 1976 and 1977 caused considerable conflict among competing uses (eg. drinking water, fisheries, hydropower, industrial consumption, irrigation, navigation and recreation) and affected federal and state agencies. In

a report issued by a Governor's Ad Hoc Water Emergency Committee, Washington State suffered an estimated loss of approximately $655 Million in income and products. During this period, many important decisions were made on an ad hoc, trial by error, basis. User groups and affected agencies were unable or unwilling to allocate reduced flows or "share the shortage", prioritize in-stream and out-of-stream uses, and otherwise create legal mechanisms to comprehensively deal with the problem. Units of local government and special districts individually responded to individual needs through federal and state emergency assistance and loan repayment programs. Washington State and Oregon State Legislatures, with technical assistance from regional utility organizations, responded quickly to empower its Governors with emergency power curtailment authorities. State efforts also included attempts at immediate solutions. For example, Washington State efforts to seed clouds were greeted with protests and litigation by the State of Idaho. Efforts to finance and develop ground water wells were not very successful.

Although the Northwest economy is presently suffering from the effects of the latest recession, increasing demand, limited storage capacity, and a finite supply of Columbia River System waters have reduced margins of safety for sustained multiple water resource use. New conditions also exist today that did not exist during the 1976-77 drought. Northwest Indian tribes now enjoy enhanced treaty rights that were not fully defined during the 1976-77 drought. Roles of Northwest states, federal agencies and user groups have been significantly changed by enactment of the Pacific Northwest Electric Power Planning and Conservation Act, P.L. 96-501, and the creation of the Northwest Power Planning Council. While the Council is not empowered to specifically respond to low water year emergencies, the Council's role in the preparation of a region-wide fish and wildlife program and regional energy plan contains elements with far reaching effect on power planning and natural resource management. Unless a low water year dips below "critical water" levels for power planning purposes, the region's fish and wildlife agencies, including affected Northwest tribes, can be assured of a sustained "water budget" designed for adequate downstream water volumes for juvenile salmon migration.

Absent new storage capacity, and should a drought persist over a longer period than the 1976-77 experience, it is probable that the next drought will likely witness more serious inter-governmental and competing use conflicts (federal v. state, federal v. federal, state v. state, private v. public, tribal v. public, tribal v. private and possibly, Canadian v. U.S.). And, the region's imagination and energies through its water

user groups and units of federal and state government will again be tested. Panelists in designing institutional mechanisms represent key players who in large part shouldered the burden of coming forth with solutions during the 1976-77 drought and who will surely be called upon to respond to the next drought.

Based upon its role in the 1976-77 drought, Mr. Rich Nassief, Deputy Director of the Pacific Northwest Utilities Conference Committee (PNUCC), offers comments on PNUCC's likely response in dealing with future low water years. PNUCC is a region-wide power planning organization representative of Northwest public and private utilities and Direct Service Industries. Mr. Nassief details PNUCC's efforts, along with tne Northwest Power Pool (NWPP), in securing significant energy conservation through voluntary efforts without resorting to mandatory measures. PNUCC and the NWPP were instrumental in assisting states in developing mandatory conservation and curtailment authorities in the event that voluntary efforts failed during the 1976-77 drought and expects that a similar effort will be forthcoming from PNUCC and the NWPP in future low water years.

Viewed from the institutional eyes of Washington State, Charles B. Roe, Jr., Senior Assistant Attorney General, concludes that any solution to low water year management should build upon a unitary state water management system already in place. With the exception of reserve federal and tribal water rights, Mr. Roe's analysis of low water year decision-making focuses on the importance of existing state water management systems which represent the product of a historic congressional policy of deference to state management of water resources.

Affected Northwest Treaty Tribes represented through Malcolm Karr, Water Resources Director of the Columbia River Inter-tribal Fish Commission (Commission) reaffirms the stature of reserved tribal treaty rights over non-reserved allocations of water resources and the protections this right has recently received in federal court decisions and the recently approved Fish and Wildlife Program under the Pacific Northwest Electric Power Planning and Conservation Act. Mr. Karr summarizes federal court decisions which protect treaty fishery rights and the Commission's likely response during low water years which would rely heavily on to the so-called "water budget" of the Northwest Power Planning Council's Fish and Wildlife Program.

As the panel's federal representative with administrative responsibility of approximately one-third the Columbia's storage capacity, Mr. L. W. "Bill" Lloyd, Northwest Regional Director of the United States Bureau of Reclamation (Bureau), offers a balanced presentation on the Bureau's multi-purpose project authorities on the mainstem Columbia River dams and tributaries (fish and wildlife protection, recreation, municipal and industrial water supply, power production and irrigation) and realistic impacts on in-stream and out-of-stream user groups during low water years. In pointing out the unpredictable nature and scope of a low water year, Mr. Lloyd alludes to the disparities among user groups in the region and changes to the Bureau's water regime as a result of the Northwest Power Act and tribal treaty rights. Mechanisms to deal with low water years are already in place at Bureau facilities through its operational criteria and contracts, better runnoff forecasting, new conservation programs and the Yakima Basin Enhancement Project.

Although the Northwest Power Planning Council (Council) was not in existence during the last serious low water year during 1976 and 1977, as General Counsel, James Fell offers straight-forward observations as to the nature of Northwest resource interests, public participation and being prepared for the next drought. The Council was created under the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), with the task of preparing a fish and wildlife program and regional energy plan. Management awareness, avoiding surprise, knowing what agencies to call and the timing of decisions are essential ingredients that must be in place and work before the next drought occurs.

Perspectives of Power Managers and Developers

Rich Nassief
Pacific Northwest Utilities Conference Committee

Introduction

The drought years of 1973 and 1977 are years that are well remembered by the utility community in the Northwest and essentially serve as the foundation for today's conference.

During those periods, a tremendous amount of regional planning and coordination were undertaken with very positive results. Indeed, in retrospect it is hard to believe that the region was able to accomplish as much as it did. In just a few short months in each of the years mentioned above, the four state region of Oregon, Washington, Idaho and Montana, working in concert, were able to forestall many of the serious effects that otherwise could have impacted the region. This early cooperative effort serves as the cornerstone for most of the regional drought-related framework that exists today.

This afternoon, I would like to devote some of the time I have with you to giving some perspective on the role that was played by the electric utility industry during the 1973 and 1977 droughts. More specifically, I will largely be covering the activities of the organizations that serve as the utilities' regional representatives -- the Pacific Northwest Utilities Conference Committee (PNUCC) and the Northwest Power Pool (NWPP).

In that context I will also briefly discuss the curtailment plan as it presently exists, as well as some considerations for the future.

Historical Role of PNUCC and NWPP

First, let's take a brief look at how the PNUCC and NWPP are constituted.

The PNUCC is an organization comprised of most of the region's electric utilities both public and private and the Direct Service Industries. Through its various committees the organization is

concerned primarily with long-term regional electric power planning. One of its most notable publications is the annual Northwest Regional Forecast of Power Loads and Resources. Its major policy making arm, the Executive Committee, formed since the 1977 drought, is made up of top level officials from the client groups described above. It is from this group that regional electric utility guidance will emanate during times of perceived regional need -- such as a low water emergency.

Similarly, the NWPP is made up of most of the region's electric utilities. The nongenerating public utilities and Direct Service Industries are indirectly represented in this organization by the Bonneville Power Administration. The NWPP is concerned primarily with the regional operating requirements of the electric power system and short-term operational planning of the region's hydroelectric system. It is in this latter role that the NWPP interacts with the region during low water emergencies. The organization's policy-making arms are the Coordination Contract Committee and the Operating Committee which are essentially comprised of the operating managers of the electric utilities.

During the droughts of 1973 and 1977 both of these organizations were very active in the regional coordination that was required. Let's cover briefly some of the major actions initiated by these organizations during each of the droughts:

1973 Drought

- During late fall 1972, rainfall begins to drop below normal. In October secondary energy for interruptible loads is curtailed.

