BY THE COMPTROLLER GENERAL

Report To The Honorable James H. Weaver House Of Representatives

OF THE UNITED STATES

Corps Of Engineers Should Reevaluate The Elk Creek Project's Benefits And Costs

The Corps of Engineers' fiscal year 1982 estimates of benefits and costs for the Elk Creek project, under construction in Jackson County, Oregon, show an excess of benefits over costs.

This report questions most of the Corps' estimates of benefits to be obtained from the project's flood control, water supply, recreation, irrigation, and area redevelopment purposes. It also questions some of the Corps' project cost estimates. These issues affect the benefit-cost value reported to the Congress in support of the project's economic feasibility.

GAO recommends that the Corps resolve these matters and recalculate project benefits and cost.

CED-82-53
MARCH 15, 1982

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-206437

The Honorable James H. Weaver
House of Representatives

Dear Mr. Weaver:

In accordance with the June 25, 1981, letter from you and seven other Congressmen--Berkley W. Bedell, Robert W. Edgar, Floyd J. Fithian, Barney Frank, Ronald E. Paul, Buddy Roemer, and John F. Seiberling--and subsequent discussions with your offices, this report discusses the U.S. Army Corps of Engineers' benefit-cost analysis of the Elk Creek project under construction in Jackson County, Oregon. The review focused on the latest benefit-cost analysis available at the time of our review and prepared in 1981 for the fiscal year 1982 budget.

As you and the others requested, we did not obtain Corps comments, but the matters covered in the report were discussed with Corps Portland District and headquarters officials. Their views are included in the report where appropriate.

As you and the other requestors agreed, this report is addressed to you. Copies of this report are being sent to the other requestors.

As arranged with your and the other requestors' offices, we are also sending copies of this report to appropriate congressional committees; the Director, Office of Management and Budget; and the Secretary of the Army. Copies are also being sent to interested parties and will be available to others on request.

Sincerely yours,

Charles A. Bowsher

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO
THE HONORABLE JAMES H. WEAVER
HOUSE OF REPRESENTATIVES

CORPS OF ENGINEERS SHOULD REEVALUATE THE ELK CREEK PROJECT'S BENEFITS AND COSTS

D I G E S T

Benefit-cost analysis is a vital tool that Federal agencies and the Congress use in making decisions on Federal water resources projects costing billions of dollars. It provides a quantified measure of a project's expected worth. The Corps of Engineers' estimated benefits have exceeded costs for its Elk Creek project since it was authorized by the Congress in 1962.

However, GAO questions most of the benefits and some of the costs claimed by the Corps in its 1981 benefit-cost update. Parts of the Corps' update (1) did not take into account many changes in conditions which adversely affected anticipated benefits or (2) was based on questionable assumptions and incomplete analysis.

GAO believes that the Corps should resolve the questionable estimates and recalculate Elk Creek benefits and costs reported to the Congress in support of the project's economic feasibility.

Congressman James H. Weaver and seven other Congressmen--Berkley W. Bedell, Robert W. Edgar, Floyd J. Fithian, Barney Frank, Ronald E. Paul, Buddy Roemer, and John F. Seiberling--asked GAO to evaluate the benefit-cost analysis the Corps prepared for Elk Creek to determine if it accurately reflected the project's economic feasibility.

GAO reviewed the latest benefit-cost analysis available at the time of its review in 1981. It was made by the Corps in February 1981 for the fiscal year 1982 budget. Subsequently, in January 1982 the Corps updated its 1981 analysis for the fiscal year 1983 budget. The Corps' January 1982 update was limited to price level changes.

The Elk Creek dam project is a multipurpose project being built in Jackson County, Oregon, as part of the Rogue River Basin Project. It is to primarily provide flood control, water supply, recreation, irrigation, and area redevelopment benefits. Project construction was estimated for the fiscal year 1982 budget to cost about $109 million ($121 million for the fiscal year 1983 budget). As of September 30, 1981, about $9 million had been spent, primarily on design and land acquisition. Actual construction of the dam had not been started.

For fiscal year 1982 the Corps computed a benefit-cost ratio of 1.15 to 1 with irrigation and 1.08 to 1 without irrigation--meaning that for every dollar spent on Elk Creek a benefit of $1.15 and $1.08, respectively, would be realized. The ratios changed slightly for the Corps' fiscal year 1983 computations--1.13 to 1 with irrigation and 1.07 to 1 without it. The Corps has made the two separate computations since the original benefit associated with irrigation was withdrawn in 1975 because the Department of Interior's Bureau of Reclamation found the plan for irrigation to be no longer economically feasible.

PROJECT BENEFITS ARE QUESTIONABLE

GAO questions $4,168,000, or 76 percent, of the $5,457,000 in annual benefits estimated by the Corps in 1981 for the fiscal year 1982 budget. Specifically:

--Flood control benefits developed in 1974 do not reflect a subsequent lower potential population and property value growth rate and more stringent flood plain zoning laws passed by local governments in the Elk Creek flood plain area. Also, contrary to applicable benefit-cost procedures, the Corps reported these benefits on a system rather than on an incremental basis. Elk Creek is a part of a Corps-developed three-dam Rogue River system.) Under the incremental approach, only benefits attributable to Elk Creek would be considered. If the area's more recent growth rate and the incremental approach were used to compute flood control benefits, the Corps' estimated annual flood control benefits of $3,685,000 would be reduced by $2,790,000, or 76 percent. (See pp. 10, 12, and 14.)

--The Corps included water supply benefits of $621,000 annually without assessing the future water needs predicted by Rogue River Basin communities. Communities justified their future water needs on such bases as unrealistic population growth rate predictions. (See p. 16.)

--The Corps developed recreation benefits in 1973 and 1974 on the basis of now outdated recreation use patterns. When current recreation use experienced at operating Corps Portland District reservoirs and trends for future recreation were used to compute recreation benefits, the benefits were reduced from $619,000 to $361,000, or $258,000 annually. (See pp. 24 and 29.)

--The Corps based irrigation benefit estimates of $341,000 annually on an irrigation plan discarded in 1975 by the Bureau of Reclamation because it was no longer economically feasible. The Bureau calculates irrigation benefits for proposed water resource projects in the Western States. The estimate consists of direct irrigation benefits of about $93,000 and indirect benefits of $248,000 distributed among three other benefit categories--water quality ($119,000), recreation ($97,000), and fish and wildlife enhancement ($32,000). (See pp. 30 and 31.)

--The Corps computed area redevelopment benefits at $153,000 annually for two counties--the county in which Elk Creek is to be constructed and a neighboring county. Both counties qualified for the benefit. However, subsequently the unemployment rate in the county in which Elk Creek is to be constructed became too low to qualify it for the benefit according to the Economic Development Administration, which qualifies areas for the benefit. Also, neighboring counties are no longer eligible for the benefit according to the Corps' interpretation of current standards. (See pp. 32 and 33.)

GAO is not questioning the fish and wildlife benefits other than those related to irrigation. However, some agencies have expressed concern about the possible adverse effects of Elk Creek on water quality and the fishery in the Rogue River. Based on its studies, the Corps has concluded that the Elk Creek project would not

have a significant impact on the Rogue River fishery. (See pp. 33 and 34.)

While GAO questions some of the benefits the Corps claimed because of questionable assumptions or incomplete analysis, most of the benefits questioned (58 percent or $2,444,000) relate to conditions which have changed since the Corps' computation of benefits in a way which adversely affected these benefits. A Corps Portland District official told GAO that, other than price level changes, the Corps does not periodically reevaluate project benefits and costs to reflect current conditions because it does not have the necessary resources. (See p. 8.)

SOME PROJECT COSTS NOT UPDATED

The Corps estimated the cost to construct Elk Creek to be $108,754,000 for the fiscal year 1982 budget. Annual costs over the 100-year project life for interest and amortization, operation and maintenance, and other costs are estimated at $4,758,000. GAO found that annual Elk Creek project costs are understated by $65,000 annually because contrary to applicable benefit-cost procedures, costs associated with interest on construction expenditures and the acquisition of project lands and timber were not updated. (See pp. 38 and 39.)

RECOMMENDATION TO THE SECRETARY OF THE ARMY

GAO recommends that to provide the Congress with current information on the economic feasibility of the Elk Creek project when funds are requested, the Secretary of the Army require the Chief, Corps of Engineers, to reexamine the economic feasibility of the Elk Creek project and resolve the questions on project benefits and costs raised in this report. (See p. 40.)

At the request of the congressional requestors' offices, GAO did not obtain comments from the Corps of Engineers.

Contents

ABBREVIATIONS

BLM	Bureau of Land Management
cfs	cubic feet per second
EDA	Economic Development Administration
EPA	Environmental Protection Agency
GAO	General Accounting Office
gpd	gallons per day
JTUs	Jackson turbidity units
M&I	municipal and industrial

CHAPTER 1

INTRODUCTION

We reviewed the latest benefit-cost analysis of the Elk Creek project available at the time of our review. The U.S. Army Corps of Engineers made the analysis for its fiscal year 1982 budget. Elk Creek is part of the Rogue River Basin Project, which was authorized by the Congress in the Flood Control Act of 1962 (Public Law 87-874, Oct. 23, 1962).

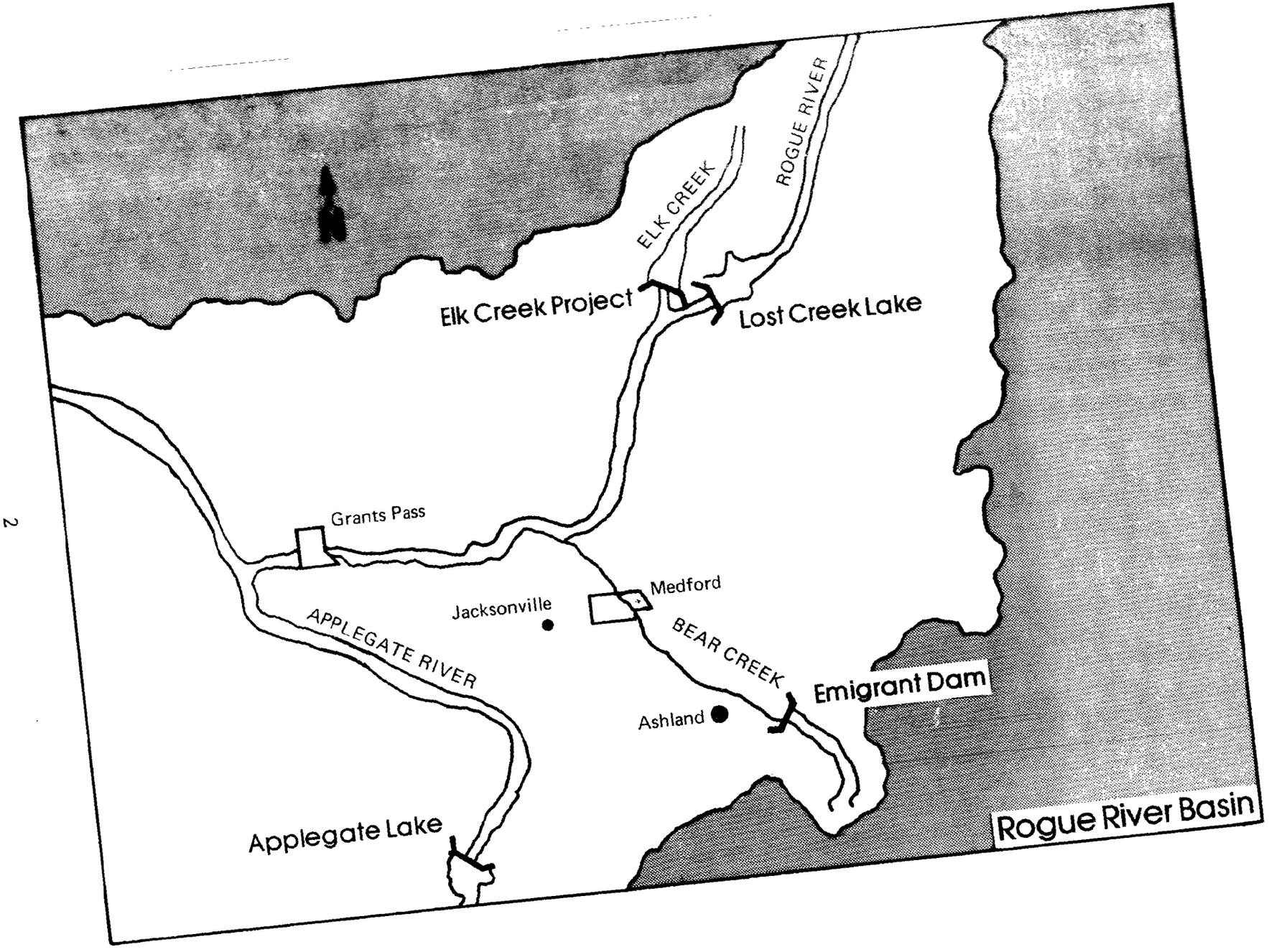
The Rogue River Basin Project includes three dam and reservoir projects. (The map on page 2 shows the locations of these projects as well as the Department of the Interior, Bureau of Reclamation's, Emigrant Dam.)

