

United States General Accounting Office

GAO

Briefing Report to Congressional
Requesters

January 1986

WATER RESOURCES

Issues Concerning Expanded Irrigation in the Columbia Basin Project



RELEASED

~~RESTRICTED~~—Not to be released outside the General
Accounting Office except on the basis of specific
approval by the Office of Congressional Relations



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

JAN 31 1986

B-221748

The Honorable James H. Weaver
Chairman, Subcommittee on General
Oversight, Northwest Power
and Forest Management
Committee on Interior and Insular
Affairs
House of Representatives

The Honorable George Miller
Chairman, Subcommittee on Water
and Power Resources
Committee on Interior and Insular
Affairs
House of Representatives

In an August 20, 1985, letter, you requested that we review the economic and environmental impacts of expanding the irrigated acreage in the Columbia Basin Project in Washington State from 556,000 acres to nearly 1.1 million acres. The Bureau of Reclamation of the Department of the Interior in a 1984 report on the project estimated that this expansion could cost \$1.9 billion and that the projects benefits outweighed its costs. On the basis of this request and subsequent discussions with your offices, we obtained information on the Project's benefit/cost analysis, repayment of construction costs, and the anticipated environmental impacts. On January 24, 1986, we briefed your offices on the results of our review, and this report summarizes the information presented at that briefing.

We reviewed studies and reports on possible expansion of the Project issued in 1984 and 1985 by the Bureau, faculty members of Washington State University and the University of Idaho, and a consulting firm for the Washington State Department of Ecology. We also interviewed officials from federal and state agencies, and organizations knowledgeable of the Project.

In summary, we found that the Bureau's 1984 benefit/cost analysis did not conform to the Water Resources Council's Principles and Guidelines for preparing such analyses. As a result, the costs were understated and the benefits overstated. The Chief of the Economic Analysis Division in the Bureau's Pacific Northwest Region advised us that the Bureau recognized the limitations of its analysis and has contracted with a consulting

firm to perform a major study of the economic and environmental feasibility of expanding the Project which will follow the Principles and Guidelines. However, in the economic analysis of the Project, the Bureau's consultant will be evaluating the Project's impacts on income and employment only within the State of Washington, even though electricity users throughout the four-state Bonneville Power Administration's marketing area will be paying for the Project. An analysis that addresses the effects on income and employment in the entire marketing area may provide a more sound basis for judging the economics of the Project.

The Bureau's 1984 analysis showed that the construction costs would be paid by irrigators (46 percent), power users (34 percent), and the state of Washington (20 percent). The Bureau's estimate was in contrast to two other studies which concluded that U.S. taxpayers would pay about 80 percent of the project costs. The major difference between the studies resulted from the treatment of interest on federal funds used for construction. The Bureau did not include a cost for interest because, by law, the construction funds are provided interest free. The other two studies included the interest cost in their analysis indicating that these costs, although not repaid, are a project expense. We have taken the position in a prior report that measuring and reporting the interest subsidy would assist the Congress when it considers and compares such projects.

The anticipated environmental impact of the expanded Project was studied in 1985 by the Fish and Wildlife Service and the Washington State consultants. These studies indicated that the proposed expansion would not adversely affect fish and wildlife or water quality.

Our review was performed between September and December 1985 and was conducted in accordance with generally accepted government auditing standards. The views of directly responsible officials were sought during the course of our work and are incorporated where appropriate. In accordance with your wishes, we did not request the Department of the Interior to review and comment officially on a draft of this report.

Unless you publicly announce its contents earlier, we do not plan to distribute this report further until 30 days from its issue date. At that time, copies will be sent to the Secretary of the Interior; the Director, Office of Management and Budget, and other interested parties. If you need more information on this report, please contact me on (202) 275-7756.


Michael Gryszkowiec
Associate Director

Enclosure

C o n t e n t s

	<u>Page</u>
SECTION	
I BACKGROUND ON THE COLUMBIA BASIN PROJECT	7
II OBJECTIVES, SCOPE, AND METHODOLOGY OF OUR REVIEW	13
III BENEFIT/COST ANALYSIS	15
Cost of replacing lost hydroelectric power not included	16
Cost placed on electricity used to pump water for irrigation too low	16
Costs for existing facilities incorrectly included	17
Benefits calculated with outdated guidelines	17
Upcoming benefit/cost analysis takes these problems into account	17
IV IRRIGATION FACILITIES REPAYMENT COSTS	19
Analysis of the Bureau of Reclamation's estimate	20
Consulting firm's analysis shows U.S. taxpayers would pay most of the Project's costs	21
Faculty members' analysis shows results similar to those of consultants' study	21
V ENVIRONMENTAL IMPACTS	23
Past studies indicate environmental quality generally enhanced	23
Additional studies now under way	24
Water quality problems like those at Kesterson refuge not expected	25
VI ADDITIONAL MATTERS	27
Economic analysis does not include consideration of Bonneville marketing area	27
Pacific Northwest power planning council initially left out of environmental impact statement process	28
FIGURE	
I.1 Columbia Basin Project	9