- During spring and early summer 1973, the region's electric utilities import large amounts of power from outside the region -- some as expensive as 20 mills! (Times change.)

- July 1973 -- PNUCC's Policy Committee meets and initiates steps to begin contending with the shortage.

- Early August 1973 -- PNUCC Task Force appointed to give immediate attention to utility conservation programs and voluntary curtailment on a regional basis.

- Late August -- PNUCC Policy Committee meets with state and local government agencies, industries and news media. A policy statement and conservation program recommendations for use by electric customers are agreed upon. Also at this meeting, formation of an NWPP Load Curtailment Subcommittee is approved and immediately assigned the task of developing mandatory curtailment guidelines. The PNUCC Task Force is requested to continue development of conservation and voluntary curtailment programs.

- August 30 -- Energy situation continues to worsen with reservoirs below programmed levels by 14+ billion kWh.

- September -- Conditions stabilize as voluntary curtailment by the region's energy consumers begins to take hold.

- October -- It is determined that response to voluntary curtailment thus far is about 5.6 percent. If voluntary curtailment continues at this level, it is felt that mandatory curtailment may not be necessary during the coming winter period.

- November -- The initiation of heavy rains breaks the back of the drought and gradual lessening in restrictions ensues.

Positive Outgrowths of 1973 Drought

- Fostering of regional utility and governmental cooperation during emergencies.

- Development of the first regional voluntary and mandatory curtailment guidelines.

- A growing perception of ongoing conservation requirements by the region's electric consumers.

1977 Drought

The initiation of the 1977 drought brought with it a rekindling of the effort that had been so successful in 1973. Some drought planning efforts had been ongoing between the periods but on a very low key.

By the end of 1976, it became apparent that the potential for energy shortage conditions existed in 1977. A flurry of planning meetings then ensued, the highlights of which were:

- Early January 1977 -- NWPP Load Curtailment Subcommittee meets, determines that there is a 20-30 percent probability that storage energy will be low enough at the end of July or August 1977 to call for some form of mandatory energy load curtailment. Subcommittee agrees to defer action until a higher risk -- perhaps 40-50 percent -- is determined and recommends to PNUCC Policy Committee continued close monitoring of the situation.

- January 1977 -- PNUCC Energy Management Committee Task Force develops Advance Action Plan (forerunner of comprehensive voluntary and mandatory curtailment guidelines eventually agreed to by the region's states).

- Early February -- NWPP Load Curtailment Subcommittee meets, determines that 50 percent probability of mandatory curtailment exists in July/August timeframe and recommends to PNUCC Policy Committee that Phase I of Advanced Action Plan be implemented through the regions utilities (Plan asks for certain voluntary public actions.)

- February 7 -- First meeting of the Northwest Electricity Task Force takes place. The Task Force is formed by the governors of the four Northwest states. Their primary assignment is to develop a regionally acceptable plan for voluntary and mandatory load curtailment. Representatives of PNUCC and NWPP are consulted extensively in this effort.

- February 14 - Because of the worsening drought in the region, the NWPP and Bonneville Power Administration issue a joint appeal for voluntary electric energy load curtailment.

Throughout the spring and summer months of 1977 many working meetings were held by the organizations primarily responsible for monitoring, analyzing and drawing up additional curtailment guidelines. In May of 1977 the Northwest Electricity Task Force, after extensive consultation and analysis, forwarded to the governors of the four Northwest States a comprehensive plan that contained a combination of several stages of voluntary and mandatory curtailment. Previous to the full Plan's approval, elements of the regional Plan (the voluntary portions) had been released for implementation by the region's utilities.

The fact that the region was successful in its efforts is now history. During the months that followed the original cry for voluntary curtailment, the region's consumers responded with a sustained voluntary effort that approached six percent. Once again, mandatory curtailments were avoided, due in large part to the voluntary effort to conserve electric consumption.

In November 1977 the rains finally came, alleviating the drought conditions that had persisted for several months in the region.

GENERAL OBSERVATIONS:

- Assistance from other regions may not be forthcoming when most needed -- both California and British Columbia were also impacted by the 1977 drought and thus were not able to assist at the levels needed. The need to have in-region thermal capability available during low water emergencies (critical water planning) is an absolute necessity.

- Nonpower water depletion requirements need to be fully defined substantially in advance of low water emergencies -- e.g., fish flush and irrigation. Substantial amounts of water were spilled during certain parts of 1977 to aid downstream fish migration.

- Voluntary curtailment requirements when clearly communicated to the public can be effective in reducing deficits.

Current Regional Curtailment Plan

Essentially, the final plan developed by the Northwest Electricity Task Force in March 1977 continues to serve as the framework for

curtailment should a low water emergency occur. This curtailment plan is broken into three stages of voluntary and three stages of mandatory curtailment. Accordingly, the stages of voluntary curtailment are triggered by probabilities of future mandatory curtailment; the stages of mandatory curtailment are, in turn, triggered by probabilities of future inability to meet regional firm energy requirements. These probabilities are based on the results of a computer simulation model, otherwise known as the Energy Reserve Planning Model (ERPM) of the regional electric system. During curtailment conditions the probability figures are updated periodically to reflect the experienced load, precipitation, conservation effectiveness, thermal plant performance and additional resources as they become available to the region. Updated probabilities are maintained by the NWPP. State authorities review and use the NWPP data to inform and advise their governors or other state agencies empowered to implement state curtailment plans.

Currently, it is assumed that when another low water condition occurs, the PNUCC, through its Executive Committee, working in concert with the NWPP will sound the alarm signaling the potential for a low water emergency. Thereafter, the NWPP will serve as the "trigger" organization, alerting appropriate state government entities to the stage of curtailment needed. This framework worked well during the 1977 low water emergency and there is every reason to believe it will work well in the future.

Future Considerations

As described above, the regional curtailment plan that currently exists is an effective tool to manage low water emergencies. However, as is the case with any tool, it should receive occasional attention to assure it is kept as sharp and therefore as effective as possible. I posit to you several considerations for the immediate future that could assist in keeping our curtailment plans and implementation requirements in a state of immediate readiness.

- Enabling legislation -- An effort should be made to assure all states in the region continue to have in force the necessary legal framework to uniformly address curtailment requirements.

- Institutional Expertise -- It is essential that each of the states maintain a staff of people knowledgeable in the mechanics of the region's power system and its curtailment plan -- there won't be sufficient time to educate them should another drought overtake us.

- Power Planning Council -- Created since the 1977 drought -- a determination of the appropriate role the Council could serve in the event of a low water emergency is needed.

- Fuel Use Act -- Passed since the 1977 drought -- an examination of its impact on the operation of combustion turbines in a drought condition should be undertaken.

- System Analysis Model -- Investigate using the more sophisticated and flexible PNUCC System Analysis Model (created since the 1977 Drought) in place of the ERPM model to determine the probability of energy insufficiency.

- Organizational Roles -- Examine the future interrelationships of the PNUCC and NWPP with respect to low water emergencies. PNUCC's regional role has greatly expanded since the 1977 drought.

Allocating Water in Low Flow Years*

Charles B. Roe, Jr.
Senior Assistant Attorney General
State of Washington

My presentation today is based upon State perspectives on the development of western water law and low water year emergencies. The problem as I see it is that there are too many state and water laws agencies involved in water resource management. I am not a water manager, but the consensus in any successful water management system is that a unitary management system must exist with responsibilities centralized in one body for administration. Another fundamental has to do with our federal constitutional system. We operate under a federal constitutional system, one with concurrent jurisdiction in the same geographic area and the same citizen body. For purposes of allocating water, the power of the federal government is derived from the U.S. Constitution - primarily the Property and Commerce clauses. We also have reserved state powers under the Tenth Amendment. The state's power is not derived from any ownership concept of water, but is derived from a regulatory or police concept. Finally, with regard to these two levels of government, the state power can be exercised, unless it is preempted by some exercise of federal power.

