

Appendix A

*Project Team Members,
Scope of Work*

Project Team Members
Lake Wenatchee Water Storage Feasibility Study

Name	Organization
Bill Bauer	Mayor, City of Leavenworth
Bill Robinson	Washington Council~Trout Unlimited
Buford Howell	Icicle Creek Watershed Council
Cot Rice	Cascade Orchards Irrigation Company
Dennis Carlson	National Marine Fisheries Service
Glenn Hoffman	US Forest Service~Lake Wen./Leavenworth
Gordon Irle	Mayor, City of Cashmere
John Hunter (in 2002)	Chelan County Commissioner
John Zipper	Landowner
Karl Halupka	US Fish and Wildlife Service
Keely Murdoch	Yakama Nation
Kirk Mayer	Washington Growers Clearing House
Lee Carlson	Yakama Nation
Mike Kaputa	Chelan County Natural Resource Program Director
Nancy Smith	Facilitator
Patrick Verhey	Washington State Dept. of Fish and Wildlife
Peter Burgoon	Water Quality Engineering
Ray Aspiri	"The Friends of Lake Wenatchee Forest"
Ray Newkirk	Department of Ecology
Rick Halstead	Washington State Parks
Rick Smith	Superintendent, Wenatchee Reclamation District
Steve Craig	Lake Wenatchee Properties~Landowner
Keith Goehner (in 2003)	Chelan County Commissioner

Exhibit B

STATEMENT OF WORK LAKE WENATCHEE WATER STORAGE FEASIBILITY STUDY

The following Tasks 1 through 5 describe the work that is required to complete the Feasibility Study and Task 0 describes work done for project management. The sections following Tasks 1 through 5 contain a description of the budget and schedule to complete those tasks.

Task 1 -WATER NEEDS

1 A. Current and Projected Water Use for Residential, Municipal & Industrial Purposes

Estimates of current water use for residential, municipal and industrial purposes are being prepared for the Wenatchee River Basin Watershed Assessment study that is ongoing. Excerpts from the scope of the Watershed Assessment that describe the current residential, municipal and industrial water use estimate task are copied below for reference.

“Current surface water use will be estimated by subbasin by first summarizing the results of the water rights database task and then verifying those results using data from a range of entities. The major surface water users will be grouped into categories of municipal, industrial, fish propagation and irrigation for crops. The major municipal and industrial surface water right holders will be contacted to verify the quantity of use and the type of use. Return flows from the water users will be estimated using data from wastewater treatment plants and experience gained from similar analyses in central and eastern Washington. The net consumptive use is the diversion minus return flow.

Major groundwater users will include the same groups but will also include domestic water users. To estimate domestic water use, two sources of data will be used: water use records from Class A and B water systems and from domestic exempt wells using population data, zoning data and existing service areas for water purveyors. Data from water purveyors using groundwater will be used to directly calculate total and representative per capita consumption. That per capita consumption will be used to quantify water use in areas served by domestic wells or in water systems without sufficient well pumping data”.

This study will use that current water use data and develop estimates of future residential, municipal and industrial water use based upon forecasts of population and industrial growth and changes in land use. The potential for future changes in water use from changes in land use such as residential growth or conversion from agricultural land to residential uses will be reviewed by analyzing Comprehensive Plans, zoning maps and planning activities in the study area. One concern may be the growth of domestic exempt wells, which can withdraw water for up to six households without applying for and receiving a water right. Future water uses will be forecast based upon growth projections and water use estimates for different land uses. Future growth will be projected using estimates and data from Chelan County Planning Department and the Office of Financial Management (OFM).

Summary tables of estimated current and future surface and ground water use by subbasin in the Wenatchee Watershed will be prepared along with a discussion of methods, results and data limitations of these estimates.

1 B. Current and Projected Water Use for Agricultural Purposes

Estimates of current water use for agricultural purposes are being prepared for the Wenatchee River Basin Watershed Assessment study. Excerpts from the scope of the Watershed Assessment that describe the current agricultural water use estimate task are copied below for reference.

