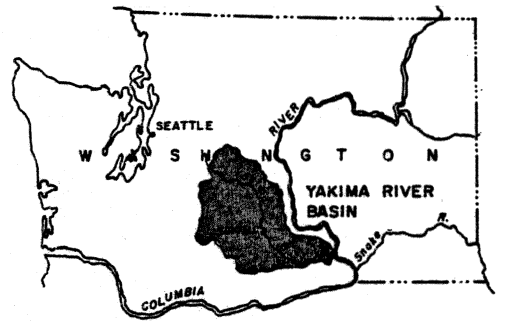


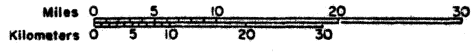
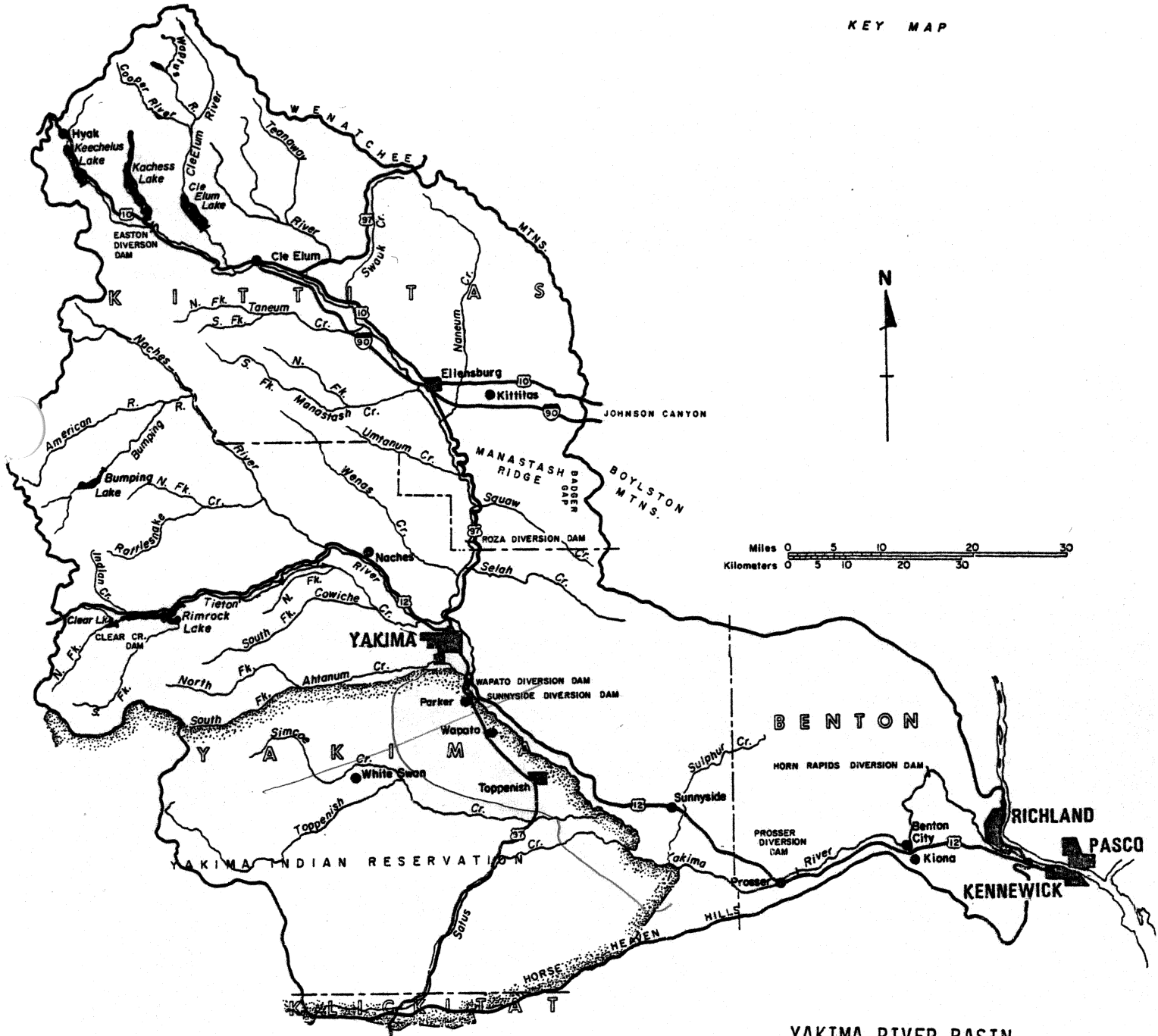
Yakima River Basin Water Enhancement Project, Washington

DRAFT
PLAN OF STUDY
PHASE 2

Bureau of Reclamation
Boise, Idaho
February 1984



KEY MAP



YAKIMA RIVER BASIN

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Yakima River Basin	Frontispiece
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INTRODUCTION

This document sets forth the plan of study for Phase 2 of the Yakima River Basin Water Enhancement Project (YRBWEP) feasibility study. The study was initiated in April 1981 and is being conducted in two phases.

Phase 1 was completed with a study team report in August 1982. The report summarized preliminary problems and needs, potential plan elements, and included a demonstration plan to indicate that the study objectives could be met by a plan which would be economically justified. The study team recommended that Phase 2 of the study proceed and specified three early action elements for implementation.

Phase 2 was initiated in November 1982 by instructions included in an October 21, 1982, letter to the study team leader from the Regional Director of the Bureau of Reclamation and Director of the Washington State Department of Ecology (DOE). The letter of instructions directs the team to proceed with Phase 2 and contains specific directions with due dates for several study tasks to be completed in the early part of Phase 2.

Phase 2 will be the feasibility level portion of the study. During Phase 2, the problems and needs will be finalized and the various plan elements retained from Phase 1 will be investigated in more detail. The Phase 2 will conclude with a recommended plan of action to resolve all or a part of the problems and needs. The results of Phase 2 will be presented in a combined planning report/environmental statement.

Study Objectives

The goal of the study is to resolve conflicts arising over water shortage conditions in the Yakima River basin by accomplishing the primary objectives, which are:

1. Provide firm water supplies to insure presently irrigated lands in the Yakima River basin receive water during times of drought

2. Provide water for new irrigation of lands on the Yakima Indian Reservation

3. Provide adequate minimum flows to attain adequate water quality and to protect fisheries, wildlife, and esthetic values and to enhance recreational opportunities

4. Develop a comprehensive plan to enable efficient management of the basin's water supply

In addition to meeting these primary objectives, the study will address the needs and opportunities for such water and land related functions as municipal and industrial water supply, water quality, hydroelectric power, flood control, and recreation. These functions will be incorporated as plan elements insofar as they are viable in terms of study objectives.

The study will examine the feasibility of (1) structural solutions and (2) nonstructural solutions including changes in the legal-institutional framework.

Previous Investigations and Events Leading to Study Authorization

Prior investigation of water and land resources within the Yakima River basin are extensive, covering in detail a broad range of subjects over a long time. Of particular value to this study effort is the "Yakima Basin Level B Study" feasibility report and the "Bumping Lake Enlargement Final Environmental Statement;" investigations in the basin under the "Yakima Valley Water Management Study;" a review of the "Yakima Project Water Rights and Related Data;" and numerous other technical, social, and institutional studies. An annotated bibliography of some of the more significant studies were prepared in Phase 1.

The Yakima Valley has had water supply problems since about the turn of the century. Facilities of the Federal Yakima Project were constructed in response to water supply needs. Even with the development of the project, increasing demands on water supply and changing priorities have continued to make water needs a pressing issue. For the past 35 years the Bureau of Reclamation and others have recognized the need for additional water supplies and have identified and evaluated many potential actions that would improve availability of water. The seriousness of the valley's water supply conditions has been underscored by drought in 1973 and 1977 and system operation problems in 1979. Conflicts arising as a result of the inadequate water supply and competing needs led to initiation of litigation by a variety of interests in the valley.

The continuing water supply problems, increasing pressure and demands on existing water supplies, and the magnitude of costs and time required to litigate led the State of Washington to initiate a comprehensive effort to solve the basin's water problems. Working from the beginning with the Yakima Indian Nation (YIN), the State conceived the YRBWEP with the purpose of resolving conflicts caused by water shortage conditions and finding alternatives to litigation.

In 1979 the DOE received authorization from the State legislature to enter into an agreement with the United States for conduct of the YRBWEP feasibility study. Substitute Senate bill 2504, chapter 263, laws of 1979, First Extraordinary Session of the State legislature also provided \$500,000 as "up front" to help fund the study.

Authority for Study

The YRBWEP feasibility study, whose primary sponsor is the State of Washington, was authorized and approved by Public Law 96-162 on December 28,

1979. This legislation authorized the Secretary of the Interior to conduct a feasibility study of the YRBWEP and accept monies from the State of Washington to assist with study funding. The State's goal is to present a report through Reclamation for congressional consideration to authorize recommended measures. The State's serious interest in the study is shown by its appropriation of \$500,000 to initiate and aid in study funding. As a result, the State and Reclamation entered into an agreement covering the conduct of the study and transfer of State funds.

Description of Study Area

The Yakima River basin encompasses about 6,100 square miles. It is located in south-central Washington including Kittitas County and portions of Yakima, Benton, and Klickitat Counties. The frontispiece is a map of the Yakima River basin.

The western, forested third of the basin reaches to the crest of the Cascade Range. It is the most rugged part of the basin and provides 90 percent of the annual runoff that comes primarily from snowpack. A large portion of the annual precipitation is received during the late fall, winter, and early spring months. The eastern portion of the basin is arid to semiarid. The cultivated areas of the basin located here are made productive by irrigation. Rangeland generally lies between the cultivated areas and the forested areas and usually receives sufficient precipitation to accommodate summer range for livestock grazing.

The Yakima River and its tributaries are the primary sources for surface water in the basin. From its headwaters, the river flows 216 miles southeast past the city of Yakima and through the lower valley to the Columbia River at Richland. A series of reservoirs on the Yakima River and

its tributaries, along with a complex system of diversions and canals, provide water to about one-half million irrigated acres. Irrigation accounts for approximately 98 percent of all water use in the basin and comprises the primary economic base in the basin. The Yakima River and its tributaries historically provided significant spawning and rearing habitat for anadromous fish. Natural streamflow conditions prevail only in the upper uncontrolled reaches of the Yakima River system because of the storage system development and extensive use of water for irrigation.

The project study area is basically confined to the river basin boundaries (see frontispiece map). However, problems and needs and effects of plans are often not confined to the basin and must be considered in a broader context. Most needs and effects resulting from plans to meet these needs are of local and regional significance. National problems and needs that can be partially satisfied by development at the local level are considered.

Current Activities

Activities and studies that could affect the YRBWEP study are listed below.

1. Pacific Northwest Power Planning Council, Fish and Wildlife Program, section 900--The council will address several potential actions that will have an impact within the Yakima basin including:
 - a. Construction of fish enhancement and protection facilities
 - b. Recommendations for minimum and optimum instream flows
 - c. Recommendations for additional storage reservoirs to meet instream flow requirements
 - d. Determination of conservation measures for improvement of water management practices

2. U.S. Department of Agriculture, Soil Conservation Service, Yakima Cooperative River Basin Study--The Soil Conservation Service addresses several areas of interest including:

- a. Ongoing inventory and monitoring activities
- b. Land management practices
- c. Control of soil erosion problems on irrigated cropland and forest lands

3. Washington State Department of Ecology, Water Right Adjudication Program

4. Yakima Basin Joint Board activities--The primary objective of the board is to develop hydroelectric power. The organization consists of several irrigation districts, cities of Yakima and Ellensburg, and two public utility districts.

At the present time, several entities are in the process of studying development of power generating facilities at existing storage and diversion dams, sites on canals, and sites along the Yakima River and its tributaries. The Federal Energy Regulatory Commission (FERC) has issued study permits on most of the sites, and applications for licensing are being prepared on several.

Development of hydroelectric power by these entities has the potential for impacting YRBWEP relative to water rights, water supply, future operations, and operational flexibility. The repayment of YRBWEP costs and economic justification could also be affected.

5. Current litigation and court actions--Several recent court actions have resulted in changes in the existing Yakima Project operations and utilization of water supplies. Additional court actions which could affect the YRBWEP study are possible.

PROBLEMS AND OPPORTUNITIES

The following problems and opportunities are taken from the Phase 1 report. Quantification is likely to change in Phase 2. Supplemental irrigation and instream flow opportunities are the areas most likely to undergo significant change.

The problems and opportunities addressed in this study were identified from previous studies, reviewed in newsletters sent to the public, and confirmed at public meetings and by written comments in response to newsletters. Additional detail and quantification of opportunities were obtained through discussions with basin residents; contact with appropriate Federal, State, and local agencies; and limited fieldwork.