History itself has gotten us to where we are today and federal-state relations must be taken into account. First of all, federal congressional policy has tended historically to centralize water resource management in a single unit of government. In 1978 the U.S. Supreme Court on at least three occasions outlined the federal-state interface on water management issues. In California v. U.S. (citation omitted), the court recognized a consistent policy thread of purposeful and continued deference to state water law by Congress in the reclamation of arid western lands. Congress desired to avoid legal confusion that would arise if federal water law and state water laws were to reign side by side in the same locality. This federal deference to

*This paper was prepared from a tape recording of Mr. Roe's speech and for purposes of clarity may vary slightly from the paper as given.

state water law was not just to stay dormant at the federal level, but was a policy of encouraging every western state to become active in water resource management. Historically, federal lands legislation also determined that when the U.S. government transferred lands under its ownership to non-federal status, no water rights were to be transferred to such lands. To acquire any water rights to use on that land, you had to look to state law. A specific act I want to mention is the Reclamation Act of 1902 which, in terms of state relationships, says that United States Bureau of Reclamation programs should be operated subject to water rights that are issued under state law. Another act is the Federal Power Act of 1926. That Act again provided that applicants for federal licenses must satisfy state water rights laws. Commendably, the Federal Energy Regulatory Commission just this year made one decision in which it ruled that FERC will not grant an application for hydroelectric rights unless non-federal applicants first obtain water rights under state law.

There is one exception to the federal policy of deference to state law and that is the doctrine of reserved federal rights. In a narrow area dealing with publicly owned lands, the federal government has argued that when the U.S. sets aside publicly owned lands for a special purpose, such as Indian reservations or forest service reserves, they implicitly reserve water rights in amounts necessary to carry out such purposes. Even in that special situation, Congress in 1953 stated that all those rights are subject to jurisdiction of the state forests and state administration of all those with reserved rights, Indian and non-Indian.

With that background, we have today a federal policy of encouraging states to carry out what has basically been a successful program of reclaiming the west and managing the waters of our western states as well. Every state has a comprehensive water code. Washington State water law covers 3 major areas: we have an extensive water planning amendment; we have water rights establishment procedures; and we have extensive regulation procedures. Washington State also has a simultaneous riparian doctrine which says that because you have water flowing through your land you are entitled to some water, together with the appropriation or first-in-time first-in-right doctrine. In Washington State all water rights acquired after 1917 had to be established under a state water code which sets up a pyramid system. Since 1967, the Washington State Legislature has added features to our water laws to ensure instream flow protection. On at least 3 occasions the state legislature has also told the Director of the Department of Ecology that he must actively assert the state's role in water management.

In that regard, Washington State will cooperate to the maximum extent it can with the federal government. However, it will ensure that at all times, the integrity of state water programs and laws is held intact. Recent developments which Don Moos mentioned to you at lunch and which we are optimistic about, is that the Legislature on a number of occasions has encouraged legal - physical solutions, such as the Yakima Basin Enhancement Project.

In a general sense, our water laws in Washington state are probably more advanced or progressive than most of the other western and Rocky Mountain states. The bottom line for low water year management is that except for reserved federal and Indian rights, all water rights to use water in the State of Washington are based on state law. There is, I think you could say, an institutional mechanism or arrangement generally in place to deal with such problems. I cannot tell you that this system will handle all the problems during low water years, but mechanisms are in place and operating. Theoretically this state's unitary system should be looked at very carefully for any low water year regulatory programs. I say it should be simple if you read the statutes and how they should have worked. However, we do not have all our water rights quantified or adjudicated primarily because until 1917, there was no centralized management system. In that situation, the state cannot realistically regulate low water problems successfully. There is need for improvement. The improvement is needed because quantifying various federal and state rights have never been precisely quantified or adjudicated. There are other problems which affect low water year management. If one accepts the proposition that most federal agencies are subject to the power of the state water administrator, there still is great reluctance by such agencies to believe that they have to operate at the "whim" of a state administrator. There is also special problem with reserved federal water rights. Some interests do not want to have their reserved rights quantified at all. And others do not want to have them quantified in state courts. There is also another problem in the federal area that deals with recent environmental legislation. For example, what impact does the Federal Water Pollution Control Act have on state water management systems? Finally, the "new man on the block" and the Northwest Power Act. The Act mandates federal agencies to comply with the fish and wildlife programs. It is completely unfair to say what that all means, but federal agencies certainly have to take the Pacific Northwest Power Planning Council's fish and wildlife program into account. Interestingly enough, as I read that statute, there are several severance clauses which provide that state powers are not to be impaired or modified in any

way. So, again, there is a recognized and continued federal policy of deference to state water law. As a result, I believe there are state mechanisms in place without the need for new federal statutes.

Realistic efforts for low water year management must focus on practical solutions and lessons learned during 1976 and 1977. The YakimaBasin Enhancement Project is a wonderful laboratory for this purpose. There is a real opportunity there to resolve in a satisfactory fashion an unsatisfactory situation.

In conclusion, I ask you to keep your eye on the ball, wearing states rights glasses, intending to look for a unitary system which has a single administration. Please take into account federal policies that support this type of system of deference to state water laws.

Perspective of the Treaty Tribes

Malcolm H. Karr
Columbia River Inter-tribal Fish Commission

Tim Wapato, Executive Director of the Columbia River Inter-Tribal Fish Commission, was scheduled for this place on the panel. To his regret, circumstances require that he be in Yakima today. Tim asked me to put together some thoughts on the perspective of the treaty tribes and to present them on his behalf. Because of my background and work, my remarks will be from the technical viewpoint.

The theme of this conference is managing low water emergencies which asks the question, "Are we prepared for the next drought?" I will answer the theme question up front be stating that, yes, from the perspective of the treaty tribes, we are prepared for the next drought.

Here are my reasons why.

The Columbia River Inter-Tribal Fish Commission is concerned primarily with water management for fisheries. Most of my remarks will therefore be directed toward that topic. But first, it is important to note from the broader perspective that treaty rights provide for Indian reserved water rights adequate to fulfill the purposes of Indian reservations. These reserved rights take precedence in most cases over rights issued under the appropriations doctrine of western water law.

Furthermore, agreements executed during the 1850's between the United States and Pacific Northwest Indian tribes secure to the tribes the right to take fish both on and off reservations. Numerous federal court cases interpret this to mean protection of biological conditions necessary to maintain tribal fisheries. Examples include: prohibiting an impoundment that would inundate usual and accustomed fishing sites; regulating hydro peaking operations; releasing irrigation district water to protect salmon redds; and providing sufficient water

of a suitable temperature to sustain resident trout.

Perhaps more direct to the question, the Northwest Power Planning and Conservation Act requires that fish and wildlife and energy programs formulated under that act be consistent with Indian treaties. The fish and wildlife program adopted on November 15 of last year by the Northwest Power Planning Council conforms to that requirement by allocating a volume of Columbia and Snake River waters specifically to protect migrating juvenile salmon and steelhead (smolts), especially during low runoff years. That basic concept, which has been mentioned by nearly every speaker preceding me, is called the "water budget" and is designed to protect smolts from losses such as occurred in past drought years. Discussion of the reasons for establishing this allocation will show that we <u>are</u> prepared for low runoff conditions.

The principle behind the water budget is to provide enough water to move smolts through the Columbia and Snake system of reservoirs in a biologically timely manner. The phrase "biologically timely" was defined through the efforts of many people who intensively evaluated the best available scientific information in order to link the biology of the fish with the hydrology of the river system.

One biology/hydrology link is that smolts apparently move downstream about at the speed of the water. Other evaluations showed that smolt survival is highly time-dependent -- the faster the fish can travel from freshwater rearing areas to saltwater, the greater the survival. Furthermore, about 30 days is the upper limit during which most species or races of salmon and steelhead retain the physiological ability to make the freshwater/saltwater transition. The time limit can be less in low runoff years, depending upon such factors as water temperature and size and condition of the smolts.