ABBREVIATIONS

cfs	cubic feet per second
RED	Regional Economic Development



GAO BRIEFING ON ISSUES CONCERNING
EXPANDED IRRIGATION IN THE COLUMBIA
BASIN PROJECT

PREPARED FOR THE CHAIRMEN,
SUBCOMMITTEES ON GENERAL OVERSIGHT,
NORTHWEST POWER, AND FOREST
MANAGEMENT, AND ON WATER AND
POWER RESOURCES,
HOUSE COMMITTEE ON INTERIOR AND
INSULAR AFFAIRS



SECTION I: BACKGROUND ON THE COLUMBIA BASIN PROJECT

The Columbia Basin Project is a multi-purpose Bureau of Reclamation project in south-central Washington State. The primary purposes of the Project are irrigation and hydroelectric power. Principal features of the Project are the Grand Coulee Dam, which produces hydropower and stores water in Roosevelt Lake for irrigation of Columbia Basin land, a pumping plant that diverts water from Roosevelt Lake to Banks Lake, and two siphons and tunnels that transport water diverted from Banks Lake into irrigation canals for delivery to farms.

The Columbia Basin Project contains 1.095 million acres that have been authorized for irrigation. Development of irrigation proceeded rapidly from 1952, when the first acres were irrigated, until the mid-1960's. By 1965, about 490,000 acres had been irrigated. Development then slowed considerably. By 1984 about 556,000 acres, or about half of the authorized Project area, were under irrigation.

To facilitate orderly development of the Columbia Basin Project, construction of irrigation facilities has taken place in stages. Storage and most of the carriage system have been built to serve the entire 1.095 million acres. Some of the major canals were built to meet full Project needs, while others were built to meet immediate needs with the expectation they would be enlarged when the Project was developed to full capacity.

The latest major Project component, the Second Bacon Siphon and Tunnel was completed and added to the system in 1980. Its completion and the future enlargement of 5 miles of canal downstream will permit the main canal to convey enough water to irrigate the entire authorized acreage.

The second half of the Columbia Basin Project consists of about 539,000 acres. This land is higher in elevation than the land developed in the first half of the Project and supports profitable dryland wheat farms. To irrigate this land, existing canals will have to be enlarged and extended, and new canals will have to be constructed.

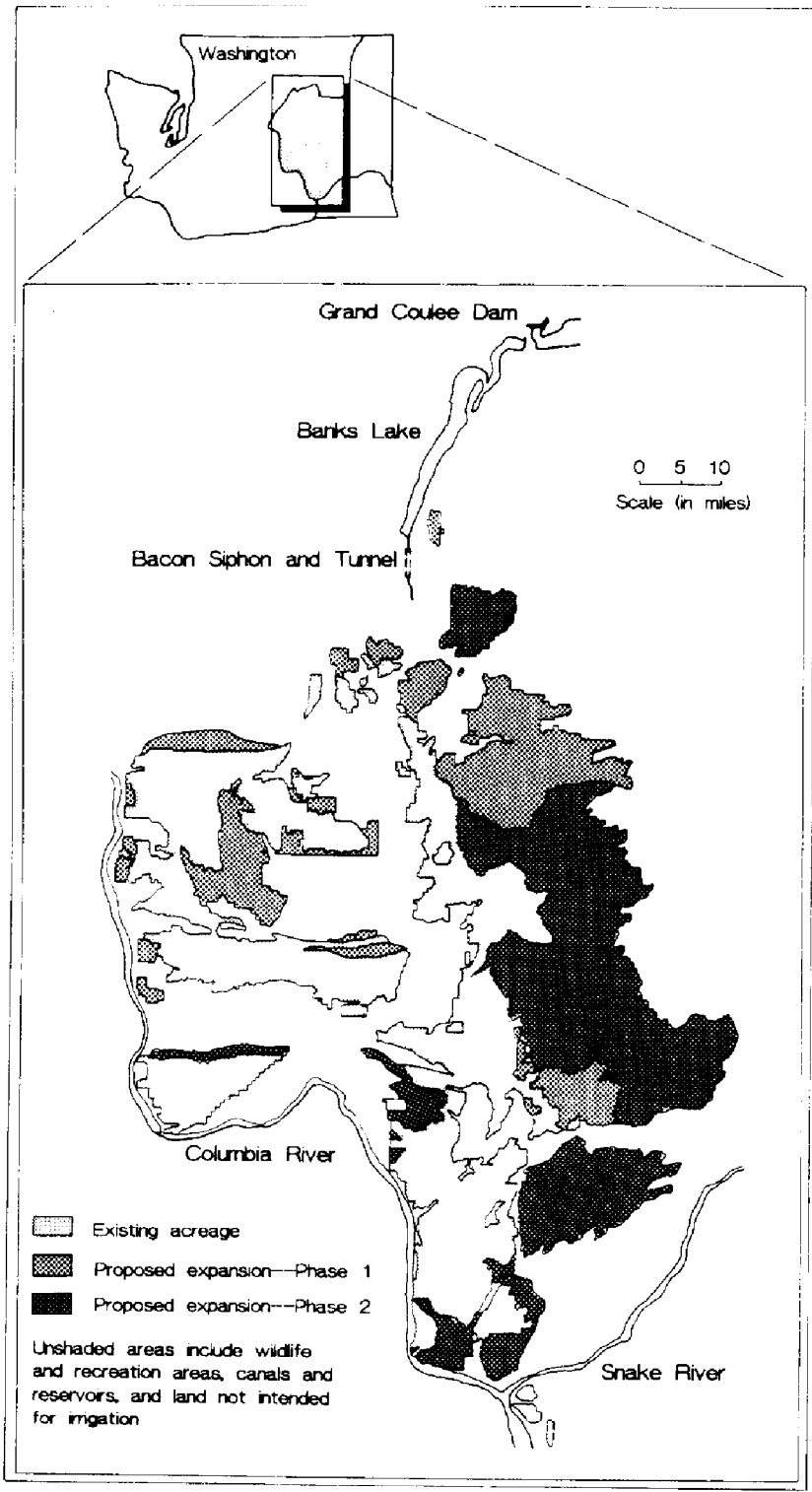
Figure 1.1 shows the existing 556,000 acres that are being irrigated and the remaining 539,000 acres that are proposed for