--Lost Creek dam and reservoir located on the Rogue River about 26 miles northeast of Medford, Oregon. This project was completed in 1977 and is the largest of the three projects with a maximum water storage capacity of 465,000 acre-feet. 1/

--Applegate dam and reservoir located on the Applegate River about 23 miles southwest of Medford, Oregon. This project was completed in 1980 and is the smallest of the three projects with a maximum water storage capacity of 82,000 acre-feet. The Applegate is a tributary of the Rogue and flows into the Rogue about 6 miles west of Grants Pass, Oregon.

--Elk Creek dam and reservoir is to be located on Elk Creek about 27 miles northeast of Medford, Oregon. Elk Creek flows into the Rogue River about 2 miles downstream from Lost Creek dam. The project is planned to have a maximum water storage capacity of 101,000 acre-feet. Construction started in 1971, and as of December 1981 some project lands had been acquired, residents had been relocated, a construction bypass road had been completed, and gravel for dam and road construction had been stockpiled at the site. Construction of the dam itself has not started.

1/An acre-foot of water (325,851 gallons) represents the amount of water sufficient to meet all the needs of a family of four for 1 year.


ELK CREEK
ROGUE RIVER
Elk Creek Project
Lost Creek Lake
Grants Pass
Medford
Jacksonville
APPLEGATE RIVER
BEAR CREEK
Emigrant Dam
Ashland
Applegate Lake
Rogue River Basin

CRITERIA FOR BENEFIT-COST ANALYSIS

Federal water resource construction agencies develop and report benefit-cost analyses to the Congress to show the economic feasibility of proposed projects. The benefit-cost analysis is a vital tool that agencies and the Congress use in project decisionmaking. It provides a quantified measure of a project's expected worth and thus serves a purpose similar to the estimated return on investment used in private business when expansion of facilities is considered. Each year the Corps provides the Congress with information on water resource projects for which it is requesting funds, including data on project benefit-cost analyses. The Congress seldom authorizes or funds water resource projects unless the estimated project benefits exceed estimated costs.

In the Flood Control Act of 1936 (33 U.S.C. 701a), the Congress declared that benefits of Federal flood control projects should exceed costs. This act led to the development of analytical procedures for evaluating the benefits and costs of proposed water resource and related land resource projects.

The procedures for evaluating project benefits and costs have changed over the years. The Elk Creek project was authorized under requirements for benefit-cost analysis contained in Senate Document No. 97. This document entitled "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources" was prepared at the President's request by the Secretaries of the Interior, Agriculture, and the Army and the Acting Secretary of the then Department of Health, Education, and Welfare. The President approved it on May 15, 1962, and it was published as Senate Document No. 97, 87th Congress, 2d session.

PROJECT BENEFITS AND COSTS

The Congress authorized the Elk Creek project to be operated for flood control, water supply, recreation, irrigation, fish and wildlife enhancement, hydropower generation, and water quality control purposes. However, no specific facilities were provided for fishery enhancement or power generation. Subsequently, under Senate Document No. 97, benefits for area redevelopment were assigned to the project for the anticipated employment on the project of otherwise unemployed persons.

In 1962 when the project was authorized, the Corps' initial benefit-cost ratio was 1.52 to 1, meaning that for every dollar spent, a benefit of $1.52 would be realized. Subsequently, the Corps made annual price level and other selected benefit and cost adjustments which caused the ratio to change. The Corps' latest estimate available at the time of our review was made in February 1981 for the fiscal year 1982 budget, and showed a 1.15 to 1

benefit-cost ratio with an irrigation diversion and 1.08 to 1 without the diversion. Subsequent to the completion of our audit work, in January 1982 the Corps made an annual update of the benefit-cost ratios for the fiscal year 1983 budget. The ratios changed slightly to 1.13 to 1 with irrigation and 1.07 to 1 without it. These changes were due to estimated price level increases.

The Corps estimated benefits with and without an irrigation purpose because the Department of the Interior's Bureau of Reclamation, which computes this benefit, initially provided an estimated benefit for this purpose but later withdrew it. In 1975 when updating the 1966 computation of this benefit, the Bureau informed the Corps that it was unable to provide an irrigation benefit because it could not formulate an economically justified irrigation plan. The Corps continues to include an irrigation benefit amount in the benefit-cost analysis because irrigation is an authorized project purpose and it believes the project will have some irrigation benefits. The irrigation benefit the Corps claimed for Elk Creek totals $341,000, or 6 percent of total project benefits. It consists of about $93,000 in direct irrigation benefits and $248,000 in indirect benefits distributed among three other benefit categories--water quality, recreation, and fish and wildlife enhancement.

The Corps' latest benefit-cost analysis available at the time of our review shows annual benefits of $5,457,000 associated with the project's purposes when irrigation is included and annual project costs of $4,758,000. These benefits and costs are based on a 100-year project life and a 3-1/4 percent interest rate. The major Elk Creek benefit categories contained in the Corps' fiscal year 1982 budget estimate with an irrigation diversion were flood control (68 percent of total benefits), water supply (11 percent of total benefits), and recreation (11 percent of total benefits). The estimated cost to construct Elk Creek increased from $17,500,000 when it was authorized in 1962 to $108,754,000 in February 1981 primarily because of inflation.

However, the Corps' more recent fiscal year 1983 budget data shows annual benefits of $5,952,000 when irrigation is included and annual project costs of $5,265,000. The fiscal year 1983 budget data also shows an estimated cost to construct Elk Creek of about $121 million.

While a hydropower facility is not authorized at Elk Creek, the addition of hydropower production may be economically justified because of increasing energy prices. The Corps has completed studies on including power facilities at Elk Creek and concluded that power is marginally feasible, but further review and analysis is required. The Corps' fiscal year 1982 appropriations included $1.3 million for Elk Creek for the purpose, among other things, of making a power study. The Corps did not request any funds for Elk Creek in its fiscal year 1983 appropriation request.

PROJECT BENEFIT AND COST VALUES

While most project benefits and costs are periodically updated through price level and other adjustments to reflect current values, Federal law does not permit adjusting interest rates. Also, Corps regulations prohibit adjusting recreation and fishing values for certain projects, including Elk Creek.

The original interest rate used in computing the benefits and costs of the Elk Creek project was 2-5/8 percent. In accordance with criteria established by Senate Document No. 97 and the Water Resources Council Regulations (18 CFR 704.39), the rate had increased to 5-5/8 percent by 1974.

However, the Corps is using the 3-1/4 percent interest rate that was in effect immediately prior to December 24, 1968, to compute the Elk Creek project benefits and costs. This interest rate is in accord with the Water Resources Development Act of 1974 (Public Law 93-251) for projects authorized before January 3, 1969, if the appropriate non-Federal interests had, before December 31, 1969, given satisfactory assurances to pay the required non-Federal share of project costs. For the Elk Creek project, the Corps obtained the required assurances from potential irrigation and municipal and industrial water supply users and therefore "grandfathered" in the 3-1/4 percent rate.

The interest rate used during fiscal year 1981 to compute benefits and costs for new water resource projects was 7-3/8 percent. Corps estimates showed that at that interest rate the benefit-cost ratio for Elk Creek would be 0.4 to 1 with an irrigation diversion and 0.3 to 1 without the diversion.

Also, the Corps in its fiscal year 1982 benefit computations for recreation and fishing continued to use values of $1.25 for each recreation day and $5 for each angler day. These were the values in effect in 1975 when the Corps determined recreation and fishing benefits. Current values for recreation and fishing are $2.68 and $12.65 a day, respectively. Corps Portland District officials told us that Corps regulations require them to continue to use the 1975 values.

PROJECT STATUS

In 1971 work began on Elk Creek, including acquiring some project lands, relocating residents and some roads and utilities, and stockpiling gravel. About $9 million had been spent on the project through the end of fiscal year 1981.

However, in 1975 work on Elk Creek was stopped when the Governor of Oregon and the Oregon Water Policy Review Board 1/ withdrew support for the project. The board was concerned about the effect that releasing Elk Creek water would have on the fishery and water quality in the Rogue River due to possible increased turbidity 2/ and higher water temperatures. The board pointed out that since the Lost Creek project was very near completion at that time, an opportunity to obtain at least partial answers to these questions was available.

Subsequently, the Corps updated its study of Elk Creek's potential for water turbidity and its impact on the fishery. This study was completed in 1979 using data obtained from observing Lost Creek. The Corps concluded that turbidity would not be at a level or duration that would adversely affect the Rogue River fishery.

The Oregon Water Policy Review Board reversed its nonsupport of the project on April 4, 1981, by voting in favor of the project. The present Governor of Oregon also supports the project. Fiscal year 1982 Corps appropriations included $1.3 million for, among other things, updating and continuing design, plans, and specifications so that construction can be resumed.

OBJECTIVE, SCOPE, AND METHODOLOGY

In response to a June 25, 1981, letter from Congressman James H. Weaver and seven other Congressmen--Berkley W. Bedell, Robert W. Edgar, Floyd J. Fithian, Barney Frank, Ronald E. Paul, Buddy Roemer, and John F. Seiberling--we reviewed the latest benefit-cost analysis of the Elk Creek project available at the time of our review, made by the Corps in 1981 for its fiscal year 1982 budget. Our objective was to determine if the Corps prepared the benefit-cost analysis in accordance with applicable criteria and guidelines and if the results of the analysis accurately reflected the project's economic feasibility.

We reviewed pertinent laws, legislative history, Senate Document No. 97, and Corps guidance and procedures implementing applicable criteria. We examined the documentation the Corps provided to support the benefit-cost analysis. We discussed with Corps Portland District and headquarters officials the criteria, guidelines, and procedures they used in developing the benefit-cost analysis.