“Water diversions from irrigation districts and private ditch companies such as the Wenatchee-Chiwawa Irrigation District, Icicle & Peshastin Irrigation District, Wenatchee Reclamation District and others will be obtained by contacting those entities to gather available data. Water used consumptively for agricultural uses will also be estimated using available data on agricultural land area and cropping patterns from Chelan County, the National Agricultural Statistics Service (NASS) and the U.S. Department of Agriculture (USDA). Crop evapotranspiration (ET) will be estimated using the best data on crop ET from the WSU Tree Fruit Research Center, our calculations using weather data in the Watershed and a modified Blannay-Criddle method or by using average crop irrigation requirements obtained from the Washington State Irrigation Guide (WSU, SCS, 1985). The Ecology water rights database also has information useful for estimating water usage, such as irrigated acreage”.

Future agricultural water use will be estimated by reviewing urban growth patterns and conversion of agricultural areas into residential areas, as described in the task to estimate future residential water use. The conversion of agricultural area into residential area can reduce the overall volume of water use but may not change the peak water use unless the change is accompanied by an improvement in water application practices. The potential for changes in agricultural water use due to changes in cropping patterns and water conservation will also be reviewed.

Using the above information the report will include tables using the data generated in the Watershed Assessment to predict agricultural irrigation water demand for both ground water and surface water along with discussion of methods, results and data limitations of these predictions.

1 C. Regional Use - Water Storage Needs

Water storage needs will depend on the additional quantity of instream flow desired for the Wenatchee River as well as the additional withdrawals from surface or groundwater required to support additional growth in the Wenatchee Watershed, to the extent that additional water use affects Wenatchee River flows. The existing instream flows for the Wenatchee River are contained in Chapter 173-545 WAC, the Instream Resource Protection Program (IRPP) for Wenatchee River Basin. The Watershed Planning Unit has not yet undertaken a new instream flow setting program but may in the next few years provided sufficient funding and community support exist. That effort would occur beyond the schedule of this study. For this study, various levels and duration of instream flow will be used to estimate water storage needs. These flow levels and duration will be discussed and agreed upon with the Technical Subcommittee to ensure a proper range of instream flow conditions are analyzed. This analysis will be performed with the hydrologic model described in the Technical Feasibility section.

1 D. Comparison of Water Savings from Conservation and System Improvements to Water Needs

For this task, water conservation opportunities will be reviewed and summarized as to their potential effect on water use and diversions. The water conservation opportunities may result in reduced water use in the residential, municipal and industrial and irrigation sectors. For residential, municipal and industrial water users water conservation opportunities result from programs such as metering, leak detection, demand management, water audits, water reuse and others. For agricultural water users, water conservation opportunities result from on-farm irrigation efficiency programs, improvements to canals and laterals, automation, re-regulating reservoirs and changes in points of diversion.

Major water users will be contacted to determine if Water Conservation Plans are available. Typically, the plans are required for municipal water users by Dept. of Health while they are optional for irrigation diverters but may be prepared under the State's Referendum 38 program. Water savings identified in those plans will be summarized. Where Water Conservation Plans are not available, current water use (per capita for municipal systems, per acre for irrigation water users and conveyance efficiency for irrigation canals) will be compared to other similar water systems and irrigation districts in north-central Washington that have implemented water conservation plans. We will estimate a range of potential water savings for each sector. The range will cover moderate to aggressive water conservation measures. The costs of the water conservation measures will also be estimated to provide a comparison of the benefits and costs compared to additional storage.

1 E. Inventory of Water Rights

The amount of surface water and groundwater allocated will be estimated using the DOE's new Geographic Water Information System (GWIS) prepared by DOE and well data. All certificates and permits in the DOE database will be considered current rights; applications will be considered potential rights. Claims will also be considered current rights if there is sufficient information to warrant inclusion in the water rights analysis. Private wells will be added since they may withdraw up to 5,000 gallons per day. The number and locations of private wells will be assessed using zoning and population data described in the Residential Water Use task and the Department of Ecology well database.

The water-rights coverage produced for this task will illustrate the distribution and types of water rights in the WRIA based on the GWIS database and our estimates of water use from domestic wells.

The deliverables for this task will discuss the methods and results of the water-rights inventory, including any data shortcomings associated with the analysis. The report will include tables of estimated groundwater and surface water allocations by status and by purpose of use, along with potential water rights (applications).