irrigation in a two-phase expansion process. The first phase would serve about 173,000 acres and require about 14 years to complete. The remaining 366,000 acres would be served through construction of additional facilities in subsequent stages. In September 1984, the Bureau reported that construction of facilities for the first phase would cost about \$802 million and that total construction costs to irrigate the 539,000 acres would be about \$1.9 billion.

At the point at which water is diverted from Roosevelt Lake to Project lands, the Columbia River's annual average flow is about 110,000 cubic feet per second (cfs). The river's minimum flow on record at the diversion point is about 70,125 cfs. In January 1934, the Secretary of the Interior authorized withdrawals of 25,000 cfs for irrigating project lands, or about 23 percent of annual average flow and about 36 percent of minimum flow. The currently irrigated portion of the Project holds a diversion permit of 13,450 cfs. The Bureau of Reclamation considers that the remaining 11,550 cfs are sufficient to develop the remaining portion of the Project.

Recently, there has been renewed interest in irrigating the remaining acreage authorized under the Project. During the 1985 legislative session, the Washington State Senate introduced a bill authorizing \$40 million in general obligation bonds for water supply projects. Although the Columbia Basin Project was not specifically mentioned in the bill, it would have been eligible for funding. Under the legislation, the bonds would be used to fund a portion of a federal project. Although the proposed legislation was not enacted into law, state officials advised us that such legislation will probably receive attention within the 1986 state legislature. The Bureau of Reclamation has testified before the Washington State Legislature in support of the proposed bonding legislation.

Figure 11: Columbia Basin Project



As part of the discussion about possible expansion of the Columbia Basin Project, several documents have been prepared assessing various aspects of the benefits and costs. In September 1984, for hearings before the Washington Legislative Budget Committee, the Bureau of Reclamation's Pacific Northwest Region submitted a report, Briefing Information on Continued Development of the Columbia Basin Project, Washington. That report discussed the history of the Project, issues involving the need for expansion, alternative concepts for continued development, the benefits and costs, and a preferred development plan. The transmittal letter accompanying the report stated that information presented in the report was not intended to represent a final proposal or commitment to further Project development. A December 1984 state of Washington legislature committee report stated that the Bureau's briefing report synthesized the arguments in favor of development, including the public benefits resulting from stimulating economic growth and creating additional fish, wildlife, and recreational opportunities.

Also in September 1984, five faculty members from the Agriculture Economics Department at Washington State University and one from the University of Idaho issued a report, Measuring the Benefits and Costs of the Columbia Basin Project. That report was also provided to the Washington State Legislature, and addressed issues pertaining to state involvement in irrigation development. Specifically, it identified reasons why the second half of the Columbia Basin Project should not be completed and why the state should not commit itself to the Project. In addition, several of the Washington State University faculty members subsequently critiqued the Bureau's report and that of a consulting firm described below.

In March 1985, the Washington State Department of Ecology released a report prepared for the Department by the consulting firm, Economic and Engineering Services, Inc., entitled Preliminary Socioeconomic Analysis: Second Half of the Columbia Basin Project. That report was intended to provide an underlying definition of the socioeconomic impacts of the Project and answer questions raised by the Washington State Legislature on funding, economic development, and environmental matters. The report also identified issues that had to be considered before the state legislature could decide on an appropriate financial support policy.

In August 1985, the Bureau of Reclamation contracted with a consulting firm, CH2M Hill of Bellevue, Washington, for a major study of the Project's expansion. That study, pursuant to instructions contained in an October 1984 memorandum from the Bureau's Acting Assistant Commissioner, will be prepared in accordance with the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (Principles and Guidelines)

and will provide the Bureau with the information needed to evaluate the economic and environmental feasibility of expanding the Columbia Basin Project. The study will examine five alternatives for expanding the Project, and the contractor will prepare

--a study analyzing competing uses for water and energy,

--an analysis of the effect of expansion on regional economic development and social and environmental quality, and

--a draft and final environmental impact statement.

The consultant's study, which is estimated to cost \$790,000, is scheduled for completion in stages. According to the consulting firm, the water and energy resources study should be issued in March 1986, the effect analysis in May 1986, and the draft environmental impact statement in September 1986.