1/This board is appointed by the Governor of Oregon; one of its major functions is formulating State water resource policy.

2/Turbidity describes the optical property of water which causes light to be scattered and absorbed rather than transmitted through in straight lines. Turbidity is caused by the presence in water of suspended matter which hinders the ability of fish to find food and reduces the number of anglers.

We also reviewed documents prepared by and held discussions with officials of organizations which had provided, or had been asked to provide, information for the Corps' analysis. These organizations included the Environmental Protection Agency (EPA), the Fish and Wildlife Service, the National Marine Fisheries Service, the Bureau of Reclamation, the Economic Development Administration (EDA), the Forest Service, the Bureau of Land Management (BLM), the Oregon Water Policy Review Board, and the Oregon State Department of Fish and Wildlife. We also spoke with and obtained documents from officials of Jackson and Josephine Counties, the cities of Medford, Grants Pass, Phoenix, Talent, Shady Cove, and Rogue River, Oregon, and the Sams Valley and Talent Irrigation Districts.

Our review was made primarily at the Corps' district office in Portland, Oregon. Work was also done at Corps headquarters and EDA in Washington, D.C., and at several local governments in cities located in Jackson and Josephine Counties, Oregon.

As part of its study of the Elk Creek project, the Corps used a mathematical model, referred to as the WESTEX model, to predict the levels of turbidity that would occur in the Rogue River as a result of the Elk Creek project. This study was done primarily to predict what effect, if any, the project would have on the valuable Rogue River fishery. The Corps concluded from this study that the predicted turbidity would not harm the Rogue River fishery. We did not evaluate the validity of this model or the Corps' conclusions.

In addition, our objective was not to prepare a benefit-cost analysis of the Elk Creek project but rather to review the analysis prepared by the Corps. Therefore, any benefit-cost ratio computed based on the benefits and costs we questioned should not be viewed as what we concluded the benefit-cost ratio should be. For example, reducing Elk Creek's recreation benefits could also reduce project construction costs if the amount of recreation facilities to be constructed is reduced in anticipation of a lower recreation demand. We did not evaluate possible reductions in project recreation costs that can be associated with reduced demand for and construction of recreation facilities.

This review was performed in accordance with our current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

CHAPTER 2

MOST ELK CREEK BENEFITS AND SOME COSTS ARE QUESTIONABLE

The Corps' fiscal year 1982 budget estimate of annual benefits for the Elk Creek project totaled $5,457,000; including irrigation benefits, the benefit-cost ratio is 1.15 to 1. We questioned $4,168,000 of these benefits, or about 76 percent of the total benefits computed by the Corps. In addition, annual Elk Creek project costs of $4,758,000 are understated by $65,000 annually because some costs associated with interest on construction expenditures and the acquisition of project lands and timber were not included.

While we question some of the benefits the Corps claimed because of questionable assumptions or incomplete analysis, most of the benefits we question (58 percent or $2,444,000) relate to conditions which have changed since the Corps' computations in a way which adversely affected benefits--for example, changes in the population growth rates. The Corps' Portland District economist told us that, other than price level changes, the Corps only infrequently reevaluates project benefits and costs to reflect current conditions because it does not have the necessary resources.

The table on the following page summarizes the benefits and costs computed by the Corps and the amounts we believe are supportable.

Summary Of Elk Creek's Fiscal Year 1982
Average Annualized Benefits and Costs (note a)

Benefit category	Corps estimate: With irrigation diversion	Corps estimate: Without irrigation diversion	Adjusted amount based on GAO review
	(000 omitted)		
Flood control	$3,685	$3,685	$ 895
Water supply	621	621	0
Recreation	619	522	264
Irrigation	93	0	0
Area redevelopment	153	153	0
Fish and wildlife enhancement	167	135	130
Water quality	119	0	0
Total	5,457	5,116	1,289
Cost category			
Interest and amortization	3,685	3,685	3,750
Operation and maintenance	581	581	581
Replacements	52	52	52
Other economic costs	531	531	531
Total	4,849	4,849	4,914
Less nonreimbursable roads	91	91	91
Total annual cost for benefit-cost ratio	$4,758	$4,758	$4,823
Benefit-cost ratio	1.15 to 1	1.08 to 1	(b)

a/All computations are based on a 100-year project life and 3-1/4 percent interest rate.

b/A benefit-cost ratio computed based on the benefits and costs we questioned should not be viewed as what we conclude the benefit-cost ratio should be as discussed on page 7.

We questioned most benefit estimates because:

--Flood control benefits which were developed in 1974 do not assess the impact of (1) a subsequent lower growth rate estimate and more stringent flood plain zoning laws passed by local governments in the Elk Creek flood plain area, (2) specific or incremental benefits, a method of computation which compares the benefits directly attributable to Elk Creek with the costs of providing them, contrary to applicable benefit-cost procedures, (3) the correct flood storage capacity of Elk Creek and a related project in distributing benefits, and (4) how flooding will be fully affected by a Bureau of Reclamation dam constructed before Elk Creek was authorized.

--Water supply benefits were included for the project without assessing the water needs predicted by Rogue River Basin communities. Projected water needs are questionable because the communities justified them on such bases as unrealistic population growth rates.

--Recreation benefits were developed in 1973 and 1974 on the basis of now outdated recreation use patterns. Current recreation use experienced at operating Corps Portland District reservoirs and trends for future recreation use are less than what the Corps used in its estimate.

--Irrigation benefits were based on a plan discarded by the Bureau in 1975 because the plan was no longer economically feasible. The Corps' estimate for irrigation benefits totaled $341,000. It included direct irrigation benefits of about $93,000 and indirect benefits of $248,000 distributed among the benefit categories of water quality ($119,000), recreation ($97,000), and fish and wildlife enhancement ($32,000).

--Area redevelopment benefits can be claimed only for counties EDA has qualified for the benefit. The county in which Elk Creek is to be constructed no longer qualifies for the benefit according to EDA because its unemployment rates are too low relative to national unemployment rate averages and neighboring counties are no longer eligible according to the Corps.

While we are not questioning the fish and wildlife benefits other than those associated with irrigation, State and Federal Fish and Wildlife agencies, EPA, and others are concerned about the possible effects of Elk Creek on the Rogue River's water quality and its fishery. Specifically, they are concerned that Elk Creek may increase turbidity in the Rogue River, thereby adversely affecting this valuable fishery. The Corps has concluded, based on studies it has made, that the increase in turbidity would not have a significant impact on the fishery.

FLOOD CONTROL BENEFITS

The Corps estimated annual flood control benefits for the project to be $3,685,000, or 68 percent of total project benefits. We question $2,790,000, or 76 percent, of these benefits because:

--The growth rate the Corps used in 1974 to project population and increased property values is no longer appropriate because subsequently (1) Corps documents indicate that a lower growth rate may be more appropriate and (2) flood plain zoning laws passed by local governments are more stringent than the Corps planned for.

--Contrary to benefit-cost procedures contained in Senate Document No. 97, the Corps reported flood control benefits on a system (part of a three-dam Rogue River system) rather than on an incremental basis; under the latter, only benefits attributable to Elk Creek would be considered. The Corps used a system approach because the Congress authorized Elk Creek as part of a three-dam system.

In addition, we found other problems which would reduce the amount of flood control benefits claimed. However, we have not included these items in the $2.8 million questioned because either we were unable to quantify the amounts involved or to do so would result in double counting amounts already questioned These problems which occurred because of Corps oversights are:

--The Corps incorrectly allocated flood control benefits between Elk Creek and a related project.

--The Corps did not fully recognize the impact on flood control benefits of a Bureau of Reclamation dam constructed before Elk Creek was authorized.

How the Corps computes flood control benefits

Flood control benefits are defined as reducing, in all forms, damage from inundation of property and increasing net returns from higher property use made possible by lowering the flood hazard. Such benefits are estimated by determining the project's capability to reduce flood stages throughout the range of possible flood levels and computing the damages to existing and future development that would be prevented by the reduced flood stages. The benefits were derived by

--determining as of 1965 the difference between (1) the average annual cost of flooding without the three Corps Rogue River Basin projects, based on records of past floods, and (2) the cost of flooding with the projects;

--allocating the resultant benefits to each of the three Corps dams based on flood storage capacity;

--adjusting the benefit to reflect price level increases from 1965 and future growth in the flood plain for the project life of 100 years; and

--determining the present value of the benefit.

The following table summarizes the Corps' fiscal year 1982 budget computation for the Elk Creek flood control benefits.

Average annual cost of flooding without the Corps projects (1965 prices)	$ 607,000
Less average annual cost of flooding with the Corps projects (1965 prices)	-158,000
Average annual flood control benefits	449,000
Portion allocated to Elk Creek	134,000
Price level adjustment from 1965 to 1980	285,000
Elk Creek benefits in 1980 prices	419,000
Growth in the value of property from 1965 to 1985	448,000
Annual benefits at project completion	867,000
Discounted future growth damages	2,818,000
Elk Creek flood control benefit	$3,685,000

Future growth rate is overstated

The annual growth rate 1/ of 3.7 percent the Corps used in determining the value of flood control damages and benefits is no longer appropriate because (1) it does not reflect the lower future growth estimates that may be more appropriate for the area and (2) local governments have imposed more stringent flood plain development limitations than the Corps planned for. Corps documents indicate that an annual growth rate of 2.8 percent may be more appropriate for the affected area. If an annual growth rate of 2.8 percent for the area were used to recompute flood control benefits, the benefits would be reduced by $1,692,000, or 46 percent.

The Corps used a growth rate of 3.7 percent in 1974 when computing flood control benefits because this was the rate used for nearby Applegate Lake and the two counties involved in Applegate are also involved in Elk Creek. However, Corps regulations as of 1978 require that growth rates be developed using OBERS Projections 2/ on economic activity in the United States,

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1/The growth rate is a composite of the population growth in the affected area and the increased value (in constant dollars) of property.

2/Contains projected national population data prepared by the Bureau of the Census.

published by the Water Resources Council for use in water resource planning. Corps documents based on this data show an annual growth rate of 2.8 percent for the Elk Creek area.

The Corps' Portland District economist agreed that a growth rate of 3.7 percent was too high but said a rate of 2.8 percent was very conservative.

The growth rate used to predict future growth in a flood plain and its resulting increased property values is affected by local flood plain zoning ordinances in effect. Since the passage of the Flood Disaster Protection Act of 1973 (Public Law 93-234), local governments whose areas would be affected by Elk Creek have passed flood plain zoning ordinances to restrict development in the flood plain. In accordance with Senate Document No. 97, which requires that all existing laws be incorporated in the analysis, the Corps' original growth rate of 4.15 percent was reduced to 3.7 percent in 1974 to reflect these restrictions.

Subsequently, however, between 1978 and 1981, local flood plain zoning ordinances were revised and made more stringent on development along the Rogue River than the restrictions considered earlier by the Corps. The following table shows the differences in the zoning requirements used in the Corps' computation and those currently in effect.

Flood frequency zone	Zoning used by the Corps	Current zoning ordinances
50-year	Limited development	No development
100-year	No restrictions	Limited development

Current zoning ordinances along the Rogue River require, for example, that new residences in the 100-year flood plain (that area which would be inundated by a flood so large that it occurs only once every 100 years) be elevated so that the ground floor is at least 1 foot above the 100-year flood. Consequently, future developments would be less affected by a flood. One county planning official told us that as existing structures in the flood plain are either replaced by floodproofed structures or are not replaced at all, the long-term effect of the zoning ordinances should be to reduce future flood damages. We were unable to place a monetary value on the questionable benefits associated with more stringent flood plain development limitations.

