SKOKOMISH RIVER GI RECON STUDY

905(b) Analysis
Seattle, Washington

1. STUDY AUTHORITY.

This reconnaissance study has been initiated using the Corps Puget Sound and Adjacent Water study authority, Section 209 of the Flood Control Act of 1962 (PL 87-874) which continues to provide authority for investigations in the Puget Sound region.

The Conference Report to PL 105-245, the Energy and Water Development Act of the 105th Congress 2nd session, of the House of Representatives, provided $100,000 for a reconnaissance study of flooding problems in the Skokomish River Basin, Washington.

Study authority for future phases would most appropriately occur under Section 212 of the Water Resource Development Act of 1999, Flood Mitigation and Riverine Restoration Program.

2. STUDY PURPOSE.

This report is a preliminary analysis, in accordance with the guidelines of Section 905(b) of the Water Resources Act (WRDA) of 1996, to determine if there is a Federal interest in pursuing further studies related to flooding problems. The primary areas of concern to be addressed in the study are flood hazard reduction and ecosystem restoration in the Valley floodplain of the Skokomish River Basin, which includes the Skokomish Indian Reservation.

3. LOCATION OF PROJECT.

The Skokomish River Valley is located in northwest Washington, in Mason County and the Skokomish Indian Reservation along the southeast portion of the Olympic Peninsula, It is within U.S. Congressional District #6 of Washington State.

The Skokomish River system consists of 80 river-miles, including the main-stem, North and South Forks and Vance Creek, and 260 miles of tributaries. The river collects drainage from an approximate 240 square mile drainage basin, and eventually flows into southern Hood Canal, an arm of Puget Sound. It flows out of three upper sub-basins (South and North Fork, and Vance Creek), into a broad, flat, alluvial plain known as the Skokomish Valley.

The South Fork Skokomish River [including Vance Creek] consists of a sub-basin which has been subjected to extensive clear-cut timber harvesting within the Olympic National Forest and lands of Simpson Timber Company. The North Fork Skokomish River sub-basin is largely dominated by the City of Tacoma's Cushman hydroelectric project. Cushman Reservoir was created in 1926 by construction on the North Fork of the uppermost of two Cushman Project dams. The Cushman Project's lowermost dam currently diverts nearly all of the flow from the North Fork out of the basin to the Project's main power plant located on Hood Canal, approximately 3 miles north of the river mouth, near Potlatch (CFHMP, 1997). Upper Vance Creek flows through lands owned and managed by the U.S. Forest Service (USFS) and Simpson Timber Company. Lower Vance Creek flows through agricultural and single family residential properties before entering the South Fork channel at river mile 0.8.

Richert Springs, Hunter, Weaver, and Purdy Creeks are predominantly spring fed tributaries that flow through agricultural lands in the southern portion of the Skokomish Valley floodplain before entering the mainstem Skokomish River. The Valley floodplain extends from the confluence of the North and South Forks, and Vance Creek for about 11 miles through an alluvial valley, about ¾ to 1½ miles wide to and including the estuary.

The lower 6 miles of the main-stem river, including a substantial portion of the estuary are located on the Skokomish Indian Reservation.

Our project study boundaries include the entire Skokomish watershed, with special focus on the Valley floodplain. Problems and opportunities for the Valley floodplain will be examined within the context of the entire watershed, recognizing that the influences of the upper watersheds must be addressed in order to fully rectify problems identified in the lower watershed.

Fish hatcheries operated by Washington Department of Fish and Wildlife are located on Hunter, Weaver and Purdy Creeks. State Route 101 is the major north/south transportation corridor in Mason County. It is intersected by SR 106 within the Skokomish Indian Reservation and extends north along Hood Canal around the circumference of the Olympic Peninsula. SR 101 was constructed across the Skokomish River Valley on fill to protect the road from frequent inundation during winter high flow periods. The highway bridges the main stem and a secondary channel of the main stem located approximately 1,000 feet to the north. Various county roads provide local access within the Skokomish Valley.

4. PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS.

Puget Sound and Adjacent Waters, Skokomish River, Washington, Flood Damage Reduction Study (81128) completed 16 September 1988. The results of the flood damage reduction study performed at the request of Mason County indicated there were no economically justified structural alternatives available to alleviate flooding in this valley. The benefit to cost ratio was less than 0.4 to 1.0. No interest was expressed in non-structural alternatives. Previous studies of Skokomish River flooding problems by the Pacific Northwest River Basin Commission in 1970 and by the Corps in 1959 and 1941 have produced similar conclusions.

Various Planning Assistance to States studies have also been undertaken with the Skokomish Indian Tribe. These include a Dredging Study and an Estuary Restoration Project. There is currently a Diking Inventory and Hydraulic Analysis PAS being done with Mason County

The Department of the Interior (Interior) has established conditions under Section 4(e) of the Federal Power Act that identify key components of flood control and environmental restoration for inclusion in the Cushman Dam FERC license in order to protect purposes and utilization of the Skokomish Indian Reservation. The National Marine Fisheries

Service and the Environmental Protection Agency have adopted Interior's mandatory license conditions as necessary to protect the Skokomish Tribe and aquatic resources of the Skokomish River and estuary.

5. PLAN FORMULATION.

A. IDENTIFIED PROBLEMS

The proposed study would evaluate alternative solutions to flooding and ecosystem degradation problems in the Skokomish River Valley floodplain. The *Mason County Skokomish River Comprehensive Flood Hazard Management Plan* identifies "unnatural filling of the river channel" as "a root cause of progressively more severe Skokomish River flooding problems" that include "rising elevation of the river bed, diminished channel capacity, progressively more frequent and severe flooding, accelerated risk of channel migration, and higher ground water levels." The Skokomish River channel has been filling with sediment for several decades, which is resulting in more frequent flooding of adjacent land and decrease in natural ecosystem function. Unnatural sediment deposition has been attributed to decreased peak and average flows from the North Fork because of the Cushman Hydropower project, and to increased sediment from the South Fork because of timber harvest activities. Therefore, there are two identified problems in the Skokomish River basin (1) flooding and (2) degraded ecosystem functions and processes necessary to support critical fish and wildlife habitat throughout the basin.

I. Existing Conditions.

Flooding.

Sediment Source - With the exception of the Skokomish Valley, the basin is typified by steep, rugged terrain. Numerous small mountain streams discharge into the three principal tributaries, which flow through deep, narrow valley and gorges to the head of the Skokomish Valley near the confluence of the North and South Forks. The soils of the Skokomish River basin are typical of the mountainous soils of the east slope of the Olympic Peninsula. These soils have high erosion potential due to slope steepness and high rainfall rates. These soils are easily disturbed by activities such as road-building and other earth-moving activities or clear-cut logging. Because of the basins unstable soils and steep slopes, and the extensive logging that has taken place in the South Fork Sub-basin, land and debris sliding contribute sediments to the river system. Substantial amounts of sediment will enter the floodplain each year, and for the next 50 years, due to sediment already in the riverbed. This does not include additional sediment inputs from mass wasting events (landslides), and normal contributions.

