
STUDY PLAN DOCUMENT

For the

Lewis River Hydroelectric Projects

Merwin Hydroelectric Project, FERC No. 935
Yale Hydroelectric Project, FERC No. 2071
Swift No. 1 Hydroelectric Project, FERC No. 2111
Swift No. 2 Hydroelectric Project, FERC No. 2213

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1.0 INTRODUCTION

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1.0 INTRODUCTION

This Study Plan Document presents the resource-specific technical studies that have been developed for the relicensing of Merwin, Yale, Swift No. 1, and Swift No. 2 hydroelectric projects on the North Fork Lewis River (Figure 1.0-1) under PacifiCorp and Cowlitz PUD's Alternative Licensing Procedures (ALP). For more information on the history of the ALP, the Collaborative Team, the relicensing schedule, and structural/operational aspects of the 4 projects, please refer to the following document available at PacifiCorp and Cowlitz PUD's offices, the Longview and Woodland public libraries, and PacifiCorp's website (<http://www.pacificorp.com/pacomp/pacpower/hydro/lewisriver/index.html>):

PacifiCorp and Cowlitz PUD. 2000b. Final Initial Information Package (IIP) for the Lewis River Hydroelectric Projects. EA Science and Engineering, Sacramento CA, and Harza Engineering Company, Bellevue WA

As part of the ALP, the Lewis River Collaborative Team developed a set of procedures to guide the relicensing process. One procedure, developed for designing and implementing studies, includes the following steps:

1. Resource Groups, with the support of the consulting team, collaboratively create the study plan using the Framework approved by the Steering Committee (see Appendix A.)
2. Steering Committee approves the study plan.
3. Consulting Team, with the support of the Resource Group, implements the study.
4. Consulting Team distributes the data to the Resource Groups as they become available. The Resource Groups discuss the data as appropriate.
5. Licensees publish Annual Technical Reports that describe the status of each study and include the data collected to date. Data are compiled and summarized but not analyzed. (PacifiCorp and Cowlitz PUD. 2000a. 1999 Technical Study Status Report for the Lewis River Hydroelectric Projects. Harza, EDAW, EA, HRA, Hardin-Davis, NHC, WDFW.)
6. Resource Groups may, based on the progress of the studies and the results, modify the studies and/or develop new studies.

This Study Plan Document fulfills Step 1 and tracks the progress through Step 2 of the process listed above and includes the following:

- Section 1.1 describes the history of study plan development beginning with the Yale Notice of Intent in 1996.
- Section 1.2 summarizes the 39 currently existing study plans, including the objectives, products, schedules, and approval status.

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Lewis River Hydroelectric Projects
FERC Project Nos. 2111, 2213, 2071, 935

Figure 1.0-1. Lewis River Project Vicinity.
[black & white; 8 ½ x 11; PacifiCorp to provide]

- Section 2 provides the draft scientific framework underlying the study plans.
- Sections 3-13 are organized by major resource area and include the study plans that have been developed to date. These sections also include a brief description of the existing environment and potential project effects.

The study plans included in Sections 3-13 are at different stages in the approval process. Some study plans have been approved by the appropriate Resource Group(s) and the Steering Committee and are considered FINAL. These study plans are clearly labeled as FINAL in the dialog box on the first page of the study. It is possible that, based on the results of the first year of field work and/or new information, some FINAL studies could be amended after they have been approved by the Steering Committee. In these cases, changes made to the study plan after Steering Committee approval are summarized in the dialog box and the study plan will be re-distributed. A number of studies are still being discussed by the Resource Groups and/or Steering Committee and are clearly labeled as DRAFT in the dialog box. When the DRAFT studies have been approved by both the Resource Groups and the Steering Committee, they will be labeled as FINAL and distributed to the all of the participants holding a copy of this document. The participants are expected to replace the DRAFT study plan with the corresponding FINAL study plan. Thus, this Study Plan Document will not be FINAL until all study plans are FINAL.