SECTION II: OBJECTIVES, SCOPE, AND METHODOLOGY
OF OUR REVIEW

In an August 20, 1985, letter, the chairmen of the Subcommittee on General Oversight, Northwest Power, and Forest Management, and the Subcommittee on Water and Power Resources, House Committee on Interior and Insular Affairs, asked us to examine the economic and environmental impacts of constructing and operating facilities to expand irrigated acreage in the Columbia Basin Project. On the basis of this request and subsequent discussions with their offices, we addressed the following three questions:

- Does the Columbia Basin Project benefit/cost analysis in the Bureau of Reclamation's September 1984 briefing report conform to the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies prescribed for use by federal agencies?

- What have existing studies concluded concerning who will repay the costs of constructing the irrigation facilities and what share of the total costs will each group repay?

- What is the anticipated environmental impact of the expanded Columbia Basin Project? In particular, is there potential for water quality problems such as those that caused deformities and high mortality in migratory birds at the Kesterson National Wildlife Refuge in California?

To answer these questions, we reviewed and analyzed the Bureau's September 1984 briefing report, the March 1985 study prepared by a consulting firm and issued by the Washington State Department of Ecology, and the September 1984 study issued by faculty members from Washington State University's Agriculture Economics Department and the University of Idaho. In addition, we applied the Water Resources Council's Principles and Guidelines to the principal benefit and cost items contained in the Bureau's briefing report. We also interviewed individuals from federal, state, academic, and private agencies and organizations who are knowledgeable of the Columbia Basin Project.

Our work was performed at the Bureau of Reclamation headquarters in Washington, D.C., at its Pacific Northwest Region office in Boise, Idaho, and at its Columbia Basin Project Office in Ephrata, Washington. We also performed work at the Washington State Legislature and the Washington State Department of Ecology in Olympia, Washington; at Washington State University in Pullman, Washington; at the Bonneville Power Administration and the Northwest Power Planning Council in Portland, Oregon; at the Fish and Wildlife Service in Moses Lake, Washington; and at the Columbia Basin Development League in Othello, Washington.

Our review was performed between September and December 1985 and was conducted in accordance with generally accepted government auditing standards. The views of directly responsible officials were sought during the course of our work and are incorporated where appropriate. In accordance with the requesters wishes, we did not request the Department of the Interior to review and comment officially on a draft of this report.

SECTION III: BENEFIT/COST ANALYSIS

QUESTION: Does the benefit/cost analysis in the Bureau of Reclamation's September 1984 briefing report conform to the Economic and Environmental Principles and Guidelines for Water and Related Land Resource Implementation Studies prescribed by the Water Resources Council for use by federal agencies?

SUMMARY OF RESPONSE: We found four instances in which the Bureau of Reclamation computed costs or benefits using methods that were different from those prescribed by the Principles and Guidelines.

--The cost of replacing lost hydropower was not included (estimated additional cost: \$42 million - \$84 million annually).

--The cost of electricity for pumping irrigation water was understated (estimated additional cost: \$22 million - \$44 million annually).

--Part of the cost of facilities already constructed was incorrectly included as a future Project cost (overstatement of one-time costs by \$133 million).

--Benefits were calculated using outdated guidelines, which may have inflated the benefits.

Compliance with the Principles and Guidelines in these instances could have an effect on the benefit/cost computation. (The Bureau's briefing report showed a 1.4:1 benefit/cost ratio at 3 percent interest. However, the Washington State University faculty members' critique of the briefing report showed a negative benefit/cost ratio when the hydropower and electricity items were considered.) According to a Bureau official, the benefit/cost analysis that will be included in the Project study currently underway by the Bureau's consultant will comply with the Principles and Guidelines.

COST OF REPLACING LOST HYDROELECTRIC
POWER NOT INCLUDED

According to the Principles and Guidelines, the benefit/cost analysis should include a cost for replacing the hydroelectric power that will be lost because the water used to generate it has been used for irrigation instead. If there is existing surplus generating capacity, the cost to be included is that for operating that capacity. If, however, there is no surplus, then the cost to be included is that for building and operating new generating capacity.

According to the Northwest Power Planning Council, the Pacific Northwest's current surplus of hydroelectric power is expected to last until at least 1990, and could last beyond 2000. This is about the same time that the first phase of the expanded Columbia Basin Project would be completed and water would be diverted to irrigation. Most of the water, therefore, would no longer be available for power generation at the Columbia River dams. The Bureau did not include the cost of replacing this lost power in its benefit/cost analysis contained in the September 1984 briefing report.

The study conducted by the Washington State Department of Ecology's consultants estimated that the cost for such power would range from 30 to 60 mills (3 to 6 cents) per kilowatt hour. The lower figure is for power that can be generated in an existing thermal plant; the higher figure is for power generated in a new facility. Using the study's estimate of lost hydroelectric power (1.4 billion kilowatt-hours) and these kilowatt-hour costs, we calculated the additional cost to be included in the benefit/cost analysis to range from \$42 million to \$84 million annually.