Channel Aggradation – The Skokomish River is filling with sediment, a process known as aggradation. Typical of Puget Sound lowland rivers, the mainstem meanders are dynamic and shifting. Gravel bars form, migrate and reform annually. Increased sediment contributions from the South Fork and decreased sediment carrying capacity of the main-stem from the diversion of North Fork flows through the Cushman Hydropower project, have contributed to unnatural filling of the main-stem channel. Unnatural filling of the main-stem channel has greatly reduced the channel's depth and bankfull capacity, thereby reducing its sediment transport and water conveyance capabilities. The rising elevation of

the riverbed has resulted in higher ground water levels in the floodplain. Reduced channel conveyance capability has resulted in more frequent and severe over-bank flooding.

Channel Capacity - The channel capacity of the Skokomish River varies significantly which causes floodwater to leave the banks at various locations causing flooding of local roads, two state highways, agricultural fields, residences, and other structures. There are many locations through the basin where the original bank has been breached thus forming numerous distributing channels. Most of the water that leaves the main channel joins with water along the opposite (South) side of the valley in Weaver and Purdy Creek thus causing much local flooding well before the main channel capacity is exceeded. Though not quantifiable at this time, there is some evidence that suggests the amount of water that goes to the South valley drainage is increasing with each successive flood event. Upstream of SR 101, the Skokomish River is capable of carrying a flow of approximately 8,900 cfs (Skillings-Connolly, 1997). The National Weather Service has established this flow as flood stage, which corresponds to a stage of 15.5 ft at the Skokomish River near Potlatch USGS gage. Downstream of SR 101, the main stem is primarily capable of carrying a capacity of approximately 4,700 cfs. With continued channel aggradation, the discharge capacity of the Skokomish River continues to decrease.

Frequency of Events - There are generally ten to fifteen events each year that exceed the 15.5 ft flood stage threshold. For example, the 1998-99 flood season produced 16 flood stage or greater events. It should also be noted that the discharge for flood stage has fallen below the 8,900 cfs as stated in the 1997 Skillings-Connolly flood report. This could be attributed to a variety of reasons, but the data suggests the river channel continues to have less and less capacity. Flood events in recent years have occurred year round, not just limited to the November-February period typical for Puget Sound area flooding. Flooding in the Skokomish River Valley can been characterized as chronic and extensive.

Diking and Bank Hardening - There is an extensive yet discontinuous network of dikes along the mainstream and tributaries. The dikes have mitigated the problem of chronic low-level flooding in some areas, but provide little protection for any floods of large magnitude. The diking system may also be concentrating flooding onto unprotected areas where higher flow velocities can cause flow-related damage that did not exist prior to dike construction. The dike network has not been adequately inventoried and there is a great deal of contention on how the dikes influence the flooding in the basin. In several location there have been bank hardening projects that try to decrease bank erosion at specific points along the river. These are sporadic in nature and typically tend to just refocus the erosion problem elsewhere in the river.

Agriculture – The Skokomish Valley has a history of agricultural production since the early 1900's. As many as 5,000 acres of tillable land has been in production. In recent years, the repetitive flooding has reduced the tillable land to about 300 acres, reducing the agricultural output by about 90%. Both elevated ground water and soil erosion contribute

to this problem. Local farmers estimate that they will have no tillable land within a few years.

Access – Roadways are covered by floodwaters which impedes or prevents travel by Valley residents. Flooded roads prevent residents , even those whose houses are not threatened by inundation, from leaving or returning to their homes. People who live in low lying areas often move their vehicles to higher ground when they receive adequate advance warning of flooding. This is a problem through out the entire Skokomish Valley. Two state highways SR 106 and SR 101 cross the valley. SR 101 is a major North-South access on the Olympic Peninsula, and the only North-South in Mason County. Both of these are subject to closure when a flood event of even low magnitude occurs. It should be noted that SR 101 has closed twice in the 1998- 99 flood season. and SR 106 even more often.

Flood Damage – Structures, both residential and agricultural, are subject to water damage, which occasionally includes significant structural damage. The contents of the structures, such as home furnishings, appliances, and farm machinery, are also often damaged. High ground water elevations have rendered many of the Valley septic systems unusable. Included in the flood damages are an estimated 1,300 acres of tribal reservation land and 60 structures that once were habitable but had to be abandoned due to flooding. A few structures in the Valley have been bought out, relocated, or flood proofed, but there is still the vast majority which are vulnerable to the effects of flooding.

Channel Avulsion – The increased sediment load, decreased sediment transport capabilities, and resulting channel aggradation have rendered many of the Valley flood control works ineffective at reducing flooding or bank erosion. Due to the filling of the river channel with sediment, the Skokomish River is on the threshold of "potential major avulsions" (Skillings – Connolly 1997), or in other words, major shifts of channel alignment. What is now floodplain could become the river channel. Existing channel segments could be abandoned by the river if it shifts its alignment in this fashion. There are several strong indications of such potentially major avulsions. The Skokomish River channel is generally perched, meaning that the channel is at a generally higher elevation than the surrounding floodplain, especially the floodplain to the south of the channel.

Ecosystem Degradation

The development of the biological characteristics of the Skokomish River Valley have been directly influenced by the local hydrologic regime. The headwaters of the Skokomish River lie with the Sitka Spruce forest ecosystem, with the remainder of the basin within the Puget Sound Western Hemlock forest ecosystem (Franklin and Dyrness 1973). The exception to this is the Skokomish Valley, which in its pre-settlement state was a riparian floodway dominated by a mix of western red cedar and various broadleaf deciduous trees. Presently, much of the South Fork sub-basin lies with the Shelton Cooperative Sustained Yield Unit (Shelton CSYU). The South Fork basin within the Shelton CSYU appears to be about 80 percent clear-cut. In contrast, much of the North Fork basin lies within the Olympic National Park. The forest is mature and old-growth successional stages, with the

exception of the lower portion of the basin, which was logged decades ago, and is now mostly relatively mature second growth forest. The Skokomish Valley has been extensively converted to agriculture through the cutting and removal of the aboriginal riparian forests.