However, small changes in the growth rate have a large impact on the value of flood control benefits. A reduction of only 0.1 percent in the Elk Creek area's growth rate reduces the flood control benefit by 7 percent. The reason for this sensitivity is the large proportion of benefits based on projected growth. As the following table shows, historic data represents only a small part of the value of Elk Creek's flood control benefits, while projected data represents a large amount of the benefits claimed.

Distribution of Elk Creek Flood Control Benefits

Element	Value	Percent of total
Historic cost	$ 134,000	3.6
Price level adjustments	285,000	7.7
Projected growth	3,266,000	88.7
Total	$3,685,000	100.0

Benefits computed on a systems rather than an incremental approach

Senate Document No. 97 defines benefits as the increases or gains, net of associated or induced costs, in the value of goods and services which result from conditions with the project compared to conditions without the project. Proper application of this criteria would have resulted in a determination of the specific or incremental benefits that each project is estimated to contribute.

However, the Corps' computation of flood control benefits treated the Elk Creek project as an integral part of a three-dam system, even though the other two dams were completed in 1977 and 1980 and are now operating. If Elk Creek is evaluated on an incremental basis as a project to be added to an established river system, flood control benefits would be reduced by about $1,098,000, or 30 percent.

Under the systems approach, flood control benefits were accumulated for three projects--Lost Creek, Applegate, and Elk Creek--in the Rogue River Basin and then distributed to the projects in proportion to each project's flood storage capability. This approach overstated Elk Creek benefits. The Corps used a systems approach because the Congress authorized Elk Creek as a part of a three-dam system in 1962. However, proper application of Senate Document No. 97 requires the use of the incremental approach.

Under the incremental approach, the benefits attributable to Elk Creek would be only those that Elk Creek adds to the existing system. The systems approach results in a much higher flood control benefit for the Elk Creek project than the incremental approach. A Corps analysis made in 1979 estimated a benefit-cost ratio of 0.7 to 1 under the incremental approach compared to 1.4 to 1 under the systems approach. The Corps' fiscal year 1983 budget data shows a 0.63 to 1 benefit-cost ratio under the incremental approach compared to 1.15 to 1 under the systems approach.

System benefits are misallocated

In using the systems approach, the Corps overstated the flood control benefits allocated to Elk Creek because the flood storage capacities used to allocate these benefits for Elk Creek and Lost Creek were incorrect. Correcting the Corps' allocation of benefits to reflect current flood control storage capacities reduces flood control benefits by 17 percent annually. We have not considered this item in our adjustments of flood control benefits because to do so would double count amounts we questioned in the Corps' use of the systems approach.

The Corps' computations allocated to Elk Creek 30 percent of the benefits on the upper portion of the Rogue River. According to Corps Portland District officials, the 30-percent allocation was based on a computation made in 1961 when Elk Creek and Lost Creek were to provide 45,000 and 105,000 acre-feet, respectively, of flood control storage. Portland district officials told us that because of an oversight, this allocation was never adjusted when flood storage capacities were changed to 60,000 and 180,000 acre-feet for Elk Creek and Lost Creek, respectively. They agreed that a 25- and not a 30-percent allocation was correct and should have been made to Elk Creek for benefits on the upper portion of the Rogue River.

An existing dam was not considered

The average annual flood damages the Corps computed for Elk Creek did not fully consider the flood control effects of an existing Bureau of Reclamation dam on a Rogue River tributary. While we were unable to quantify the effect of this dam on flood control benefits, if the dam were included, annual flood control benefits would be reduced.

The Corps computes annual flood damages based on data about past floods. Elk Creek benefits are based on floods that occurred in 1953, 1955, 1964, and 1974. However, the Bureau rebuilt Emigrant Dam on a tributary of the Rogue River in 1960 to include 20,000 acre-feet of flood control storage. Although Senate Document No. 97 requires that the "without project" condition include existing conditions, the Corps, in computing flood control benefits, did not adjust the 1953 and 1955 flood damage data to include Emigrant Dam.

While Emigrant Dam provides 20,000 acre-feet of flood control storage and Elk Creek provides 60,000 acre-feet, the effect of Emigrant Dam on reducing Elk Creek's flood control benefits would be significantly less than the amounts indicated by these storage capacities because:

--The effects of Emigrant Dam are included in the 1964 and 1974 flood damage data.

--Emigrant Dam benefits occur only along the Rogue River below Bear Creek, which flows out of Emigrant Dam and empties into the Rogue 25 miles below Elk Creek.

Corps Portland District officials agreed that the Corps should have included the effect of Emigrant Dam on the 1953 and 1955 flood damage data in the benefit-cost analysis and that had it done so, Elk Creek flood control benefits would be reduced. However, they told us that they could not determine the amount by which benefits would be reduced without recomputing the flood control analysis.

MUNICIPAL AND INDUSTRIAL WATER SUPPLY BENEFITS

The Corps estimated the Elk Creek project's municipal and industrial (M&I) annual water supply benefits at $621,000, or 11 percent of total project benefits. We question this benefit because water needs predicted by the communities involved are not supported. This occurred because the Corps did not analyze the communities' projected water needs as required by its regulations.

In addition, alternatives exist to Elk Creek M&I storage, such as the water stored at Lost Creek, to help meet present and future water needs of the cities in the Rogue River Basin.

How the Corps estimates M&I water benefits

The Water Supply Act of 1958 (Title III, Public Law 85-500) established the policy to be followed in determining the water supply needed when building dams and reservoirs. The act provides that

--storage may be included in any reservoir project planned or constructed by the Corps for present or future M&I water needs;

--communities will provide the Corps with reasonable assurances of payment for M&I storage within a time which will permit payment of costs allocated to water supply within the life of the project; and

--payment of construction costs, including interest costs, allocated to water supply must be made within 50 years after the water is first used or within the life of the project, whichever is shorter.

Senate Document No. 97 provides that annual benefits resulting from an increase in water quantity and dependability may be measured as the cost of obtaining the same quantity and quality of water by the alternative means that would most likely be developed by the potential users in the absence of the Federal project. Corps regulations implementing Senate Document No. 97

provide that the costs of the least costly-most feasible alternative source are to be based on private practices for such works and on non-Federal financing and interest rates.

Corps regulations implementing the Water Supply Act and Senate Document No. 97 also require that the Corps develop and analyze reasonable evidence showing that anticipated future demand for M&I water storage will occur within a period of time which will permit repayment, within the life of the project, of costs allocated to water supply. The Corps discounts benefits claimed for future water supply for periods of anticipated nonuse. To accomplish this, Corps regulations require a careful analysis of communities' projected water needs.

The authorizing document for the Rogue River Basin projects states that Lost Creek and Elk Creek would be operated in tandem to provide a total of about 20,000 acre-feet of water for future M&I water use. Each reservoir was to provide half of this total. The 20,000 acre-feet of storage needed for the Rogue River Basin's future water supply was determined by a 1959 Public Health Service study made at the Corps' request.

The Corps and the Bureau of Reclamation selected the theoretical construction of a single-purpose dam with 20,000 acre-feet of storage on McNeil Creek as representative of the least costly-most feasible alternative for developing such storage. The 1961 estimated construction cost of $6.5 million for the McNeil Creek site equaled the estimate of its corresponding benefits, which converted to an annual cost of $322,700 over the life of the project. Therefore, the annual benefit was about $161,350 for each project. Through price level adjustments, the Corps increased this benefit for Elk Creek to the fiscal year 1982 budget figure of $621,000.

The Corps Portland District economists who computed these benefits could not document how or why the McNeil Creek alternative was selected. They said that all such documentation has been lost or misplaced since the first benefits were computed in 1961. Therefore, we were unable to analyze the McNeil Creek alternative or its related costs.

In accordance with the Water Supply Act, the Corps first began to market Lost Creek and Elk Creek M&I water in 1965. It requested Rogue River Basin communities to provide reasonable assurances by April 1966 that they would use the stored water and pay related costs. Six communities responded with assurances they would need a total of 22,750 acre-feet of future storage at Lost Creek and Elk Creek.

In September 1980 the Corps attempted to firm up the 1966 assurances by requesting communities to respond with expressions of interest to identify them as potential purchasers of M&I water stored at Lost Creek (which had become operational in February 1977). The Corps told the communities that since Elk Creek construction was questionable at that time, it could market 10,000

acre-feet of M&I storage from Lost Creek but M&I storage would be increased upon completion of Elk Creek. The Corps requested that the communities notify it of all present and future M&I requirements. Based on responses from five communities, the Corps reported that seven communities 1/ needed a total of 21,585 acre-feet of storage.

Municipalities' projected water needs are questionable

We question the need for most of the 21,585 acre-feet of water storage at Lost Creek and Elk Creek because the 1980 community projected needs for this water were

- --based on population growth rates which are unrealistic in view of current population trends;
- --not always reported by the communities involved, although officials of the communities involved estimated that existing and other potential water supply sources were adequate for future needs;
- --double counted by the Corps;
- --conditioned on a future event not likely to occur; or
- --based on a more than doubling of water consumption rates.

Only two of the seven communities reporting a need for water--Phoenix and Talent--have a reasonable basis for asking for M&I water storage, and their need for 2,600 acre-feet of storage can be met by using water allocated for M&I water supply in Lost Creek Lake.

Although Corps regulations require, as discussed on page 17, that the Corps analyze reasonable evidence to show that anticipated demand for M&I water will occur, a Corps Portland District economist and the district study manager told us that no one had analyzed the water supply needs reported by the communities.

Medford

The City of Medford Water System currently serves 60,000 people in the cities of Medford, Central Point, and Jacksonville and other locations. Medford obtains its water from Big Butte Springs and the Rogue River. Sources for additional water beyond the year 2000, if needed, include unused permits on the Rogue River and Big Butte Creek as well as potential storage at Lost Creek. People in the Medford service area use an average of 297 gallons per day (gpd), as compared to the regional average of 150 gpd.

1/One community reported water needs for itself and two others.

In September 1980 the Medford Water Commission responded to the Corps' request for future water needs. The commission stated that an extensive 1979 study documented that the water supply available to the Medford system through present permits "will be sufficient to supply the system's needs within the next 50 years, such projection being based on the average of population projections by various projection techniques." Moreover, the Medford Water Commission in May 1977 stated that the M&I water presently available can supply about 317,000 people versus the 137,000 then served in the Rogue River Basin.

The Corps, however, used Medford's estimate of 10,600 acre-feet of storage needed by 2030, which was based on Medford's higher population projections. This additional storage would provide Medford enough water to serve about 225,000 people at an average daily use of 580 gpd, or about double the actual consumption rate. The Medford Water Commission used the highest consumption rate in its estimates to provide for any contingency that may arise. Medford's potential growth to 225,000 people in 50 years is questionable. The Portland State University Center for Population Research told us that since the 1980 census, Jackson County, in which Medford is located, has experienced "a radical reversal" downward of population growth.

In addition, as discussed below, 1,600 acre-feet of this amount was also requested by the city of Phoenix and therefore was double counted by the Corps.