Greatly increased travel time created by the Columbia/Snake system reservoirs that the smolts pass through causes a survival problem of large magnitude. Before the impoundments, smolts could migrate from upper basin rearing areas to saltwater in about five or six days. Now, with eight dams and reservoirs and with controlled flows, especially in low runoff years, travel time for the same distance has increased ten-fold -- from fifty to sixty days. This causes huge smolt losses which greatly reduce the number of returning adult salmon and steelhead. The water budget therefore is available for flow augmentation during smolt migration to reduce travel time and increase survival.

For the benefit of those of you who may be hearing the term "water budget" for the first time, or lack a

clear understanding, I will mention some of its major features. The allocated water is managed jointly by the Columbia Basin fish and wildlife agencies and tribes and can be used annually from April 15 through June 15. The two control points for measuring water budget usage are Lower Granite Dam on the Snake River and Priest Rapids Dam on the Columbia. Project operation and requirements include maintaining power base flows at those two locations, to which the water budget can be added. Base power flows at Priest Rapids are 76,000 cubic feet per second (cfs) throughout the two months period; and at Lower Granite are 50,000 cfs during the second half of April, 65,000 during May, and 60,000 cfs during the first half of June.

The volume of the Snake River water budget allocation is equivalent to a sustained flow of 20,000 cfs for one month at Lower Granite Dam. The Columbia allocation is equivalent to 58,000 cfs for one month at Priest Rapids Dam. If the allocated water is used over a longer period, the sustained flow rate would be reduced accordingly. Use of this water is at the discretion of two water budget managers, one appointed by the tribes and the other by the agencies.

Now, an illustration of how travel times can be reduced through water budget application during spring smolt migration. Analyses have been made to compare travel times corresponding to actual flows in the 1973 and 1977 low runoff years with travel times that could have been achieved using the water budget to increase flows. These comparisons were made for travel through the four lower Snake reservoirs from the head of Lower Granite pool to the head of McNary pool, and for the total freshwater to saltwater distance, also starting at the head of Lower Granite pool.

An example of the results from the 1973 regulations showed that smolts arriving at the head of the Lower Granite pool on April 19 probably required about 46 days to reach saltwater under the actual conditions, if they survived. This time could have been reduced to about 31 days, for one of the daily flow regulations examined, by using the water budget. Similar results were obtained from examining the 1977 smolt migration period with simulated water budget usage.

It is important to note that in all evaluations leading to development of the water budget concept, and in subsequent examination of means for implementing the concept, existing water rights, including irrigation, are fully accommodated before using the water budget. Thus the water budget comes solely from shifting a portion of the water normally used to produce hydropower in the winter, to more than normal hydropower production in

the spring. Because of this, and because of the extremely low spring runoff in 1973 and 1977, the full water budget allocation was not available in either year.

We lack adequate information with which to translate the improvement in travel time into the percentage increase in smolt survival. But what we do know supports the conclusion that smolt survival will increase substantially with water budget use during low runoff years.

A coordinated management effort is taking place this year between the water budget center, operated by the two water budget managers, and the reservoir control center, operated by the Corps of Engineers. Results to date show that the water budget concept is workable.

Therein lies the basis for my opening statement, which I repeat in closing, that from the fisheries perspective of the Columbia Basin treaty tribes, we are prepared for the next drought.

Perspectives of The Bureau of Reclamation

L. William Lloyd
Bureau of Reclamation

The first question to be addressed as to how this conference topic affects the United States Bureau of Reclamation is: What authorities may the Bureau apply in response to a low-water year or drought emergency? The Emergency Fund Act of June 26, 1948 provides authority to appropriate money from the existing Reclamation Fund to defray expenses incurred by water users because of unusual or emergency conditions such as fires, floods, droughts, or other situations that cause or threaten to cause interruption in water service. Second, the Emergency Drought Act of 1977 and special acts passed by Congress provide authority and funding assistance in mitigating the impacts of a drought by measures to better utilize existing water supplies, aid in the purchase of additional water when available, and defer annual charges and payments owed to the United States that might be burdensome because of a drought. Third, the Deferment of Charges Act as of September 21, 1959 provides authority for the Secretary of Interior to defer the time of payment for such construction charges as he deems necessary to be within the probable ability of water users to pay.

In addition to the foregoing authorities cited above, existing contracting authority (when water is again available) allows existing supplies of water to be made available to water users under current contracting authority. The Bureau may seek additional delegated authorities if it is made necessary by a drought. Water banking also exists, as do local water authorities in establishing a pool of available water from sources that may be surplus to the needs of existing water users or from uncontracted storage space behind federally constructed reservoirs. The right to eminent domain also allows the Bureau to acquire surplus waters by adverse possession and purchase of water rights, including existing sources of stored water.

The Bureau does not design its projects, however, to be drought-proof. What does the Bureau design for? Normal shortage criteria for Bureau projects include:

This text was in part edited by conference moderators from a detailed outline provided by Mr. Lloyd and used in his presentation.

1) In the most critical years, the shortage should not exceed fifty percent of the requirement.

2) A shortage in any two consecutive years should not exceed seventy-five percent of the requirement.

3) The cumulative shortage for the driest consecutive ten years should not exceed one hundred percent of the requirement.

There are exceptions to these standards and criteria. First, a project that has as its only source of supply an unlimited supply, such as ground water or the Columbia River, and that is supplied by pumping may have one hundred percent of supply at all times. Where the only way to instigate a shortage would be to underdesign facilities, no shortage is included. In some cases where the proposed project cannot provide sufficient water to meet the normal shortage criteria and where the project would provide a significant improvement in existing supplies, the shortage may be allowed to exceed normal criteria with permission of the Commissioner's Office and in making certain that those users included in such a project fully understand what to expect. For some crops, such as orchards and vineyards, the normal criteria may be too severe, and the most critical year shortage may be reduced to approximately twenty-five percent.

Proper forecasting by the Bureau may also be of special help during a low water or drought year. What did the 1977 Yakima experience show us? We still use the basic forecast equation as in 1977, but now to establish a range of TWSA's, we compute four forecasts which assume fifty, one hundred, and one hundred and fifty percent of normal subsequent precipitation. Also, we now compute a forecast assuming a continuation of the trend for the water year to date. The fifty to one hundred and fifty percent range above is now included in all our forecasts. The 1977 experience also told us that our basic forecasting techniques, while they were developed for use in flood control situations, will work for water supply forecasts in many situations. There are still those very low snowpack years for which these forecast equations, however, do not work. In such years, we would forecast essentially base flows, or very close to the minimum runoff that has occurred historically. We also learned that the best forecast is the one that has a sound statistical basis and is not adjusted by "feel" for the data. By giving water users our best forecast for the three prior conditions, they can make informed decisions for the year.

Forecasting runoff effectively is important to the Bureau's reservoir operations to assure that flooding does not occur due to filling prior to the peak flow, or that too much space is not provided prior to runoff, and prevents filling to meet irrigation demand. The 1977 experience proved that everyone should know how a forecast is developed (flood control, not water supply), what information was used in its development (return flow, periods, etc.), and that base flows will provide a certain degree of water supply regardless of present conditions. Therefore, the supply of water

today can be forecast better than what initial forecasts may otherwise indicate.