The Skokomish River system formerly produced substantial runs of salmon. Cushman Dam greatly reduced the anadromous fish habitat on the North Fork system. Degradation of the available habitat for fish spawning, rearing and migration has resulted from diversion of flows from this tributary. The Cushman project reduced flow out of the North Fork below the lower dam by over 96%, and reduces flows in the mainstem by approximately 40% (WRIA #16, 1999). Limited information is available related to the present day fishery resources within the Skokomish River Basin. However, the main stem, lower South Fork and Vance Creek provide spawning and rearing habitat for chinook, chum, coho, pink and sockeye salmon, and steelhead and cutthroat trout. In recent years, spawning populations have been about 100 chum, 100 coho, 500 fall chinook, 60 spring chinook, and a few hundred winter steelhead and some summer steelhead. The Vance Creek spawning populations have been about 1,100 chum, and 500 coho. The pink salmon run has essentially disappeared from the South Fork. North Fork spawning populations have been about 3,500 chum, 2,200 coho, 25 fall chinook, and some steelhead. Mainstem spawning populations have been about 250 chum, 500 coho, 800 fall chinook, and few hundred winter steelhead and some summer steelhead (CFHMP 1997). The decline in fish stocks in the Skokomish system has partially resulted in the listing as threatened under the Endangered Species Act of Hood Canal summer run chum, Puget Sound chinook, and bull trout. Relatively little information is known about the resident (non-anadromous) fish of the basin.

Limiting factors for fish in the Skokomish River Basin include low summer flows, which limit the availability of rearing area, and excessively high winter flows, which intensify the problems associated with unstable streambed gravel. Subterranean flow of the river during crucial salmon spawning migration periods in the late summer and early fall greatly diminished the anadromous fish returns and highlights the aggradation problems within the main stem. Decreased channel conveyance limits the recruitment of gravel in the estuary, which adversely affects the shellfish production in this area. The instability of the river bed (aggradation, shifting patterns, etc.) produce annual changes in the spawning gravel locations. Recreational misuse of the river has been identified as localized problem where recreational vehicles drive in and through the river damaging salmon eggs. Along with the decreased channel conveyance is an associated lack of channel diversity. There is a significant lack of pool, riffles, and long glides along the mainstem. In addition, side channel habitat, important for rearing, has been cutoff by channel aggradation and diking. Large woody debris (LWD) quantities have been severely reduced through existing land use practices (i.e. logging; agricultural clearing, and diking which prevents LWD from reaching the river), and river aggradation which has left most LWD on terraces inaccessible during low flows. Clearing of riparian forests, particularly along the mainstem Skokomish, Hunter Creek, and Weaver Creek has significantly reduced LWD recruitment which in turn influences pool formation processes.

A major problem for the salmon migration is that often times the flooding will force salmon to follow the flow of the river over farmlands during flooding and die in their attempts to regain entrance to the main channel. It is very typical after floods to see the floodplain is littered with hundreds of dead and dying salmon. Peak flows accentuated by aggradation and diking have resulted in severe scour and fill episodes which destroy redds and hinder redd construction.

Since most of the larger gravel material falls out higher in the valley, the smaller fines are distributed on the delta within the estuary, starving the delta of coarser material and leading to erosion of its outer edge. The limited amounts of gravel making it to the estuary also shortens the estuary biotic zone by steepening the zones available for shellfish production. Additionally, eelgrass bed production is diminished when gravel fail to make it to the estuary. Eelgrass is a critical nursery zone for many species including salmonids, herring, crabs, and plankton. One estimate states that a 20% reduction in area of productive estuary can be directly attributed to lack of gravel recruitment, and continual erosion due to wave action, and other natural intertidal processes. Bortelson and others (1980) noted that one third of the original marsh area has been lost to agricultural activities including diking. This loss of intertidal marsh combined the loss of subtidal estuary area reduces the amount of available rearing and refuge area for juvenile salmonids.

Subterranean flow within the upper reach of the valley is experienced most dramatically at lower Vance Creek. During the late fall, no surface hydraulic connection exists between the main stem and Vance Creek. If salmon cannot gain access, they cannot spawn. Also, large shoal areas of gravel are located at the confluence of the North Fork and main stem. The North Fork connection is completely severed at some times in late fall. Directly downstream of Rocky Beach, huge gravel shoals exist and the channel is very shallow. The river does not go subterranean, but flow is so low that fish are impaired from moving up. Finally, below SR101, the river is very wide, but flows are so low that salmon would have a great deal of difficulty getting up, and many become stranded.

Elevated summer temperatures have been observed in the South Fork Skokomish River partially attributable to channel widening and aggradation which can inhibit upstream movement and migration of summer chum and induce premature immigration of fry from the redd environment. Elevated temperatures may occur in the mainstem as well where water withdrawal along with aggradation and channel widening could influence peak temperatures. Nutrients from livestock and septic systems may impact water quality in the river and estuary.

II. Future Without Project Conditions

The future without project conditions for the Skokomish Valley are bleak and dire. If the natural water and sediment conveyance capabilities of the river are not restored and maintained, the trend of aggradation will continue to worsen. Stopgap measures would

likely be ineffective at best in mitigating for the damages to lands, structures, facility and natural ecosystem.

Flooding

Data show that the historic aggradation will continue to decrease the bankfull conveyance capacity of the Skokomish River (Skillings-Connolly 1997). This aggradational trend means that the river will convey progressively smaller flows within its banks. This will result in increased frequency of overbank flooding and decreased total water quantity which flows within the banks of the river. Eventually, as the channel capacity continues to decrease, the channel will experience significant avulsions, probably during flood events. Portions of the existing channel may be abandoned and new channels formed, likely through the adjacent floodplain. There may be a number of years when the water is forced out of the existing channel and will form in an ill-defined path over the flood plain until a new channel is formed. This will result in much disruption and expense to those who live in, and travel through, the Skokomish River Valley, particularly residents of the Skokomish Indian Reservation.

Ecosystem Degradation

The Skokomish Valley will continue to experience an increase in the accumulation of gravel into the upper main stem which will exacerbate the aggradation within the channel, with a rise in the water table a direct result. This will encourage continued gravel depletion in the estuary, subterranean flow of the thalweg and further stress to salmonid and estuarine species. Continued destabilization of the main channel exacerbates the decline of available and optimal fish habitat for spawning and rearing, buries redds, dewaters redds, and increases the likelihood of decreases in salmon propagation. Salmon will continue to face obstacles within the main stem migration corridor, including spawning at less than optimal sites that dry out in late summer or early fall jeopardizing redds buried in gravel; salmon will be unable to gain access to upper watershed to spawn and die trying to get over gravel; water temperatures are high now and will likely rise even more during migration and spawning which stresses fish and lowers the probability that they will successfully spawn. In addition, the river may create a new channel through agricultural or residential lands, which would increase sediment in the new channel, severely limit natural migration and spawning in the short term. LWD recruitment will continue to be low, which further degrades the habitat. Fish will continue to attempt to follow the flow of the river over farmlands during flooding and die in their attempts to regain entrance to the main channel.