Water Shortage on Presently Irrigated Lands

At present, about 550,000 acres of land are irrigated in the Yakima River basin. Of this total irrigated acreage, about 190,000 acres with proratable water rights and about 20,000 acres of other lands are short of water in varying degrees during dry periods.

The estimate of the need for supplemental irrigation is dependent on the definition of a full water supply and what shortages would be acceptable. In Phase 1 the full water supply is defined as the existing or recognized entitlements and water rights in the basin. The State of Washington is at present conducting an adjudication of water rights and may adjudicate water on the basis of beneficial use. In some cases, there is indication that existing entitlements exceed beneficial use. If so, the adjudicated water rights in the future could be less than existing entitlements. The acceptable shortage definition used for Phase 1 is based on what would be economically tolerable for general crops. The Yakima basin, however, includes

many specialty crops, so in Phase 2, a detailed examination would be made to determine economically tolerable shortages based on actual cropping patterns.

On the basis of the foregoing definitions, it was determined that there is a need for an estimated 150,000 to 200,000 acre-feet of storage to reduce shortages to an acceptable level. A change in these definitions is likely and could lead to a greatly altered estimate of the need for supplemental irrigation water.

New Irrigation Development on the Yakima Indian Reservation

The YIN is interested in protecting its claims to diversionary water rights and developing new irrigation on the Yakima Indian Reservation. Development of about 36,000 acres is being considered in this study, of which some 24,000 acres are presently drylands. An estimated 200,000 acre-feet of storage would be needed to meet these demands.

Anadromous Fishery

Anadromous fish populations in the Yakima basin have declined. Today, annual spawning runs, including spring chinook, fall chinook, coho salmon, and steelhead trout, are estimated at 2,000 fish. Steelhead trout account for about one-half of the population, spring chinook account for about one-fourth of the population, and the remainder is composed of fall chinook and coho salmon. The primary reasons for the decline and continued low populations are inadequate instream flows at times and excessive flows at other times in the Yakima River and tributaries. Minimum and optimum instream flow needs for fishery enhancement were identified for various stream reaches. These preliminary recommendations were developed in cooperation with Federal and State fish and wildlife agencies and are

based on existing data and professional judgments. The daily average minimum and optimum flow recommendations for various stream reaches are shown in table 1.

Table 1.--Recommended Daily Average Minimum and Optimum Instream Flows (Listed in Approximate Order Going Downstream)

Stream Reach	Minimum Flow	Optimum Flow
	ft^3/s	ft^3/s
Yakima River near Martin	50	100
Kachess River near Easton	30	90
Yakima River near Easton	150	285
Cle Elum River near Roslyn	95	280
Teanaway River below Forks ^{1/}	65	125
Yakima River at Cle Elum	210 ^{2/}	625
Yakima River near Umtanum	250	730
Bumping River ^{1/}	60 ^{3/}	120 ^{3/}
Little Naches River ^{1/}	30	90
Rattlesnake Creek ^{1/}	15	45
Naches River above Tieton River confluence	120	365
Tieton River below Tieton Diversion Dam	55	170
Naches River below Tieton River confluence	180	530
Yakima River at Parker	400	1,355
Yakima River at Prosser	560	1,680
Yakima River at Kiona	560 ^{4/}	1,680

^{1/} Can be provided only if storage is constructed on the drainage

^{2/} 400 ft^3/s from October 15 to March 1

^{3/} Without enlargement of Bumping Lake the flows would be 30 ft^3/s minimum and 90 ft^3/s optimum.

^{4/} From April 15 to June 30 and October 1 to November 15 the minimum flow would be 1,200 ft^3/s .

The storage required to meet the minimum recommendations totals 300,000 acre-feet. Approximately 450,000 acre-feet of storage could provide instream flows midway between minimum and optimum recommendations for about three-fourths of the time. The amount of storage needed to provide flows midway between minimums and optimums all of the time or for optimum flows all of the time would be much greater and was not calculated.

Other problems include high fishing pressure; poor, lacking, or improperly maintained fish passage facilities; and unscreened or inadequately screened diversions. If minimum instream flow needs and adequate fish passage and protective facility needs are met in the basin, it is estimated that an annual spawning run of 68,000 fish could be realized. Spawning runs of about 100,000 could be expected if enhanced flows (flows midway between recommended minimums and maximums for about three-fourths of the time) were substituted for minimum flows. Annual addition of about 715,000 pounds of hatchery produced smolts to the Yakima River system combined with enhanced flows and fish passage facilities would provide a potential spawning run of 138,000 fish. Total harvest, including sport, Indian, and commercial fisheries, would be 2.6 million pounds for 68,000 spawners, 3.7 million pounds for 100,000 spawners, and 5.1 million pounds for 138,000 spawners.

Resident Fishery

The resident fishery of the basin generally is considered poor. Present conditions are largely the result of inadequate instream flows to maintain game fish and aquatic invertebrate populations. Other factors include large fluctuations of flows below reservoirs and diversions, very low drafts and lack of minimum pools in some reservoirs, degraded water quality, and unscreened diversions.

Hydroelectric Power

Although projections of the growth rate in electric power demand have declined, power deficits continue to be predicted for the Pacific Northwest power system in the 1990's and beyond. Also, power self-sufficiency continues to be a national objective. A need exists to develop renewable resource

power facilities, such as hydroelectric powerplants, especially where environmental effects would be minimal.

Municipal and Industrial Water Supply

Water supplies for all communities in the basin, except for the city of Yakima, are considered adequate for the present and estimated future expansions. In Yakima the existing supply is considered adequate to meet a present average daily demand of 9,960,000 gallons but too small to meet future growth. By 1990, municipal and industrial requirements of Yakima are expected to surpass the existing supply and capacity of the system. The increase in average daily water use above 1980 levels is projected to be 1,100,000 gallons in 1990, 2,440,000 gallons in 2000, and 4,520,000 gallons in 2010. An additional water supply of about 3,400,000 gallons per day would be needed to meet 2010 needs.

During low flow periods the city of Yakima is unable to divert its full water right because of physical limitations. This problem can be solved by maintaining sufficient instream flows for use of present facilities or by redesigning new facilities capable of diverting the full water right at lower flows.

Flood Control

Average annual flood damages in the Yakima basin are estimated by the Corps of Engineers at \$3,888,000 and occur primarily in the low lying lands below Yakima (see table 2). Cost-effective methods of reducing flood losses are needed.

Table 2.--Average Annual Flood Damages Anticipated
in the Yakima River Basin

River Reach	Damages <i>dollars</i>
Easton to Thrall (Ellensburg)	192,000
Thrall to Selah Gap (Selah)	28,000
Selah Gap to Union Gap (Yakima, Union Gap)	2,220,000
Union Gap to Mabton	640,000
Mabton to Columbia River (Benton City, Richland, and West Richland)	112,000
Teanaway River Valley	132,000
Naches River Valley	282,000
Ahtanum Creek Valley	42,000
Toppenish Creek Valley	120,000
Satus Creek Valley	120,000
Total	3,888,000

Water Quality

Water quality in the lower reaches of the Yakima River and tributaries is severely degraded. Standards and recommendations set for acceptable levels of fecal coliform, temperature, turbidity, nitrates, and orthophosphates are exceeded at times in all reaches of the river below the towns of Cle Elum and Naches. The most severely affected reaches are below Sunnyside Dam where recommendations and standards on dissolved oxygen, nitrites, and ammonia concentrations cannot be met. Nonpoint source pollution appears to be the major factor causing reduced water quality.

There is a need to improve agricultural practices and water management to reduce pollution from agricultural sources. In addition, the treatment plants at Prosser, Snoqualmie Pass, West Richland, Ronald, and Roslyn need to be improved to meet 1983 effluent limitations.

Wildlife

The most significant wildlife problem is the loss of habitat. While irrigation originally increased habitat for pheasants and Hungarian partridges

and some other species, urban and suburban growth and intensive farming practices have reduced the amount and value of that habitat. Also, improvements in irrigation systems in recent years which are intended to conserve water have further depleted habitat by reducing canal seepage and waste water that supported riparian vegetation. Large canals can also affect wildlife by blocking migration. Attempts to cross canals can result in injury or the death of the animals.

In addition to these general problems, the water supply for the Toppenish National Wildlife Refuge is inadequate and needs to be supplemented.

The primary wildlife need in the basin is to protect and preserve existing habitat. Also, enhancement of existing habitat where possible would be desirable.

Recreation

Although the recreational resources of the Yakima basin are extensive, the demands on the resource are also large because of proximity to the Puget Sound metropolitan area. Projections show recreation demand will increase 28 percent in the next 20 years. A demand of this magnitude would indicate a need for a substantial increase in campsites, picnic tables, and boat launch lanes.

New Irrigation Development of Nonreservation Lands

An extension of the existing Kennewick Division has been identified as a potential for new land development. The Kennewick Irrigation District is independently studying the development of lands located between Benton City and Richland.

There are other tracts throughout the basin that may have irrigation development potential, but their scattered nature and location makes many of

these lands unsuitable for project-type development because of water supply and economic considerations. The need for new irrigation off the Yakima Indian Reservation will be further evaluated in Phase 2.

RESOURCE AVAILABILITY

In the Yakima basin there are sufficient undeveloped water resources to provide for all existing and future needs. However, with the present storage system and the present institutional constraints, irrigation needs are not fully met about 30 percent of the time, and instream fish flows are inadequate in some reaches most of the year. Additional storage is required to provide supplemental irrigation supplies for approximately 210,000 acres and to fill instream flow needs.

During Phase 1 of this study, a minimum of 450,000 acre-feet of new storage was estimated to meet irrigation needs and minimum flow recommendations. Further, an additional 150,000 acre-feet (a total of 600,000 acre-feet) was estimated to meet both supplemental irrigation needs and an enhanced level of fish flows halfway between minimum and optimum 75 percent of the time. Some new storage is needed on the Naches drainage to meet instream flow recommendations. Although all new storage development could be made in the Naches drainage to meet identified needs, some additional development on the upper drainage of the Yakima River would permit greater operational flexibility.

The effects of improved system operation as a result of the proposed East Selah reregulating reservoir and conservation measures (both improvements to conveyance system and onfarm use) would reduce the required new storage by improving the use of present supplies. However, as was shown

during Phase 1, these alone do not fulfill all irrigation and instream flow needs.

Institutional changes including adjudication or reallocation of water supplies or waterbanking could improve water resource management use but would not provide any additional water supplies.

New irrigation development on the Yakima Indian Reservation could be served from storage developed in any part of the basin upstream from the reservation or by development of storage on the reservation. From examination in Phase 1, development of about 200,000 acre-feet of storage within the reservation would provide an adequate supply for about 36,000 acres. The potential for ground-water development to meet irrigation needs on the reservation is limited and is not capable of meeting the needs entirely. Integrated use of ground water and storage would increase the amount of land that could be served from reservation resources. Development of new irrigation on the reservation would not conflict with other study objectives related to instream flow improvement and supplemental irrigation water.

Additional water resource development may also be made available for hydroelectric generation, wildlife and resident fishery enhancement, recreational use, and municipal and industrial water supply. Resource development elements may also be used to facilitate flood control measures. However, constraints on availability of water supplies will not permit full resolution of all water-related needs in the basin.

STUDY APPROACH AND SPECIAL PROBLEMS

Study Approach

Type of Study

The YRBWEP study is a feasibility level investigation which will result in a combined planning report/environmental statement. The document would

be prepared for presentation to Congress for their consideration to authorize and fund any new Reclamation features and/or other measures in the Yakima basin.

The State of Washington would also use the document for legislature consideration in participation in the implementation of features or measures of YRBWEP.

The document would serve as the vehicle for compliance with the National Environmental Policy Act (NEPA) and with State environmental policy.

Study Partner

The State of Washington is represented by the DOE staff member assigned to work full-time with the study team. Other personnel will be assigned by DOE for specific tasks as needed.

The State contributed \$500,000 to help fund the YRBWEP study and will be involved in the decisionmaking process on the YRBWEP study. The State indicates they intend to provide cost-sharing funds to facilitate implementation of YRBWEP measures.

Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies

The study will generally be done in conformance with the Principles and Guidelines. The first analysis will be a pure analysis under the Principles and Guidelines. Subsequent analyses will incorporate customized procedures for evaluation of irrigation benefits.