Each study plan has been assigned a 4-digit alphanumeric designation. For example, the first watershed processes study plan is labeled WTS 1 and has a pagination scheme beginning with WTS 1-1 and running through WTS 1-X. The second watershed processes study plan begins on page WTS 2-1. Thus, when the WTS 1 study is finalized, it will not “interfere” with the pagination or tables/figures of any subsequent study plans in the watershed processes section. This system will also preclude the need to distribute a new master table of contents each time a currently existing study plan is finalized. However, a revised table of contents will accompany any newly proposed study plan.

1.1 HISTORY OF STUDY PLAN DEVELOPMENT

The development of study plans for the Lewis River relicensing process has been a collaborative effort between the consultants, Licensees, and Resource Group participants. The following Resource Groups were established to address studies and other resource-specific issues:

- Aquatic Resource Group (ARG)
- Cultural Resource Group (CRG)
- Flood Management Group (FMG)
- Recreation Resource Group (RRG)
- Socioeconomic Resource/Aesthetics Group (SRG)

- Terrestrial Resource/Land Use Group (TRG) (note: the TRG also covers land use issues)

The origin of many of the study plans contained in this document dates back to 1996, when PacifiCorp was in the early stages of the Yale Project relicensing process. During a meeting with key agencies and non-governmental organizations (NGOs) to discuss Yale relicensing issues and related study needs, several participants expressed a desire to simultaneously address all of the hydroelectric projects on the Lewis River to allow for a comprehensive basin-wide analysis. As a result of that meeting and subsequent discussions with FERC and Cowlitz PUD, PacifiCorp and Cowlitz PUD proposed a collaborative watershed-based relicensing effort for all four of the projects on the Lewis River.

In early 1997 PacifiCorp retained Stillwater Sciences to help facilitate a Watershed Scoping process to address the needs of the Lewis River relicensing process. A series of scoping meetings were held in 1997 with Yale relicensing participants and other interested parties to identify issues that related watershed processes and hydro project operations. A draft Watershed Scoping Document was produced in August 1997 identifying the following primary issue areas:

- Fluvial Geomorphic Processes, Stream Channel Morphology, and Aquatic, Riparian and Wetland Habitats
- Aquatics, including Habitat Connectivity, Anadromous Fish Reintroduction, Hatchery Management, Instream Flows, Reservoirs, and Water Quality
- Flood Management
- Watershed-scale Planning for Terrestrial and Riparian Habitat Conservation
- Conservation of Unique Habitats and Habitat Elements
- Cultural Resources
- Recreation

For each identified issue, the draft document contained lists of species potentially affected by the projects, potential project impacts and enhancements, and a set of key questions surrounding each issue. Subsequent meetings were held throughout 1997 and early 1998 with the goal of designing studies to answer key questions. As a result of these meetings, the Final Draft Watershed Studies Scoping Document and draft Lewis River Cooperative Watershed Studies Study Plan were issued on May 8, 1998 (Stillwater Sciences 1998a and 1998b, respectively).

The Watershed Scoping Document presented issues by resource and related key questions, while the Study Plan converted key questions into potential studies. These two reports have served as the basis for development of the study plans currently contained in this document.

In the course of numerous Resource Group meetings held as part of the Lewis River ALP in 1999, some participants expressed concern that PacifiCorp and Cowlitz PUD were not designing studies around each and every key question developed during the watershed scoping process. In response to the participants' concerns, PacifiCorp and Cowlitz PUD have prepared a Key Question Matrix (Appendix B), which provides the link between the key questions and the study plans included in this document.

1.2 SUMMARY OF STUDY PLANS

As of April 2000, PacifiCorp and Cowlitz PUD have proposed 39 studies (including 3 that have not been developed) to address the following resources: watershed processes, water quality, aquatic resources, terrestrial resources, cultural resources, recreation, land use, visual and aesthetic resources, socioeconomics, and flood management. Table 1.2-1 lists the individual studies currently proposed. The framework for study plan development is presented in Appendix A.

Table 1.2-1. Summary of study plans for the Lewis River relicensing.