Without intervention, the ecosystem will not correct itself in the foreseeable future. Avulsions will most likely occur creating new riverine habitat in mainly agricultural lands. In the short term this area will be largely devoid of riparian vegetation. The channel is choked with sediment. Before bank protection is put in place to protect private property the new channel will most likely develop more channel complexity than the mainstem (i.e. greater sinuosity, and pools and riffles). However, over the long term this channel could also become overloaded with sediment due to the large supply still present in the upper watershed.

III. Planning Constraints

These are suggested criteria to screen alternative and select potential projects. These criteria will be finalized in the feasibility study.

- The expected benefits will extend over a long periods of time (i.e., 50 years or more.
- The proposed work is compatible with other ongoing efforts by Federal, State, Tribal, and local agencies.
- Public health, safety, and well-being will be protected
- The project should be designed to minimize the amount of maintenance required for the non-Federal sponsor.
- Proposed work will implement the County/Tribe priority projects.
- Proposed work will enhance habitat for threatened or endangered species that occur in the basin.
- The proposed work will significantly restore the existing river channel both from a capacity and ecosystem perspective.
- Real estate is reasonably available and is cost effective.
- The non-Federal sponsor is willing to operate and maintain.
- The proposed project will have positive net benefits to existing ecosystems.

IV. Specific Problems and Opportunities.

The following identifies specific objectives and potential solutions to address the water resource problems outlined above.

Restoration of Conveyance - Substantial restoration and maintenance of depth and water/sediment conveyance capabilities of the main-stem Skokomish River channel in order to reduce frequency and severity of flooding, lower ground water tables, improve sediment transport, and restore natural ecosystem functions to main-stem and estuary.

Channel Reconnection - Restoring fish and wildlife habitats within the floodplain that are currently blocked from the river (i.e. North Channel). Some channel reconnection projects are currently being implemented by the Skokomish Tribe. Initial reports indicate that even with existing river conditions these newly opened areas are providing additional fish habitat.

Control Structures - Measures are needed to discourage catastrophic channel avulsions at strategic points along the river and tributaries. Comprehensive diking is not a preferred alternative and structures should focus upon bio-engineering techniques incorporating LWD.

Estuary Restoration - Restore more natural estuary conditions (i.e. restore sediment transport and remove diking). Restoration of previously diked estuary will provide critical rearing habitat for three ESA listed species, bull trout, Hood Canal summer run chum, and Puget Sound chinook.

Dike and Bank protection– Selectively remove, repair, and/or relocated substandard dikes in the Valley floodplain and estuary to reduce flood hazard and restore natural ecosystem functions.

Fish & Wildlife Habitat - The main channel and tributaries require restoration of natural ecosystem processes and associated habitat features including (i.e. pool habitat, removing blockages, engineered log jams). This includes improving wildlife habitat within the watershed as well. There is need for more natural habitat conditions.

Natural Floodplain Drainage - Reduction/elimination of interference with natural drainage at strategic locations in order to reduce flood hazard and improve natural ecosystem functions. This action parallels the benefits found in reconnecting old channels.

New Channel Alignment - If the river has a catastrophic avulsion prior to other action being implemented, remedial measures will be investigated that are consistent with overarching objectives of flood hazard reduction and ecosystem restoration.

Perpetual Easements - Acquisition of perpetual easements, land and structures to reduce flood hazard, facilitate natural streambank stabilization, and improve fish and wildlife habitat.

Flood Proofing – Elevate or otherwise flood-proof existing structures not acquired through perpetual easements.

Sediment Source Issue - Not meant to revise existing plans, but to assist with implementation. Sediment source control and/or sediment traps. The sediment must be addressed in ways to benefit ecosystem process and function.

B. ALTERNATIVE PLANS

The Corps assembled a project steering committee to formulate an implementation plan for the Skokomish River. The committee consists of the Corps, Mason County, Skokomish Indian Tribe, and US Fish and Wildlife Service. This committee worked to bring the Corps study team "up to speed" on the facts and issues surrounding the Skokomish River. The focal point of the committee effort was upon implementing key consensus elements of the *Mason County Skokomish River Comprehensive Flood Hazard Management Plan* and related planning documents.

The *Mason County Skokomish River Comprehensive Flood Hazard Management Plan* identifies "unnatural filling of the river channel" as "a root cause of progressively more severe Skokomish River flooding problems" that include "rising elevation of the river bed, diminished channel capacity, progressively more frequent and severe flooding, accelerated risk of channel migration, and higher ground water levels." Principal goals of the *Flood Plan* are to "restore and maintain the water and sediment carrying capabilities of the Skokomish River system," and to promote programs and strategies consistent with restoration of natural ecosystem functions and productivity.

The overarching objectives for Corps involvement are to restore and maintain channel conveyance capacity and natural ecosystem function and productivity pursuant to key consensus elements of the *Flood Plan* and related documents. The Corps project will seek to significantly reduce potential flood damages, will improve the quality of the environment, and will be justified considering all costs and beneficial outputs of the project.

Flood Hazard Reduction Methodologies

Flood hazard reduction methodologies are based upon restoring and maintaining water and sediment carrying capabilities of the main-stem Skokomish River channel, and implementation of complementary measures to further reduce flood hazard. This broad goal can potentially be addressed through six different measures.

1. Channel Conveyance Improvement - Substantial restoration and maintenance of depth and water/sediment conveyance capabilities of the main-stem Skokomish River channel, consistent with the County's Flood Plan in order to reduce frequency and severity of flooding, lower ground water tables, improve sediment transport, restore natural ecosystem conditions to main-stem and estuary. Investigations should include, for example, initial one-time mechanical removal of sediment to restore main-stem channel depth/conveyance capacity and thereby expedite achievement of channel restoration and maintenance recommended in the County's Flood Plan and prescribed by the Department of Interior as the minimum necessary to protect the purposes of the Skokomish Indian Reservation. Various degrees of sediment removal will be analyzed ranging from selective bar scalping to wide scale dredging.

2. Acquisition - Acquisition of perpetual easements, land and structures to reduce flood hazard, facilitate natural streambank stabilization, and improve fish and wildlife habitat. This should include, but not necessarily be limited to, high flood hazard areas identified in the Flood Plan and other studies. Combine with elevation/floodproofing to reduce flood hazard for structures at lower levels of risk.

3. Control Structures - Permanent measures to discourage catastrophic channel avulsion at strategic points on the South Fork and Vance Creek upstream from confluence with the North Fork. This will include an analysis of bank protection and other measures. Implementation would focus on bioengineering techniques, engineered log jams, and similar types of activities

4. Floodplain Drainage - Reduction/elimination of interference with natural drainage at strategic locations in order to reduce flood hazard and improve natural ecosystem functions. This should include, for example, examination of strategic roads, culverts and bridges [including highways 101 and 106, reservation river road].