Once we know when a drought is about to occur, conservation can help reduce its impact. A grower will substitute labor for water (usually the opposite will occur during periods of abundant supply) by changing irrigation sets at odd hours and may irrigate less frequently. If he knows ahead of time, he will plant crops with a low water management requirement. He may also choose to plant fewer acres. If practical, he may rent or lease sprinkler pipe and temporarily sprinkle gravity-irrigated land. A few growers will seek/ and or buy irrigation scheduling services. Previously unused sources, such as surface drains, may be utilized. Because of significant increases in the price of energy, those irrigators who pump irrigation water may choose to do one or more of the above. They may also consider reducing total dynamic head by: a) converting to low pressure nozzles; b) increasing size of laterals and/or mainlines to reduce friction loss; c) trim impeller on centrifugal pumps or remove a bowl from a turbine pump to reduce pump horsepower; d) replace leaky fittings and nozzles; and e) seek irrigation scheduling information.

Water rights during low water years are directly affected by existing water law regimes as a result of historic judicial allocation. Rights to divert water from the Yakima River system for irrigation purposes were allocated by judicial decree in 1945, commonly referred to as the Yakima Consent Decree. The Decree states that waters of the basin shall be meted out from the "total water supply available" (TWSA), which is defined as natural flow, reservoir, storage, and other sources. The rights of all parties are classified as nonproratable and proratable. The former are held by those water users with the earliest developed lands. These rights are served first from the total water supply in the basin. The Consent Decree identifies and quantifies all nonproratable water uses, and implies that all other waters available are proratable and are of equal priority. Prior to the start of each irrigation season, the TWSA is allocated to users according to their established rights. As the season progresses and to the extent nonproratable users do not use their share, the excess is made available to proratable users as it becomes available. This practice has led to a situation where the percentage of proration may increase as a season progresses, a result which the Consent Decree cannot anticipate.

The Bureau is now better able to anticiapte the onset of drought conditions than during the 1977 experience. The Bonneville Power Administration is now funding three weather stations using a "hydromet" system of the Bureau in order to determine when to irrigate, thereby saving pumping costs and water. Aside from these technical advances, available uncontracted water supplies can be made temporarily available during a drought with relatively short processing time, assuming that compliance with the National Environmental Policy Act does not operate as an obstacle. The Bureau has authority to approve and execute temporary contracts for up to 10,000

acre-feet of irrigation water and 2,000 acre-feet of municipal, industrial, or miscellaneous uses. Contracts for higher quantities must be approved at headquarters, but additional authority could be delegated to the region in the event of a widespread drought.

The Reclamation Reform Act Amendments of 1982 may also assist during low water years, although the Act's conservation requirements relate more to long-term actions rather than as responses to short-term needs. Under the Act, the Secretary of the Bureau encourages, but does not require, implementation of conservation practices when economically feasible. Irrigation districts participating in such programs must prepare water conservation plans containing goals, conservation measures, and schedules. The Secretary is also authorized to enter into Memorandums of Understanding with nonfederal entities such as states, Indian tribes, and water user organizations. The Act has also permitted funding of the Yakima River Basin Enhancement Project Study, which is currently collecting data and performing a preliminary examination of water conservation opportunities in that basin. Conveyance systems along with modifications to canal operation are under examination as are economic costs and water savings. Impacts to wildlife are also under consideration. The Soil Conservation Service of the United States Department of Agriculture is also assisting by providing information on farm efficiencies within the basin's various districts.

Water conservation possibilities will be recognized in the future without (baseline) setting, but the on-farm measures will not be incorporated into any basin conservation plan because of implementation limitations imposed by law. The Yakima Basin Study will also assist in estimating irrigated acres and upgrade previous estimates for each diversion's service area through field sampling and aerial photographic coverage. Although the Yakima Basin Study is not complete, the indications are that improvements to conveyance systems may not be cost-effective. Changes to operations to decrease required operational flows would result in minor water savings. On-farm efficiencies in some irrigation districts are possible with well-operated farms (62 percent or greater efficiency) when the total irrigated area for a district is considered. The initial indications, together with the absence of any change in the present rate structure, are that water conservation would have a minor impact on increasing the net available water supply for fish enhancement flows or for supplemental irrigation.

While conservation practices may not represent an immediate tool for short-term use during droughts, the rental pool concept holds great promise. An example of this concept in practice is the Upper Snake River rental pool. Water District No. 1 within the Snake River Basin was established for the purpose of providing a more equitable distribution of stored water supplies within the service area of federally constructed reservoirs. The so-called Committee of Nine represents water user interests within the district and has assumed responsibility for "renting" stored water. Actual operation, however, has been delegated to the district's

water master. Since passage of the Water Supply Bank Act by the Idaho State Legislature in 1979, the rental pool program has been carried out in a consistent manner under regulations adopted by the Idaho State Water Resources Board.

The rental pool program is based upon reservoir storage. Waters accruing thereto are committed to the pool on an annual basis by spaceholders who determine the extent to which entitlements will be used during the irrigation season. To the extent that waters are not utilized, lessees make payments to lessors when water is leased from the pool. All shareholders offering water by July 1 enjoy proportionately in the rental proceeds. All spaceholders offering water after July 1 share proportionately in the proceeds from the sale of all or any part of the water sold following that date. Water sales before July 1 may be purchased from the rental pool. Payments to spaceholders under the rental pool program are based upon a formula covering annual construction cost repayment, and reservoir operation and maintenance costs.

Any waters made available through the rental pool program are marketed according to certain priorities. First priority is given to those water users owning rights in various storage reservoirs constructed by the Bureau in the Snake River above Milner Dam. Second priority is given to other irrigation water users in service areas of such reservoirs. Third priority uses are determined on the basis of executed leases received by the Watermaster of Water District No. 1 within the Snake River Basin. Under regular sales from the rental pool, administrative costs of program administration are added to rental payments paid to spaceholders. Excess revenues generated from such sales are used to benefit the water users within Water District No. 1.

The rental pool program while successful in many respects, has perceived weaknesses. Only water stored in federally constructed reservoirs is accepted into the rental pool program. This limitation restricts otherwise available supplies from other sources, such as natural flows. Second, leased or rented prices paid by users are limited to construction charges and operation and maintenance costs payable by the spaceholder,which operates to limit incentives for participation in the program. Under these limitations, the rental pool program would most probably not significantly alter or provide for a better distribution during a low water year or prolonged drought. Spaceholders would most likely be very reluctant to commit water to the pool beyond the first water-short year and along with the lack of additional economic incentives would probably result in negligible rental offerings after a first drought year.

Another potential method for reducing the impact of low water years is water banking. Water banking allows the "have nots" to share with the "haves" on principles that apply to the Upper Snake River Basin rental pool program discussed above with the exception that private water supplies (as opposed to Bureau storage) are in-

volved. A major weakness of water banking is that the concept simply has not been implemented. Only the water bank concept is in place at this writing.

Lastly, the Bureau's weather modification program is another tool that may be useful during droughts. The Division of Atmospheric Resources Research at Denver, Colorado, is engaged in a winter cloud seeding experiment in the Sierra Nevada Mountains of California. The Division is planning a large demonstration program in efforts to increase the flow of the Colorado River. The Bureau's technology is sufficiently advanced to warrant such demonstration projects, and the Bureau has cooperated in efforts with state government in summer cloud seeding experiments. However, cost/benefit ratios for these efforts are not readily identifiable. The Bureau must resolve scientific problems associated with such summer experiments, as well as their relatively higher costs. Indications to date support a 10 to 20 percent increase in summer and winter precipitation as a result of these programs.

What can we conclude from managing low water year emergencies? The Bureau concludes that there already exist several mechanisms, that, while not perfect, will work during such conditions. The region's water users have historically supported problem-solving efforts when the "chips are down" and should be expected to solve problems in the future. What else is needed? The Bureau suggests that improvements can be made within the existing legal system through the following:

1) state laws that provide for specific water distribution procedures during drought conditions;

2) more states establishing water banking procedures;

3) retaining blocks of water for use during droughts;

4) providing additional storage within the region;

5) educating the public and agencies that droughts or other "Acts of God" are inevitable, regardless of whether or not we have drought programs;

6) continuing efforts toward improving water supply and forecasting.