A comparison of the water rights summary to water use (estimated in previous tasks) will be provided. This comparison is proposed as means of estimating the quantity of the water rights held that are actually being used.

1 F. Allocation of New Water Rights

A summary of the current water rights applications will be provided in the previous task. For this task we will analyze the potential effect on Wenatchee River stream flow from approving those applications, as well as approving water rights applications to provide for future growth in water use due to residential, municipal and industrial use. The analysis will be performed by estimating the effect on Wenatchee River flows from surface and groundwater diversions. This method directly subtracts the increased allocations (in the case of surface water withdrawals) or to lag (attenuate) in time the effect of the additional withdrawals on Wenatchee River flow (used for groundwater withdrawals). Similar analyses have been performed in the Kittitas Valley for estimating the effect of reducing irrigation seepage and increasing groundwater withdrawals on stream flow.

1 G. Use of Additional Water Storage

Additional water provided by Lake Wenatchee could be used to increase instream flow for environmental purposes and/or meet future water needs for the Wenatchee Watershed and/or for other purposes identified by the Wenatchee Watershed Planning Unit. The volume of water available will vary depending on streamflow conditions in the White and Little Wenatchee Rivers. The first component of this task is to quantify the amount of water available from the project on a monthly basis for a range of runoff conditions from drought to wet conditions. That work will be performed using a hydrologic model that is discussed in the Technical Feasibility section. The second component is to list

the purposes that the additional water supply could be used for and define the water needs for those purposes (i.e., increase instream flow in the Wenatchee River by 100 cfs during August and September during drought years, provide for 25 cfs municipal demand). That work is described in previous tasks. The third component is to compare the volume of water supply available from Lake Wenatchee to the desired uses. A discussion of the ability of the project to supply the various purposes or groups of purposes will be prepared and presented to the Technical Subcommittee for review and comments.

1.H. Potential Improvement in Instream Flow

The potential improvement in instream flow will be analyzed using the hydrologic model described in the Technical Feasibility section. The model will be run for a long period to establish the volume of water that would be available during different hydrologic conditions ranging from drought periods to wet periods. The model will have a daily time step and will have the capability to analyze the improvement in instream flow for a variety of desired instream flow rates and duration of improved instream flow.

Task 2 - TECHNICAL FEASIBILITY

2.A. HYDROLOGY

2.A.1. USGS Data Gathering

Daily flow data is available on the Wenatchee River at the following USGS gages:

- USGS gage 12455000, Wenatchee River below Wenatchee Lake. Period of record is from January 1932 through September 1958. Drainage area is 273 square miles.
- USGS gage 12457000, Wenatchee River at Plain. Period of record is from October 1910 through September 2001. Drainage area is 591 square miles.
- USGS gage 12459000, Wenatchee River at Peshastin. Period of record is March 1929 through September 2001. Drainage area is 1,000 square miles, approximately.
- USGS gage 12462500, Wenatchee River at Monitor. Period of record is October 1962 through September 2001. Drainage area is 1,301 square miles.

Daily flow data will be gathered at Plain and Peshastin for the common period of record with the gage below Wenatchee Lake. The gage at Monitor does not have a common period of record with the gage below Wenatchee Lake, but the flows are only about 7% greater than the flows at Peshastin so it is assumed that estimation will yield reliable results.

For the gage below Wenatchee Lake, additional information will be gathered. All stage-discharge rating curves will be requested from the USGS. Hourly stage-discharge information will be gathered for the three largest floods of record during the period of potentially increased storage.

2.1.B. Create Storage Operation Model

A reservoir storage operation model will be developed to simulate the water levels and outflows from Lake Wenatchee under the proposed conditions. The model will operate on a daily time increment for the 26 year period from 1933 through 1958.

Reverse routing utilizing the USGS record of daily outflows and the existing outlet rating curves will allow development of inflows to Lake Wenatchee. The daily outflow data and the existing rating curves will be used to develop a continuous record of daily Lake Wenatchee elevations for the 26-year period.