5. Dikes and Bank Protection– Selectively remove, replace, and/or relocate substandard existing dikes to reduce flood hazard and restore natural ecosystem functions in the Valley floodplain and estuary.

6. Alternative River Alignment - The potential of alternate river alignments, including flood bypass channels, were examined. Should the river choose a new course prior to project implementation, remedial measures will be investigated which are consistent with overarching objectives of restoring and maintaining the water and sediment carrying capabilities of the main-stem Skokomish River channel. This analysis would include an examination of old oxbows and meanders.

7. Sediment Source Control - The sediment sources have been studied and analyzed by the US Forest Service and Simpson Timber. A comprehensive forest plan to address the sediment source is currently being implemented. The feasibility study will identify activities to supplement or assist the forest plan implementation. Typical activities could include road decommissioning, stabilizing slide areas, or large upstream sediment traps.

Ecosystem Restoration Methodologies

Ecosystem restoration in the Skokomish River involves the reversal or elimination of continual degradation of natural ecosystem functions and habitat due to increased sediment load, reduced flows and encroachment on the floodplain by man made structures. The types of ecosystem restoration projects that will be investigated during feasibility fall into two basic categories based on input from agency representatives. These categories are channel conveyance improvement and enhancement of floodplain habitat conditions.

Channel conveyance improvement activities are those activities directly related to the South Fork and Mainstem Skokomish channels. The activities recognize the need for restored channel capacity to restore lost habitat. Improvements to floodplain habitat are those activities that are focussed outside of the South Fork or mainstream channels, recognizing that it will take more than just channel restoration to restore the Skokomish ecosystem.

The following are five activities, when done in some combination, will provide substantial ecosystem restoration in the Skokomish River.

1. Channel Conveyance Improvement - Substantial restoration and maintenance of depth and water/sediment conveyance capabilities of the main-stem Skokomish River channel to improve sediment transport, restore natural ecosystem processes and habitat conditions to main-stem and estuary. This action would be a one time event done to expedite achievement of channel restoration and maintenance recommended by the County's Flood Plan and prescribed by the Interior Department as the minimum necessary to protect the purposes of the Skokomish Reservation. In conjunction with the channel improvements side channels would be opened up for rearing habitat, return

pathways for fish would be opened to reduce stranding impacts, dikes would be breached in the Valley floodplain and estuary for improved fish and wildlife habitat, and blockages such as culverts and bridges rebuilt to improve channel capacity.

2. Sediment Traps - Sediment traps can be constructed to reduce the flow of sediment into the lower valley reaches of the river. This action would allow the river to rework the existing sediment load in the lower river creating pool habitat, and improving the condition of spawning gravel. Engineered logjams could be used to improve channel morphology. In conjunction with the channel improvements side channels would be opened up for rearing habitat, return pathways for fish would be opened to reduce stranding impacts, dikes would be breached in the Valley floodplain and estuary for improved fish and wildlife habitat, and blockages such as culverts and bridges rebuilt to improve channel capacity.

3. Improve Off Channel Habitat - Side channels would be opened up for rearing habitat, return pathways for fish would be opened to reduce stranding impacts, dikes would be breached in Valley floodplain and the estuary for improved fish and wildlife habitat, and blockages such as culverts and bridges rebuilt to improve channel capacity.

4. Buyout of Affected Properties - Acquisition of priority properties in high risk areas of the floodplain combined with removal of structures and restoration to natural condition will be to restore fish and wildlife functions by allowing the river channel to migrate and establishing a more natural riparian corridor.

5. Dike Removal - Selectively remove substandard existing dikes to restore natural ecosystem functions in the Valley floodplain and estuary.

Skokomish River Flood Hazard Reduction/Ecosystem Restoration Alternatives
A substantial portion of ecosystem restoration may occur outside of any Corps activity through the implementation of the Department of Interior's 4(e) conditions, at no cost to the Corps project. The most pertinent part is the increase in discharge from Cushman Dam. The following alternatives would be analyzed in context of these 4(e) conditions and their implementation.

1. Dredging to Expedite Channel Conveyance Restoration – This alternative considers a range of one-time dredging activities to remove accumulated sediments in within the existing channel limits along the Main Stem from the confluence of the North and South Forks, down to the river's delta. This alternative would seek to restore and maintain of depth and water/sediment conveyance capabilities of the main-stem Skokomish River channel to at least 13,000 cfs capacity. This alternative assumes implementation of the Department of Interior's discharge prescriptions. The options for one-time selective mechanical removal of bedload would seek to increase the sediment transport capabilities of the mainstem channel. A possible approach would be to establish a pool-riffle and meander pattern appropriate for the Skokomish River conditions. To completely dredge the river approximately 2.4 million cubic of sediment would be removed, restoring 13,000

cfs capacity. The cost for a complete dredge, with maintenance and real estate is estimated at $86,000,000. Based upon cursory investigation of river geomorphology (Richards, 1982) (Leopold, 1994) appropriate pool-riffle and meander pattern would require significantly less dredging quantity be removed to obtain the desired results. If a self maintaining system can be created the cost for this alternative (prior to real estate) is estimated to be $13 million. If maintenance is required then the present value cost is estimated to be $18 million. Significant hydrologic, sediment and hydraulic studies would need to be done to determine the most appropriate approach for this alternative.

2. Dikes and Bank Protection – This alternative would selectively remove, breach or upgrade substandard existing dikes to reduce flood hazard and restore natural ecosystem functions in the Valley floodplain and estuary. These actions will be based on results of ongoing investigations evaluating existing dikes for compliance with minimum standards established in the County's Flood Plan. Bank protection measures will be installed to discourage catastrophic channel avulsion at strategic points on the South Fork and Vance Creek upstream from confluence with the North Fork. Bio-engineering techniques (including incorporation of LWD; construction of engineered log jams, and riparian plantings) would be emphasized for any construction. This alternative would not address the sediment issue, merely re-configure the diking system. Sediment trap(s) could be added to this alternative to address the sediment issue. An estimated 40,000 linear feet of dike removal, breaching, upgrade, and bank protection are required, with a cost estimate (not including real estate) of $4.8 million. An additional option to build an entire system of set back levees alone would cost approximately $7 million.

3. Bypass Channel– This alternative is based upon the June, 1997 Skillings-Connolly Report that suggested a new overflow channel alignment along the southern valley wall. This alternative assumes that the river, in response to the severe aggradation of the mainstem, is seeking to establish a new alignment along the south wall. The alternative alignment would relocate the river to the south side of the floodplain, away from the highly agraded main-stem. A variation to this has a bypass to the south valley wall, but instead of capturing all of the flow, its splits flow between the old and new channels. These options do not address the overarching sediment transport issue. The first option with a completely new channel has a cost (not including real estate) of $84 million and the split channel has a cost (not including real estate) of $64 million.