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Watershed Processes							
WTS 1	Physiographic Setting and Stream Channel Classification	Describe general characteristics of Lewis River.	Written description of watershed Written description of geomorphic processes GIS map of stream reaches Drainage area calculations	7/8/99, 10/1/99 & 3/1/00		10/99	1/01
WTS 2	Streamflow Study	Describe flow condition at 6 locations.	Flow-duration, exceedance, and flood frequency curves Baseflow and flood timing graphs Document spill events Rates of flow change Water runoff and precipitation plot	7/8/99, 10/1/99 & 3/1/00		10/99	8/00
WTS 3	Stream Channel Morphology & Aquatic Habitat Study (formerly the Sediment Budget and Large Woody Debris studies)	Document aquatic habitat values in stream reaches. Assess project effects on habitat & stream morphology. Assess effects of potential management changes.	Channel and reach maps Map indicating platform changes over time Gage stage graph Areas of spawning gravel graph Changes in grain size graph	3/1/00	10/18/00	2000	2/01

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Watershed Processes							
WTS 4	Swift Bypass Reach Synthesis Study	Compile information on the current condition of the Swift bypass reach.	Water quality and temperature data in the bypass reach Pre-project and with-project quantity and timing of flows Synthesized flows (magnitude and timing) for the Rain/Ole Creek system Maps showing location and connectivity of wetlands and side channels Map showing existing vegetation cover types Aquatic and riparian habitat composition, structure and use by amphibians and fish Maps of aquatic habitat types, substrate, and spawning gravel Area, substrate, and LWD by habitat type Discuss potential and methods to provide controlled flows to the reach Weighted useable aquatic habitat area versus flows in the reach	3/22/01, 4/10/01		1999	06/01

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Water Quality							
WAQ 1	Water Quality Monitoring and Assessment	Determine current water quality conditions at Mervin, Swift. Assess effects of projects on water quality/temperature. Determine if water quality meets WA standards.	Study results report Water quality sections of APEA Application for 401 certification	8/18/99		8/99	12/00
WAQ 2	Total Dissolved Gas Study	Determine extent of TDG supersaturation at Swift No. 1 and No. 2 tailraces. Establish relationship between TDG and discharge at Swift No. 1 and No. 2 tailraces. Determine the persistence of TDG in Swift canal and through Yale Lake.	Study Results Report	8/18/99 & 8/30/99	9/17/99	9/99	1/01
WAQ 2 Cont.	TDG 2000	Continuation and expansion of AQU 2	Results combined with WAQ 2	8/00	10/18/00		1/01
WAQ 3	Polycyclic Aromatic Hydrocarbons (PAHs) in Yale Reservoir	Establish baseline description of PAHs in the concentrations in reservoir water	Analytical results of water samples from the 4 boat launches on Yale Comparison of total PAHs to existing WDOE standards and other criteria designed to serve as thresholds of PAH toxicity to aquatic life	9/28/00, 2/22/01	6/18/2001	07/01	10/01
WAQ 4	TDG 2001						

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Aquatics							
AQU 1	Report on Life History, Habitat Requirements, and Distribution of Aquatic Analysis Species	Compile life history, habitat requirements, distribution of analysis species.	Report on life history, habitat requirements and distribution of each analysis species.	11/29/99	2/4/00, 4/14/00	2/00	1/01
AQU 2	Swift Bypass Reach Instream Flow Study	Evaluate incremental changes in aquatic habitat as flows are increased.	Hydraulic simulations WUA vs discharge curves for target species Habitat suitability criteria	2/15/00	4/14/00	3/00	2/01
AQU 3	Merwin Streamflow and Ramping Rate Study	Identify flow effects on ESA listed species Determine if flows and ramping rate comply with Merwin license Identify stranding areas downstream of Merwin Dam and critical dewatering flows	Describe Merwin operations and potential stranding sites Show elevation and flow changes over time, overlaid with species periodicity Map of potential stranding areas and gage locations Elevation and flow changes over time at each potential stranding site Report on ramping rate/flow attenuation study Determine effects of Merwin flow regime on aquatic species Recommend Merwin streamflow Recommendations for operations at each potential stranding site	9/28/2000	10/18/2000	2000	2001
AQU 4	Assessment of Potential Anadromous Fish Habitat Upstream of Merwin	Delineate/characterize existing lotic reaches above Merwin currently not accessible to anadromous fish.	Map and photos of fish barriers Barrier characteristics table Accessible areas table Stream segment gradient graph	8/18/99, 11/29/99	2/4/00	9/99	12/00