Phoenix

The City of Phoenix Water System presently serves 2,300 people, and city officials estimate that by the year 2000 it will serve 5,400. Phoenix currently obtains its water from municipal wells, but this source has recently experienced extremely high chloride and sodium levels. Therefore, in September 1980 Phoenix asked the Corps for 1,600 acre-feet of storage at Lost Creek, estimating first use in the spring of 1982. As discussed above, the same 1,600 acre-feet was also requested for Phoenix by Medford. Phoenix is contracting with the Corps for 1,600 acre-feet of storage at Lost Creek.

Grants Pass

The City of Grants Pass Water System obtains its water from the Rogue River and currently serves 16,000 people, each of whom uses an average of 253 gpd. Grants Pass officials estimated that by the year 2000 it will serve 36,000 people.

In September 1980 Grants Pass told the Corps that it might need about 6,700 acre-feet of storage at Lost Creek. The city said that the timing of use is difficult to determine because it was attempting to obtain clarification of its existing water rights from the State Water Resources Department. However, in January 1981 Grants Pass told the State it was reconsidering its

application for Lost Creek water "since this additional water will probably not be needed until the middle of the next century." At the present time, the city has water rights for 62.5 cubic feet per second (cfs) 1/ from the Rogue River.

Grants Pass' future need for 6,700 acre-feet of water storage is questionable because it is based on an average per capita consumption of 683 gpd, which local planners told us is the historical maximum consumption rate, as compared to the actual average consumption rate of 253 gpd. The city's present water right of 62.5 cfs could serve about 160,000 people at the rate of 253 gpd, or 4 times more people than are estimated to be served by the year 2000. About 60,000 people could be served at the maximum consumption rate of 683 gpd.

Talent

The City of Talent Water System currently serves 2,600 people, and city officials estimate that by the year 2000 it will serve 6,300. In September 1980 the city told the Corps it would need about 1,000 acre-feet of storage by the year 2000. Talent gets its water from Wagner Creek, Bear Creek, and the Talent Irrigation District.

Talent city officials justified this future water need based on growth projections which are inconsistent with the county's actual declining population pattern. However, if the Talent Irrigation District does not renew its contract with the city for M&I water after the year 2000, the mayor of Talent estimated the city may need about 1,000 acre-feet of storage around the year 2000.

Shady Cove

Private wells provide all M&I water to Shady Cove's 1,100 residents. Current water usage cannot be estimated since water consumption is not metered. City officials estimated that by the year 2000, 4,000 people will live in the city. Such a projection appears questionable. In fact, from 1972 through June 1981, the city grew from 1,004 to only 1,120 residents.

Shady Cove's city manager told us the city did not request consideration for any future water from the Corps and did not believe he would make any such request in the foreseeable future. Moreover, he told us that in his opinion, Shady Cove residents could not afford Corps water. Corps records showed that Shady Cove needed 700 acre-feet of storage based on a phone conversation with a Medford Water Commission official.

1/One cubic foot per second = 646,000 gpd.

City of Rogue River

The City of Rogue River Water System currently serves 1,300 people from municipal wells within the city. City officials estimate that by the year 2000, 4,000 people will be served from the wells and an unused water right on the Rogue River.

The city's mayor and public works director acknowledged that the growth projections made were liberal and not in line with recent experience. They said, however, the city's present wells and Rogue River water rights could easily supply water for the population projection made. They said they had never requested water storage from the Corps and would not be able to use the water. Corps records showed that the city's reported need for 700 acre-feet of storage was based on a phone conversation with a Medford Water Commission official.

Sams Valley Irrigation District

Sams Valley Irrigation District currently serves a population of about 300 people who obtain all of their water from private wells. Sams Valley planners estimated that if a proposed irrigation project is funded and developed, the population served will increase to 1,250 by 1990 and to 3,200 by 2010. Sams Valley estimated that this population would need additional water and requested 285 acre-feet of M&I storage from the Corps. If the irrigation project is not developed, Sams Valley planners estimate population will probably decline and no M&I water will be needed from the Corps.

Sams Valley Irrigation District's need for M&I water depends on approval of its loan application to the Bureau of Reclamation for an irrigation system. However, the Bureau has given little reason for optimism on this loan request. Sams Valley has attempted since the early 1960's to obtain funding for this project. In October 1981 the Bureau responded to Sams Valley's most recent loan application by asking it to reapply. The Bureau noted that

> "this reinitiation of processing does not imply imminent resumption of financing for new loan starts. On the contrary, resumption of financing of new loans will depend on the general economy and our budgetary situation in the future * * * we wish to caution you that if you submit your final application report now, it may have to be revised in the future to reflect the impacts of inflation prior to its being considered for funding."

According to the Bureau's regional loan coordinator, Sams Valley had not reapplied for the loan as of January 20, 1982, but it plans to reapply shortly.

Alternative M&I water sources are available

M&I water supplies, other than potential water stored in Elk Creek, are available to help meet present and future water

demands which may develop for cities in the Rogue River Basin. These sources are

--available but unused water in Lost Creek and Applegate Lakes and

--unused water currently apportioned to irrigation districts.

Lost Creek and Applegate water

Lost Creek and Applegate dams, both completed projects, contain 315,000 and 75,000 acre-feet of usable water storage, respectively. While portions of this storage have been set aside for various purposes (for example, irrigation), such allocations can be revised to meet other needs. If a future M&I water need develops in the absence of an Elk Creek project, reallocating unused portions of this abundant storage could help satisfy the need.

The Chief of the Corps' Portland District Engineering Division stated that M&I storage at Lost Creek and Applegate can be made available after certain requirements are satisfied. He stated that (1) assigning additional space at Lost Creek for M&I would require administrative reallocation of present storage allotments and is subject to approval by the Chief of Engineers and (2) including an M&I water supply as a project purpose at Applegate would require congressional approval.

For example, water allocated at Lost Creek and Applegate for irrigation could be used to help meet future M&I needs. Of 61,000 acre-feet allocated from Lost Creek and Applegate for irrigation, the Bureau has pending or actual contracts for use of only 2,665 acre-feet for this purpose. Consequently, it appears that a significant amount of water allocated to irrigation from these two reservoirs is available to help meet M&I use in the Rogue River Basin.

In addition, in May 1979 the Corps Portland District responded to the Chief of Engineers' request to analyze the projects on a system versus an incremental basis. The Portland district acknowledged at that time that

> "with storage now available, Lost Creek can meet all currently anticipated future water supply needs. Should demand develop for M&I water supply in excess of 20,000 acre-feet, this demand could be met by using storage assigned to irrigation. At this time, there is no identified economic justification for water supply storage at Elk Creek."

Water allocated to irrigation can be reallocated to M&I use. For example, on October 15, 1979, the Corps responded to a Josephine County request that the Corps change the Applegate Lake allocations to allow the county to use stored water for

future M&I purposes. This is the county in which Grants Pass is located. The Corps told the county that while M&I water supply was not an authorized project purpose at Applegate Lake, congressional action could include M&I as a project purpose. The Corps told the county that in order to initiate this process, it should first formally state its interest in obtaining Applegate water for M&I use. On October 19, 1979, the county filed its application with the State Water Resources Department to appropriate 6,000 acre-feet of M&I water from Applegate Lake. State action on the application is being withheld pending a county contract with the Corps for storage and release of M&I water from Applegate Lake, which would require congressional approval.

Irrigation water

Indications are that some irrigation districts in the Rogue River Basin hold rights to water which is no longer needed for irrigation. The State can take action to reallocate water from irrigation districts' shrinking agricultural areas to growing urban areas that need more M&I water.

For example, the Oregon State Water Resources Department documented that the Grants Pass Irrigation District had a permit to use water it no longer needed. During a recent 3-year survey of water needs in this irrigation district's service area, the State found that the area had shrunk from 18,400 acres to 7,300 acres although the district still had a permit to use 230 cfs from the Rogue River. Subsequently, the State reduced the irrigation district's water permit to 91 cfs and may assign the balance of 139 cfs to another beneficial use.

In this regard, when Grants Pass and the State were discussing a pending water rights application in December 1979, the State told the city that the Grants Pass Irrigation District's unused water is a viable alternative to help meet future M&I needs. The State told Grants Pass that

> "* * * the rapid growth within the Irrigation District boundaries has also caused them considerable problems. As growth continues, lands are no longer irrigated. Water used for these lands could be transferred to municipal use benefitting all people within the (Grants Pass) urban growth boundaries."

Other cities have been able to negotiate with irrigation districts to obtain M&I water when needed. For example, the city of Talent has contracted with the Talent Irrigation District and the Bureau until the year 2008 to store 600 acre-feet of water at Emigrant Lake. Talent officials estimate this supply could serve about 6,300 people, even though only 2,600 are served now. They believe the city will be able to renegotiate the storage contract with the Talent Irrigation District in the future. Other cities, such as Medford, are considering obtaining unused water supplies from various irrigation districts as potential M&I water sources when and if the need occurs.

RECREATION BENEFITS

The Corps estimated annual recreation benefits for the project at $619,000, or 11 percent of total project benefits. We question $355,000, or about 57 percent, of these benefits because:

--Some benefits are based on a discarded irrigation plan.

--The Corps developed recreation benefits in 1973 and 1974 on the basis of now outdated recreation use patterns. Current recreation use experienced at operating Corps Portland District reservoirs and trends for future recreational use are less than what the Corps used in its estimate.

--Federal, State, and local agencies may be less able to operate recreation facilities because of staff and funding cuts.

It should be noted that any reduction in expected recreation benefits which reduces construction of planned recreation facilities would be partly offset by reduced construction cost. We did not attempt to determine the cost to construct facilities associated with the benefits we questioned.