4. Restore Natural Drainage Patterns – Reduction/elimination of interferences with natural drainage at strategic locations in order to reduce flood hazard and improve natural ecosystem functions. There are several possibilities throughout the basin including, downstream connection to main-stem of relic North channel oxbow, SR-106/Skabob Creek Bridge replacement, SR-101/Purdy Creek Bridge replacement. The estimated cost for these activities is (not including real estate) $2.4 million.

5. Selected Acquisition of Floodplain Easements and Floodproofing – Acquisition of perpetual easements, land and structures to reduce flood hazard, facilitate natural streambank stabilization, and improve fish and wildlife habitat. This should include, but

not necessarily be limited to, high flood hazard areas identified in the Flood Plan and other studies. Combine with elevation/floodproofing to reduce flood hazard for existing structures at lower levels of risk. The assumptions used for the recon level cost are 10 miles of 200 foot buffer along both side of water courses, making approximately 500 acres of buffer zone to acquire easements for. In addition, approximately 10 residences would need to be bought out/relocated and approximately an additional 50 may need some form of flood proofing. This action has an estimated range of $3.7 to $5.2 million.

6. Combination Alternative (Recommended Alternative) – This alternative attempts to combine a variety of measures to address the multitude of problems in the valley. Recognizing that there is likely not just one methodology that will solve problems, this combination is thought to best represent what is needed to both restore environment and will also provide ancillary flood relief as well. This alternative can be broken down into four parts as follows. Costs include feasibility study.

a) Selective Gravel Removal - The options for one-time selective mechanical removal of bedload would seek to increase the sediment transport capabilities of the mainstem channel. The approach recommended would be to establish a pool-riffle and meander pattern appropriate for the Skokomish River conditions. This will provide immediate environmental benefits and will seek to jumpstart the gravel transport required to establish the 4(e) mandated 13,000 cfs channel capacity. This feature has an estimated cost (including feasibility studies, designs, real estate and present value of O&M) of $19,500,000

b) Dikes and Bank Protection- This alternative would selectively remove, breach or upgrade substandard existing dikes to reduce flood hazard and restore natural ecosystem functions in the Valley floodplain and estuary. These actions will be based on results of ongoing investigations evaluating existing dikes for compliance with minimum standards established in the County's Flood Plan. Bank protection would be installed in key areas to prevent channel avulsions. Bio-engineering features will be the focus. This feature has an estimated cost (including feasibility studies, designs, real estate and present value of O&M) of $5,900,000

c) Improve Natural Drainage - Reduction/elimination of interference with natural drainage at strategic locations in order to reduce flood hazard and improve natural ecosystem functions including, downstream connection to main-stem of relic North channel oxbow, SR-106/Skabob Creek Bridge replacement, SR-101/Purdy Creek Bridge replacement. This feature has an estimated cost (including feasibility studies, designs, real estate and present value of O&M) of $2,400,000.

d) Acquisition of Floodplain and Floodproofing - Acquisition of perpetual easements, land and structures to reduce flood hazard, facilitate natural streambank stabilization, and improve fish and wildlife habitat. This should include, but not necessarily be limited to, high flood hazard areas identified in the Flood Plan and other studies. For planning purposes 250 acres of flood plain shall be acquired (200 foot buffers along both sides of 10 miles of stream bank). This

feature has an estimated cost (mostly real estate but some study required) of $5,200,000.

This alternative has an estimated total cost (including feasibility studies, designs, and present value of O&M) of $33,000,000. These costs were derived from the conceptual designs and costs prepared by a consultant to the Corps, modified to reflect a more accurate array of projects that could be supported by the project sponsors.

C. EVALUATION OF ALTERNATIVES.

1. Dredging to Expedite Channel Conveyance Restoration

This Alternative builds on assumed substantial restoration of main-stem's natural sediment transport capabilities and restoration/maintenance of channel capacity through an adaptive program of testing and monitoring. It is important to determine if there is a feasible approach that could expedite achievement of channel restoration. If so, this would allow early enjoyment of related flood hazard reduction and ecosystem restoration benefits from this action. This Alternative is a consensus priority project of Mason County and the Skokomish Tribe. It merits being carried into the feasibility phase of study to analyze options for one-time selective mechanical removal of bedload that would complement or expedite achievement of Interior Department's prescription for restoration and maintenance of main-stem channel. This alternative should be analyzed as a stand alone or as part of a combination alternative.

Flood Control Benefits – The channel conveyance restoration objective of at least 13,000 cfs is estimated to provide protection for at least the 1.5 year event, thus providing substantial flood control benefit relative to existing conditions.

Ecosystem Benefit – Initial dredging of the main-stem channel could expedite restoration and maintenance of channel capacity and of natural ecosystem functions, both of which are currently in a severely degraded and unacceptable state. Over the long-term the reconfiguration of the channel would create a much more fish friendly environment. Pool and riffle habitat that is currently lacking in the system would be reestablished. Spawning areas would be subjected to less frequent catastrophic flooding , and productivity would be expected to rise. Low flow blockages would be removed on the mainstem improving fish migration. Enhanced sediment transport, would allow for the gradual rebuilding of the estuary. Turbidity levels would drop with the more efficient movement of sediment.

2. Dikes and Bank Protection

Whereas dikes and bank protection are not considered to be environmentally appealing, there are appropriate instances in the Valley where the diking system (if properly improved) can provide substantial flood relief. In addition, bank protection is also required in many areas due to the likelihood of channel avulsions. This alternative should be further analyzed in feasibility, but under a combined alternative, not as a stand alone.

Flood Control Benefit – Repair and/or relocation of select dikes will provide localized flood control benefit for up to the 5 year event. Breaching and/or removing select dikes can provide more off-channel storage and increased

conveyance. Installing bank protection in key areas could prevent channel avulsion, however, these benefits are difficult at best to quantify. With the fact that these diking (repair/relocation/breaching/removal) and bank protection activities provide localized protection, overall flood control benefits are limited.

Ecosystem Benefit- Creation of setback levees or selective levee removal would provide significant environmental benefits opening up the floodplain and allowing for natural channel forming processes to operate. Increases in LWD structures would aid in restoring channel complexity forming processes and provide refuge and rearing habitat for fish. The breaching of levees on the lower river in the historic estuary would increase rearing habitat for salmonids and increase primary productivity.

3. Bypass Channel

This alternative is unacceptable due to unacceptably high economic and social costs, severe adverse environmental impacts, and strong political opposition. It is not worthy of being carried into the feasibility phase of study as a stand alone feature or as part of a combination. It has virtually no political support; there is strong opposition to this alternative from Valley residents and the Skokomish Tribe. In addition, this alternative is not consistent with the planning criteria that states that the river channel should be restored in place. The Skokomish Indian Tribe has usual and accustomed fishing areas (bound by treaty) that would be severely impacted by a move of river channel alignment.