Benefits for instream flow enhancement will be based on the increased anadromous fishery. Benefit values will be based on the currently accepted sports and commercial anadromous fishery benefits identified by the National Marine Fisheries Service (NMFS) and agreed to by the Bureau of Reclamation. A sensitivity analysis may be made using a higher set of values recommended

by NMFS but not yet concurred in by the Bureau of Reclamation. In the irrigation benefit analysis, fruit crops such as apples, pears, and grapes will be treated as basic crops for new land development evaluation on the Yakima Indian Reservation. This addition to the list of basic crops is in compliance with section III of the Principles and Guidelines. However, customized procedures relating to the use of interest rates and debt-equity relationships as set forth in accepted payment capacity determination procedures will be used in the farm budget analysis for determining irrigation benefits. In addition, the operator and family labor and management return will be treated as benefits to both new land irrigation development and supplemental irrigation water supplies. Customized procedures will appropriately reflect interest costs existing in the agricultural community and will also reflect benefits that would accrue due to a reduction of unemployment or underemployment for a labor force that is highly immobile and where there has been a historically high level of unemployment.

Regional development and social well-being benefits will be quantified. Monetary and nonmonetary regional development and social well-being benefits will be used in the formulation and overall justification of reservation resource development.

Secretarial exemption may be necessary if the resource development on the reservation that best meets the tribe's needs does not conform to maximization of national economic development benefits or does not result in a positive benefit-cost ratio but has positive nonmonetary social and environmental benefits that offset the benefit deficit.

Public Involvement

The public involvement plan up through December 1983 is in Appendix A. The public involvement plan through fiscal year 1985 will be written in the

fall of 1983. The public involvement plan addresses four study objectives: storage site reevaluation, water requirements, water conservation, and instream flows. Some common elements for public involvement in 1983 include:

1. Several newsletters and fact sheets designed to provide information and elicit feedback from the public will be prepared.
2. Public advisory groups for water conservation and instream flows will be formed. The life of the advisory groups will be of limited duration, not past December 1983, and their recommendations will not be binding on decisionmakers.
3. No large scale public meetings are planned. Meetings will be held with cooperating agencies and with public groups at their request.
4. Key decisions will be released through newsletters and press releases.

Alternative Plans

Potential exists for many alternative plans to be considered in plan formulation. The only plan that is sure at present for consideration is the future without plan. Although exact plans that will be considered cannot be stated with certainty at this time, some of the elements likely to be included in a final plan are:

1. The East Selah reregulating reservoir was identified in Phase 1 for early implementation. It will probably be constructed and be part of any plan.
2. Fish passage and protective facilities were recommended for early implementation in Phase 1. A multiagency group is now preparing a list of facilities for construction or improvement along with a schedule for implementation. These facilities will be part of any plan.

3. Instream flows recommended for the upper Naches River cannot be met without construction of storage high on that arm. Bumping Lake enlargement or the Horsetail site are likely to be included in any plan.

4. Establishment of recommended minimum, optimum, and maximum instream flows are likely for any plan.

5. Phase 1 studies indicated that opportunity exists to conserve water in the basin. The amount of water that can reasonably be conserved based on economic and environmental considerations has not been quantified. The types of conservation measures most likely to be pursued have not been identified to date. Water conservation is likely, however, to be included in any final plan.

6. Supplemental irrigation water supply was shown to be a definite need during Phase 1. Development of water for supplemental irrigation in times of drought is likely to be part of any recommended plan. The method or methods for developing the needed water has not yet been determined.

Special Problems

Following is a list of potential problems which may affect the study progress, including matters for which a study approach cannot be readily defined.

1. Yakima Indian Nation--Development plans and direction need to be provided by the tribe, within the Phase 2 schedule, in order for the assessment of onreservation reservoir sites to be completed in time.

2. Instream flow requirements--The current schedule for completing the "instream flow recommendations" are based on the study team receiving data, information, and specific investigation results from the Bureau of Indian Affairs (BIA) and others. If the information is not released as scheduled, this element of the study will be delayed.

3. Early action items--Some of the early action items specified by the directors as part of Phase 2, such as the East Selah reregulating reservoir and the fish improvement facilities, are dependent on passage of State and Federal legislation for implementation.

4. Controversial sites--Bumping Lake enlargement and the Forks site have drawn considerable opposition from individuals and organized groups who represent interests in lands within or adjacent to the sites. The study team will attempt to recognize and consider the social and political pressure generated in opposition to these sites while, at the same time, assessing all factors and comparing all proposed sites in an impartial manner.

5. Timing for completion of Phase 2 studies--The study team recognizes the desire of the public, Federal and State legislatures, and various interests and groups to minimize the time frame needed for completion of the Phase 2 investigation. The team is also aware that the letter of instructions issued by the two directors contained early action items and short time frames for specific tasks to be accomplished during Phase 2. Therefore, it is the intent of the study team to streamline the Phase 2 process in every way possible. Schedules will be shortened and unneeded procedures eliminated for specific tasks and elements whenever it is found that these measures can be accomplished. Consulting services will be used whenever delays can be avoided by doing so.

The schedules, time frames, and procedures contained in this plan of study are subject to being shortened and streamlined at any time during the study.

TECHNICAL ANALYSIS

Economics

Data Gathering

Irrigation.--Farm budgets will be developed using standard Reclamation procedures. Existing data for developing the budgets will be updated based on current conditions in the Yakima River basin. The budgets will represent general and specialty crops grown in the area and will be tailored to represent local conditions in various areas of the basin.

Prevailing crop distribution will be based on annual crop reports. Additional data on drylands will be gathered from local sources.

Anadromous Fishery.--Determination of returning spawners (escapement) for instream flow levels will be estimated in cooperation with the NMFS, U.S. Fish and Wildlife Service (FWS), BIA, YIN, and Reclamation. The instream flow requirements and estimated production levels of the anadromous fishery will be reviewed by an independent consultant as a means of obtaining acceptance of instream flow requirements by different segments of the community.

Current benefits for the sport fishery are \$51 per angler-day for freshwater anadromous fishing and \$60 per angler-day for ocean anadromous fishing. The commercial value is computed by multiplying the estimated commercial harvest by the value per pound. The commercial value will be updated to reflect current dockside prices. Table 3 summarizes the benefit values by species.

The Bureau of Reclamation currently has a contract with Philip A. Meyer to reevaluate anadromous fishery benefits. The report is due in June 1983.

The current benefits values will be modified following favorable review and acceptance of updated values.

Table 3.--Multipliers for Evaluating Escapement Using \$60 Per Angler-day Value for Saltwater (Reference 1) and \$51 Per Angler-day in Freshwater (Reference 2) for Sport Fishing and 1977 Commercial Dockside Values

Item		Species				
		Spring Chinook	Fall Chinook	Coho	Winter Steelhead	Summer Steelhead
<i>Multiply the Values Below by Escapement (Reference 3)</i>						
Ratio of total harvest in commercial catch	(A)	0.94	4.76	4.98	0.06	0.33
Commercial pounds		13.16	66.70	29.86	0.62	3.30
Commercial value (value per pound)		\$23.03 (\$1.75)	\$114.80 (\$1.72)	\$32.25 (\$1.08)	\$0.51 (\$0.82)	\$2.74 (\$0.83)
Ratio of total harvest in sport catch	(B)	1.06	1.24	2.02	0.54	1.17
Sport angler-days ^{1/}		5.30	1.73	2.83	2.42	5.27
Angler-days per fish		5.	1.4	1.4	4.5	4.5
Sport value		\$271.20	\$103.75	\$167.73	\$123.52	\$268.52
Combined sport and commercial value	(D)	\$294.23	\$218.55	\$199.98	\$124.03	\$271.26
Escapement	(C)	1	1	1	1	1
Estimated total population = A + B + C; total annual value = C x D						

^{1/} Number of angler-days required to catch amount of fish in (B) above

References

1. Pacific Fishery Management Council, 1978. Final Environmental Impact Statement and Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California. Commencing in 1978. 157 pages.
2. Charbonneau, John J., Michael H. Hay. 1978. Determinants and Economic Values of Hunting and Fishing. U.S. Fish and Wildlife Service, Washington, D.C. 18 pages. To be published in proceedings of 43d North American Wildlife and Natural Resource Conference of March 1978.
3. Tuttle, Merritt, E., Jack A. Richards, Roy J. Wahle. 1975. Partial Net Economic Values for Salmon and Steelhead for the Columbia River System. U.S. Department of Commerce, National Oceanic Atmospheric Administration, National Marine Fisheries Service, Pro. Rep. 22 pages (being revised)

Recreation.--Data for recreation will be provided by regional office personnel (see sections dealing with recreation and fish and wildlife).

Hydroelectric Power.--Basic data for use in the hydroelectric power analysis will be developed (see hydrology section). Benefit values will be provided by FERC.

Municipal and Industrial Water Supply.--Data on the amount of water to be supplied for municipal and industrial use will be developed (see hydrology section).

Flood Control.--Data on flood control benefits will be supplied by the Corps of Engineers and will be compiled in accordance with their guidelines.

Data Analysis

Irrigation.--Analysis of the potential for new irrigation development will be confined to the Yakima Indian Reservation. Some portions of the land resource are suitable for the production of highly specialized crops such as apples, pears, and vineyards. Some of the lands are suitable for both general crops and the more highly specialized fruit crops, and a relatively small proportion of the potential new land development is suitable for general crops only. Constraints on land use are attributable to topography, size and shape of irrigable tracts, and climatic factors associated with air drainage conditions.

Monetary benefits will be based on representative farm budgets for both general field crops and for fruit crops. Two farm budgets, one that represents general field crops and one that represents specialty fruit crops, will be used in estimating irrigation benefits. The fruit budget will be treated as a basic crop for new land development evaluation on the Yakima Indian Reservation. Addition of fruit to the list of basic crops for new irrigation development is in compliance with section III of the Principles and Guidelines.

Land use of present drylands will continue to be marginal spring and fall grazing in the future, with or without a project.

The use of lands in need of supplemental irrigation water supply is expected to be the same in the future, with or without a project. Because fruit growers requiring supplemental irrigation water generally produce only fruit, irrigation water would not be readily available for orchards and vineyards at the expense of field crops during a drought period unless institutional and legal actions are taken to permit a transfer of water supplies among irrigation districts.

Irrigation benefits for a supplemental irrigation water supply will be estimated by analyzing the net income for an adequate water supply on an acre-foot basis. The quantity of supplemental water multiplied by the per acre-foot benefit will provide the sum of the supplemental irrigation benefits attributable to development. The same farm budgets used in estimating benefits for new irrigation development will be used in estimating per acre-foot benefits for supplemental irrigation. A more exact evaluation of net income (difference in net income between the future without and future with condition) will be determined subsequent to the plan formulation phase for use in economic justification of the potential plans. The base analysis for irrigation benefits will be in accordance with the Principles and Guidelines.

Customized procedures relating to the use of interest rates and debt-equity relationships as set forth in accepted payment capacity determination procedures will be used in the farm budget analysis for determining irrigation benefits. In addition, the operator and family labor and management return will be treated as benefits to both new land irrigation development and supplemental irrigation water supplies.

Monetary and nonmonetary regional development benefits will be quantified and used in the formulation and overall justification of reservation resource development.

Payment capacity determination will be completed for plan formulation. The methodology will follow accepted Bureau of Reclamation procedures. The basis for payment capacity will be determined by the prevailing crop distribution anticipated for each major area.

Anadromous Fishery.--Benefits for instream flow enhancement will be based on the increased anadromous fishery. Benefit values will be based on the currently accepted sport and commercial benefits that have been identified by NMFS and agreed to by Reclamation. The commercial value is computed by multiplying the estimated commercial harvest by the value per pound. The sport and commercial values are combined into a multiplier value for evaluating benefits per returning spawner (escapement) by species.

Recreation.--Recreation benefits for the study will be determined using current unit-day values. The estimate of recreational user-days of water-oriented recreational activities will be based on the capacity of newly developed facilities and will recognize distance from population, accessibility, dispersed recreational use opportunities, and location relative to other recreational opportunities.

Resident fishery and wildlife enhancement benefits will be determined in cooperation with FWS and Washington State Department of Game. User-days for resident fishery and wildlife enhancement will be provided by FWS and Washington Department of Game; Reclamation will apply user-day values and incorporate any user buildup into the economic analysis.

Hydroelectric Power.--Determination of hydroelectric power benefits will be done in conformance with the Principles and Guidelines. Benefits will reflect Federal financing. The cost allocated to the power function will be payable in full in accordance with departmental policy.

Municipal and Industrial Water Supply.--Benefit analysis, account displays, and financial analysis of municipal and industrial benefits will be based on non-Federal construction since that is the most likely alternative.

The Water Supply Act of 1958 will be applied. Costs for unused storage capacity (up to 30 percent of the total project cost) can be deferred for up to 10 years provided that all costs are repaid within the standard 50-year repayment period.

Flood Control.--Benefits will be determined in cooperation with the Corps of Engineers and will be consistent with directives provided in the Principles and Guidelines.