How the Corps computes recreation benefits

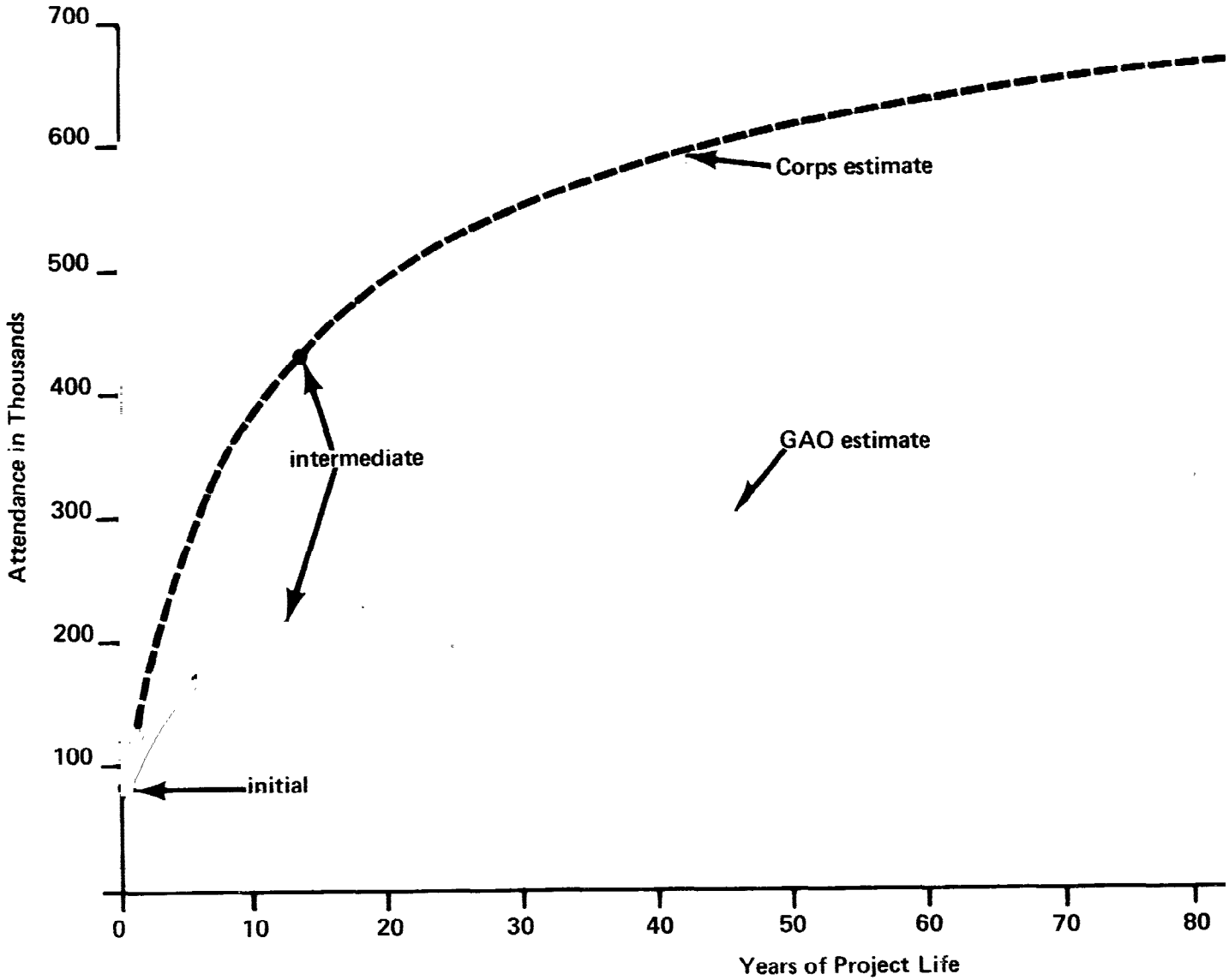
The Corps computes recreation benefits by estimating the average annual recreation usage throughout the life of the project and multiplying this usage, expressed in recreation days, by a predetermined daily dollar value. To compute annual recreation usage, the Corps estimates expected use at the beginning and end of a project's life and at an intermediate point. For Elk Creek, the values determined by the Corps were:

Initial:	80,000 recreation days
Year 13:	450,000 recreation days
Year 100:	680,000 recreation days

These points are then connected by a curve, as shown in the graph on page 25, and the values indicated by the curve, after reducing them for angler days which are included in fish and wildlife benefits, are used to compute the average annual use. This resulted in 418,000 average recreation days a year over the life of Elk Creek. The final step is to compute a dollar value for each recreation day based on the type and quality of recreation to be provided by the project and the availability of similar facilities.

In accordance with Senate Document No. 97, the value set for Elk Creek was $1.25 a day, resulting in an annual benefit of

Estimated Annual Attendance Curve



$522,000. To this benefit, the Corps added $97,000 a year for increased recreation along Bear and Little Butte Creeks, attributable to the project's irrigation diversion plan, to arrive at a total benefit of $619,000.

Recreation benefits attributed to irrigation cannot be realized

The recreation benefits of $97,000 attributable to the Bureau's irrigation plan cannot be realized. As discussed on page 30, the irrigation system planned for Elk Creek is no longer considered by the Bureau to be economically feasible and will not be built. Since these recreation benefits would occur only along Bear Creek and Little Butte Creek if the irrigation diversion were constructed, these benefits will not be realized unless the diversion is built.

Subsequent events reduce projected demand

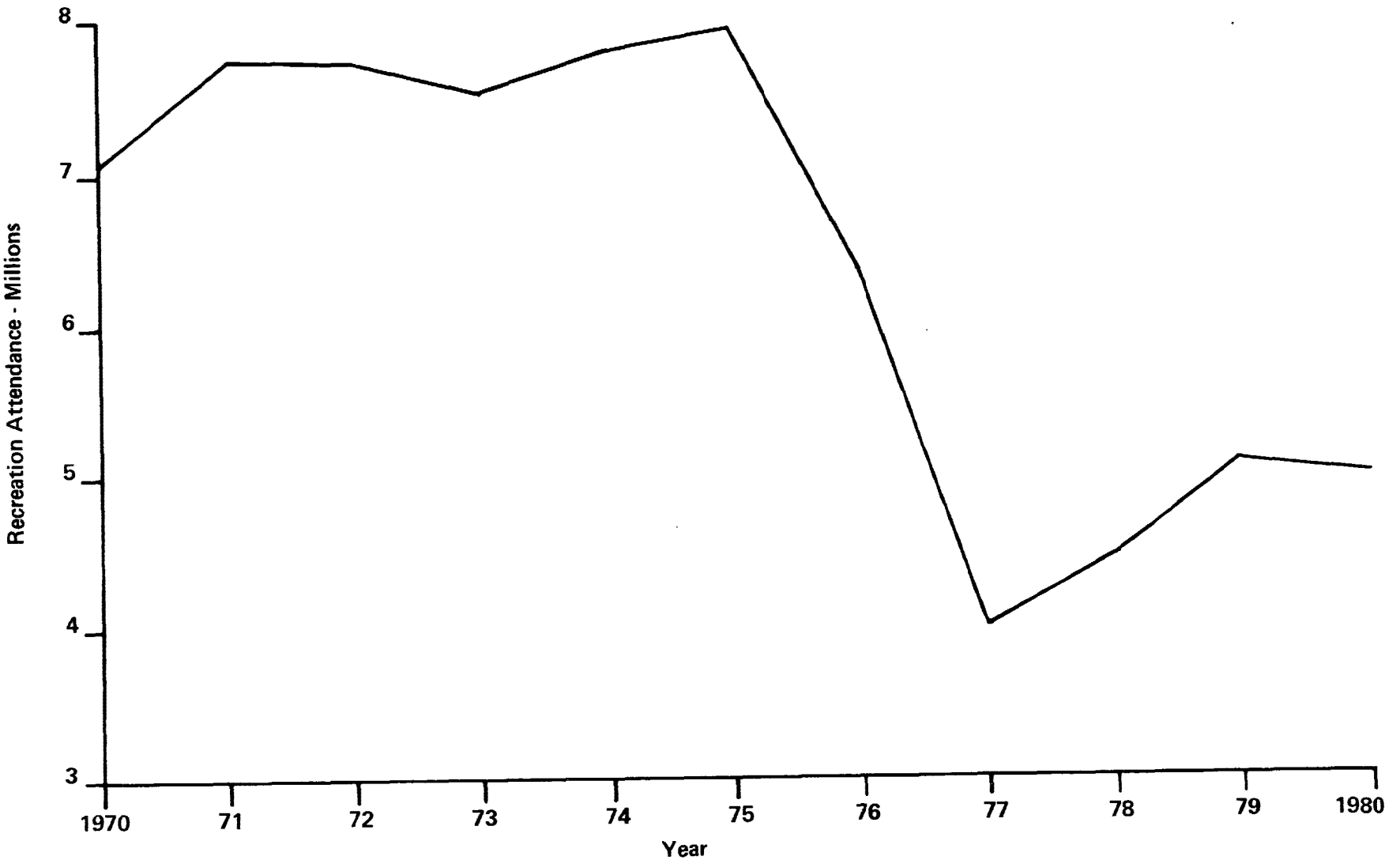
The recreation master plan for Elk Creek, which is the basis for computing the recreation benefits, was developed by the Corps in 1973 and revised in 1974. However since then, actual recreation usage at the 13 Corps Portland District reservoirs operating in 1970 has decreased drastically, as shown in the graph on page 27. A Corps report on the impact of the energy crisis on recreation attributes this, in part, to the cost and availability of fuel, which changed recreation use patterns. This trend makes it unlikely that the Corps estimate of extremely rapid growth in recreation usage at Elk Creek will be attained.

Intermediate demand

The number of recreation days the Corps used for project intermediate use (450,000) is not based on projected use. Corps regulations provide that two-thirds of recreation facilities needed to meet ultimate recreation use must be constructed during the construction of the project itself. The Corps Portland District recreation planners assumed that these facilities would be fully utilized by the 13th year of project life, citing "planners judgment" as justification for the assumption.

Elk Creek's recreation usage would have to grow by 14 percent a year during the first 13 years of its life to reach an intermediate-use level of 450,000 recreation days. However, no operating Corps project in the Portland district has had an actual growth rate in recent years as large as that predicted for Elk Creek. Instead, the Corps' Portland District showed an actual average annual growth rate of 8 percent during the period 1962 to 1975 for the eight reservoir projects then in operation. By 1980 the actual average annual growth rate of these projects was negative. If an annual growth rate of 8 percent is used for Elk Creek, the projected intermediate recreation use is reduced to 210,000 recreation days.

Annual Recreation Attendance At Portland District Corps Reservoirs



Ultimate demand

Corps regulations governing the computation of ultimate recreation use at projects permit such estimates to be based on (1) population projections over the life of the project and (2) the application of recreation use rates which vary based on distances from the project. These regulations also permit using other methods of calculating ultimate use, provided the method used is consistent with sound economic and project formulation practices.

Population projections and use rates were made for the Lost Creek and Applegate projects, and the resulting demand was compared to the capacity of planned recreation facilities. This comparison showed that recreation capacities at these projects were a limiting factor. Consequently, the Corps used capacity instead of demand to estimate recreation use at these locations.

In determining ultimate recreation use for Elk Creek, the Corps, rather than using population projections and recreation use rates, assumed that any facilities built would be used to the capacity of the land and water to support recreation without degrading the environment. We question the propriety of continuing to use this method for Elk Creek because it

--assumes that recreation demand would always exceed available supply when in fact (1) actual recreation use at the Corps' Portland District projects has been declining and (2) recent Oregon State studies have reported that an oversupply of recreation facilities exist in some categories in the two counties nearest Elk Creek and

--does not consider potential competing recreation facilities in the Elk Creek area.

At the time Corps officials estimated recreation use for Elk Creek, they computed an ultimate-use figure based on projected population and recreation use rates. However, Corps Portland District recreation planners told us they believed the results were too low and discarded them. They agreed that current data indicates that the Corps should use a lower figure.

If ultimate recreation use for Elk Creek is determined by using projections of population and recreation use patterns based on current data, the computation shows 350,000 ultimate-use recreation days a year rather than the 680,000 computed by the Corps. The graph on page 25 shows this relationship.

The Corps assumed in 1974 when computing Elk Creek recreation use that recreation demand would always exceed the available supply. Since then, actual attendance at the Corps' operating Portland district reservoirs has declined, as shown in the graph on page 27. In addition, a 1977 Oregon State Outdoor Recreation Needs Bulletin showed an oversupply of recreation in some categories through 1990 in the two counties nearest Elk Creek. The

two-county recreation supply and planned Elk Creek additions are compared below.

Facility	1990 over-(under-) supply	Added by Elk Creek
Trails	104 miles	11 miles
Playfields	12 fields	6 acres
Boat ramps	36	4
Picnic tables	(2,232)	215
Camp sites	564	188
Regional parks	2,143 acres	360 acres

Also, the Corps' analysis does not fully consider plans by other governmental bodies for additional recreation development. Federal agencies, such as the Forest Service, BLM, the National Park Service, and the State and county governments, develop comprehensive plans for future recreation needs. For example, the Jackson County Parks and Recreation Comprehensive Five-Year Plan includes plans for acquiring and developing park facilities, including facilities at other reservoirs in the vicinity of Elk Creek.