COST PLACED ON ELECTRICITY USED TO
PUMP WATER FOR IRRIGATION TOO LOW

In the Bureau's benefit/cost analysis contained in the September 1984 briefing report, electricity used to pump water for irrigation was assumed to be worth 4 mills (0.4 cents) per kilowatt hour. Section 2.3.3(c)(ii) of the Principles and Guidelines states that the analysis is to ". . . value purchased inputs at current market prices." If the electricity to pump water were purchased at a time of surplus power, the value of 4 mills per kilowatt hour would be appropriate. However, if the surplus is expected to end at about the same time the first phase of the Project becomes operational, the value used should include the cost of providing additional generation.

The study conducted by the Washington State Department of Ecology's consultants contained an estimate of the additional energy (730 million kilowatt-hours) needed to pump the irrigation water. Using that estimate and the projected cost of power (3 to

6 cents per kilowatt hour), we calculated the additional cost to be included in the benefit/cost analysis to range from \$22 million to \$44 million annually.

COSTS FOR EXISTING FACILITIES INCORRECTLY INCLUDED

Various facilities such as the Grand Coulee Dam, two tunnel projects, and pumping facilities for two lakes have already been constructed. The Bureau's analysis of benefits and costs included part of the cost of these existing facilities as a cost of completing the Columbia Basin Project. This one-time cost, about \$133 million, should not have been included. Under Section 2.12.4(a) of the Principles and Guidelines, only those resources that are required or displaced to achieve the Project's purposes are to be included as costs. In this case, the facilities had already been constructed, and no new resources would be required to make them available to the Project.

BENEFITS CALCULATED WITH OUTDATED GUIDELINES

The Bureau's analysis of benefits and costs used \$244 as its value for annual direct per-acre benefits that each farmer would realize as a result of the Project. The Bureau acknowledged in the briefing report that the benefits were determined using federal water project evaluation guidelines in effect prior to 1979. The Bureau reasoned that this was proper because the Project expansion was a continued development of the Columbia Basin Project and was authorized prior to 1979.

The guidelines in effect prior to 1979 differ from the Principles and Guidelines in several important respects. For example, the Principles and Guidelines require that the current interest rate be used. By contrast, the old guidelines permit the use of the interest rate when the Project was authorized. In the case of the Columbia Basin Project, a considerable difference existed between the then current federal discount interest rate (more than 8 percent) and the authorized rate (3 percent). The cumulative effect of using the old guidelines was that the \$244 benefit value was greater than the one that would have resulted had the Principles and Guidelines been followed.

UPCOMING BENEFIT/COST ANALYSIS TAKES THESE PROBLEMS INTO ACCOUNT

We discussed our benefit/cost analysis findings with Bureau officials. They said that the briefing report (which included the preliminary benefit/cost ratio of 1.4:1 at 3 percent interest) had not been prepared in complete accordance with the Principles and Guidelines. In addition, they said the report was not intended as a benefit/cost analysis that would satisfy the requirements of a full environmental impact statement. By contrast, the current study under way by CH2M Hill is intended to satisfy these requirements. According to the Chief of the

Economic Analysis Division in the Bureau's Pacific Northwest Region, the study's calculations will take our four points into account in the following ways:

- The cost of replacing lost hydropower will be based on estimates prepared by the Bonneville Power Administration. The estimates are expected to be available about February 1986.
- The cost of electricity for irrigation will be based on estimates prepared by the Bonneville Power Administration. The estimates are expected to be available about February 1986.
- The cost of existing facilities will not be included in the calculations.
- Benefits will be calculated in accordance with the Principles and Guidelines.

These changes could have an effect on the benefit/cost computation presented in the briefing report. For example, the faculty members critique of the briefing report stated that if the Bureau's accounting for energy costs and operator's inputs in estimating benefits was corrected to federal guidelines, the benefit-cost ratio would fall to approximately 0.2:1.

SECTION IV: IRRIGATION FACILITIES REPAYMENT COSTS

QUESTION: What have existing studies concluded concerning who will repay the costs of constructing the irrigation facilities and what share of the total costs will each group repay?

SUMMARY OF RESPONSE: The Bureau, the Washington State Department of Ecology's consulting firm, and faculty members of the Washington State University's Agricultural Economics Department and the University of Idaho have identified the groups that will pay the costs of completing the Columbia Basin Project. Each source also estimated the share of costs to be paid by each group, as shown by the following table.

	<u>Bureau</u> ^a	Consulting <u>firm</u> ^b	Faculty <u>members</u> ^c
	-----	-----	-----
	(percent)		
State of Washington	20	15	20
Federal Columbia River Power System	34	1	3
Irrigators	46	2	3
U.S. Treasury	<u>-</u>	<u>82</u>	<u>74</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>

^aNot discounted.

^bDiscounted at 6 percent.

^cDiscounted at 5 percent.

The main difference between the Bureau's analysis and the two others is that the Bureau's analysis is based only on estimated construction costs as allowed by federal law, and does not display the interest subsidy granted to users of federal irrigation. The other two analyses take into account the interest costs involved in repaying these construction costs over time, thus showing the subsidy.