Engineering

Data Gathering

Cost Estimates.--Existing data will be used for appraisal grade estimates during plan formulation. Cost estimates for some of the alternatives at selected damsites were developed by the Engineering and Research (E&R) Center for one size facility. Previous feasibility cost estimates at several damsites were revised using unit prices from E&R Center estimates. These cost estimates will be used as a basis for developing cost curves.

More detailed data will be gathered for E&R Center cost estimates following plan formulation. The more detailed data will include such information as surface mapping, geologic mapping, subsurface geologic conditions, and inflow design floods.

Data on land values for various land types and land use area will be collected for estimating right-of-way costs.

Field inspections of reservoirs and other major facility sites will be made to obtain data on improvements and relocation cost estimates.

Mapping.--Geological Survey (GS) 7-1/2-minute quads are available for mapping during plan formulation. More detailed mapping is available for some sites for which previous feasibility investigations have been made. Detailed mapping will be accomplished for features carried past plan formulation. Aerial mapping will be contracted for by the regional office for most sites. In areas where surface surveys are needed to supplement aerial mapping, the surveys will be performed by regional office staff.

Geology.--No subsurface exploration will be done prior to plan formulation, except for the Forks site on the Teanaway River. Geologic mapping and subsurface investigations will be required at several of the damsites if they are retained for feasibility level studies. The geologic investigation program is identified in a separate document.

Water Conservation.--Main stream diversion records are available from the Yakima Project office, Yakima, Washington. Records for off-farm deliveries are available from the larger irrigation districts. Irrigation district records will be examined to identify areas of high water loss, and those areas will be examined by ground observation. If proposals for canal lining of high loss areas are recommended from plan formulation, infiltration and ground-water movement studies will be carried out.

Existing irrigation records will be examined to determine operational waste. Where the potential for improving system operations to reduce operational waste exists, improvements such as more or improved control structures will be identified.

A water conservation study was completed in April 1981 on selected pump areas of the Roza Irrigation District. The study shows a construction program can be justified with only energy saved and reduced operation and maintenance costs. This study shows a potential for reducing energy consumption in some areas up to 30 percent.

Data Analysis

Cost Estimates.--Cost estimates prepared during plan formulation will be appraisal grade. Cost curves will be prepared for the various storage sites. The cost curves will compare cost versus storage and will be used for screening purposes and formulation.

After the plan formulation working document is completed, feasibility estimates will be prepared for the features to be presented in detail in the Regional Director's proposed report. Major features will be designed and cost estimates prepared by the E&R Center. All other project facilities costs will be estimated in the regional office.

Mapping.--Mapping for the various damsites and other features will use existing mapping for plan formulation. Detailed mapping will be obtained for features which will be studied beyond plan formulation.

Geology.--Existing geologic data will be used for design and cost estimates for formulation. New geologic mapping and subsurface exploration will be obtained for designs that do not presently have sufficient information and are carried beyond plan formulation.

Water Conservation.--Water conservation measures to be studied under this investigation are as follows: (1) replacing existing open ditch laterals with pipe lateral systems, (2) lining canals and laterals, (3) installing more control facilities for better water management, (4) irrigation management services, and (5) ground-water recharge.

Hydrology

Data Gathering

Water Conservation.--The irrigated acreage for each diversion will be measured from aerial photographs (1/24000 U2 overflights) by planimetry. The gross area will be adjusted for roads, homesteads, canals, and other areas not cropped. Correction factors for various areas will be determined by measuring irrigated land on larger scale photographs. The larger scale photographs will sample all irrigated areas. Measuring work will be done by a combination of Reclamation, DOE, and Agriculture Stabilization and Conservation Service personnel.

Diversion and return flow records are available from the Federal Yakima Project office. Much of the data is on computer files and can be manipulated through computer programs.

A team from the regional office Water, Power, and Lands Division examined Sunnyside, Roza, Kittitas, and Wapato Irrigation Districts. They will prepare a report on conveyance efficiency and potential improvements to the conveyance and operation system.

The Soil Conservation Service (SCS) and DOE are now developing onfarm efficiencies data. They will also identify efficiencies of irrigation systems outside the Yakima Project.

Cropping patterns for developing consumptive use information are available from Federal crop reports. Future cropping patterns are being estimated by irrigation district officials. Climatological information is available from the National Weather Service for several stations within the basin.

Municipal and Industrial Water Supply.--The city of Yakima planning department will be contacted to confirm their future need for surface water.

Waterbank.--Cropping patterns will be obtained from Federal crop reports. The Yakima River basin monthly planning model will be used to simulate present and future conditions to determine areas that suffer shortage and the frequency of the shortages.

Operations Studies.--All the data needed to run the operations model for present conditions now exists. Data for new reservoirs will be obtained from design information. Changes in diversions due to water conservation, changed water duties, instream flows, or anticipated future conditions will be derived from studies relevant to those factors. Changes in return flows will be based on available technical information and professional judgment.

Flood Studies.--The data for flood studies is presently available. Any studies of new storage sites will require information regarding drainage area, mean basin elevation, and precipitation.

New Irrigation.--Flow data on Yakima Indian Reservation creeks will be obtained from various sources such as the Yakima Project office and the BIA. Diversion and return flow data, if applicable, would be obtained from the same sources. Field diversion demands for HEC-3 will be based on estimated conveyance and onfarm efficiencies and net consumptive use obtained from Blaney-Criddle examinations on general cropping patterns.

Data Analysis

Water Conservation.--The objectives of the water conservation analysis are to determine (1) present water use on a per acre basis, (2) net consumptive use, (3) onfarm efficiencies, (4) conveyance efficiencies for each diversion system, and (5) a theoretical diversion requirement for each diversion. Potential efficiency improvements in both conveyance and onfarm efficiencies will be identified. An initial screening of potential

conservation potentials will be made on an economic basis. Impacts of potential improvements will be evaluated from operations studies. Results of the studies will be used with other information such as economic and environmental information in plan formulation. A reiteration of the above process, but with more detailed information, will be made during plan evaluation.

Crop consumptive use will be determined using a Blaney-Criddle method (E&R Center computer program XCONS 21). The program requires the following input: (1) percentages of different crop types, (2) monthly average precipitation, and (3) monthly average temperature. The crop consumptive use will be compiled for each diversion to reflect cropping patterns for that district and climatological differences.

A diversion requirement will be calculated for each diversion. The diversion requirement will use information on theoretical consumptive use and "reasonable" onfarm conveyance efficiencies.

Shortage Criteria.--The traditional shortage criteria, based on a common mix of crops, should be modified to reflect specialty crops found in some districts of the Yakima basin. The traditional shortage criteria used to determine an adequate water supply are as follows: (1) recurrence of the worst single year of record would not produce a shortage of greater than 50 percent of the full water supply, (2) recurrence of the worst 2 consecutive years of record would not produce shortages totaling more than 75 percent of a single year's full water supply, and (3) recurrence of the worst 10 consecutive years of record would not produce shortages totaling more than 100 percent of a single year's full water supply.

From discussions with the E&R Center concerning shortages on high value perennial crops, a memorandum was prepared from the Chief, Division of

Planning Technical Services (dated December 20, 1982). The shortage criteria recommended were as follows: (1) recurrence of the worst single year of record would not produce a shortage of greater than 25-30 percent of the full water supply and (2) recurrence of the worst 10 consecutive years of record would not produce shortages totaling more than 100 percent of a single year's full water supply.

This shortage criteria will be discussed with the irrigation districts and modified if necessary. The modified shortage criteria will then be input to the formulation operation studies.

Municipal and Industrial Water Supply.--The offices of the major municipalities were contacted in Phase 1 to determine if their water supplies are considered to be adequate to meet present and future conditions. The potential increase in need for water supplies is minimal compared to other needs in the basin. The city of Yakima was the only community expressing an interest in additional surface water, and their need was estimated to be 3,400,000 gallons per day ($5.3 \text{ ft}^3/\text{s}$) through 2010.

Yakima's needs will be rechecked with representatives of the city in Phase 2.

Waterbank.--One potential plan element is waterbanking. Waterbanking is the short-term exchange of water between willing buyers and willing sellers with the objective of redistributing water supplies to minimize losses and damages caused by drought. Establishment of a waterbank would not have an effect on water supplies but would only redistribute available supplies during a drought period.

The DOE is presently examining legal constraints to waterbanking and will determine if waterbanking could be instituted in the basin. If

waterbanking can be instituted, economic and hydrologic studies will be performed.

The hydrologic study will be based on professional judgment of study team members. The 1945 Consent Decree will be used along with historic use in operation studies to determine where shortages will occur. Cropping patterns will be checked to determine the number of acres most likely to seek additional water. After making assumptions about the amount of shortage, if any, that may be acceptable to those acres seeking additional water, the total amount of water likely to be sought through a waterbank will be determined.

Operation Studies.--The computer model to be used in the operation studies was developed during the Yakima Valley Water Management Study. Some modifications have been made to this model to better represent potential plan elements. Modifications include (1) breaking several reaches into smaller reaches to cover points of interest (e.g., minimum flows) and (2) adding potential reservoir sites to the model (e.g., Horsetail, Forks, and Wymer).

This model analyzes present and future conditions on a monthly basis for the 1926 to 1977 period of record. The model requires two separate input files. One is the year data file that contains data on diversion demands and reach inflows. The other file contains basic data such as the basin structure to be modeled, the diversion rights, and physical and operational constraints for the reservoirs. The reservoir operational constraints are significantly different from the previous model, as the reservoirs are operated according to levels, or buffer zones, much like HEC-3 rather than using reservoir operation parameters.

The reservoir operations model will be reviewed by the GS for both content and suitability for the study. This review is to satisfy requirements of the enabling legislation.

The operation studies will be run to examine the modifications to the existing system necessary to meet defined needs in the basin for (1) supplemental irrigation, (2) enhanced fish flows, (3) municipal and industrial needs, and (4) electrical power needs.

Both structural and nonstructural elements will be examined and the model input modified to model their effects. The primary nonstructural elements are water conservation and waterbanking. The primary structural elements are increased storage and the reregulating reservoir at East Selah.

During plan formulation the sizing of the new or enlarged reservoirs and the value of nonstructural measures will involve an iterative process of operation studies. The previously identified shortage criteria will be used to measure the effects of plan elements on supplemental irrigation supplies. The enhancement of instream flows in various reaches will be examined with the operations studies. The fulfillment of municipal and industrial needs will be examined.

Hydroelectric Power.--Monthly heads and outflows obtained during the operation studies will be used as input to SPLGN (a computer program) to assess feasibility of power at storage sites. SPLGN is relatively simple: it uses average head, outflow, and specified turbine type (e.g., Francis or Kaplan) to compute potential power generation. The turbine size can be optimized to reflect the smallest cost to produce the greatest amount of power (largest power benefit).

Storage Site Reevaluation.--Preliminary inflow design flood studies have been prepared for all storage sites carried forward from Phase 1. These include Bumping Lake enlargement, Cle Elum Lake enlargement, Devil's Table, Forks, Horsetail, Wymer, Satus, Simcoe, and Tampico. For each site, three flood peaks and volumes were determined: (1) local maximum event, (2) rain on frozen ground, and (3) rain on snow event. These preliminary studies were done in close coordination with the Flood Section, Division of Planning Technical Services, E&R Center, and informal approval was obtained.

After formulation, new storage may be selected as part of the plans. A formal flood study will be prepared for each new storage site and submitted for review by the E&R Center.

New Irrigation.--Three potential new storage sites were proposed for the Yakima Indian Reservation during Phase 1. They are Tampico on Ahtanum Creek, Simcoe on Simcoe Creek, and Satus on Satus Creek. New irrigation water supply would be the function at these three sites. Instream flow and flood control are potential functions of the Satus site.

River discharge and return flow data will be input to HEC-3, a general computer model. HEC-3 simulates the operation of a reservoir system for such conservation purposes as water supply, navigation, recreation, low flow augmentation, and hydroelectric power. Some aspects of flood control operations can be handled. Economic values can be computed for meeting selected targets.

Plans would be developed to optimize benefits derived from improved fish flows (if applicable), new irrigation, and other potential functions. The development of plans would be an iterative process of operation studies and benefit and cost analyses. Close coordination will be maintained with the YIN to insure acceptability of any plan.

Water Quality

Data Gathering

Resource Base.--Sufficient data exists to perform the analyses. Data will be gathered from Reclamation and Environmental Protection Agency data files.

Eutrophication.--Discharge and quality measurements at each potential reservoir site will be made. Samples for total phosphorus and inorganic nitrogen will be taken bimonthly in the April to July period and monthly during the remainder of the year. Instantaneous discharge readings will be made when the samples are taken.