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If intermediate and ultimate annual use figures of 210,000 and 350,000 recreation days that we computed are used instead of the Corps' estimated 450,000 and 680,000 recreation days, estimated average annual use over the life of the project will decrease 49 percent from 418,000 to 211,000 recreation days. At a value of $1.25 for each recreation day, the recreation benefit would be $264,000, or $258,000 less than the Corps' estimate.

Corps Portland District recreation planners told us that the assumptions they made about future recreation usage were based on conditions that seemed valid at the time, but they agreed that conditions have changed significantly. These officials agreed that future recreation usage will grow more slowly than in the past. The Corps' Portland District Engineer acknowledged the need to update the recreation master plan to reflect changes since 1974. He also said that since Elk Creek is part of the Rogue River system and recreation facilities are already in place at the system's other two dams, recreation facilities are not specifically required at Elk Creek.

In this regard, it should be noted that if recreation attendance at the project were to be reduced from the current Corps estimate, fewer facilities would be needed. The Elk Creek construction cost estimate for fiscal year 1982 includes $9,136,000 for constructing recreation facilities, and the annual cost data also includes $240,000 for operating and maintaining them. Corps recreation planners could not tell us how much these costs would be reduced if recreation facilities were reduced without restudying the recreation needs, because without such a study

they cannot tell what facilities would be eliminated. They said, however, that a substantial portion of the costs would be eliminated if the estimated annual use was 211,000 rather than the 418,000 recreation days currently included in the benefits.

Operating funds may not be available

Once recreation facilities are built, they must be operated and maintained. However, funding problems make it questionable whether Elk Creek park areas can be kept open.

--Jackson County was originally responsible for operating Elk Creek park areas. In April 1980 the county commissioners withdrew from the agreement, citing budget constraints.

--BLM has discussed assuming responsibility for operating the Elk Creek facilities with the Corps. However, they have not been able to reach an agreement. BLM cited a lack of funding and suggested that the proposed recreation development is excessive considering user trends and availability of similar facilities in the area.

--The Corps is currently facing cutbacks in recreation operation and maintenance funding. The Corps' Portland District Engineer announced on February 18, 1982, that 15 Corps recreation areas in Oregon and Washington are being closed and 24 others will be operated with reduced maintenance or on a limited basis. Four of the facilities involved are at Lost Creek Lake.

IRRIGATION BENEFITS

The Corps' current benefit-cost analysis for the Elk Creek project consists of two separate benefit-cost analyses--one which includes $341,000 in annual direct and indirect irrigation benefits, and one without irrigation benefits. About one-third of the irrigation benefits are also included in recreation and fish and wildlife benefits as explained on page 31. The irrigation benefits claimed represent about 6 percent of total project benefits. We question the irrigation benefits at Elk Creek because they are based on an irrigation plan that the Bureau of Reclamation has concluded is no longer economically feasible and will not be built.

Under 43 U.S.C. 390, the Secretary of the Interior, acting through the Bureau of Reclamation, calculates irrigation benefits for proposed dams and water resource projects operated under the direction of the Secretary of the Army in the Western States. In 1966 the Bureau calculated irrigation benefits of $578,000 for the Elk Creek and Lost Creek projects, of which the Corps allocated $341,000 to Elk Creek. In 1975 the Bureau restudied the proposed irrigation plan and concluded it was not economically justified. Therefore, the Bureau informed the Corps that it could not furnish an amount for irrigation benefits for the Elk Creek project.

Subsequently, the Corps elected to show a benefit-cost analysis for Elk Creek both with and without an amount for irrigation.

Corps Portland District officials told us that they included an irrigation benefit amount in the benefit-cost analysis because irrigation is an authorized project purpose and they believe the project will have some irrigation benefits. They have not estimated the amount of the benefit, however, and acknowledged that the $341,000 figure is no longer valid.

Original estimate of irrigation benefit

The Elk Creek project's original design included a plan proposed by the Bureau of Reclamation in 1966 for diverting water stored at the Elk Creek reservoir for irrigation use in the Rogue River Basin. A principal feature of that plan was the Rogue-Elk diversion complex, near the confluence of Elk Creek and the Rogue River, which would divert water from the Rogue River and Elk Creek into a canal for downstream users. The Bureau expected to fund and construct this facility, known as the Medford Division of the Rogue River Basin Project. As of July 1965, the Bureau estimated the cost to construct the Medford Division to be $51,340,000.

The Bureau estimated that this diversion could provide $158,400 in direct irrigation benefits, plus indirect benefits to water quality, fish and wildlife, and recreation. The Corps allocated a portion of these benefits to Elk Creek as shown below.

Elk Creek Irrigation Benefits

Irrigation	$ 93,400
Fish and wildlife enhancement	32,300
Recreation	96,700
Water quality control	118,600
Total	$341,000

Irrigation benefits restudied

In November 1974 the Corps of Engineers asked the Bureau of Reclamation to review the irrigation benefits creditable to Elk Creek. In March 1975 the Assistant Regional Director of the Bureau of Reclamation's Pacific Northwest Regional Office conveyed the results of this review in a letter to the Chief, Engineering Division, Portland District Corps of Engineers:

> "Using current evaluation criteria, we have not been able to formulate an economically justified plan for the Medford Division. * * * at this time the Medford Division is not economically justified and we are unable to furnish you benefits."

The Chief of the Economics Branch of the Bureau's Pacific Northwest Region told us in January 1982 that the Bureau is still unable to provide the Corps with an irrigation benefit amount for Elk Creek because it has no economically justified irrigation plan for the project. He told us that the Bureau had no plans to build the irrigation facilities at that time.

The Elk Creek indirect irrigation benefits of $247,600 were to have occurred on Bear and Little Butte Creeks, tributaries of the Rogue River. These benefits were to result from the Medford Division supplying water to three irrigation districts in return for the release of water stored for these districts on Bear and Little Butte Creeks. The release of water from Bear and Little Butte Creeks previously held for irrigation would augment stream flows in these creeks during the low runoff season and therefore provide the fish and wildlife, recreation, and water quality benefits claimed. These indirect benefits depend on building the Rogue-Elk diversion or a similar project in order to make such an exchange of water possible. Since the Bureau no longer plans to build this project, the estimated benefits are questionable.

A 1979 analysis prepared by the Corps also questioned the irrigation benefits of Elk Creek. In January 1978 Corps headquarters asked its North Pacific Division to develop a separate (or incremental) benefit-cost analysis for Elk Creek. Previously, Elk Creek and Lost Creek were considered to be two elements of an economically and operationally inseparable project. Thus, some of the benefits (including irrigation) were divided between the two projects on a basis such as relative reservoir capacity.

Using the incremental approach, the benefits assigned to an individual reservoir consist only of the benefits that the reservoir adds to the existing system. The incremental analysis made for Elk Creek concluded that given the size and operational flexibility of Lost Creek, that project could adequately serve the functions of water supply, irrigation, fishery enhancement, and recreation. Thus, direct and indirect irrigation benefits of $341,000 attributed to Elk Creek were deleted from the Corps' North Pacific Division analysis.

AREA REDEVELOPMENT BENEFITS

The Corps estimated annual area redevelopment benefits for the project at $153,000, or about 3 percent of total project benefits. We question these benefits because after the Corps had computed them, the county where the Elk Creek project is to be constructed and a neighboring county were determined to be no longer qualified or eligible for the benefit as an inclusion in the benefit-cost calculation.

The Area Redevelopment Act of 1961 (Public Law 87-27) stated that

> "* * * some of our communities are suffering substantial and persistent unemployment and underemployment * * * that to overcome this problem the Federal Government * * * should help areas of substantial and persistent unemployment and underemployment to take effective steps in planning and financing their economic redevelopment * * *."

As a result, Senate Document No. 97 provided that, for areas designated by EDA as redevelopment areas under the act, redevelopment benefits could be included in the benefit-cost calculations for water resource projects.

When the Corps first computed the benefit in 1968, Jackson County, where Elk Creek is to be located, was designated by EDA as a redevelopment area. Since neighboring Josephine County was also EDA qualified and within reasonable commuting distance from the project site, area redevelopment benefits were also computed for this county as permitted by Senate Document No. 97.

In October 1979 the Corps recomputed the benefit based on then-current unemployment data for Jackson and Josephine Counties. It determined that the average annual employment benefits creditable to area redevelopment at the Elk Creek project were $143,000 at 1979 price levels. This figure was adjusted to $153,000 for the 1982 budget data based on the Department of Commerce's construction wage index.

The area redevelopment benefit no longer applies to the Elk Creek project. The EDA economist who determines which counties qualify told us that Jackson County has not qualified for the benefit for about 3 years because its unemployment rates have been too low relative to national unemployment rate averages. In addition, the Corps Portland District's interpretation of current standards is that only the county in which the project is constructed can be credited for the benefit. Consequently, neighboring Josephine County is no longer eligible for the benefit.

Corps Portland District economists agreed that neither county currently qualifies for a direct area redevelopment benefit for the Elk Creek project. However, they believe that some external employment benefit would be realized in project construction since some unemployed labor would be hired and other spin-off employment would result.

FISH AND WILDLIFE BENEFITS

The Corps estimated fish and wildlife benefits of $167,000 annually when benefits for irrigation were included and $135,000

without them. This represents about 3 percent of total annual project benefits when irrigation benefits are included.

While we are not questioning the fish and wildlife benefits other than those associated with irrigation, some agencies have been concerned about the possible adverse effect of the Elk Creek project on water quality and the fishery in the Rogue River. Federal and State Fish and Wildlife agencies, EPA, and others are concerned that the project may increase turbidity in the Rogue River. They believe that increased turbidity could reduce the fishery in the river, which has an estimated annual value of about $18 million. The Corps acknowledges that turbidity will be increased at times during the year. However, the Corps concluded, based on its studies, that the increase in turbidity would not have a significant impact on the fishery.

Of the $167,000, we question $37,000 because it represents benefits attributable to an irrigation diversion which will not be built, as discussed on page 30. Of the $37,000, $32,000 represents irrigation fishing benefits. The remaining $5,000 is for wildlife irrigation benefits. In addition, indications are that fishing benefits may be difficult to achieve because of factors such as competition from nearby reservoirs.

The Rogue River is internationally famous for its Chinook salmon and steelhead trout fisheries, as well as its scenic and recreation resources. It is considered to be one of the premier recreational fishing rivers in the Western United States. It is particularly noted for the clarity of its water and fly fishing for steelhead. While most who fish there come from Oregon and northern California, anglers from southern California, other Western States, and foreign countries are not uncommon.

The Rogue River is the most productive and valuable salmon and steelhead stream in Oregon. Annual anadromous fish 1/ runs are estimated at 50,000 spring Chinook, 80,000 fall Chinook, 100,000 winter steelhead, 50,000 adult summer steelhead, and 120,000 half-pounder summer steelhead. According to National Marine Fisheries Service officials, the Rogue River sport and commercial fishery is valued at about $25 million annually. According to U.S. Fish and Wildlife officials, a 1977 economic study of the Rogue River fishery estimated that recreational fishing has a total economic impact of $17.6 million annually.

1/Species of fish which are spawned and reared in fresh water streams and migrate to the ocean for their adult life. The species return to their native fresh water streams to spawn.