The Role of the Northwest Power Planning Council

James F. Fell
Northwest Power Planning Council

The Northwest Power Planning Council is an agency of the four Northwest states -- Idaho, Montana, Oregon, and Washington. The Council is composed of eight members, two appointed by each governor in the region. We have a staff of approximately 30 employees who work in our central office in Portland. The Council was created under authority granted by Congress in the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (the Northwest Power Act) (P.L. 96-501, 16 U.S.C. §§839 et seq.). The Act gave the consent of Congress to the formation of a regional electric power planning council and identifies the responsibilities the Council is charged with carrying out.

Initially, Congress and the region assumed that the Council would be faced with an electric power supply shortage. In fact, the Council found itself in an economic recession with excess electric power resources for at least the balance of the decade. In that respect, the Council's function has been similar to the function of this conference -- planning for shortages during a period of surplus.

The Council's statutory role is contained in the Northwest Power Act. For purposes of this program, the most significant statutory responsibilities and limitations of the Council are:

(1) The Council must "assure the Pacific Northwest an adequate, efficient, economical, and reliable power supply." 16 U.S.C. §839(2).

(2) The Council must "protect, mitigate, and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries." 16 U.S.C. §839(6). The Act calls for particular attention to the protection of anadromous fish (generally, salmon and steelhead), "which are of significant importance to the social and economic well-being of the Pacific Northwest and the Nation and which are dependent on suitable environmental conditions substantially obtainable from the management and operation of the Federal Columbia River Power

System and other power generating facilities on the Columbia River and its tributaries." Id. Congress understood that these first two responsibilities would conflict from time to time. The protection of migratory fish will almost necessarily increase the cost of a hydropower system. Congress made it clear that the Council would be responsible for balancing these two important issues.

(3) "The authorities and responsibilities of state and local governments, electric utility systems, water management agencies, and other non-federal entities for the regulation, planning, conservation, supply, distribution, and use of electric power shall be construed to be maintained." 16 U.S.C. §839. The Council has not been given authority to override the other agencies in the region. Specifically, the Council has not been given any authority whatsoever over state water management agencies in the region.

(4) The Council must "ensure widespread public involvement in the formulation of regional power policies." 16 U.S.C. 839b(g)(1). Because the Council lacks authority to direct other agencies, consultation and public involvement are the Council's most useful tools in the development of regional power policies.

(5) The Northwest Power Act does not authorize the "appropriation of water by any federal, state or local agency, Indian tribe, or any other entity or individual. Nor can the Act or the Council's plan "(1) affect the rights or jurisdictions of the United States, the States, Indian tribes, or other entities over waters of any river or stream or over any groundwater resource, (2) alter, amend, repeal, interpret, modify, or be in conflict with any interstate compact made by the States, or (3) otherwise be construed to alter or establish the respective rights of States, the United States, Indian tribes, or any person with respect to any water or water-related right." 16 U.S.C. §839g(h). The message here is very clear. The Council does not have authority to grant, alter, or override any water right in the region.

Generally, the Council represents the Northwest states in matters involving electric power planning and the protection, mitigation, and enhancement of fish and wildlife affected by hydropower dams on the Columbia River and its tributaries.

While the Council was created by and represents the Northwest states, the authority of the Council derives from an Act of Congress. The Council's powers relate to federal agencies. Thus, the Bonneville Power Administration (BPA) is directed by the Northwest Power Act to use its resources and authorities "to protect, mitigate, and enhance fish and wildlife to the extent affected by the development and operation of any hydroelectric project on the Columbia River and its tributaries in a manner consistent with" the Council's plan. 16 U.S.C. §839b(h)(10)(A) (emphasis added). Furthermore, BPA "and other federal agencies" responsible for managing, operating, or regulating Columbia River basin hydropower facilities must exercise their responsibilities

(1) "in a manner that provides equitable treatment" for fish and wildlife and (2) "taking into account at each relevant stage of decisionmaking processes to the fullest extent practicable, the program adopted by the Council." 16 U.S.C. §839b(h)(11))A). The Act also calls for consultation with BPA, federal agencies, state agencies, Indian tribes, project operators, and others.

FISH AND WILDLIFE PROGRAM

The Council adopted its Columbia River Basin Fish and Wildlife Program on November 15, 1982. The program includes four elements that would be particularly affected by a low water emergency.

The most important program measure involving the use of water is the water budget. The water budget is a block of water, measurable in acre feet, which the Council's plan withdraws from the electric power system and allocates for use in meeting flows for the spring migration of fish. It appears that travel time is critical to the survival of salmon and steelhead smolts in their downstream migration, and that travel time is dependent upon the volume of water flowing downstream. Dams and reservoirs delay migration, while increasing water flows tend to speed migration. Because of limitations under the Northwest Power Act, the water budget cannot be used to conflict with firm, non-power constraints. This limitation is acknowledged in the Fish and Wildlife Program, Section 304(a)(6). It is important to recognize that the water budget represents water previously available to the power supply system. The water does not come from other uses such as irrigation or recreation. Under the program, the water budget represents a firm power constraint. It is to remain unchanged during all water conditions consistent with those within the 40-year water record, including the critical period. (The critical water period is a term of art in the Northwest power system. It refers to the amount of water and power available during either a 4-year period from August 1928 to March 1932, or, depending upon the context, a more severe but shorter two-year period from September 1943 to April 1945.) The program is silent on what should occur in the event that water levels fall below the critical level. If that event were to occur, I presume the Council would wish to consult with other agencies and interested persons to reach some equitable allocation.

Second, the program calls upon the Federal Energy Regulatory Commission to develop plans for spills of water at the mid-Columbia hydropower projects. The purpose of these spills is to achieve survival rates for smolts migrating downstream that are comparable to those achievable through the best available collection and bypass systems. The program calls for spills of at least 20 percent of the average daily flow at each project for any 30 out of the 60 days when smolts are present (April 15 through June 15). The project operators may concentrate their spills during the night-time hours for maximum effectiveness. In the event of a low water emergency, the spills would help transport smolts past the dams, but at a loss of power production. Note that the amount of spill is based upon average daily flow,

and would decline with the decline in available water. Nevertheless, we expect that the combination of the water budget and these spill provisions would provide adequate spills to transport the smolts past the power turbines.

Third, the program recognizes the need for additional water storage to be used for fish flows. The Council will investigate Canadian storage, Yakima River basin storage, and Weiser River basin storage for this purpose. At this point, the Council's role in the development of additional storage would be limited to securing water for fish flows during low water conditions.

Fourth, the program includes measures calling for improved water flows for the spawning and incubation of fish. The timing and amount of these flows vary from stream to stream. If these flows cannot be met because of a low water emergency, the Council would expect to be consulted and would be eager to assist other agencies in reaching equitable solutions.

ELECTRIC POWER PLAN

The Council adopted its conservation and electric power plan on April 27, 1983. As required by the Northwest Power Act, the plan includes a 20-year forecast of regional electricity demand and a forecast of resources (including conservation) required to meet that demand. All BPA acquisitions of major power resources must be consistent with the Council's plan, as determined by the Council.

The Council has included low water conditions in its planning in the same way in which that has been done in the past. The Council evaluated all resources (existing and new) based upon their potential output and compatibility with the power system under critical water conditions.

It is important to understand that the Council is a planning agency. Conditions that occur during the operation of the regional electric power system can easily differ from the assumptions used for planning. It would not be cost-effective to plan and construct power resources to meet every conceivable situation. For that reason, reasonable but conservative planning assumptions -- such as the critical water assumption -- are used, and actual conditions must be accommodated in the operation of the system.