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Aquatics (cont.)							
AQU 5	Engineering Feasibility Study for Fish Passage Facilities	Determine technical & biological feasibility of fish passage. Identify impacts on other resources. Develop planning-level cost estimates.	Fish Passage Feasibility Report	3/30/00	6/18/01	8/99	3/02
AQU 6	Evaluation of Fish Species Entrainment at Swift No. 1	Assess composition and abundance of fishes entrained through Swift No. 1 and present in tailrace Describe seasonal changes in species composition and abundance	Report on results	5/17/2001	6/18/2001	06/01	05/02
AQU 7	Creel Surveys	Monitor success of stocking program. Quantify angler effort, catch rates, species harvested. Collect biological information.	Survey summaries. Data to be used in APEA	6/3/99, 8/18/99	9/17/99	4/99	12/00
AQU 8	Study on Fish Management and Hatchery Operations	Summarize fish management and hatchery operations information.	Interviews with fisheries and hatchery managers, tribal members, and genetic specialists Report on results	11/29/99 & 1/28/00	4/14/00	Summer 2000	2/01
AQU 9	Speelyai Creek Connectivity and Speelyai Hatchery Protection Study	Identify measures needed to operate the Speelyai diversion within the parameters of the existing water right	Report on results	8/16/2000	6/18/2001	2001	2001

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Aquatics (cont.)							
AQU 10	Evaluation of Hatchery-Origin Coho Salmon Behavior and Habitat Selection in the Upper Lewis River Watershed	Identify adult coho holding and spawning locations in the upper watershed Determine migration behavior in the upper watershed	Identify adult holding and spawning locations Describe migration patterns of adult coho released at Eagle Cliff and Muddy River Determine if bull trout adult spawning locations are potentially used by coho	10/13/2000	11/9/2000	2000	2001
AQU 11	Quantification of In-River Residency and Investigation of Release Strategies for Hatchery Coho Salmon Smolts in the Lower Lewis River	Determine the amount of time juvenile wild fall chinook are exposed to hatchery coho smolts Determine whether hatchery coho can bypass chinook spawning/rearing locations by using alternate release points	Report on results	9/28/2001	6/18/2001	2001	2001
AQU 12	Feasibility Assessment of Bull Trout Habitat Enhancement in Rain and Ole Creeks	Investigate the potential to restore or enhance bull trout spawning habitat through flow augmentation in the lower reaches of Rain and Ole creeks	Report on results	9/28/2001	6/18/2001	2000	2001
AQU 13	Evaluation of Anadromous Salmon Behavior and Habitat Selection in the Upper Lewis River Watershed, Phase 2	Estimate migration rates and secondary productivity of hatchery origin fry Identify adult coho spawning locations Estimate smolt survival through Swift Reservoir Evaluate the movements of smolts through Swift Reservoir and its major tributaries	Report on results, including maps	3/22/2001	6/18/2001	2001	2002

Table 1.2-1. Summary of study plans for the Lewis River relicensing (cont.)

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Aquatics (cont.)							
AQU 14	Migratory Behavior of Coho Salmon Smolts Through Swift Reservoir, with Implications of Fish Collection at Swift Dam, 2001	Describe the migratory behavior of radio-tagged coho smolts within Swift Reservoir Determine detectability of tagged coho arriving at the Swift No. 1 intake area Determine survival of radio-tagged coho smolts through the reservoir	Report on results			2001	2001
AQU 15	Genetic evolution of native trout & steelhead in the Upper Lewis River Watershed	Determine genetic characteristics of rainbow trout, cutthroat & steelhead Are wild stocks present?	Report on results.	7/26/01		2001	2002
Terrestrial							
TER 1	Vegetation Cover Type Mapping	Provide map of cover types. Provide data on the area of each cover type by project. Provide info to assess PM&E measures. Provide map of cover types.	GIS map and acreage report. Data to be used in APEA	7/16/99	9/7/99	10/99	1/01
TER 2	Habitat Evaluation Procedure	Provide quantitative description of existing wildlife habitat quality on affected lands. Provide process for identifying enhancement opportunities for consideration in the TRMP. Provide a mechanism for monitoring PM&E measures.	Input to Terrestrial Resource Management Plan and SOP manual Recommendations on monitoring Meeting notes Draft and Final HEP reports	7/16/99	9/7/99	7/99	12/01