Controversy over predicted turbidity levels

The level of turbidity present in a stream can adversely affect recreational fishing because high levels hinder the normal eating habits of fish and therefore reduce the number of anglers.

Studies made by the California and Oregon fish and wildlife agencies in 1972-73 and 1979, respectively, showed that angler counts and efforts decrease as turbidity increases. Both studies showed a substantial decrease in angler efforts and counts when turbidity levels exceeded 5 to 8 Jackson Turbidity Units (JTUs). One study indicated that about 98 percent of the fishing efforts occurred at turbidity levels of 10 JTUs or less. The other study showed that optimum angler efforts declined rapidly at turbidities in excess of 10 JTUs. The California study was made on the Eel River and the Oregon study was made on the Rogue River.

The Corps acknowledges that the turbidity levels after construction of the Elk Creek project will be higher in the Rogue River except after storms; but it concluded, based on a 1974 turbidity study and a 1979 water quality update study, that turbidity from Elk Creek would not have an adverse impact on the Rogue River salmon and steelhead fisheries. The Corps also concluded that proper operation of the Elk Creek dam would pass the most turbid water through the basin in about 2 weeks with minimum impact.

The Corps pointed out in its December 1980 Environmental Impact Statement that flyfishing would not be impaired until the turbidity reached 10 JTUs or as high as 20 JTUs for other fishing methods. According to the Corps data, the operation of Elk Creek is expected to increase turbidity below Elk Creek during the month of August to an average of 8 JTUs during an average flow year as compared to 3 JTUs without the project. Turbidity is also predicted to increase to an average of 9 JTUs during August in high-flow years compared to 3 JTUs for the same month without the project.

The Corps also believes that in addition to being able to control turbidity at acceptable levels throughout the year, constructing and operating Elk Creek would enhance the downstream Rogue River fisheries during periods of low flow because of the potential for releasing water to increase and cool Elk Creek and the Rogue River flows. The multilevel intake tower proposed at Elk Creek would allow the Corps to control the temperature of the water to be released. The Corps believes that cool water releases during the low-flow summer months would be made possible by releasing water from the reservoir's lower level.

Portland area State and Federal fish and wildlife agency officials agreed that the cooler water is needed during the summer months. However, they indicated that if Elk Creek proves to be as turbid as they expect, the Corps' cool water releases may harm more than help. An Oregon fish and wildlife official said that various studies have shown that suspended solids settle to the bottom of an impoundment; therefore, when the cooler bottom waters are released, so are the suspended solids.

In this regard, EPA believes the incremental increase in Rogue River turbidity from operating Elk Creek would exceed the State of Oregon's water quality standards promulgated in accord with the Clean Water Act of 1977 (Public Law 95-217). While the Corps acknowledges turbidity levels will be higher than State standards, it does not believe that the impact of Elk Creek on the incremental water quality in the Rogue River will be significant. Furthermore, the Corps' legal position is that the water released from a dam is not a discharge within the meaning of the Clean Water Act of 1977. Therefore, no water quality certification is required. Consequently, the Corps does not believe that the State water quality standards apply to the Elk Creek project. However, on January 29, 1982, the U.S. District Court for the District of Columbia ruled that discharges from dams are subject to the national pollutant discharge elimination system permitting requirements (National Wildlife Federation vs. Gorsuch, Civil Action No. 79-0915).

WESTEX model

In making the 1974 and 1979 turbidity studies, the Corps used a mathematical model called WESTEX to estimate potential turbidity from the Elk Creek project. The WESTEX model is an adaptation of a basic model originally used to predict temperature. The Corps believes that the WESTEX model is the best tool currently available for simulating turbidity conditions in reservoirs.

The use of the WESTEX model has become the most controversial issue stemming from the proposed construction and operation of the Elk Creek project. Based on the results of the 1974 and 1979 studies, the Corps predicted turbidity would not be at a level or duration which would adversely affect the Rogue River fishery. However, the Corps' predictions of turbidity levels based on the WESTEX model have been criticized by State and Federal fishery agencies, EPA, and an expert from Oregon State University for a lack of documentation, methods of obtaining input data, and the source of the data used.

Even though the Corps refers to the WESTEX model as the state of the art in mathematical models, fishery and environmental agency officials and others still perceive some shortcomings. They believe the shortcomings could result in higher turbidity levels than the Corps predicted. Among these perceived shortcomings:

--The model does not have the capability to predict behavior of turbidity generated within the lake itself, to predict the precise turbidity levels or periods of increased turbidity, or to account for turbidity caused by road development and recreational use of the reservoir.

--EPA stated in a January 19, 1981, memorandum to the Corps, "We are extremely concerned that the WESTEX model has not been adequately documented nor appropriately tested. We, therefore, question the use of the WESTEX model as a basis for justifying this project."

--In response to the Corps' February 1980 Draft Environmental Impact Statement, a modeling expert from Oregon State University said, "I would like to provide a more technical evaluation of the material in the EIS. This is impossible, however, because the assumptions behind your work are poorly documented."

In response to these criticisms, the Corps pointed out that it considered the data used for input to the model to be the best available and adequate for its intended purpose and the WESTEX model to be the state of the art. Therefore, the Corps expressed the belief that turbidity from operating the Elk Creek project will not pose a significant problem to the downstream Rogue River fishery. The Corps also pointed out that its assumptions were adequately documented to allow a reasonable and knowledgeable person to reach the same or similar conclusions. According to Corps officials, all available data was provided to requestors; therefore, no additional work is planned to further document the model and the conclusions reached.

Fishery benefits may be difficult to achieve

The Corps computed project fish benefits of $130,000 based on the fishery to be developed in the Elk Creek reservoir. The number of angler days was estimated by the U.S. Fish and Wildlife Service to be 6,000 in the first year of the project, increasing to 30,000 in year 50 with a slow increase indicated for the next 50 years to a maximum of 35,000. Angler-day values of $5 per day (as established by the Fish and Wildlife Service in 1975) are applied to project use to determine the average annual benefit.

The fishery to be developed at Elk Creek will compete for anglers with other area reservoirs. The existence of numerous other-well established reservoir fisheries in the area has caused some fishery agency officials to question the benefits the Corps claimed for the Elk Creek project. The following comments were made in reference to competing reservoirs within the immediate area of the Elk Creek project.

--A fishery biologist for the Oregon Wildlife Commission reported that in his opinion the reservoir fishery benefits should be reduced to 15-20,000 angler-days a year.

--In its response to Supplement Number One to the Draft Environmental Impact Statement for Elk Creek, BLM stated that "the projected angler-use figures appear questionable, as does the fishery benefit. There are many reservoirs within easy driving distance * * *."

--The Fish and Wildlife Service computed fish benefits for Elk Creek. Subsequently, in rebutting the Corps' comments on the Elk Creek project, it stated that the Elk Creek reservoir is in an area where there are already a number of lakes and reservoirs including Crater and Fish Lakes, Applegate, Howard Prairie, Emigrant, Hyatt, and Savage reservoirs, and other smaller reservoirs.

The Chief, Fish and Wildlife, for the Corps' Portland District told us that, in his opinion, the Elk Creek reservoir will be heavily used for fishing even with the other reservoirs in the immediate area.

Fishery and environmental officials have also expressed concern about other factors, not considered in the benefit computation, that may have an adverse impact on fishery benefits. These factors included:

--The possibility of cuts in Federal funding to the State of Oregon to operate hatcheries for mitigation and enhancement. If Oregon's funds are cut, the level of reservoir fishery may be reduced below the level needed to support the level of mitigation required as compensation for destroyed habitat.

--During the early planning phase of the Elk Creek project Jackson County agreed to fund operation and maintenance of the recreation facilities. In a memorandum to the Corps dated April 11, 1980, this financial support was withdrawn. State and Federal fishery agency officials told us that any reduction in recreation facilities would mean a similar reduction in the number of visitors using the facility for fishing. As discussed on page 30, the Corps' Portland District Engineer recently announced the closing or reduced maintenance and availability of certain Corps recreation areas in Oregon and Washington.

PROJECT COSTS

The Corps estimated the cost to construct Elk Creek to be $108,754,000 for the fiscal year 1982 budget. Annual cost over the 100-year project life for interest and amortization, operation and maintenance, and other costs is estimated at $4,758,000.

Our examination of project cost identified additional costs of $65,000 annually for (1) interest on construction expenditures and (2) the acquisition of project lands and timber. These costs were not recognized in the Corps' estimate, contrary to Senate Document No. 97. Including these costs will increase the estimated total construction cost to $110,683,000 and the annual cost to $4,823,000.

Corps Portland District officials agreed that project costs should be revised for these items. They said they would consider making these revisions.

Senate Document No. 97 requires that interest on expenditures made during construction be included in the project's economic costs. The Corps' Elk Creek cost estimate includes an estimate of the interest that would accrue during the planned future construction period but does not include interest on construction expenditures already made.

The first project allotments were made in 1964 and expenditures have totaled about $9 million through the end of fiscal year 1981. However, the Corps cost estimate's only allowance for interest during construction is for the future 4-1/2-year planned construction period. The estimate includes no interest on expenditures already made from 1964 to date. The net effect of adjusting for interest on expenditures made is to increase total construction costs by $726,000 and increase annual costs by $24,000.

Elk Creek project boundaries include about 841 acres of land currently administered by BLM. The value of this land and its timber has not been adjusted for several years, even though the land had not been transferred to the Corps at the time of our review.

In accordance with Senate Document No. 97, the Corps included the appraised value of BLM lands to be transferred to the Corps in arriving at total construction cost. A value of $171,000 was set in 1972 and has not been changed since. According to the Corps Portland District's chief appraiser, area land prices have been increasing by about 10 percent a year since that time. Applying this growth rate to the 1972 value will increase it by $233,000 to $404,000. This would increase annual costs by $8,000.

The value of standing timber on the BLM land to be transferred was last adjusted in 1973 to $609,000. Based on timber prices reported in the project's 1980 Environmental Impact Statement Supplement, the current value would be about $1,579,000--an increase of $970,000. This would increase annual costs by $33,000.

In addition, it should be recognized that reducing Elk Creek's recreation benefits could also reduce project construction costs if the amount of recreation facilities to be constructed is

reduced in anticipation of a lower recreation demand as discussed on page 24.

CONCLUSIONS

The benefit-cost analysis supporting the economic feasibility of a proposed water resource project is an important factor in the congressional and agency decisionmaking process. The issues identified in this report can have a substantial impact on the benefit and cost values the Corps claimed for the Elk Creek project. The Corps should resolve the matters identified in this report and recalculate project benefits and costs accordingly so that the Congress has current information on the economic feasibility of the Elk Creek project during the appropriation process.

Most of the changes are needed because changed conditions have affected some of Elk Creek's benefits and costs. Other changes are needed because some benefits were

--based on methods involving questionable assumptions and

--not supported by complete analysis.

In addition to the need for changes in the benefit-cost factors developed by the Corps because of these issues, other issues could affect the benefit-cost ratio if they were considered in a reevaluation of the economic feasibility of Elk Creek. They include the (1) potential addition of hydropower to the project, (2) higher current values for recreation and fishing, and (3) reduction of recreation facilities.

RECOMMENDATION TO THE SECRETARY OF THE ARMY

In order to provide the Congress with current information on the economic feasibility of the Elk Creek project when funds are requested, we recommend that the Secretary of the Army require the Chief, Corps of Engineers, to reexamine the economic feasibility of the Elk Creek project and resolve the questions on project benefits and costs raised in our review.

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