The storage model will be written in Fortran computer code to provide maximum flexibility of operation and output formatting and to utilize available flow frequency routines. Input to the model will include operating criteria for the dam structure. Output from the model will include Lake Wenatchee elevation frequency (a duration curve) for each month, and flow frequency for each month at the Lake Wenatchee outlet and for the Wenatchee River at Plain and Peshastin. The flow frequency and Lake Wenatchee elevation frequency data will be compared to the historic data to determine the incremental effects of the proposed storage project. A series of runs will be performed based on alternative water storage scenarios on Lake Wenatchee.

2.1.C Flood Operation Model

Hourly flood hydrograph data will be developed for the three largest floods of record that have occurred during the season when the rubber dam may be in operation. The largest floods will be selected after a review of hydrologic records. Floods that appear to have a rapid rise will be selected over floods with a greater peak, but a slower rate of rise. Hourly outflows will be calculated from lake elevation data and the available rating curves. Hourly lake inflows will be calculated by reverse routing. A model will be developed to determine if the dam can be lowered at a rate that would not increase historic lake elevations. Alternatively, the maximum rate at which the dam would have to be lowered to avoid raising lake levels will be determined.

The hydraulic and flood impacts from the project in areas downstream from Lake Wenatchee will also be reviewed to determine the effect of operating the dam. The potential change in flood levels or river levels will be estimated using the output from the flood operations model and stage-discharge information available in downstream reaches from USGS and other stream gages.

A Shoreline Erosion analysis will be done in the following manner. Obtain existing wind speed and direction data from the Stevens Pass weather station (the closest station with wind data) and calculate potential wave heights along various sections of the lakeshore of Lake Wenatchee. The wave height calculations will be based upon fetch length and wind duration. The calculation will be performed for existing conditions and with-project conditions to compare the wave heights at different elevations and time periods when water may be impounded at higher elevations.

Note: A direct correlation between lake level, wave height and potential shoreline erosion cannot be prepared as topographical, soils and structure elevation and condition information along the lakeshore is not available. However, the height and duration of waves at various lake levels will provide an indication of potential changes in shoreline erosion.

2.1.D Gathering Data on Normal High Water

Normal high water information will be developed based on a frequency analysis of the 26 years of daily Lake Wenatchee water levels that are developed for the storage operation model. Normal high water information will also be developed based on a frequency analysis of the instantaneous annual maximum lake elevations.

2.2 CIVIL ENGINEERING

2.2.A Field Reconnaissance – dam site feasibility and impacts on existing infrastructure

Prior to any field visits, data will be gathered regarding topography, geologic formations and seismicity in the vicinity of the outlet for Lake Wenatchee. Once this information has been gathered, our geotechnical subconsultant, and a MWH senior civil engineer will make a one-day reconnaissance level site investigation. The visit will involve walking the length of the outlet channel from the lake to the vicinity of the bridge downstream of the lake. Distance and channel width measurements will be made and a boat will be launched to determine water depths in the outlet channel. Geology will be noted in the area and notes taken to allow siting of a storage structure. In addition, access roads and other existing features will be noted to allow feasibility level planning of construction activities and potential affects.

Once the site investigation has been completed, a memorandum will be written, condensing the data gathered in the field and making recommendations for siting of a storage structure and construction considerations. This memo will be the basis for future technical feasibility analyses and cost estimates and can be included in the feasibility report as an appendix.

2.2.B Storage Structure Feasibility Design

Based on the field reconnaissance, a storage structure will be laid out at the location determined best for development. The layout will include foundation layout, number of spans, mechanical equipment building, potential electrical feed, and access road. The structure's ability to allow sediment and woody debris passage will be assessed. Two 11" x 17" drawings will be developed for inclusion in the feasibility report.

2.2.C Fish Ladder Feasibility Design

A fish ladder will be integrated into the design of the storage structure. The ladder will be designed for the fish indigenous to the upper Wenatchee River and Lake Wenatchee. We assume that the ladder will need to be designed for bulltrout, the weakest swimming species likely to be found in the area. One 11" x 17" drawing will be developed for inclusion in the feasibility report.

2.2.D Feasibility Level Cost Estimate

Based on the layout of the storage structure and the fish ladder, quantities will be computed and construction sequence determined. The cost estimate will be based on unit prices for similar work and a generous contingency added to account for the feasibility level of the design and layout of the structures.