The Council's plan focuses on both sides of the resource balance: the forecast of demand and the resource portfolio. The Council concluded that demand forecasting is not sufficiently precise to allow for "point forecasting." A point forecast is a forecast of demand that specifies the most probable load growth and the precise amount of power that will be required at the end of the 20-year period. The Council instead chose to forecast a range of demand that would encompass all plausible growth during the 20-year planning period. The Council then took the uncertainty of that demand into account in its development of the resource

portfolio. With that in mind, the Council placed its emphasis on the flexibility of resources and on resources that have short lead times for construction. Under this approach, the Council found that conservation is a particularly attractive resource, and that rapid and unexpected load growth could be met with combustion turbines.

This emphasis on flexibility appears throughout the plan, and can be quite useful in accommodating low water emergencies. For example, the plan includes a number of measures to improve BPA's capability to acquire conservation from all sectors of electric power users. This will provide better information about electricity use and the effects of conservation, and will put in place conservation programs that can be accelerated quickly to reduce the region's reliance on hydropower. The plan also calls for improvements in power system efficiencies, which could be undertaken at any time to increase the amount of deliverable power.

The plan encourages the investigation of interruptible power for both industries and irrigation. The terms of interruption could certainly include periods of low water. Customers would presumably receive lower power rates in exchange for a right to interrupt their service under certain circumstances. The approach of the plan is to use interruptible power customers to take better advantage of the surplus hydropower in the region. When hydropower is not in surplus, service would be discontinued. If necessary, it might be that firm customers could also be switched to an interruptible status to avoid regionwide curtailments. This would allow the economics of the market to determine which customers would be least hurt by a reduction in electric power service.

There are two issues that the power plan does not resolve. First, BPA will be financing conservation improvements in the irrigation sector. These improvements will be designed to reduce the electric power requirements of irrigators, and in some cases will do so with more efficient use of water. The point has been raised that some reduction in water usage should be expected when the power system pays for improvements in irrigation efficiency. Irrigation uses water in three ways: it requires electricity to pump water from the river, it uses water on crops, and it diverts water around hydropower facilities, thereby reducing the capability of the hydropower system. The Council has not taken any position whatsoever on this sensitive issue. Nevertheless, irrigation efficiency improvements might well improve the ability of the irrigation community to meet their needs during low water emergencies.

Second, the Council chose not to make a firm recommendation with respect to the use of rate design during low water conditions. It is clear that during low water conditions it may be necessary for the power system to purchase expensive thermal power to replace the lost hydropower. If the higher cost of that thermal power were reflected immediately in the rates of electricity consumers, some conservation of electricity could be expected in

response to the increased price.

I mentioned earlier that the Council's flexible resource plan relies upon the use of combustion turbines to meet unexpected, rapid load growth. Presumably, combustion turbines could also be used to meet unexpected, rapid loss of hydropower resources due to a low water emergency. The Powerplant and Industrial Fuel Use Act, 42 U.S.C. §830, et seq., has been cited as a barrier to the use of combustion turbines in the manner provided in the plan. The Fuel Use Act generally prohibits the use of oil or natural gas powerplants. There are a number of exemptions to this general prohibition, including power plants used to meet peak loads. Our research suggests that a combustion turbine which has a peaking exemption could be used to meet a temporary emergency. It appears that the only requirements would be to notify the Economic Regulatory Administration within 24 hours of the commencement of the emergency and to limit the use of the facility to 24 months or the period of emergency, if that is shorter. 10 CFR 501.192. Twenty-four months should be sufficient to either outlast the low water emergency or allow the region time to replace the lost power.

PUBLIC INVOLVEMENT

Before closing, I must emphasize that the Council is charged under the Northwest Power Act with a responsibility for involving the public in the formulation of regional power policies. The Council maintains comprehensive programs to carry this out and to consult with appropriate parties in the region. Public involvement and consultation would play important roles in any Council activities to accommodate a low water emergency. We believe that consultation and public involvement facilitate decisionmaking, if issues are presented clearly and in a straightforward manner.

Events such as this conference make everyone more aware of the interests that must be taken into account in making decisions during low water emergencies. We encourage this type of program, and we would be pleased to meet again on this issue. I can assure you that the Council will do everything it can to play a constructive role if a low water emergency occurs. In the meantime, we will be working with BPA, the region's utilities, and others to develop the capability to implement conservation, to develop short lead-time, flexible resources, and to facilitate the use of combustion turbines during unanticipated resource shortages.

Questions and Answers–Panel III.

The first question of the panel concerned the existence of models for the Columbia River that could be utilized during low water years.

Rich Nassief and Malcolm Karr responded, as did a volunteer from the audience, that a wide variety of models are already in existence to assist northwest user groups and agencies. The socalled seasonal model used by the Bonneville Power Administration and Northwest Power Pool simulates historical water conditions over long periods of time so as to define system capability during such periods. Other models are used for daily simulation, and a hydrologic model simulates basin runoff, channel routing and reservoir regulation. Bill Lloyd later added that the United States Bureau of Reclamation uses hourly stream flow models that estimate stream flow and storage reservoir storage rights.

The second question addressed non-power allocations of water needed to satisfy the Northwest Power Planning Council's Fish and Wildlife Program water budget and resulting loss of 500 to 550 MW of firm capacity. Rich Nassief responded that the utility industry ultimately will have to replace the loss and needs proper notice in order to determine whether resources must be acquired on a short or long term basis. In a follow up question from the panel moderator, Mr. Nassief responded that probability models could serve to identify the appropriate time to purchase or acquire short term resources during a low water emergency.

The third question was directed to Mr. Charles B. Roe, Jr. who was asked to describe existing legal mechanisms which protect in-stream beneficial uses in Washington State. The adoption of administrative rules based upon state statutes serve as the state's enforcement tool for in-stream flow standards. The Washington State Department of Ecology has issued water rights to individuals as a part of the state's appropriative permit system as an alternate means of imposing and enforcing in-stream flow requirements.

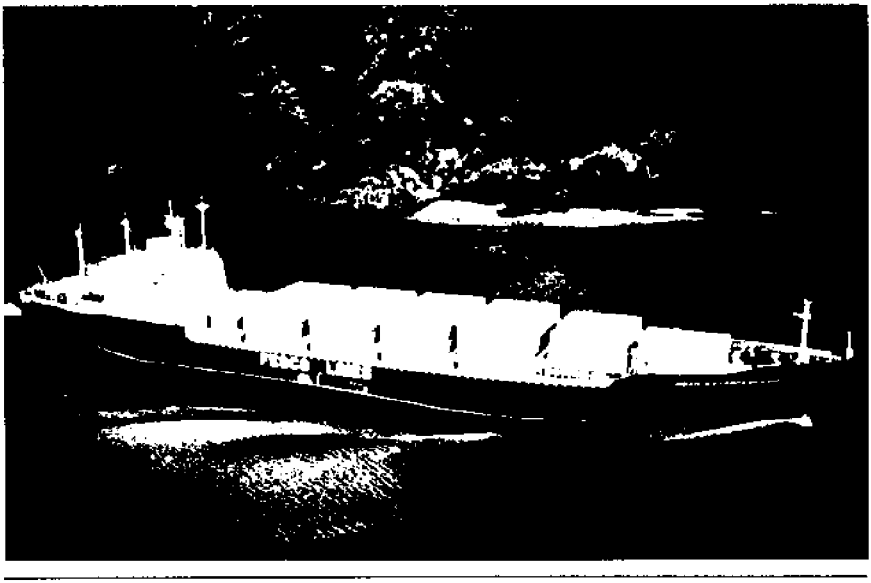
A fourth question of the panel concerned the ability of the Northwest Power Planning Council (or any agency or user group) to accurately predict power surpluses versus water requirements for spawning and incubation. Jim Fell stated that in-stream flow information for preserving habitat and facilitating migration exists, but varies from stream to stream and river run areas. Projection of power surpluses at this time is comparatively less accurate than stream flow projections.

A fifth question concerned the distinction between new United States Bureau of Reclamation projects and old projects. Assuming that all Bureau projects are for multiple use purposes, why does the Bureau treat primary users differently from secondary users at new Bureau projects than the Bureau apparently treats such users at old projects. Mr. Lloyd responded that older Bureau projects accommodate secondary uses differently than new projects where legal constraints generally affect all users on a coequal basis.