Sedimentation.--Discharge and sediment measurements will be made at all potential storage sites. Sediment samples will be taken bimonthly from April to July and monthly during the remainder of the year. Samples of the channel bed at potential reservoir sites will also be taken. Particle size analysis will be made of bed material and representative suspended sediment samples. Discharge, suspended sediment, and channel bed data will also be gathered for potential pumping plant sites associated with the Wymer storage site. Measurements of channel characteristics for backwater studies at potential pumping sites will also be made. More detailed suspended sediment measurements related to storm events will be made for those sites carried beyond plan formulation.

Temperature.--Two years of streamflow and water temperature data are being gathered at each potential reservoir site. Weather data from surrounding weather stations will be obtained from the National Weather Service. Reservoir characteristics will come from design information and the operating regime from operations studies.

River Quality.--Field data for model calibration and verification are complete. The model is being developed by the E&R Center, Division of Planning Technical Services, as part of a research project. The model is to be available in fiscal year 1983.

Irrigation Return Flows.--Data needs will depend upon the type of analyses considered. Sediment and nutrient studies will be a primary concern. Consideration will be given to surface and subsurface impacts.

Data Analysis

Resource Base.--An analysis will be made of the existing surface and subsurface water resource. Analysis will include comparison of quality to standards and recommendations. Water quality as it relates to uses will be examined. Geographic and temporal variability will be discussed.

Eutrophication.--A phosphorus loading model will be used to estimate primary production for each potential reservoir. Primary production will be given in terms of chlorophyll-a and total phosphorus concentrations. Predicted total phosphorus concentrations will be compared with index values to estimate the potential trophic state for each reservoir. A prediction of algal dominance for each reservoir will also be made using a phosphorus-to-nitrogen ratio.

Sedimentation.--Discharge and sediment loads will be determined for all potential reservoir sites. Particle size of suspended and bedload material will be determined. Storage depletion of potential reservoirs due to sediment buildup will be determined. Potential stream channel aggradation or degradation below each potential dam will be estimated. Potential scour and abrasion at potential pumping sites will also be determined. Storage depletion and scour and abrasion studies will utilize existing Bureau models.

If new irrigation development is recommended on the Yakima Indian Reservation following completion of the plan formulation process, sediment studies related to canal and pump designs will be undertaken.

Temperature.--The Water Resource Engineers (WRE) reservoir temperature model will be used to predict the thermal regime of each potential reservoir. Reservoir operations studies will be used for operating the model.

River Quality.--A steady state river quality model, QUAL 2, will be used to predict quality changes in the Yakima River. Variables to be modeled include dissolved oxygen, total dissolved solids, temperature, chlorophyl-a, nitrogen, and phosphorus. Changes in river operations will be the primary factor varied in the model. If water conservation practices are to be implemented, assumptions will be made and used in the model to predict effects of these practices.

If new irrigation development is to occur, return flow analyses will be made, and inputs to the model will change accordingly.

Irrigation Return Flows.--If new irrigation development is recommended for the Yakima Indian Reservation following plan formulation, a program will be developed to predict water quality impacts. The type of studies required will depend upon the type of development and area of development considered.

If water conservation measures are recommended, some assumptions regarding the impact on the quantity and quality of return flows will be made.

Land Resources

Data Gathering

New Irrigation.--At present, the BIA is conducting a soils-land classification survey of Yakima Indian Reservation lands outside the existing Wapato Irrigation District. This effort, funded by BIA, has been contracted

to YIN. The tribe, in turn, has hired professional soil scientists to do the fieldwork as well as necessary laboratory analyses. The soil surveys are being conducted to the standards of the National Cooperative Soil Survey as administered by the SCS. The soil survey mapping units are interpreted into land classes for use in determining lands feasible for irrigation. The BIA is to contract with a consulting firm for aid in placing the soil survey mapping units into the appropriate economic land classes, taking into consideration all relevant land classification factors.

Reclamation completed a detailed land classification study of the potential Ahtanum lands. The field mapping, as well as all laboratory data, is available for use in the present project study.

Most of the Toppenish-Simcoe lands were included in the soil survey "Yakima Indian Reservation, Irrigated Area." This survey, published in 1976, is a modern soil survey meeting the standards of the National Cooperative Soil Survey. The soils mapping and interpretive data provide much information on the productive capability of the proposed project lands.

Supplemental Irrigation.--If certification of land is required for supplemental irrigation, the primary source of data will be published soil surveys. The soil survey data will be supplemented by new data as required. Soil samples will be gathered by Reclamation soil scientists and analyzed in Reclamation's soil and water laboratory in Boise, Idaho. All the samples and analyses will be performed in accordance with Reclamation guidelines.

Drainage.--Data for drainage analysis will come from existing data sources. The BIA classification study includes infiltration tests and other data relative to drainage needs. Field reviews will be made of existing

problem areas and any new lands considered for development. Subsurface soil data will be obtained from existing soil surveys and land classification studies to the extent possible. Existing topographic maps will be used. During preconstruction, some new field data may be required and will be gathered concurrently with any required soil classification studies.

Data Analysis

New Irrigation.--New irrigation development is being considered only on the Yakima Indian Reservation. An economic land classification is being prepared by BIA but will be reviewed to insure compliance to accepted Reclamation standards.

Reclamation performed an economic land classification on the potential Ahtanum project area in the recent past, and the data from that classification will be used for studies in the Ahtanum area. In the Topenish-Simcoe area, soil survey data will be used to aid in development of an economic land classification.

Supplemental Irrigation.--Some lands are now being irrigated that were either not part of the original project or were not classified as irrigable at the time of project development. If a decision is made to provide these lands with a water supply, a certification of the lands must be made and will be made during preconstruction. Certification will conform to accepted Reclamation procedures.

Drainage.--All drainage analyses will conform to accepted Reclamation procedures. The potential for drainage problems will be identified for areas being studied by regional office personnel. If drainage systems

appear to be warranted, the type of drainage system required will be identified and a per acre cost will be determined; this analysis will be performed prior to completion of the planning report. Detailed drainage plans will not be developed until preconstruction.

Social Factors

Data Gathering

Data needs fall into two main categories of primary and secondary data. Primary data must be acquired during plan formulation and will include sources such as key informants, group meetings, advisory groups, telephone and inperson discussions, and observation of physical characteristics of the area. Much of the gathering of primary data will be keyed to the public involvement program.

Secondary data is readily available. Examples of secondary data include census, local planning documents, tribal documents, newspapers, social science literature, and written public response to planning activities.

Data Analysis

Dam Site Evaluation.--Site-specific impacts will be assessed. Methods will include content analysis of public feedback and telephone and inperson discussions with knowledgeable persons and key publics.

Formulation Assessment.--A document will be prepared discussing key publics, their problems and needs (including those of the YIN), how they would be impacted by different alternatives, conflicts, common ground, and recommendations for changes in formulation. Primary methods may include a values assessment (using Multi-Attribute Tradeoff System [MATS]), key

informant discussions, and small group meetings. If time and resources permit, the initial document will be updated based on similar methodology as the formulation process continues.

Plan Formulation Working Document.--A preliminary social account will be prepared concentrating only on significant differences between plans. Some suggestions for mitigation will be provided along with an indication of acceptability of alternative plans.

The existing situation and future conditions will be described with the help of both primary and secondary data.

Environmental Quality

Data Gathering

Existing documentation from previous Reclamation reports, documents of the YIN, reports of other Federal and State conservation agencies, and reports and research of other entities will be used as a basis of information.

New and more detailed data will be required in several areas. Input needed for environmental quality analysis will be provided through several technical disciplines, and the methods for gathering that information are discussed in the appropriate sections of this chapter. Some information will be obtained through the public involvement program. Contact will be made with local groups, especially environmentally oriented groups, to provide information and reaction to environmental analysis.

Data Analysis

Environmental quality analysis encompasses several disciplines. The disciplines that contribute information for the environmental quality analysis include fish and wildlife, water quality, cultural resources, and

other environmental disciplines. The following discusses the work efforts under the environmental quality portion of the study.

Identification of Problems and Opportunities.--Initial environmental quality problems and opportunities were identified during Phase 1 studies. During the first 6 months of Phase 2 studies, these problems and opportunities will be reexamined and updated as necessary. The final list of environmental quality problems and opportunities will depend largely on input provided by Federal and State conservation agencies, local environmental groups, the YIN, and other public entities.

Analysis of Potential Plan Elements.--Working with concerned environmental groups, potential environmental quality plan elements will be formulated based upon the identified problems and opportunities. Preliminary costs, benefits, and acceptability information will be generated for the potential plan elements to analyze their viability for inclusion in preliminary plans. Several reiterations of this process, with increasing detail, will result in a list of viable elements for inclusion in potential plans at the end of plan formulation.

Existing and Future Without Project Resources.--Some information on existing environmental quality resources was gathered during Phase 1 studies. For Phase 2 the future without project conditions will be made based on information gathered in Phase 2. The existing and future project conditions will be used as a basis for determining the effects of potential plans on environmental quality.

Environmental Quality Assessment.--During the latter stages of plan formulation, but before preparation of the plan formulation working document, an environmental quality assessment of the proposed plan or plans will be

made. The assessment and preparation of the environmental quality account will generally follow the procedures discussed in the December 29, 1982, "Technical Instructions for Evaluation and Presentation of the Environmental Quality Account in Planning Investigations." We intend to use a team approach to weighting resources, deriving function forms, and assessing the degree of impact to specific resources. The MATS computer program will be used during this assessment to help derive weights and function forms and to store information. The environmental quality account will then be one of the major analyses for selecting a best plan.

Fish and Wildlife

Data Gathering

Information and analyses related to fish, wildlife, and vegetative resources will largely be obtained through coordination with Federal and State fish and wildlife agencies. Fish and Wildlife Coordination Act funding transfers have been established with the FWS, NMFS, and Washington Department of Game. The Washington Department of Fisheries and YIN are participating in the study and covering their own costs.

Early in the study it was agreed that NMFS would coordinate and provide input to Reclamation on matters relating to anadromous fish and that the FWS would do the same for resident fish, wildlife, and vegetative resources. Information is to be conveyed to Reclamation in a series of planning aid letters relating to specific subjects (e.g., problems and opportunities, existing resources, etc.) and a joint Fish and Wildlife Coordination Act report will be prepared by NMFS and FWS at the completion of the feasibility study. The planning aid letters will provide coordination support for the

plan formulation working document. A Fish and Wildlife Coordination Act report will be appended to the planning report/draft environmental statement.

Data specific to instream flows will be provided from various sources. FWS, Reclamation, BIA, and others have been working on several instream flow incremental methodology studies in the basin. The data from these studies will be available by October 1983. The data is expected to be available in a form that will allow qualified persons in the fisheries field to make recommendations for various levels of instream flows.

Data Analysis

Problems and Opportunities.--Problems and opportunities used for Phase 1 were developed from data supplied by NMFS and FWS in planning aid letters. Following meetings with the fish and wildlife agencies regarding the information in the planning aid letters, we expect some refinement of the information for problems and opportunities for Phase 2. The revised information should be available before formulation.

Analysis of Potential Plan Elements.--Through consultation with the fish and wildlife conservation agencies, some potential fish and wildlife plan elements have been identified. The fish and wildlife conservation agencies will prepare costs, benefits, and acceptability information on potential fish and wildlife plan elements. Other potential fish and wildlife plan elements will be identified through formulation, and the fish and wildlife conservation agencies will provide information on costs, benefits, and acceptability. Following formulation the number of potential fish and wildlife plan elements will be reduced, and more detailed studies will be performed on those that remain.

Instream Flows.--Although technically a problem and opportunity, instream flows are discussed separately because of their importance as a major objective of the YRBWEP study. The data from several instream flow incremental methodology studies will be used as a basis for recommending instream flows. Reclamation will contract with an independent, qualified consultant to review these studies; work with the fish and wildlife agencies and other technical groups in the basin concerned with instream flows; and recommend technically acceptable minimum, optimum, and maximum instream flows for use in the YRBWEP study.

Existing and Future Without Project Conditions.--The results of a habitat evaluation procedure (HEP) will be used to assess impacts from proposed reservoirs or irrigation development. Only preliminary HEP work will be done prior to completion of formulation. The data gathered from HEP will determine existing conditions, and trends will be used to extrapolate to future conditions with the project. Since HEP will not be completed prior to formulation, analysis during formulation will be based on existing data and application of professional judgment.

Threatened and Endangered Species.--A preliminary survey of threatened and endangered species present at potential reservoir sites was conducted by the FWS and Washington Department of Game during Phase 1. Since no adverse impacts are expected, the Phase 1 data will be used for plan formulation. A more detailed evaluation of potential endangered and threatened species impacts from YRBWEP activities will be conducted after plan formulation and the list of potential impact areas is reduced.