Task 3 - LEGAL FEASIBILITY

3.1.A Project Compliance with Existing Federal, State, and Local Laws

This subtask will involve an evaluation of the proposed project to determine how well it complies with existing laws and regulatory agency requirements. This will involve a review of the existing statutes and also discussions with the appropriate regulatory agencies such as the Corps of Engineers,

Washington State Department of Ecology, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Washington Department of Fish and Wildlife.

Note: In order to reduce the cost of this task to fit within Chelan County's budget we have reduced expenditures on legal time to just \$9,000. This will mean that the questions that we can ask of our legal team will be very limited and targeted.

3.1.B. Compliance with Endangered Species Act

Steelhead, Chinook, and bull trout, three species of fish involved in this project, are listed in the Endangered Species Act (ESA) and migrate into and out of the lake. Installation of a control structure on the lake outlet will necessarily have to incorporate fish passage facilities in the form of fish ladders, bypass channels, or by other means. Based on our inspection of dam site conditions it appears one or more fish ladders would be the preferred fish passage solution if fish passage cannot be accomplished over the dam section itself.

For this task the issue becomes whether the dam and fish passage facilities can be designed, constructed, and operated in such a manner that the project is in compliance with the requirements of the Endangered Species Act. Our team will assess how a storage structure can be designed with ESA-listed species present and meet regulatory requirements. In addition to the structure itself there are ESA compliance issues associated with how the project is operated. In this task the effects on instream flows in the river, water quality, wetlands, impacts on downstream fish spawning areas, passage past the dam of gravels, sands, and woody debris to replenish downstream spawning habitat, and other issues will be assessed and reported.

3.1.C. Compliance with Tribal Nations Rights

This subtask will involve evaluation of the impacts the project may have on Tribal Nation rights due to the altered flow regime. In principle, withholding of some water during the spring runoff for release into the river later in the year could affect the fishery resources of the Wenatchee River Basin and perhaps even the Upper Columbia River system. The Tribes (Yakama and Colville and others) have certain legal rights to harvest a percentage of the fishery resource. The scope of this task will be to evaluate the possible impact of the project on the fishery resource and from a legal standpoint assess whether the project is in compliance with the rights of the Tribal Nations to a portion of the fishery resource.

3.1.D. Permitting Requirements

This subtask will involve the identification of all applicable federal, state, and local permits, and other regulatory approvals necessary for construction of the dam. The task will also include related actions of the project, which may require permitting or regulatory agency approvals. A list of the likely major permits and approvals follows:

- Corps of Engineers 404/Section 10
- Washington Department of Ecology Dam Safety
- Clean Water Act Section 401, Water Quality Certification
- Section 7 Consultation (Biological Assessment)
- Hydraulic Project Approval
- County Shorelines Permit
- Water Storage Permit
- State Environmental Policy Act and possibly NEPA Compliance

Early coordination with the regulatory agencies will be an important component of defining permitting elements and issues. The MWH team will insure that there is open communication between the team and agency representatives assigned to the project. As a part of the permit review process, the study team will identify the permits and prepare a summary of related conditions associated with the applicable permitting or approval processes. In addition we will define threshold determinations whether the proposed project is likely to satisfy applicable federal, state, and local requirements necessary to obtain the permits and/or approvals.

The product of this subtask will be a technical memorandum identifying the permits, potential issues, permit timeframes, agency contacts, project features subject to permits, potential approaches (and additional study needs) for completing permitting process, and mitigation requirements.

3.1.E. Regulatory Authority

This subtask will address issues such as the entity that would own and operate the dam and the liability and regulatory compliance obligations or other liability they would assume in doing so. There are only a small number of candidates, including the Washington Department of Fish and Wildlife, Wenatchee Reclamation District, and the Chelan County Public Utility District (PUD).