Flood Control Benefit – This alternative does not address overarching sediment transport issues and would, therefore, offer only temporary flood reduction benefits. The cost of building a channel would never be justified.

Ecosystem Benefit – Construction of a new channel by taking water and concomitant sediment and nutrient transport capabilities from the existing channel, would degrade ecological conditions of the main-stem Skokomish River.

4. Restore Natural Drainage Patterns

This Alternative would build on previous detailed studies of specific projects that enjoy broad public support. It merits being carried into the feasibility phase of study. This Alternative addresses very well defined projects with virtually unanimous political and resource agency support. This is a consensus priority project of Mason County and the Skokomish Tribe, as well as having the support of the U.S. Fish and Wildlife Service. This alternative should be further analyzed in feasibility both under a stand alone context and as a combined alternative

Flood Control Benefit – Flood control benefits are highly dependent upon the nature of the blockages to the natural drainage. Due to the widespread location of these blockages (bridges, culverts, and old channels), there could be a widespread reduction in flood stages. These could provide as much protection as 5 year recurrence.

Ecosystem Benefit – Restoration of natural drainage patterns would increase the amount of off channel rearing habitat for salmonids. Reconnection of previously

cutoff channels would also provide flood refuge as well as return pathways for fish so as to avoid stranding.

5. Selected Acquisition of Floodplain Easements and Floodproofing

This Alternative builds on ongoing implementation of consensus County/Tribe objectives and merits being carried into the feasibility phase of study. This Alternative is a consensus priority project of Mason County and the Skokomish Tribe and enjoys virtually unanimous support of Valley residents, and regulatory agencies. It would build on past floodplain acquisitions and floodproofing accomplished by Mason County and the Skokomish Tribe to take advantage of substantial unfulfilled opportunities to acquire from willing sellers easements to reduce flood hazard, facilitate natural streambank stabilization and improve fish and wildlife habitat, and to elevate/floodproof existing structures.

Flood Control Benefit – Removing structures out of harms way does provide flood control benefit, but often times the expense can outweigh the cost of damages. Acquiring flowage easements and floodplain will allow for greater flooplain capacity which will increase flood protection.

Ecosystem Benefit – Acquisition of riverfront properties will allow for lateral migration of the river, allowing for a natural process and function to occur, which will in turn provide for improved fish habitat.

6. Combination Alternative (Recommended Alternative)

This Alternative combines consensus County/Tribe projects and Department of Interior mandated 4(e) conditions to make a project that will provide effective ecosystem restoration while providing quantifiable flood relief for residents of the valley. This alternative addresses sediment transport issues as well as flow considerations. Off channel and estuary habitat would also be improved.

Table one (below) summarizes ecosystem benefits from each alternative. The categories used in the table came from the Skokomish tribes' analysis of factors impacting Hood Canal summer run chum, and acreage estimates from the HDR (1999) analysis Skokomish River restoration alternatives. The categories identified by the Skokomish Tribe are:

Factors For Decline – Based On Skokomish Tribe Draft Skokomish River Summer Chum ESA Issues –

1. Low Flow
2. Estuarine Delta Impacts
3. Estuarine Alterations
4. Channel Complexity
5. Sediment
6. Peak Flows
7. Riparian Condition

Alternatives are evaluated as to whether they improve upon specific factors or if they are neutral. In some cases weak relationships are indicated by combing the neutral and improve categories.

TABLE 1

ECOSYSTEM BENEFITS FOR ALTERNATIVES											
FACTORS->	Low Flow	Estuarine Delta Impacts	Estuarine Alterations	Channel Complexity	Sediment	Peak Flows	Riparian Conditions	Wetlands Restored (acres)	Estuarine Habitat Restored (acres)	Riverine Habitat Created from Wetlands (acres)	Riverine Habitat Restored or Created (linear feet)
ALTERNATIVES											
1 Dredging to Expedite Channel Conveyance Restoration	Improve	Improve	Neutral	Improve	Improve	Improve	Neutral	0	?	0	47520
2 Dikes and Bank Protection (Removal, Breaching or Upgrades)	Improve/ Neutral	Neutral	Improve	Improve/ Neutral	Neutral	Improve/ Neutral	Improve	44	16	0	?
3 South ByPass Channel	Worsen	Worsen	Neutral	Worsen	Worsen	Improve	Neutral	165	0	11	26400
4 Restore Natural Drainage Patterns	Neutral	Neutral	Neutral/ Improve	Improve (provide off-channel Habitat)	Neutral	Improve	Improve/ Neutral	0	0	0	29 acres
5 Selected Acquisition of Floodplain Easements and Floodproofing	Neutral	Neutral	Neutral/ Improve	Neutral/ Improve	Neutral	Improve	Improve	?	?	?	?
6 Combination Alternative a. Selective Gravel Removal b. Dikes and Bank Protection c. Improve Natural Drainage d. Acquisit. of Flood-plain and Flood-proofing	Improve	Improve	Improve	Improve	Improve	Improve	Improve	44	16	0	47520

6. FEDERAL INTEREST.

Alternative 6, Combination Alternative appears to be justified by ecosystem restoration benefits, and will also have ancillary flood control benefits. The U.S. Army Corps of Engineers has an appropriate role in reducing flood hazard, and repairing damaged ecosystem in Skokomish River Valley and estuary that is consistent with other Federal initiatives, and is consistent with the Corps' fiduciary/trust duty to the Skokomish Indian Tribe and other tribes dependent upon the resources produced in the Skokomish River Basin. Therefore, there is a Federal interest in pursuing a Feasibility Study under Section 212 of the Water Resource Development Act of 1999, Flood Mitigation and Riverine Restoration Program.

7. PRELIMINARY FINANCIAL ANALYSIS.

The Skokomish Indian Tribe has indicated their support for the findings of the 905(b) analysis and have indicated in a letter of support that they are willing and able to cost share in a feasibility study and will be exploring many options for providing the items of local sponsor cooperation for the eventual project implementation. Mason County has also indicated that they support the findings of this 905(b) analysis, but are unable to cost-share in a feasibility study or implementation at this time. The Tribe is working with the state of Washington and the local flood control zone district to find additional sources of funding. As the project study plan is developed, we will examine ways to include Mason County and other agencies in the feasibility process, either through in-kind services, or other means of funding.

8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS.

1. The project study plan and FCSA will be developed to identify the specific studies and issues for the feasibility study. Due to the sensitive nature of the project, the local sponsor wants to (and will have) a close scrutiny of what is being studied and why. If agreement can not be met due to political reasons or timing, the feasibility study initiation could be delayed. Upon approval of the plan by all parties, the FCSA will be signed.