Impact Assessment.--As previously mentioned, the HEP analysis will be the primary tool for assessing impacts to fish, wildlife, and vegetative resources. Other tools to be used would include the results of the instream flow incremental methodology studies, existing data, previous analyses, and professional judgment.

Recreation

Data Gathering

Problems and Opportunities, Future Without the Project, and Impacts.--

The Washington Statewide Comprehensive Outdoor Recreation Plan (SCORP) is the primary data source for current and future recreation use trends. The Washington Interagency Committee for Outdoor Recreation will be contacted for information. Federal, State, and local agencies will be contacted as well as private businesses such as Boise Cascade Corporation. Interviews with residents and users of impact areas will be another source of information.

Mitigation and Enhancement.--Reservoir maps and operations studies will be prepared by the YRBWEP study team to help determine the resource capability. Site visits will be made to help evaluate the extent of impacts and to help conceptualize development of a recreation plan. Recreation needs and resource capability will be evaluated in order to prepare the recreation plan.

Data Analysis

Problems and Opportunities, Future Without Project.--The SCORP will be used for projections in future demand. Future outdoor recreation supply

projections will be determined by talking with pertinent Federal, State, county, and private agencies.

Needs will be based on a comparison of recreation facility supply with demand for various recreation activities and associated facilities (e.g., picnic tables, boat lanes).

Recreation Impacts.--Impacts to recreation will be estimated for plans and features during plan formulation. Loss of recreation opportunities will be identified as will gain in recreation potential. Net change in types and quantity of recreation opportunities will be determined.

Mitigation and Enhancement.--Where mitigation is possible, costs will be assessed based on most recent replacement construction costs for the recreation facility or access. Where demand and resource capability exist, enhancement opportunities will be investigated, and a recreation plan will be prepared. Cost and benefit data will be determined for economic analysis. Mitigation and enhancement features carried forward from plan formulation will be reevaluated. Detailed design and cost estimates will be prepared.

Benefits and Costs.--Benefits will be determined using current unit-day values as presented in the Principles and Guidelines. The unit-day value will be applied to predicted recreation-days of use attributable to the project to develop benefits. Costs will be based on current field costs for facilities. Cost estimates will be developed in the regional office.

Angler-days provided by the FWS will be reviewed to insure that fish and wildlife benefits are not included in other recreation benefits.

Cultural Resources

Data Gathering

Reevaluation of Reservoir Sites.--Existing site inventory information will be consolidated for use in site reevaluation.

Plan Formulation.--A class I cultural resources survey of the Yakima River basin will be completed under contract. Primary and secondary literature and an archival review of all cultural resources survey activities in the region will form the data base. Known archeological sites; buildings; districts; structures; and objects of interest in history, prehistory, and architecture will be inventoried and evaluated based on the existing data.

A contract should be awarded in the fall of 1983 and a final report received in the late spring of 1984.

Detailed Evaluation of Selected Plans.--A class II cultural resources survey of each remaining alternative that would cause ground disturbance will be accomplished. The survey design will be based on the results of the class I survey and will provide site-specific data on impacts. This survey would probably involve detailed evaluation of a sample of sites identified in the class I survey and a partial on-the-ground survey of each alternative. The class II fieldwork will have to begin during the summer of 1984.

Preconstruction.--If needed, class III surveys will be completed for the preconstruction report. The scope of the class III work will be contingent upon the selected plan and the results of the class II survey.

Data Analysis

Reevaluation of Reservoir Sites.--For each potential reservoir site under consideration, potential impacts to cultural resources will be identified.

Plan Formulation.--During plan formulation, an evaluation of potential impacts relative to cultural resources will be made. A predictive model for locating potential sites will be developed. The predictive model will be used to identify work required for a complete survey during later stages of study.

Detailed Evaluation of Selected Plans.--Specific impacts from implementation of the best plan will be identified. The predictive model developed during plan formulation will be evaluated based on data gathered in a class II survey. The needs for a class III survey will be made. Mitigation for the recommended plan will be identified.

Preconstruction.--Exact mitigation needs will be identified.

STUDY ORGANIZATION AND MANAGEMENT

The conduct of the YRBWEP feasibility study is the responsibility of the Pacific Northwest Region of the Bureau of Reclamation. The Regional Planning Officer will be responsible to the Regional Director for management of the study.

The Regional Planning Officer has assigned several members of his planning staff to provide a full-time core of a multidisciplinary study team for conducting Phase I of the study. The DOE has assigned a full-time representative to work with the study team and provide liaison between Reclamation and the State. The study team will maintain coordination with YIN through a designated committee of the Tribal Council. The team will coordinate with and will be assisted by other Federal and State agencies.

The Regional Planning Officer has designated a team leader to manage the study team and to serve as the contracting officer's authorized representative to assist with administration of contracts. Bureau full-time study team members represent discipline areas requiring major work effort. Bureau personnel representing other technical disciplines will assist the study team on a part-time basis.

The study team will conduct most activities of Phase 2 as an "in-house" effort. Consultants will be used on specific work where needed to provide expertise not available on the team and to expedite completion of the study.

As indicated in the agreement between the State and Reclamation, the study team will consult with (in addition to DOE and YIN) Federal and State fish and wildlife agencies, irrigation interests, environmental interests, local governments, and other groups having an interest in the study. Consultation will be made during preparation of the plan of study and at key points in the study.

Bureau personnel from the Commissioner's Office and the E&R Center will provide policy and technical guidance to the study team.

The Study Organization Chart, on the following page, represents the study control relationships of the study.

REPORTS, APPENDIXES, AND SUPPORTING DOCUMENTS

Appendixes to be provided with the Regional Director's report and draft environmental statement are listed on the following page. A schedule for release and review of major documents leading up to and including the Regional Director's report is shown in table 4.

Agricultural Economy
 Designs, Estimates, and Operations
 Economic and Financial Analysis
 Environmental Quality
 Hydrology
 Lands

Plan Formulation
 Problems and Needs
 Public Involvement
 Regional Development
 Reports and Letters of
 Cooperating Agencies
 Social

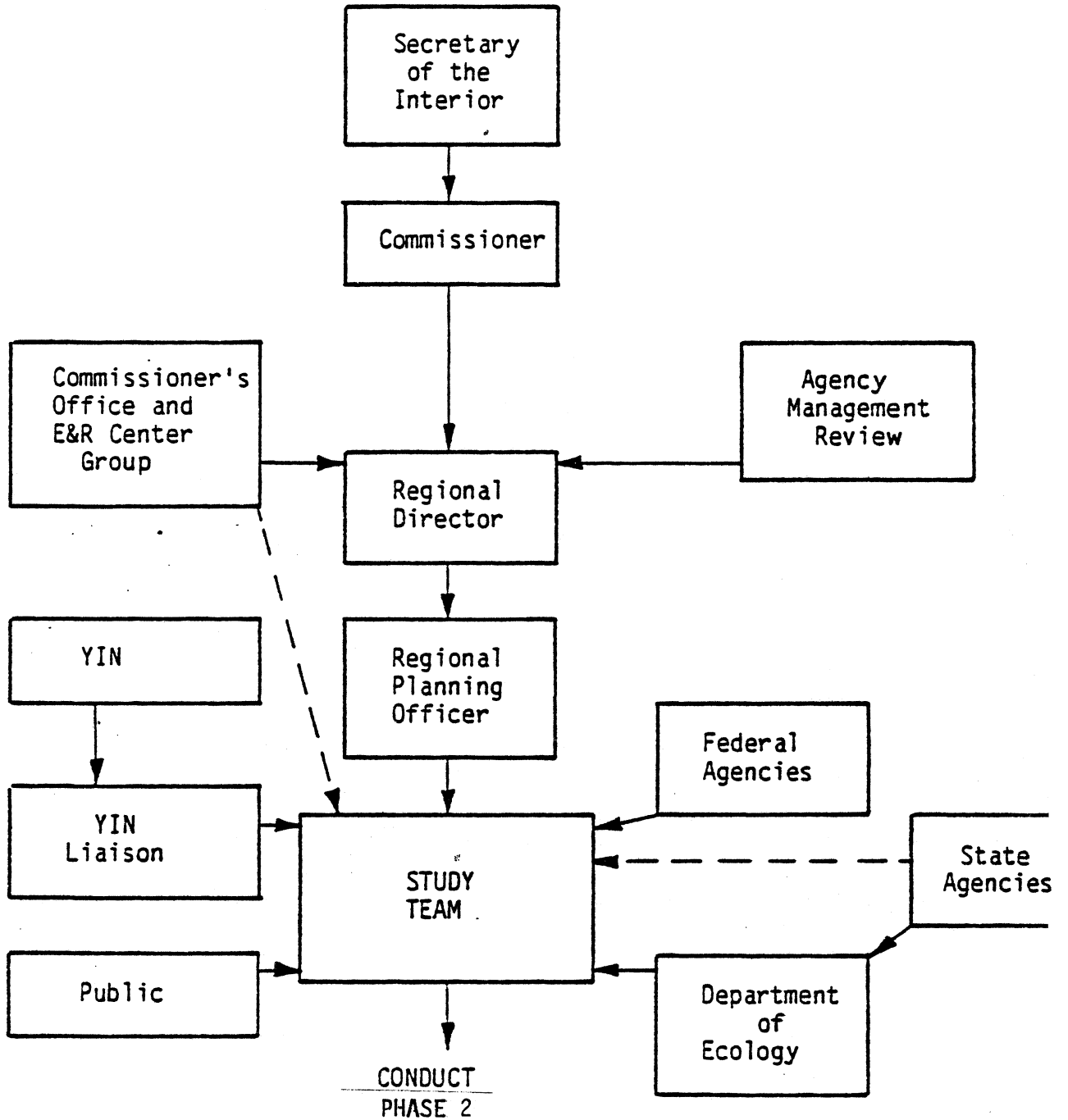
Table 4.--Document Schedule

Document	Release Date	Processing
Plan formulation working document	December 31, 1984	30-day review by E&R Center, Washington Office, and public
Regional Director's proposed report/preliminary draft environmental statement and appendixes	October 31, 1985	45-day review by E&R Center and Washington Office
Regional Director's report/draft environmental statement and appendixes	January 15, 1986	90-day public and agency review

Yakima River Basin Water Management Project

STUDY ORGANIZATION

PHASE 2



PROGRAM ANALYSIS

Activity Schedules

A draft program schedule is on the following page. A revised schedule will be developed using PROPLAN-EZPERT (computer program) following review by Reclamation, DOE, and other involved agencies.

Study Costs

The estimated cost of the YRBWEP feasibility study is \$3,590,000. The costs prior to fiscal year 1984 and by fiscal year thereafter are shown below.

<u>Total Estimated Cost</u>	<u>Total to 9/30/83</u>	<u>Fiscal Year 1984</u>	<u>Fiscal Year 1985</u>	<u>Fiscal Year 1986</u>
\$3,590,000	\$1,465,000	\$1,025,000	\$900,000	\$200,000

Study costs consist of salary, travel, and overhead for the full-time study team and other regional office personnel working part-time on the study. Other costs include transfers to other agencies, geologic investigations, contracts, and E&R Center costs. These are discussed below.

Transfers

Transfers cover the cost for other agencies to participate in the study. Included are funding for FWS and NMFS for study activities leading to preparation and completion of the Fish and Wildlife Coordination Act Report. Transfers are also made to the Washington Department of Game. Costs are included to fund the GS as specified by Public Law 96-162. Transfer costs are summarized in table 5.

Table 5.--Transfer Costs

Agency	Fiscal Year 1984	Fiscal Year 1985	Fiscal Year 1986
U.S. Fish and Wildlife Service	\$ 70,000	\$70,000	\$20,000
National Marine Fisheries Service	20,000	25,000	15,000
Washington Department of Game	(Included in FWS transfers)		
Geological Survey	30,000	30,000	20,000
Miscellaneous	25,000	25,000	--
Total	\$145,000		

Geologic Investigations

Geologic investigations include mapping and drilling major structures considered in the feasibility study. Geologic data will be collected at three of the storage sites being investigated--Bumping Lake enlargement, Horsetail damsite, and Wymer damsite. Geologic mapping and a limited drilling program are scheduled for Horsetail and Wymer damsites. Seismotectonic studies are anticipated at the Bumping Lake enlargement site. The total cost for geologic investigations, which will be completed in fiscal year 1984, is estimated at \$110,000.

Contracts

Several contracts have already been awarded, and several additional contracts are anticipated. These are for collection and evaluation of specific information needed to complete the study. Table 6 summarizes the estimated contract costs.