Irrigation facilities for the second half of the Columbia Basin Project would be financed initially by the federal government and the state of Washington. Under proposed state bonding legislation, the state's share would be paid from the proceeds from the sale of general obligation bonds, which would then be repaid by Washington State taxpayers. Under federal law and Bureau of Reclamation policies, irrigators would repay the federal share of irrigation construction costs without interest and within their estimated repayment ability. The balance of construction costs would be repaid, again without interest, from revenues of the Federal Columbia River Power System or other sources. These revenues are derived from the sale of hydroelectric power generated by federal dams.

ANALYSIS OF THE BUREAU OF RECLAMATION'S ESTIMATE

The financial feasibility analysis included in the Bureau's September 1984 briefing report discussed irrigation repayment. However, the discussion was limited to phase 1 of the Project-- 173,000 acres--and did not include all Project irrigation costs. We asked the Bureau's Pacific Northwest Region to provide us with an analysis showing repayment of all irrigation construction costs for completion of the Project. In a letter dated November 22, 1985, the Bureau responded with information shown for the Bureau in the table on page 19.

Our evaluation of the information and assumptions in this response and in the September 1984 briefing report showed two problem areas:

- The Bureau's analysis did not show the interest subsidy provided by federal taxpayers.
- The Bureau estimated the state's participation at 20 percent of the construction costs. However, the proposed state bonding legislation called for 15-percent participation. Although no percentage has been definitely established, it appears that the state's share may be less than the percentage used in the Bureau's analysis.

While money borrowed from the federal treasury to pay for the Project's construction will be eventually repaid by farmers and electric utility ratepayers, there is no interest charge on the loan. The Chief of the Bureau's Pacific Northwest Region Economic and Evaluation Division said that Reclamation law and Bureau policies do not consider the interest subsidy.

In our previous study of irrigation projects, Federal Charges for Irrigation Projects Reviewed Do Not Cover Costs (PAD-81-7, Mar. 13, 1981), we pointed out that the terms of repayment of federal costs--lack of an interest charge and length of time without repayment--combine to give a large subsidy to users of federal irrigation. The interest subsidy on the Columbia Basin Project has been estimated at 82 and 74 percent of the total cost by the consulting firm and the faculty members, respectively.

In the March 1981 report, we concluded that accurately measuring and reporting subsidies would assist the Congress when it considers individual programs as well as when it compares various projects and programs. We suggested that the Congress consider the nature and origin of the interest subsidy during its future deliberations on water projects and repayment.

CONSULTING FIRM'S ANALYSIS SHOWS
U.S. TAXPAYERS WOULD PAY MOST OF
THE PROJECT'S COSTS

The Washington State Department of Ecology's consultants prepared an analysis showing who would pay the Project's irrigation construction costs and what percentage each group would pay. Unlike the Bureau's calculations, the consultants discounted future payments to a present value, thus taking the interest subsidy into account. The consultants based their calculations on the Bureau's estimate of irrigators' ability to pay included in the September 1984 briefing report. Their findings showed that when the interest subsidy is taken into account, the U.S. Treasury is the source for 82 percent of the funds.

FACULTY MEMBERS' ANALYSIS SHOWS RESULTS
SIMILAR TO THOSE OF CONSULTANTS' STUDY

The September 1984 report by the faculty members contained an analysis of who would repay the irrigation construction costs. It also discounted future payments to a present value. Our evaluation of the information and assumptions used in that analysis showed that two assumptions may have overstated the shares for the state of Washington and the Power System. First, the analysis used 20 percent for the state's participation as opposed to the 15 percent called for in the proposed state bonding legislation. Second, the faculty members assumed that the Power System's share would be repaid with periodic payments on the same schedule as the irrigators' payments instead of being repaid after the investment in power facilities is paid. If these assumptions were adjusted, the result would be an allocation similar to that in the consultant's report.



SECTION V: ENVIRONMENTAL IMPACTS

QUESTION: What is the anticipated environmental impact of an expanded Columbia Basin Project? In particular, is there potential for water quality problems such as those that occurred at the Kesterson National Wildlife Refuge in California?

SUMMARY OF RESPONSE: For the most part, federal and state agencies have concluded that the first half of the Columbia Basin Project had a positive effect on fish and wildlife and had no overall adverse impact on water quality. Federal and state agency studies to date indicate that the proposed expansion will have similar effects. Because geologic and physical conditions at the Columbia Basin Project are environmentally more favorable than those at the Kesterson National Wildlife Refuge, federal officials advised us that problems such as those at Kesterson are not expected.

PAST STUDIES INDICATE ENVIRONMENTAL QUALITY GENERALLY ENHANCED

In recent years, several federal and state agencies have studied and monitored the environmental impact of the completed portion of the Columbia Basin Project. These studies, which have addressed the Project's effects both on water quality and on fish and wildlife resources, have been conducted by such agencies as the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and the Washington State Department of Game.

For the most part, these studies concluded that the first half of the Project has produced net positive benefits for fish and wildlife. The studies also concluded that although some localized instances of water quality degradation have taken place, no measurable adverse impact on the quality of water in the Columbia River has occurred.

Development of the first half of the Project, according to the studies, increased groundwater storage that eventually surfaced to form potholes, marshes, and perennial streams. This created new habitat for waterfowl and provided conditions for development of fish populations. Irrigation of the land also provided habitat for pheasants. According to the studies, fish and wildlife populations flourished.