3.1.F. Responsibility for Mitigation

This subtask will involve evaluating institutional responsibilities for mitigation of impacts due to installing a regulating structure at Lake Wenatchee. Typically, responsibility for mitigation lies with the owner of the project. In this case, the organization that would ultimately own and operate the project has not been established. Candidates might include the Wenatchee Reclamation District, which owns the Dryden Dam, the Washington Department of Fish and Wildlife, and Chelan County PUD, although their interest in assuming such responsibility is unknown. The responsibility and cost of mitigation would likely be worked out when determining the source of funding for the project.

We will evaluate the legal statutes concerning responsibility for mitigation and the circumstances under which legal and financial responsibility might be assumed by entities other than the Owner.

3.1.G. Evaluate the Status of the Water Storage Permit

The Wenatchee Reclamation District (WRD) had for many years held a permit for storage on Lake Wenatchee. Some years ago, Chelan County PUD was interested in possibly developing a small hydro project near Lake Wenatchee and the WRD permit for storage was transferred to the PUD. The PUD never did implement the project and the permit was transferred back to WRD. WRD believes it has retained the right to store water at the lake.

For this subtask, we will review the history of the storage permit and current regulations that govern the duration a permit remain valid. We assume the history and details of the storage permit will be provided for our review. If the permit has lapsed, we will evaluate whether it can be renewed and under what circumstances. Dave Sonn of Jeffers, Danielson, Sonn, and Aylwood, P.S. (JDS&A), of Wenatchee, is legal counsel to the WRD and has been actively involved with the permit issues. He has agreed to provide services to our team through WRD, provided there is approval of both WRD and the Project Team.

Task 4 - SOCIOECONOMIC IMPACT

4.1. Assess Changes in Land Use – Short and Long Term Impacts on Lakefront Property

Under this task we will assess changes in land use associated with the water storage project. The focus of this task will be to determine the potential effects on public and private land uses occurring around Lake Wenatchee as a result of increasing water storage during the summer months.

4.1.A Identify Land Ownership Patterns and Improvements

Under this subtask the Team will identify the land ownership patterns occurring around Lake Wenatchee. We will also identify the land uses and general types of land improvements associated with the different ownership classes such as septic systems, docks and building foundations. Because of the large number of private parcels around the lake we will not conduct a parcel-level inventory of land improvements.

4.1.B Assess Sensitivity of Land Uses and Improvements to Changes in Lake Hydrology

Under this subtask, the Team will determine the sensitivity of the land uses and improvements identified in Subtask 4.1.A to the expected changes in lake hydrology that would occur as a result of operation of the water storage project. Information will be gathered from the U.S. Forest Service (USFS), Washington Department of Parks, and local landowners to determine how existing land uses and improvements may be affected by higher lake levels during the summer. This information will then be compared to with-project and without-project hydrologic conditions to determine if a significant change in the frequency the surface elevation of the lake reaches a level which land uses or improvements are adversely affected.

4.1.C Assess Changes in Property Values

If the analysis conducted under Subtask 4.1.B concludes that land uses and improvements occurring on private lands could be substantially affected by operation of the water storage project, potential effects on property values will be described. The change will be qualitatively described based on discussion with landowners, real estate brokers, and conclusions of similar studies. The purpose of this assessment is to determine if an overall increase or decrease in the value of properties around the lake would occur as a result of operating the water storage project.

4.2. Assess Changes in Recreation Activities

Under Task 4.2, the Team will assess potential changes in water-dependent and water-enhanced recreation occurring at Lake Wenatchee and the Wenatchee River.

4.2.A Identify Recreation Activities and Lake-Level/River-Flow Thresholds

Under this subtask, we will identify the recreation activities occurring on Lake Wenatchee and the segment of the Wenatchee River affected by operation of the water supply project. Water-dependent and water-enhanced activities will be identified based on type, location, and season. Annual use numbers will be reported if available from the USFS and Washington Department of Parks.

The relationship of water-dependent and water-enhanced recreation activities to changes in the surface elevation of the lake and changes in river flows will be identified. This information will be expressed as the minimum, maximum, and optimum lake levels or river-flows necessary to support a particular type or class of recreation activity.

4.2.B Assess Changes in Recreation Activities

Under this Subtask, potential changes in recreation occurring at Lake Wenatchee and the Wenatchee River as a result of project operations will be assessed. With-project and without-project hydrologic conditions will be compared with the lake-level and river-flow recreation thresholds developed under Subtask 4.2.A. Changes in recreation opportunities will be compared to baseline conditions to determine the intensity and context of expected changes.