2. The local sponsor wants the Corps to prepare a preliminary PSP in entirety, for them to review, then negotiate.

3. Much work has been to document and study the flooding and ecosystem problems in the Skokomish River basin. The proposed feasibility study will use this information as a basis for future studies. This will require the first step of the feasibility study be a literature compilation and review. This review will allow the local sponsor(s) to provide their knowledge and information to provide the basis for the Corps study. Also, there are several ongoing efforts by the Tribe, County, and other agencies related to ecosystem restoration, flooding, and the FERC licensing of the basin's Cushman Dam project. This feasibility study will have to work in conjunction with these other on-going efforts.

4. The document will be a combined EIS and Feasibility Report. The report will rely heavily on the existing information, updated through the EIS process.

5. The document will address the project in two ways, as a stand alone item, but most importantly as an integral part of action that must occur in the Skokomish Basin.

6. Feasibility Report will be based upon a package of engineering and scientific study from three sources.

a. Existing information - review and adopted as agreed upon by the Corps and local sponsor.

b. Revised/Updated Local Sponsor Studies - The local sponsor will need to revise and/or update their provided studies. There is much fisheries and biological study done by the local sponsor that can be updated (by the local sponsor) with current information.

c. New Studies - New studies will be performed by a combination of Corps, local sponsor, and contract resources, depending upon who is the most practical and logical party for the task.

7. The Corps or Corps contractors will perform the Real Estate and Economic Analysis functions for this project.

8. Suggested criteria to screen alternative and select potential projects were referred to earlier in this report. These criteria will serve as additional assumptions for the feasibility study. They are:

- The expected benefits will extend over a long periods of time (i.e., 50 years or more.)
- The proposed work is compatible with other ongoing efforts by Federal, State, Tribal, and local agencies.
- Public health, safety, and well-being will be protected
- The project should be designed to minimize the amount of maintenance required for the non-Federal sponsor.
- Proposed work will implement the County/Tribe priority projects.
- Proposed work will enhance habitat for threatened or endangered species that occur in the basin.
- The proposed work will significantly restore the existing river channel both from a capacity and ecosystem perspective.
- The most practical property interest/estates will be used, and will vary between project features.
- The non-Federal sponsor is willing to operate and maintain.
- The proposed project will have positive net benefits to existing ecosystems.

9. FEASIBILITY PHASE MILESTONES.

Feasibility study schedule is highly dependent upon the negotiation of the PSP with the local sponsor. AS PSP is developed, the schedule will be revised and details completed.

Notice of Intent/Notice of Initiation of Feasibility Study	6 March 00
NOI published in FR/Public Notice NOP circulated	13 March 00
Preliminary draft PSP	31 March 00
Joint EIS/EIR Scoping Meeting – Public Workshop	19 July 00
PDPSP reviewed by sponsor, Response to comments, and negotiations	31 March- 30 June 00
FCSA signed	7 July 00
DFR and DEIS complete	October 01
District submits final report to Division	July 02
Division Commander's public notice. Final report submitted by Division to HQ. Initiation of Washington level review.	August 02

10. FEASIBILITY COST ESTIMATE

This estimate is only preliminary and will be modified pending the formulation and negotiation of the PSP.

MAJOR WORK ITEMS	**STUDY COST**
COST SHARING FOR FEASIBILITY STUDY	
TOTAL STUDY COSTS	**$ 1,000,000**
50% FEDERAL SHARE (Note that this is only funding estimates, local sponsor cash will increase these figures)	
Public Involvement	$ 50,000
Environmental Studies	$ 100,000
Economic Studies	$ 50,000
Project Management	$ 100,000
Engineering	$ 50,000

	Real Estate Studies	$ 50,000
	Model Studies	$ 50,000
	Review Contingency	$ 50,000
	TOTAL FEDERAL SHARE	**$ 500,000**
50% SPONSOR SHARE		
	IN-KIND SERVICES	**$ 250,000**
	Public Involvement	$ 50,000
	Environmental Studies	$ 100,000
	Economic Studies	
	Project Management	$ 50,000
	Engineering	$ 50,000
	Real Estate Studies	
	Model Studies	
	Review Contingency	
	CASH FUNDS	**$ 250,000**
	TOTAL SPONSOR SHARE	**$ 500,000**

11. RECOMMENDATIONS.
On the basis of the findings above, I recommend that this 905(b) analysis be certified as being in accordance with current policy and that a feasibility study be conducted. The estimate of the cost of the study is $1.0 million. This estimate will be revised as the PSP is developed. The feasibility study is currently scheduled for completion in July of 2002.

These recommendations reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in the local and state programs, or the formulation of a national Civil Works water resources program. Consequently, the recommendations may be modified at higher levels within the executive branch before they are used to support funding. However, prior to initiating the feasibility study, the local sponsor will be advised of any modifications and will be afforded an opportunity to comment further.

12. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE.
There are two issues that will affect the initiation of a feasibility study.

The first issue is more directly related to the on-going Skokomish Tribe - City of Tacoma litigation regarding the Cushman Dam FERC licensing issues. The Tribe has expressed grave concern about any studies being done that would re-examine the 4(e) conditions that have been established by the Department of Interior. A cursory review of the technical

studies done in support of the 4(e) show that additional studies would be required to support the differing objectives and requirements of the Corps' feasibility analysis. The 4(e) studies do, however, provide a strong foundation to build from. The additional studies will need to be developed in close conjunction with the Skokomish Indian Tribe to ward off conflict.

The second issue is the quickly degrading situation in the valley itself. Each year, the floods are more frequent and severe. There is potential for catastrophic damage to occur to the valley, which could lead to a complete shift in river alignment. If this were to happen the entire context of any potential feasibility study would have to be shifted.

13. VIEWS OF OTHER RESOURCE AGENCIES.

There is much support amongst the various resource agencies to find a comprehensive solution to issue in the Skokomish River basin. The USFWS is in general support of the project, but wishes to see the project expand to include upper watershed sediment source issues. The Washington Department of Fish and Wildlife has expressed that they are willing to explore gravel removal projects and are quite interested in floodplain acquisition. Other agencies, such as EPA, NMFS, Washington Department of Ecology, are eager to have the Corps working to find a solution. The Skokomish Tribe is very supportive of our activities and is a strong advocate for consensus building measures.

The bottom line is that there is much work to be done, and that the various agencies are in support of Corps involvement, and are willing to "come to the table" to discuss and negotiate all the various proposed actions.

14. PROJECT AREA MAP.

Figure one shows the project area. Figure two showns the river cross sections. Particulalry telling on the cross sections is the dramatic sloping of the flood plain. This demonstrates the potential for dramatic shifts in river alignment because the main river channel is so much higher than surrounding areas.

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