ADDITIONAL STUDIES NOW UNDER WAY

Through its contract with the Bureau, CH2M Hill will study the environmental impacts of expanding the Columbia Basin Project. Part of the contract calls for the firm to evaluate the environmental impacts of five alternative plans for further Project development. The results will not be available until September 1986, when a draft environmental impact statement is scheduled to be completed.

Federal and state agencies are also studying the possible environmental impact of the proposed expansion. They are attempting to identify ways to mitigate environmental damage and enhance fish and wildlife in the area. The Fish and Wildlife Service has made a detailed analysis of the impact of the expansion alternative preferred by the Bureau of Reclamation--initial development of about 173,000 acres and eventual development of the remaining acreage in the Project.

The Fish and Wildlife Service has not yet issued a final report on its study; the report is expected to be issued in September 1986. However, the Service's preliminary and unofficial results indicate that if suggested measures for mitigation and enhancement are adopted on the initial 173,000 acres proposed for irrigation, the following will occur:

- Although about 35,000 acres of shrub and steppe land will be converted to irrigated farmland with negative impacts to certain species inhabiting it, the overall effect on wildlife resources should be positive.
- Fish may be negatively affected at two existing impoundments but may benefit significantly in four coulee (dry-gulch) areas.

The Bonneville Power Administration is currently studying the effects that withdrawal of additional irrigation water from the Columbia River would have on anadromous fish such as salmon. (Anadromous fish are hatched in fresh water, migrate to the ocean, and return to fresh water to reproduce.) A Bonneville official told us that the results of this study would not be available until February 1986. Bonneville's results are to be incorporated into the study being conducted by CH2M Hill.

The March 1985 study by consultants for the Washington State Department of Ecology contains some observations on the effect that further irrigation withdrawals will have on anadromous fish runs. The consultants concluded that in years of average river flow, withdrawal of the amount of water estimated as needed for the remainder of the Columbia Basin Project would not have a detectable effect on upstream or downstream migration. However, the study concluded that in a year with an extremely low river flow, the withdrawal of this water could have a significant impact on the survival of juvenile anadromous fish migrating downstream.

The Assistant Regional Director of the Bureau's Pacific Northwest Region told us that if a conflict arose between water for irrigation and fish, irrigation needs would be met. He said irrigation's water rights are superior to those of providing sufficient flow to meet the needs of migrating fish. He said that it is Bureau policy that in low water years, the Bureau will meet its irrigation commitments before it meets fish flow requirements because (1) the Columbia Basin Project is authorized by the Congress for irrigation and (2) the Project water rights of 1938 predate the fish flow requirements established by the Northwest Power Planning Council in its 1982 fish and wildlife program.

WATER QUALITY PROBLEMS LIKE THOSE AT
KESTERSON REFUGE NOT EXPECTED

In 1983 deformities and high mortality were found in migratory birds on the Kesterson National Wildlife Refuge in the San Joaquin Valley in California. Research indicated that the problems were caused by toxic elements--especially selenium--and heavy metals. These elements and metals, which had been naturally dispersed in irrigated farmlands, had been swept up by irrigation water and carried from the land by drains, and were concentrated in the refuge's marshy ponds.

According to the chief of the U.S. Geological Survey Office's Environmental Quality Section in Tacoma, Washington, when water quality problems arose at the Kesterson National Wildlife Refuge, the Geological Survey investigated whether the Columbia Basin Project could encounter similar problems. For this investigation, he said the Geological Survey conducted a record search of all irrigation return flow studies of the Columbia Basin Project done by federal agencies, state agencies, and universities. This search, he said, showed that the return flows contained sediments and chemicals at only insignificant levels. Furthermore, he said, because Columbia River water naturally has a low mineral content and because there is such a large quantity of water, sediments and chemicals are diluted so that there is no adverse effect on the river.

Officials of the Bureau of Reclamation and the Fish and Wildlife Service advised us that geological and physical conditions at the Columbia Basin Project are very different from those at the Kesterson Refuge. They explained that Kesterson is a "sink" with no outlet from which collected irrigation return flows can escape. At Kesterson, the water is trapped, and when it evaporates, concentrated chemical residues remain. The Columbia Basin Project, they said, is a "flow-through" system in which about 40 percent of the water that is applied to the land returns to the Columbia River. They also said that in contrast to Kesterson, lands in the Columbia Basin Project are deficient in selenium--the element that is cited as one of the principal problems at Kesterson because of its overabundance.



SECTION VI: ADDITIONAL MATTERS

SUMMARY OF ADDITIONAL INFORMATION: We noted an additional matter that may have a bearing on proposals to expand the Project. The CH₂M Hill economic analysis of the Columbia Basin Project will address the Project's effect on the state of Washington and an immediate five-county area, but it will not address the Project's impact on the entire Bonneville marketing area. Because users of federal electric power throughout the marketing area will be paying part of the cost of the Project, expansion of the economic analysis to include the effects on income and employment in that area may provide a more sound basis for judging the economics of the Project.