E&R Center

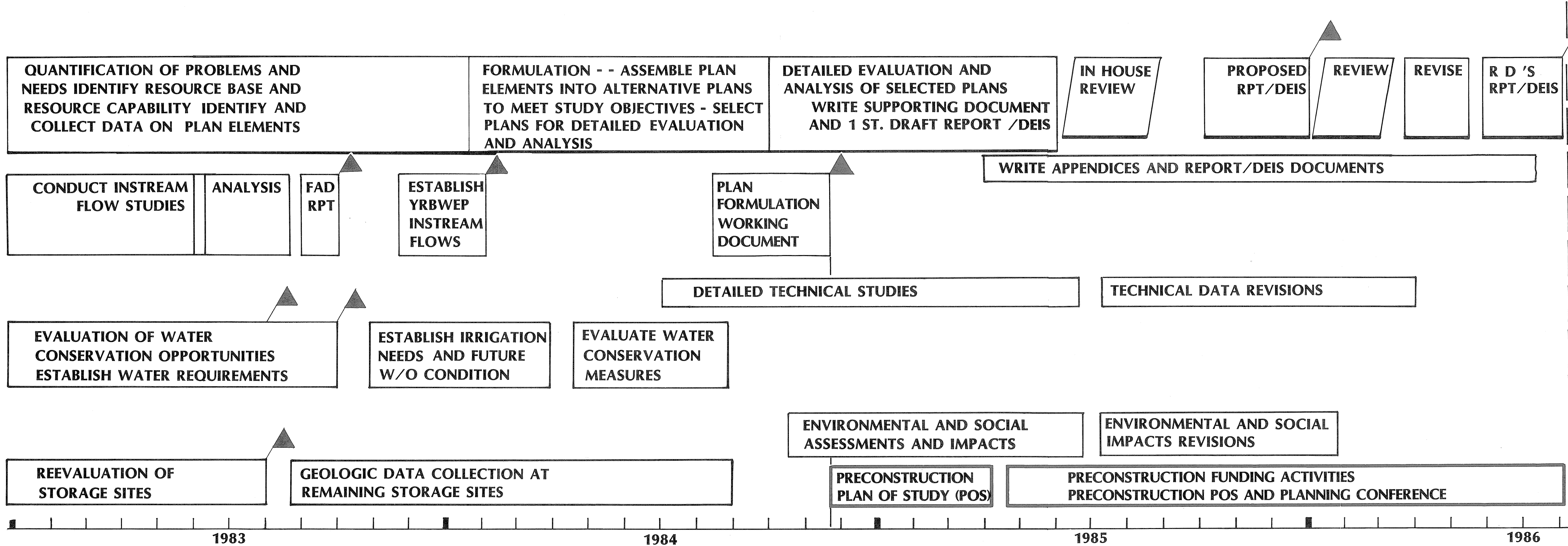
The E&R Center estimated costs are shown in table 7.

Table 6.--Contract Costs

Contract	Total	Fiscal Year 1984	Fiscal Year 1985	Fiscal Year 1986
Ongoing				
Planning assistance (Creighton & Creighton)	\$60,000	\$ 40,000	\$20,000	
Instream flow review (Parametrix)	65,000	65,000		
Topographic mapping of damsites	20,000	20,000		
Fish counting at Roza and Prosser Diversion Dams	15,000	15,000		
Washington State Department of Ecology (Interagency Personnel Act)	75,000	25,000	25,000	\$25,000
Anticipated				
Environmental assessment	50,000	25,000	25,000	
Social assessment	50,000	25,000	25,000	
YIN assistance	40,000	15,000	15,000	10,000
Total		\$230,000		

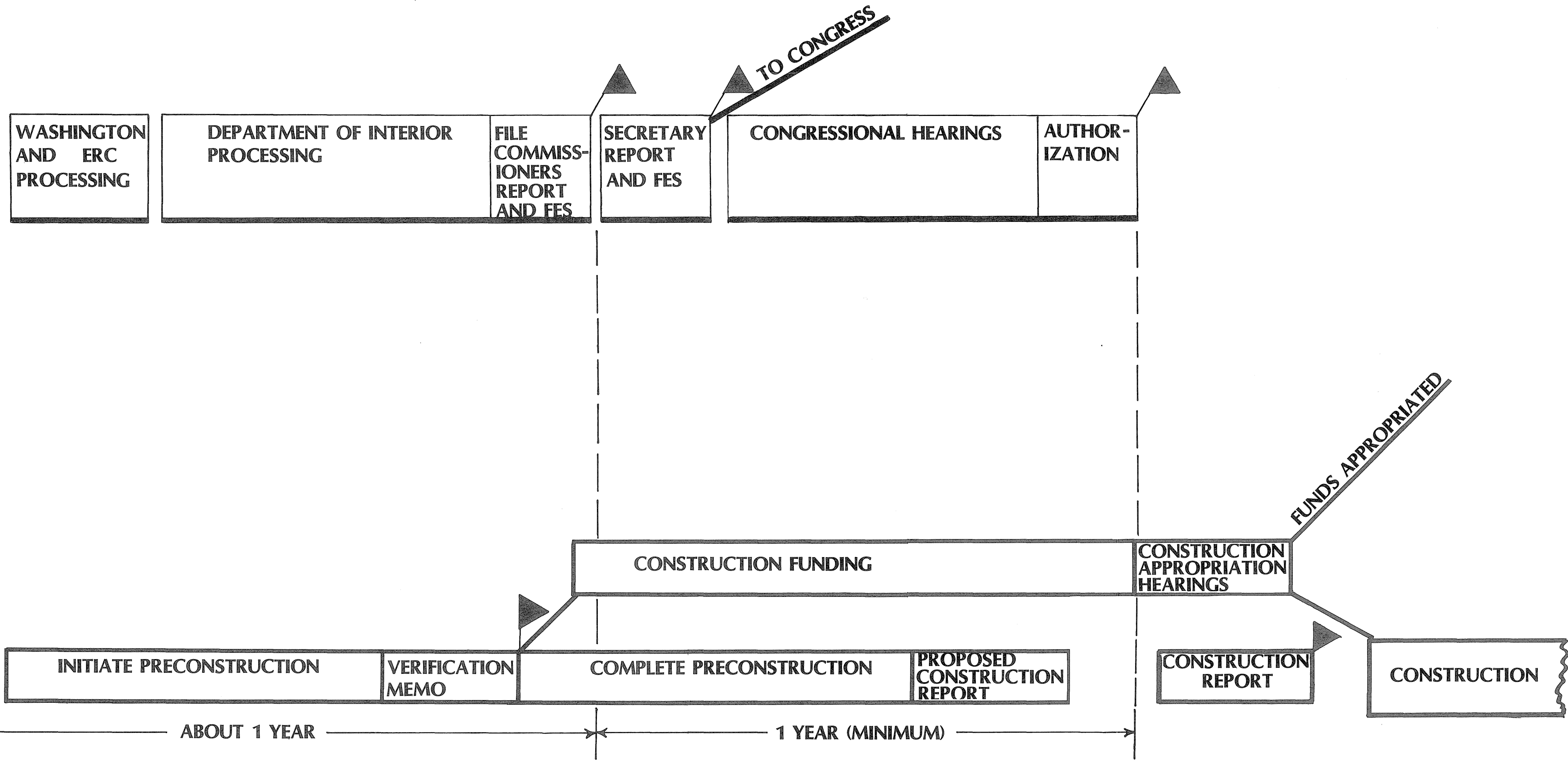
Table 7.--Engineering and Research Center Costs

Item	Fiscal Year 1984	Fiscal Year 1985	Fiscal Year 1986
Review and liaison	\$10,000	\$10,000	\$ 5,000
Review land and drainage	6,000		
Review public involvement	2,000	2,000	
Review reports and appendixes	2,000	5,000	20,000
Review designs and estimates		15,000	10,000
Prepare feasibility designs and cost estimates--dams	20,000	80,000	
Prepare feasibility designs and cost estimates--power and pumping plants		50,000	
Review and update cost estimates--Indian projects		80,000	
Total	\$40,000		



Match Line Sheet 2

Match Line Sheet 1



APPENDIX A
PUBLIC INVOLVEMENT PLAN

PUBLIC INVOLVEMENT PLAN

This document sets forth the public involvement plan for the remainder of calendar year 1983 for the YRBWEP feasibility study.

Background

The goal of the study is to resolve conflicts arising over water shortage conditions in the Yakima River basin by accomplishing four primary objectives:

1. Providing adequate minimum flows to protect and improve fisheries
2. Providing firm water supplies to insure presently irrigated lands in the Yakima River basin receive water during times of drought
3. Providing water for new irrigation of lands on the Yakima Indian Reservation
4. Developing a comprehensive plan to enable efficient management of the basin's water supply

The study is being completed in two phases. Phase 1, now completed, was an appraisal level investigation of problems and needs and potential elements for plans to meet those needs. As a result of Phase 1, a number of potential elements were eliminated due to engineering or geotechnical problems or excessive cost.

During Phase 2 the remaining elements will be combined into alternative plans, which will then be evaluated for feasibility. The feasibility study will conclude with a recommended plan of action for resolving all or parts of the problems and needs previously identified.

The YRBWEP feasibility study, whose primary sponsor is the State of Washington, was authorized and approved by Public Law 96-162 on December 28, 1979.

Preliminary Consultation

The Phase 1 and Phase 2 (calendar year 1983) public involvement plans were developed cooperatively by Reclamation and the Washington DOE.

The Phase 1 public involvement plan was reviewed by a public involvement consulting firm, Hall and Associates, and revisions were made in response to their recommendations. Hall and Associates also provided a critique of the Phase 1 public involvement program and made recommendations for the Phase 2 program.

The Phase 2 (calendar year 1983) public involvement plan is designed to support the study activities outlined in a letter to the study team from the Pacific Northwest Regional Director, Bureau of Reclamation, and Director, Washington State Department of Ecology. This letter provided guidance for study activities through the end of calendar year 1983. This plan has been reviewed by a public involvement consultant, Creighton and Creighton, Inc.

A recommended public involvement plan for activities through September 1985 will be prepared by Creighton & Creighton, Inc., subject to review by Reclamation and Washington DOE. This plan is to be completed in October 1983.

Major Issues

From Phase 1 it is clear that a great diversity of opinion prevails both on the relative need for each of the major objectives and the means to satisfy them. The issues have been sharply defined by ongoing litigation among a number of the interests, regional diversity, institutional water allocation procedures, and personal values.

The major issues are discussed on the following pages.

Instream Flows

Phase 1 showed that approximately two-thirds of the need for additional water is for instream flows to protect and enhance fisheries. Court orders have been issued requiring release of water from storage to provide instream flows to specified reaches of the river. The basis for these court orders is guarantees provided in Indian treaties executed during the last century. The court has ruled that these treaties require protection of fisheries habitat.

It is the belief of many fisheries experts that the decline in the Yakima River's anadromous fishery is due to the operations and withdrawals necessary to provide water for irrigation. Some people question this premise and believe that providing increased instream flows will not relieve the problem.

In addition, there is not an agreement on the amount and timing of instream flows that are needed. One of the major objectives for the balance of 1983 will be to achieve agreement among technical experts on the recommended minimum, optimum, and maximum instream flows for fish. Technical studies are already underway by several agencies, and an independent contractor is being selected to assist in conducting the studies necessary to arrive at these figures.

Water Supply

A second question of need which remains is to determine the water supply requirements of existing irrigated farms in the Yakima basin. At present there are different classes of water rights within the basin. Some water rights are legally assumed to be nonproratable; i.e., the supply would be provided even under any predictable drought condition. Other rights are

proratable; i.e., supplies may be cutback during dry years. People are unwilling to invest in irrigated farming if the water supply is highly insecure.

On the other hand, a distinction can be made between a full water supply and an adequate water supply. A full water supply will provide, each year, the total amount of water needed to have optimum crop production to all acres of a farm unit. While a full water supply may be desirable, it may be impractical to achieve. An adequate water supply acknowledges that in some years an irrigator can suffer some cutback from a full supply without long-term economic damage. This is based on the assumptions that in exceptionally dry years an irrigator can reduce the number of acres in cultivation and that crops can suffer some cutback without damaging long-term productivity.

Determinations of either full or adequate water supply are complicated by the fact that water rights have been established over the years on the basis that the first people to establish a water right maintain that right in perpetuity, with subsequent water users able to establish a right only if additional water supplies are available. This is the premise upon which virtually all western water law is based. This can mean, however, that there can be discrepancies between legal entitlements and either full or adequate water supplies.

In order to define the need for future water development, it will be necessary to establish a definition of an adequate irrigation water supply that is both acceptable and technically valid. This will also be a priority for the balance of calendar year 1983.