A sixth question concerned winners and losers during a low water year and the application of the Northwest Power Planning Council's Fish and Wildlife Program. Both Malcolm Karr and Jim Fell responded that the Fish and Wildlife Program were conceived so that firm non-power constraints would not be interfered with by the Program's requirements. Actual and simulated application of the water budget components for low water years contain provisions to prevent losses to non-power water users. The only area not covered by the Program that deserves careful attention is for those periods when water levels fall below critical firm levels for power planning purposes. Under these circumstances equitable adjustments between user groups would appear to be necessary.

CONCLUDING REMARKS: Heading Off the Long-term Crisis

The Honorable Ron Wyden
U.S. House of Representatives



I wish to thank you for inviting me to share my thoughts regarding our diminishing water resources and how we meet future demand. As the very theme of this conference indicates, there is increasing talk of a coming water crisis; it emerges out of the many complex water issues facing the nation.

You have spent the day listening to experts in water policy at all levels of government and have had the opportunity to share ideas and concerns regarding the situation in the Northwest. You have also discussed needed action. Oregonians have historically preferred strong leaders--those who have innovative ideas and the courage to pursue them. By concretely addressing a problem area before it reaches crisis levels, you have demonstrated both qualities.

I would like to take this opportunity to follow in your footsteps and pass on a few thoughts of my own and hopefully enlist your future assistance in heading off a water crisis at the national level.

In the Northwest, we have often devised strategies to deal with crises and resource shortfalls in a unique and equitable way. During the first real oil crisis in 1973, it was the odd/even distribution plan started in Oregon that was a national model for consumers; it allowed everyone to meet normal transportation needs. This plan went into effect before tempers flared.

The Northwest Power Planning Council is also an example of an idea that came out of the West to deal with the question of who has access to another needed--and potentially scarce--resource, electricity. The Council has been working to be sure that we have safe and affordable energy supplies to meet future demand. As a result of their commendable work, the lights will not go out in Oregon. They will not go out in Washington or any other part of this region.

The question here today is: How do we meet the demand from all competing interests for water supplies in the future--particularly if those supplies are diminished?

How do we make sure that when my constituents in Portland turn on the faucet, clear Bull Run water will come gushing out? How do we guarantee that eastern Washington farmers will have irrigation water for their crops; for the dams to create electrical energy; and for the fish that are a vital part of our economy and our heritage?

One can readily see that from just these few competing uses of the Northwest's water, that water use and policy affecting its use are fast becoming pivotal issues in our economic future.

These are not easy answers to come by. I expect that even after a full day of discussions, you don't have the answers. It is imperative that we all work together to find answers and to devise strategies so it is not a last trickle of water coming out of the spigot, but a robust flow.

The real question before us then is: How do we succeed in elevating water resource planning and management--the need to prepare for dealing with a water crisis--to the proper priority on the state and the national agenda it so rightly deserves?

One of my favorite sayings is that objects at rest, stay at rest. On the issue of water resource planning and management, this region and the country have for the most part been at rest. Clearly, a catalyst is necessary to produce action before crisis. One example of such a catalyst is Oregonian reporter John Hayes' series of articles about water supplies and management in Oregon. The series focused on the lack of a real inventory of water supplies in the state and the reactive, rather than proactive, manner in which Oregon has been dealing with the issue. Not only were the water managers not getting a handle on the water situation, but elected officials were not putting water resource management as a priority in funding decisions.

The buck was passed back and forth. Perhaps the most startling point about the Oregonian series, for our purposes however, is that the situation described existed at least eight or more years ago when the League of Women Voters of Oregon and the Oregon Student Public Interest Research Group (OSPIRG) published reports on water depletion in Oregon and called for water resource management to be put at the top of the state's priority list. Although the reports were widely recognized by many persons concerned about water resources, no long-term action followed.

As the impact of the Oregonian series highlights, one of the first steps in motivating people to support change is education. The public will not support expenditures of money if they do not believe that there is a need. People have to be convinced that

despite heavy rainfalls in the Northwest, our water supply is finite, but our thirst is not.

Knowing that a water shortage could occur will not be enough to gain and sustain public support. Water users have to take part in development of the strategy and management planning to better understand what competing uses exist and to balance them against their own needs. If there is not going to be enough water to go around, what water is available will have to be distributed in a way that respects not only the principles of western water law, but also the new responsibilities vested in the Northwest in terms of self-management of our water-dependent resources.

Bringing people into the decision-making process will make it their plan too. And they will put elected officials and managers on notice that water resource strategy and management need to be high priority in the region. The message needs to go beyond this region, however. We need an examination of the wisdom and feasibility of a national water resource management strategy.

The track record at the federal level is not good. We haven't passed the buck, we've done worse. We have so scattered knowledge and responsibility for water resources that no one knows the question, let alone the answer.

Management problems in water programs and the lack of coordination among federal water agencies are nothing new. In 1908, Theodore Roosevelt's Inland Waterways Commission recommended coordinating all federal agencies involved in building waterways. A National Waterways Commission was authorized by Congress, but its members were never appointed. Since then, there have been dozens of studies, commissions, and reports, all calling for unified national water policy. None prompted Congressional action. In the 1960s, federal planning agencies were created; yet without any enforcement powers, they proved largely ineffective.

Perhaps it is time that we question some fundamental "givens" in our historical water relationship equation. We need to look at the relationship between water quality and water quantity. Is it appropriate for water quality policy to be largely driven by federal law and water quantity policy by state law?

Between ground water supplies and surface water: Do we have a sound inventory of both and an understanding of how the two interact?

Between the use of water for the MX missile, for irrigation of agricultural lands and for development of minerals?

We need to consider just how many hydroelectric projects one river can sustain before it becomes a series of lakes with no other ultimate use or value.

Congress needs to take a close look at the water-related responsibility of the EPA, the Bureau of Reclamation, the Army Corps of Engineers, the Federal Energy Regulatory Commission, the Departments of Agriculture and Defense, and the Department of the Interior. The jurisdiction is so scattered that I have probably forgotten one or two other agencies whose actions impact water resources.

Once we ask the tough questions, reexamine the "givens," we need to begin developing programs and possibly legislation now, at both the state and national level, which can be passed and implemented so that the pending water crisis remains a myth.

We also need to consider consolidating water resource activity. We need to overcome institutional barriers and turf battles to build a majority for a new policy thrust in water resource management. This thrust need not, and probably should not, entail new bureaucracy, but rather should focus on integrating existing responsibilities and statutes.

I am eager to put in time and energy to move those at rest to initiate the examination of legislation and programs this entails. I ask all of you to join with me in not only educating the public but also in developing new ideas and innovative approaches--so much a part of the heritage of the Northwest--to keep the water flowing from the spigot.

Finally, let me part with one observation that probably most here recognize. We must shift from a development mode mentality for solutions to our problems to a management mode.

There are no more dam sites on the lower Columbia. What this implies is that in years of low rainfall and low snowpack, the Columbia will be unable to provide for downstream uses as well as for irrigation and other consumptive uses.

Clearly, the legacy of our more arid neighbor states west of the 100th meridian is catching up with us. We must accept that solutions to water problems now lie not in supply-oriented solutions but in solutions aimed at controlling and reducing demand. But unlike our neighbors, we have innovative solutions to draw from. The Northwest Power Council's suggestion that the region have flexible resources and options on the shelf and ready to go when needed has application here too. Responsible officials, many of whom are present today, must strive to build a consensus and develop such an on-the-shelf low water year management strategy now. The cornerstone of such a plan, and indeed of any long-range water resource policy for the Northwest, must be more efficient application and conservation of water.

As with energy conservation in the Pacific Northwest, the potential for water conservation is enormous and largely untapped.

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