Working with the environmental impact assessment team, we will assess potential changes in fishing opportunities occurring at Lake Wenatchee and the Wenatchee River. Changes will be qualitatively described based on changes in the quality of the aquatic habitat of Lake Wenatchee and the Wenatchee River.

4.3 Assess Expected Project Costs and Benefits

Under this task the major costs and benefits of the project will be reported. The purpose of this assessment is to provide feasibility-level description of the major costs and benefits of the projects. This portion of the analysis assumes that the study-area for estimating project-related costs and benefits will be Chelan County.

4.3.A Describe Regional Economy

For purposes of establishing baseline conditions, a description of the regional economy will be developed. This will include a description of employment, income, and the major economic sectors present in Chelan County. This information will serve as the basis for determining the magnitude of a change in economic activity associated with the water supply project.

4.3.B Estimate Project Costs

Under this subtask, the construction, operation, and maintenance costs of the rubber dam will be reported. Information provided by the project engineers will serve as the basis for estimating these costs. Based on the conclusions from Subtask 4.2.A and B, the costs to repair or compensate for damages to property as a result of operating the water supply project will be reported.

4.3.C Estimate Changes in Recreation Expenditures

Based on the conclusions of Task 4.2, expected changes in recreation use and the associated changes in recreation expenditures will be estimated. These changes will be based on the information gathered from recreation providers at Lake Wenatchee and the Wenatchee River. Estimated changes in expenditures by recreationists will be based on existing spending profiles for similar recreation activities.

4.3.D Estimate Changes in Economic Output

Under Subtask 4.3.C, potential changes in economic output associated with enhancing the water supply will be assessed. Based on the conclusions of the water needs assessment, changes in output will be estimated based on changes in land uses (e.g. agricultural, residential, commercial, and industrial) within the water delivery area.

4.3.E Employment and Income

Based on the results of subtasks 4.3 A, B and C changes in regional employment and income will be estimated. The purpose of this task is to place the economic changes associated with construction and operation of the water storage project in context with the regional economy. If sufficient quantitative information is generated as part of the previous tasks, changes in employment and income will also be estimated quantitatively.

4.4 Impact on Cultural Resources

4.4.A Records Search/Literature Review

The team will collect and review existing literature and archival data applicable to the project area. The primary sources of data will be the State of Washington Office of Archaeology & Historic Preservation in Olympia and the University of Washington Libraries. The study area for the Lake Wenatchee Water Storage Feasibility Project will incorporate the whole of Lake Wenatchee including the construction footprint of the storage structure near the mouth of the Wenatchee River and following the shoreline surrounding the lake at ordinary high water levels. A project binder will be compiled of relevant background information on the previously recorded archaeological and historic properties within the proposed project's Area of Potential Effect (APE).

4.4.B Field Survey

We will conduct a cultural resources field survey of APE. The purpose of the field survey will be to:

- (1) Confirm previously recorded archaeological sites and/or historic structures in the proposed project area
- (2) Survey sections of the proposed project area that have not been adequately inventoried; and
- (3) Identify and characterize those areas in the proposed project area that would have a higher probability for encountering cultural resources during construction excavation. The focus of the field survey would be on the construction footprint of the storage structure.

Specific activities of the field survey will include:

Documenting and assessing previously recorded archaeological sites and/or historic structures within the APE; and

Map and describe any newly discovered archaeological sites and/or historic structures in the APE.

Subtask 4.3 Technical Letter Report/Consultation

We will characterize the cultural setting; and describe the prehistory, ethnography, recent history, and traditional cultural uses of the project area; and analyze potential impacts of the proposed project to existing and/or newly identified cultural resources.

We will assist in consultation with Office of Archaeology and Historic Preservation OAHP to:

- (1) receive their input regarding mitigating any adverse effects on archaeological sites, historic structures, and traditional cultural properties associated with the project; and

(2) (2) Facilitate the OAHP letter of concurrence on the APE of the project area.

We will identify the affected Native American Tribe(s) that will need to be consulted with in order to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.