Table 1.2-1. Summary of study plans for the Lewis River relicensing (continued).

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Terrestrial (cont.)							
TER 3	Analysis Species Assessment	Document abundance and distribution of selected analysis species. Analyze factors affecting distribution of analysis species.	Recommendations for improvement Location and habitat GIS maps	7/16/99	10/21/99	10/99	12/01
TER 4	Botanical Surveys	Analyze factors affecting distribution of TES plants. Document locations/relative abundance of noxious weeds; analyze effect on TES plants. Document distribution of cottonwoods. Document presence of culturally important plants.	GIS maps FERC-required TES information Management recommendations	7/16/99	Approved	4/00	11/01
TER 5	Wetland Information Synthesis	Provide information on location, extent, quality, use of wetlands. Assess impacts of project operations on wetlands. Develop management options.	Protection recommendations Buffers map	10/1/99 & 12/7/99	6/23/00	Fall 99	12/01
TER 6	Reservoir Fluctuation Study	Evaluate the effect of project operations (daily/seasonal) on analysis species/habitats. Evaluate the effect of project operations on wetlands hydrologically connected to the reservoirs. Evaluate the effect of project operations on reservoir shoreline vegetation composition and structure.	Drawdown area GIS map Drawdown exposure report Comparison report for APEA Literature review Summary of effects	10/1/99, 12/7/99, and 9/20/00		12/99	12/01

Table 1.2-1. Summary of study plans for the Lewis River relicensing (continued).

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Terrestrial (cont.)							
TER 7	Tributary Stream Study	Locate and describe barriers to movement of terrestrial species. Assess effects of projects on habitat connectivity. Map and describe culverts. Develop management recommendations.	GIS maps of culverts. Habitat connectivity recommendations. Potential enhancement input.	10/1/99, 12/7/99	6/23/00	Summer 2000	11/01
TER 8	Forest Harvest Practices Assessment	Describe the silvicultural practices of forest landowners. Identify stand conditions/ silvicultural practices that may be used for future enhancements.	Forest management practices report TRHMP input	8/19/99	10/18/00	Summer 2000	2/01
TER 9	Riparian Habitat Information Synthesis	Describe riparian habitat in several project-affected stream reaches. Assess effects of projects on structure and function of riparian habitat. Estimate effects of increased flow on riparian habitat in Swift bypass.	Riparian habitat maps and acreage Table of habitat parameters and descriptions Tabulation of historic conditions	7/18/00	10/18/00	6/00	10/01
Cultural Resources							
CUL 1	Traditional Cultural Properties Inventory and Assessment	Consult with CIT/YN; understand concerns about project impacts on traditional cultural properties and culturally significant plants/animals. Develop appropriate mitigation measures.	Report on traditional cultural properties			1999	12/01

Table 1.2-1. Summary of study plans for the Lewis River relicensing (continued).