Water Conservation

Many people believe the existing irrigation systems can be made more efficient and save water, and some have argued that all the needs in the basin could be made by conservation rather than new structures. Preliminary studies indicate that it is unlikely that both minimum instream flows for fisheries and irrigation needs could be met with the existing water supply. However, as noted above, there is continuing uncertainty on both the amount of water needed for instream flows and the amount for irrigation. The third uncertainty is the amount of water which could be saved through conservation. To reach a successful conclusion to YRBWEP, consensus on how much can and should be accomplished through water conservation efforts will be necessary. There are numerous institutional and legal issues which must be addressed in order to achieve water conservation, as well as the problem of providing incentives to achieve conservation. The high degree of polarization which already exists on the subject means that efforts to achieve consensus on this issue are likely to be very controversial.

Storage Sites

Phase 1 studies suggest--pending agreement on the issues above--that one or more storage sites will be required to meet the basin's water needs. Several sites are under consideration in Phase 2. Almost every site considered has some opposition from one or more segments of the public. If storage is needed to meet the basin's needs, some degree of consensus as to which site is best will be needed.

Water Rights

The State of Washington is in the process of adjudicating water rights in the Yakima River basin, although the process is currently held up in the

courts. Due to recent court decisions providing for the release of water for fish spawning and incubation, the water rights of some may be in jeopardy. Not only are there different classes of water rights, but people holding water rights often are contractually obliged to make repayment to the Federal Government for portions of earlier water storage projects. Any changes to water distribution proposed under YRBWEP will be controversial. In addition, the technical findings made as part of YRBWEP will be under intense scrutiny because these findings might be presented as evidence during the adjudication process.

New Irrigation Development

A primary objective of the study is to investigate potential irrigation development on the Yakima Indian Reservation. Several groups have questioned the need for additional irrigated lands at a time when there is an oversupply of certain food commodities. It also appears that new irrigation on the reservation may be difficult to justify under the current guidelines. It will also be controversial if different methods are used to evaluate irrigation on the reservation than are used generally.

Interested Entities and Groups

Federal Agencies

A number of Federal agencies are required to provide information or participate in specific aspects of YRBWEP. The Corps of Engineers must provide information concerning flood related aspects. FWS provides information on wildlife and resident fisheries. NMFS provides information on anadromous fisheries. The Environmental Protection Agency will participate in National Environmental Policy Act compliance. GS will review hydrologic studies. BIA will oversee and comment on activities affecting the Yakima

Indian Reservation. The Forest Service will provide information related to timber and recreation. The National Park Service will provide comments on possible impacts on national parks. The Bureau of Mines will comment on impacts to mineral resources. SCS has agreed to provide information regarding onfarm irrigation practices and efficiencies. BPA will coordinate power and fishery activities, especially as related to the Northwest Power Act.

Indian Tribe

Northwest Indian tribes will be following YRBWEP closely for several reasons. Of primary concern is the Columbia River anadromous fishery and the potential role of the Yakima River to help strengthen the fishery. Northwest tribes are also interested in onreservation economic development, which includes irrigated agriculture. Protection of Indian water claims under treaties and the Winters Doctrine are basic to the Indian concerns. Obviously, YIN has the highest level of interest.

Washington State Agencies

The State of Washington is a partner with Reclamation on YRBWEP. DOE is Washington State's designated agency for implementing YRBWEP. The Washington Department of Game and Department of Fisheries will provide basic data on wildlife, resident fisheries, and the anadromous fishery. The Washington Department of Natural Resources will provide information relative to State lands they administer. The Washington Interagency Commission for Recreation will provide information concerning recreation impact analysis and planning. The county extension offices have been providing information about the study to the agricultural community. Washington State University will be reviewing assumptions regarding onfarm water use.

Counties and Cities

The interest levels of counties and cities in the basin vary considerably. Some areas that are directly impacted, such as flood prone areas, have high levels of interest. Most areas will be indirectly impacted through agriculture, fisheries, and recreation. All of the counties have shown some degree of interest but few of the cities have.

Congressional Offices

Congressman Morrison has taken a strong active interest in the study. He has introduced enabling legislation, handled public inquiries, and offered guidance to the study team. Senator Gorton and the late Senator Jackson have been less involved but have shown some interest.

Other Entities and Interests

The agricultural community has shown great interest in the study. They favor structural solutions, agricultural development, and the preservation of agricultural water rights. Environmental groups show varying levels of interest. Most environmental groups favor nonstructural solutions, enhancement of the anadromous fishery, and protection of natural areas. The Northwest Power Planning Council is highly interested in anadromous fishery issues and has designated the Yakima River as a high priority for fisheries enhancement. Most chambers of commerce have expressed support for additional water development. A citizen group, People Interested in Saving the Teanaway Valley, has been formed to oppose the construction of any dam on the Teanaway River. Residents in the Goose Prairie area have been vocal in opposing an enlarged Bumping Lake Dam. The Northwest Water Resources Committee is interested in finding a solution which both meets Indian concerns and provides an adequate water supply for irrigation and supports a structural

solution combined with possible nonstructural measures. The League of Women Voters has an interest in finding the best solution to the problem but have not advocated any positions. The Boise Cascade Corporation may be impacted by development on the Teanaway River.

Public Involvement Program

The overall public involvement program for the balance of calendar year 1983 has six major components covering these areas: (1) public information, (2) instream flows, (3) irrigation water requirements, (4) water conservation, (5) site evaluation, and (6) Yakima Indian irrigation projects.

Public Information

In addition to the public involvement activities dealing with specific subjects, several ongoing activities will be continued which are designed to keep the public informed of study progress. These continuing activities are discussed below.

Presentations to Groups.--During the balance of calendar year 1983, a series of presentations will be scheduled with service clubs, agricultural groups, environmental groups, etc., to provide an overall view of the issues being addressed in the study and the opportunities for participation.

Newsletter.--A newsletter describing study progress and results is mailed to approximately 1,200 people. Anyone wishing to receive the newsletter is put on the mailing list. During the balance of calendar year 1983, this newsletter will be issued on approximately a bimonthly basis.

Phone Network.--A phone list has been established which includes the leaders of all the major interests and groups which have expressed interest in the study. Members of the study team will make periodic calls to everyone

on the list to insure that the groups are informed of study progress and to get "early warning" on new issues which may be emerging.

Instream Flows

The public involvement objective for this component of the public involvement program is to achieve a consensus among technical experts on the minimum, optimum, and maximum instream flows for fisheries enhancement.

The overall plan is to retain an independent consultant who will conduct the technical studies upon which these figures can be based. An Instream Flows Technical Advisory Group (IFTAG) will be established, and the consultant will work with this advisory group in an effort to achieve an agreement. The IFTAG will include technical experts from the various State and Federal agencies concerned with fisheries issues, the University of Washington, YIN, and representatives from interests such as agriculture or environmental groups. IFTAG is scheduled to submit its report by the end of 1983.

Specific steps are discussed below.

September 1983.--The contracting procedures for selection of an independent consultant are currently underway, and a consultant should be selected by September 1983. Although the selection process will be made internally, in order to prevent political issues from influencing selection, interested groups will be briefed on the criteria used in selection.

October 1983.--A mission statement will be prepared by the study team for IFTAG. This mission statement will include such information as the lifetime of the IFTAG, the number of persons to be on the IFTAG, how the members are to be selected, who will chair the IFTAG, what level of support

the study team will provide, the alternative scenarios for which estimates must be generated, and the role of IFTAG'S recommendations.

Once the mission statement is completed, a newsletter will be mailed to the complete mailing list describing the functions of the IFTAG, its membership, and its mission.

November 1983.--IFTAG meetings will be held throughout the month of November. These meetings will be announced to the public and will be "observable;" i.e., interested people may sit in the meetings and observe the discussion but will not be invited to participate.

December 1983.--Early in December, IFTAG will hold a public meeting(s) to present preliminary findings to the public. These results will also be summarized in a newsletter that will be sent to everyone on the mailing list. All public comment will be analyzed by the IFTAG, which will then develop its final recommendation to the directors. This recommendation will be submitted no later than December 29, 1983. It is anticipated that the directors will make a decision on instream flows almost immediately thereafter, and this decision will be announced in another newsletter and with press releases.

Irrigation Water Requirements

The public involvement objective during calendar year 1983 is to achieve a consensus on the actual water requirements to provide an adequate water supply for all lands currently under irrigation.

Preliminary findings regarding water requirements have been generated using computer modeling techniques. In order to insure that the figures generated in the model fit reality, they will be presented to each irrigation district individually so that the districts can comment on the figures.

Because of the possibility that these figures could eventually be presented as evidence in adjudication, it is important that these figures not be released until the districts have had an opportunity to comment. A Water Requirement Technical Advisory Group (WRTAG) will be established, whose purpose it will be to evaluate the comments from the irrigation districts and recommend final figures. The WRTAG will contain technical representatives from the appropriate State and Federal agencies, agricultural groups, the University of Washington, and others. Final recommendations from the WRTAG will be submitted to the directors by the end of 1983.

Specific steps in the process are discussed below.

August 1983.--The preliminary findings from the "modeling" of water requirements will be submitted to each water district individually. Comments will be invited from each district, and the study team will meet with any district which requests a meeting.

September 1983.--Meetings with the districts will continue into September, with all comments from the districts documented by the end of September.

October 1983.--A mission statement for the WRTG will be prepared and the WRTAG established. The October 1983 newsletter will contain a description of the WRTAG, including its membership and mission.

November 1983.--The preliminary findings from the modeling and the comments received from the irrigation districts will be presented to the WRTAG. The WRTAG will review the comments and revise the figures generated by the modeling where incorrect assumptions or other erroneous information have been used.

December 1983.--Early in December the WRTAG will hold a public meeting(s) to announce its findings and receive public comment. These meetings may be

scheduled jointly with the IFTAG. The WRTAG findings will also be announced in the December newsletter. Comments received from the public will be analyzed by the WRTAG and final recommendations developed for submission to the directors by December 29, 1983. The directors' decision will be announced with press releases and in the next issue of the newsletter.

Water Conservation

The public involvement objective for calendar year 1983 is to reach agreement on a set of alternative water conservation plans.

The primary mechanism for development of alternative water conservation plans will be the establishment of three working groups which will include representatives from agricultural and environmental groups as well as governmental agencies. The first step in the process will be a conference or workshop on water conservation which will be designed jointly with Agricultural Extension or Washington State University. This conference will serve as a "technical briefing" for the three working groups on the opportunities and problems associated with water conservation; but, the conference will also be open to the general public, so that it will also serve a public education role. The three working groups will be heterogenous groups, with representatives from the various interests in each group. Each working group will be assigned a different aspect of water conservation, such as: (1) incentives for conservation, (2) institutional and legal issues, and (3) water conservation technologies. Each working group will have approximately 1 month to develop a report in the assigned area, and then the three groups will be combined into a single group to develop alternative water conservation plans. The study team will then develop appraisal level estimates of cost and anticipated water savings.

Specific steps in this process are discussed below.

August 1983.--Agreement will be reached with Agricultural Extension or Washington State University on time, date, and program for a conference on water conservation.

September 1983.--The conference will be publicized to groups interested in water conservation as well as to the general public. In addition, the membership of the working groups will be determined.

October 1983.--The conference should be held early in October. As soon as the conference is over the working groups will begin to meet. Reports from the working groups should be ready in late October or early November.

November 1983.--The three working groups will then assemble as a single group to review the reports from the three subgroups. The objective will be to identify alternative water conservation plans.

December 1983.--The report from the combined working groups should be submitted to the study team by early December. The study team will then identify appraisal level costs and water savings associated with each plan.

Site Evaluation

The calendar year 1983 public involvement activities associated with site evaluation have largely been completed. In July, a newsletter was issued to the entire mailing list describing the study team's recommendation regarding which elements should be carried forward for more detailed evaluation and which should be eliminated. This newsletter also contained a matrix summarizing the technical findings on each potential element. The newsletter also contained a response form inviting public comment. A more complete technical document describing the findings on each element was sent

to a mailing list of approximately 50 people representing all the major organized groups or agencies which have expressed an interest in the study.

The current plan is to document public comment and submit this, along with the study team's recommendations, to the directors by August 1, 1983.

If there is more public controversy than presently anticipated, it may be necessary to either hold public meetings or meet with groups that have particular concerns.

Unless there is unanticipated public controversy, the directors' decision will be made and announced early in August. The balance of 1983 will be taken up with technical studies on the remaining elements.

Yakima Indian Irrigation Projects

Periodic meetings are being held with the Irrigation Committee of YIN, as directed by the Tribal Council. Once a recommended plan has been developed, it will be submitted to the Tribal Council and then the General Council of the Yakima Indian Reservation. The recommended plan will also be described to the general public through the newsletter.