Task 5 - ENVIRONMENTAL IMPACT

This task is focused on evaluating environmental impacts (both positive and negative) that may result from the construction and operation of a storage structure at the mouth of Lake Wenatchee. The task is specifically targeted at addressing two resource issue questions identified in the proposed scope of work. These are:

- What would be the effect of the construction and operation of an inflatable dam on lake limnology/ecosystem and species movement through the lake and around the lake? and
- What direct and indirect effects would the dam have on the life cycle of Spring Chinook, Sockeye, Bull Trout, Steelhead and other fish? Secondary questions/issues related to this include:

Is high water flow a benefit to migrating salmonids (juvenile downstream and adult upstream) and lamprey?
Quantity and quality of downstream aquatic habitat for species listed in item 6 and freshwater mussels.

5.1 Literature and Data Compilation and Review – The initial effort will focus on identifying, compiling and reviewing information and data relevant to understanding the fishery and aquatic ecology of 1) Lake Wenatchee, including its bathymetry, limnological characteristics (water quality, productivity), fish communities and their life history characteristics, invertebrate productivity (zooplankton/phytoplankton), and the location of major tributaries (and their fish composition), and 2) Wenatchee River below Lake Wenatchee, including habitat and water quality characteristics, fish species composition, relative abundance, and periodicity. This information will be obtained via electronic searches as well as personal contacts with state, federal, tribal and county agency and resource specialists, and library searches. The Team will develop and maintain a project library of reports and information specific to the aquatic resources of the Wenatchee Basin.

5.2 Field Reconnaissance – Lake Wenatchee and Wenatchee River – Based on the results of an initial review of literature, R2 will complete a field reconnaissance of Lake Wenatchee (via boat) and the reach of the Wenatchee River that will be influenced by the project. Visual observations of shoreline areas and major tributaries will be made as well as wetland areas adjacent to the White River and Little Wenatchee River deltas. A general qualitative habitat survey will be completed of the Wenatchee River, with a focus on areas that may be influenced the most by flow augmentation. Photographs and videotaping will be taken during the field surveys. Because of weather concerns this fieldwork should be completed early in November. The field trip will be coordinated with other team members and as well agency and other stakeholder personnel.

5.3 Identify and Evaluate Potential Project Effects – Subsequent to the site visit and the review of existing information and data, the Team shall identify potential effects of storage options implementation on the lake and river ecosystem due to the changed hydrograph, with a focus on fishery resources. The effects will be organized around major headings that relate to life history functions of important salmonid species. Examples of these include: water quality (temperature, dissolved oxygen, etc.), food production, juvenile rearing habitat, spawning habitat (shoreline spawning and effects of holding lake level at full pool elevations longer than normal), connectivity/access to tributaries (important for adfluvial bull trout populations and anadromous species), adult upstream and juvenile downstream migration, species interactions/competition, among others. A temporally and spatially explicit matrix evaluation form will be developed that provides for a qualitative rating of the relative magnitude of project effects (both positive and negative) on important life history stages and habitat components. The specific ratings will be determined based on the expected effects of project implementation relative to each element. This analysis will rely in part on the lake operations and river hydrology model being developed in the Technical Feasibility task. A narrative (suitable for inclusion in the feasibility report) will be prepared which describes the rationale and basis for each of the ratings.

5.4 Identify and Prioritize Additional Study Needs: The results of the qualitative assessment will be used to identify and prioritize issues requiring additional investigation. For each issue identified, R2 shall prepare a short Technical Memorandum that explains the rationale and need for the study, provides a general description of study components, and an estimate of approximate costs for study conduct.

Task 0 – Contract Administration

Contract administration will consist of three elements:

- Attendance at meetings to keep the with the Lake Wenatchee Water Storage Feasibility Study Project Team (the Project Team) and/or the leadership of the Team apprised of progress on the study,
- Coordination of work on the tasks and,
- Dovetailing the task reports into a final overall Feasibility Study report.

It is anticipated that there will be three progress meetings over the course of the project, and that the final draft report will be presented to the Project Team at a formal public hearing. This contract will cover the cost of preparation of twenty-five copies of the final report. It has been agreed that Chelan County will pay for the meeting facilitator.