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Cultural Resources (cont.)							
CUL 2	Archaeological Resources Inventory and Assessment	Inventory and evaluate the eligibility of prehistoric and historic archaeological resources for National Register.	Research design for archaeological investigations Inventory and evaluation of archaeological resources report	10/7/99		1999	12/00
CUL 3	Historical Hydroelectric Structures Inventory and Assessment	Inventory and evaluate National Register eligibility for historical structures associated with hydroelectric facilities.	Inventory and evaluation of historical hydroelectric structures report	11/19/99		1999	12/00
CUL 4	Historical Non-Hydroelectric Structures Inventory and Assessment	Inventory and evaluate National Register eligibility for historical structures not associated with hydroelectric facilities.	Inventory and evaluation of historical non-hydroelectric structures report	11/19/99		1999	12/00
CUL 5	Assessment of Impacts of Project Alternatives on National Register-Eligible Cultural Resources	Determine potential impacts of the projects and other land-uses on National Register-eligible cultural resources (TCP, archaeological resources, hydro and non-hydro structures).	Address cultural resource issues in APEA	11/19/99		2001	6/02
CUL 6	Preparation of Cultural Resource Management Plan (CRMP)	Provide a coherent framework for managing cultural resources in the project area.	Cultural Resources Management Plan			2000	12/02
Recreation							
REC 1	Recreation Supply Analysis	Document and describe existing recreation resources and their condition.	AutoCAD maps Report	7/27/99	10/14/99	Summer/ Fall 1999	12/00
REC 2	Recreation Demand Analysis	Compile and estimate existing and future visitor demand for recreation opportunities and resources.	Report Data will be used in APEA	7/27/99	10/14/99	Early 2000	12/00
REC 3	Recreation Surveys	Assess existing visitor demand, use levels, visitor attitudes/ preferences.	Recreation demand analysis report Data will be used in APEA	7/27/99	10/14/99	1998; Summer/ Fall 1999	12/00

Table 1.2-1. Summary of study plans for the Lewis River relicensing (continued).

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Recreation (cont.)							
REC 4	River-Related Recreation Surveys	Determine recreational values of river-oriented recreation in the project area. Determine user relationships to flow volumes below Merwin Dam. Determine users' relationship to project recreational facilities.	Recreation demand analysis report	7/27/99	10/14/99	1998; Spring/Summer 1999	12/00
REC 5	Recreation Capacity and Suitability Analysis	Investigate recreation and use area capacity (physical, social). Identify potential sites where new facilities may be considered in the project area. Identify best route(s) for potential trail(s) in the project area.	GIS mapping Report and sections of APEA	7/27/99	6/23/00	Spring 2000	4/01
REC 6	Recreation Needs Analysis	Identify and project existing and future recreation needs in the project area.	Summary report	7/27/99	6/23/00	Aug 2000	7/01
REC 7	Recreation Resource Management Plan (RRMP)	Define Licensees' long-term recreation responsibility for recreation resources in the project area.	RRMP AutoCAD maps PM&E estimates	7/27/99	6/18/01	Jan 2001	12/01
Land Use							
LND 1	Land Use Study	Identify existing land use and ownership. Determine if existing project facilities or proposed operations are compatible with existing land uses. Evaluate consistency of project facilities/operations with applicable land use laws/regulations. Assess potential effects of increased residential development on project operations, wildlife management, recreation.	Land use sections of PDEA GIS maps	5/24/01		2000	2001

Table 1.2-1. Summary of study plans for the Lewis River relicensing (continued).

Study Number	Study Plan	Objectives	Work Products	Approved by Resource Group	Approved by Steering Committee	Expected Start Date	Expected Completion Date
Visual and Aesthetic Resources							
VIS 1	Visual and Aesthetic Resources Study	Assess basic visual characteristics of each project facility. Assess visual quality of each project facility. Evaluate pool fluctuations.	Assessment of facilities, levels and flows Policies and guidelines Proposed measures Sections of APEA	2/23/00	4/3/00	Spring 2000	6/01
Socioeconomics							
SOC 1	Socioeconomics Resource Study	Evaluate the current effects of the project on socioeconomic resources in the local and outlying areas. Evaluate the impact on socioeconomic resources associated with the PM&E measures and any proposed construction activities.	Report on results Socioeconomic sections of APEA Analysis of alternatives	4/16/01 (Phase I)		2001	8/01
Flood Management							
FLD 1	Flood Management Study	Document current flood control requirements. Analyze flood management under current operations. Identify opportunities to improve flood management.	Revised estimates Hydraulic modeling Floodplain mapping Analysis of alternatives in APEA	2/17/00 and 6/7/00	10/18/00	Jul 1999	1/01
Cumulative Effects							
CUM 1	The Cumulative Effects Study Plan has not been developed.						