We also noted that the Pacific Northwest Power Planning Council was not involved initially in the ongoing process of developing an environmental impact statement for the Columbia Basin Project. After we brought this matter to the Bureau's attention, the Council was provided an opportunity to participate in the environmental impact statement process.

ECONOMIC ANALYSIS DOES NOT INCLUDE CONSIDERATION OF BONNEVILLE MARKETING AREA

The Principles and Guidelines require that a regional economic development (RED) account be developed to evaluate and display the economic and environmental effects of water and related land resources planning. Such an account is to register changes in the distribution of regional income and employment resulting from each alternative plan. The regions used for RED analysis are to be those within which the plan will have particularly significant income and employment effects.

The manager of the project team for CH₂M Hill told us that at the Bureau's direction, two RED accounts will be prepared as part of CH₂M Hill's analysis of the Columbia Basin Project. One will display the effects on the five counties within and adjacent to the Project. The other will display the effects on the entire state of Washington. He said no RED account will be prepared for the entire Bonneville marketing area (Washington, Oregon, Idaho, and western Montana).

RED accounts limited to either the five-county area or Washington State could present a more favorable picture of the economic desirability of the Project than an account that would encompass the entire Bonneville marketing area. This is because nearly all of the Project-created increases in income and employment should occur in the five-county area.

About 45 percent of Bonneville's revenues are provided by residents of Oregon, Idaho, and western Montana; therefore, those residents will bear 45 percent of the increased power generation costs. Because these states may not benefit from increased Project-created income and employment, the additional power costs may decrease present income, which, in turn, may decrease employment. Because power users are likely to pay only a small share of Project costs, these effects may also be small. Nonetheless, an analysis that addresses the effects on income and employment in the entire Bonneville marketing area may provide a more sound basis for judging the economics of the Project.

PACIFIC NORTHWEST POWER PLANNING
COUNCIL INITIALLY LEFT OUT OF
ENVIRONMENTAL IMPACT STATEMENT
PROCESS

The Principles and Guidelines instruct the federal agency responsible for planning a project to include affected federal; state; local; and other interested agencies, groups, and persons in the study's planning and scoping activities. The guidelines also call for identifying review and consultation requirements so that cooperating agencies may prepare required analyses and studies concurrently with the study under consideration. (As defined in 40 CFR 1508.5, a cooperating agency is any federal, state, or local agency or Indian tribe with jurisdiction by law or special expertise with respect to any environmental impact involved in a major federal action significantly affecting the quality of the human environment.)

The Northwest Power Planning Council is one of these agencies. The Council is charged in the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (16 U.S.C. 839 et seq.) with, among other activities, conducting regional electrical energy planning, leading fish and wildlife restoration in the Columbia River Basin, and reviewing certain actions taken by Bonneville's administrator.

On December 30, 1983, the Bureau's Columbia Basin Project Office sent information packets regarding the continued development of the Project to agencies, organizations, the Washington State and federal congressional delegation, and others. However, the Assistant Regional Director of the Bureau's Pacific Northwest Region told us no packet was sent to the Council. He said this was an oversight on the part of the Bureau.

To assist in the preparation of the Columbia Basin Project's environmental impact statement, Bonneville is conducting modeling studies that appear to be addressing regional electrical energy planning and fish and wildlife restoration issues for which the Council may have jurisdiction by law or special expertise. These modeling studies, scheduled for completion by February 1986, are addressing

- the effect that increased seasonal water diversion for irrigation will have on plans to improve Columbia River salmon and steelhead production,
- the net changes that will result in energy consumption from full development of the Columbia Basin Project, and
- the impact and value of water removed from generating electricity and applied instead to irrigation.

The Bonneville staff person responsible for coordinating the modeling studies told us that Bonneville did not contact the Council because such notification is the Bureau's responsibility. On November 21, 1985, after we had called this matter to the Bureau's attention, the Acting Director of the Bureau's Pacific Northwest Region sent a letter to the Chairman of the Council to bring him up to date on the status of the environmental impact statement and related studies for the continued development for the Columbia Basin Project. The letter also said that because the Council's pivotal role in regional electric power planning places it in a unique position regarding several issues addressed in the environmental impact statement, the Bureau plans to provide the Council with the opportunity to participate in further development of the Columbia Basin Project.

According to the Council's Executive Director, the notification came too late to allow participation in Bonneville's modeling studies. He said that although future involvement in the environmental impact statement process is possible, the Council's staff will be unable to work with Bonneville on the modeling studies because the Council is revising its regional power plan. The Council's revised power plan is scheduled for completion in mid-January 1986. The Executive Director said that if the Council had received sufficient notice, it would have been able to both work with Bonneville on the modeling studies and revise its power plan.

(140806)



Requests for copies of GAO reports should be sent to:

U.S. General Accounting Office
Post Office Box 6015
Gaithersburg, Maryland 20877

Telephone 202-275-6241

The first five copies of each report are free. Additional copies are \$2.00 each.

There is a 25% discount on orders for 100 or more copies mailed to a single address.

Orders must be prepaid by cash or by check or money order made out to the Superintendent of Documents.

33478

United States
General Accounting Office
Washington, D.C. 20548

Bulk Rate
Postage & Fees Paid
GAO
Permit No. G100

Official Business
Penalty for Private Use \$300
