WASHINGTON STATE DEPARTMENT OF ECOLOGY

Application for a 2015-2017 Floodplains by Design Project Grant

Project Title: **Restoring Roads and Habitat Within the Upper Quinault River Floodplain**

Organization/Jurisdiction Name: **Quinault Indian Nation**

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Legislative District(s): **24**
County: **Grays Harbor, Jefferson**
WRIA(s): **21**
Congressional District(s): **WA-06**

Specific Project Location
Section (multiple) Township (multiple) Range (multiple) River Mile 35+
Latitude N47 31'43.40 Longitude W123 46'04.10

Major Watershed Project is in **Quinault River watershed.**

1. Short Description of Project

The roads and public access system in the upper Quinault River watershed provides access to Olympic National Park, residences, recreation areas and a popular tourism loop around Lake Quinault. Most of the system is located in "high-risk" areas within the floodplain and channel migration zone of the upper Quinault River – the same areas that provide ecologically sensitive spawning and rearing habitats for Quinault River salmon. Road washouts and emergency repairs have been a chronic costly problem for decades and the methods used to repair and maintain them is damaging to salmon habitat.

The Quinault Indian Nation (QIN) together with federal, state, and county agencies has worked for a dozen years with varying levels of success, to address road, public access, salmon habitat and floodplain issues. The primary factor limiting a long-term solution has been developing a roads and public access strategy that is compatible with restoration of the upper Quinault River.

The Quinault Indian Nation requests $560,000 to develop and assess the feasibility of various alternatives to relocate or possibly improve roads, restore salmon habitat, and address other floodplain issues in the upper Quinault River watershed. The project area encompasses approximately 8,200 acres containing about 90 mile of rivers, tributaries, and side channels and 32 miles of roads. The proposed project will bridge the gap between roads infrastructure and public access with other restoration elements identified in the *Salmon Habitat Restoration Plan – Upper Quinault River* (QIN 2008).

The QIN will hire a consulting firm to facilitate and support a multi-disciplinary planning team consisting of representatives from the Quinault Indian Nation, Grays Harbor County, Jefferson County, Washington State Department of Transportation, National Park Service, Olympic National Forest, federal and state regulatory agencies, and local stakeholders.

The proposed 2-year project will result in a cost-effective, long-term* Upper Quinault River Roads, Public Access, and Habitat Improvement Plan *that has been fully vetted with the public, satisfies environmental compliance requirements, and is compatible with restoration of floodplains and salmon habitat.

The project has three major components:

- Phase I: Feasibility Assessment will involve a review of existing information, plans and reports; identification of areas prone to flooding, erosion, channel migration, and debris flows; analysis of road management plans and strategies; a review of geomorphic and hydraulic analyses associated with river channel processes, impacts of bridges, culverts, levees and riprap revetments on hydrology and channel processes; and an evaluation of the cost-effectiveness of various designs and solutions.

- Phase II: Conceptual Design will develop conceptual designs and cost estimates for a suite of potentially feasible scenarios and alternatives. Alternatives will be further scoped through a series of public meetings leading to selection of a preferred course of action.

- Phase III: Environmental Compliance encompasses environmental compliance work. An Environmental Assessment will be completed to satisfy National Environmental Policy Act (NEPA) requirements. State environmental compliance (SEPA) and some permitting may also be completed. Additional funding will need to be secured for Endangered Species Act (ESA) consultation, final permitting and future construction and implementation (Phase IV).

2. Flood hazard / risk reduction (*60 points*)

The Quinault River is located on the west side of the Olympic Peninsula in Washington State (Figure 1). The river flows approximately 33 miles from its headwaters on the west side of the Olympic Mountains to Lake Quinault then another 35 miles to the Pacific Ocean at Taholah. The total drainage area of the watershed is 436 square miles. Physiographic features are determined by interactions among geologic and geomorphic processes and are variable within the watershed. However, much of the variation is systematic (e.g., attributes associated with elevation and gradient) and typical for coastal temperate rainforest river systems in the Northwest (Naiman et al. 1992).

Annual average rainfall in Quinault, WA, is 12 feet per year with most falling during the months of November through March as powerful winter storms from the Pacific Ocean move through the area. Measurements of river discharge at the USGS streamflow gage at the outlet of Lake Quinault range from a low of less than 400 cubic feet per second in late-summer to more than 60,000 cubic feet per second during peak flows in the winter. Peak flows in the upper river are masked by the lake's dampening effect on discharge to the lower river – upper Quinault River peak flows are estimated to be approximately 30% greater than the measured discharge at the lake outlet.

Flooding and bank erosion are annual occurrences in many areas of the upper river and have been especially problematic for roads managers and the landowners who live along the river. Flooding is not expected to change much because of the hydrologic characteristics of the watershed and because so much of the project area lies within the 100-year floodplain. However, reduced rates of erosion and channel migration are expected, reducing impacts to roads and public access system over time as elements of the plan are implemented and floodplain conditions improve. With completion of each restorative action (project), we expect positive responses to occur as natural river and floodplain processes are restored, floodplain forests mature, and the river becomes more stable.

The proposed project focuses on feasibility assessment, planning, local stakeholder input, science-based design and environmental compliance. The project will result in the project partners developing and selecting a new, sustainable road infrastructure and public access system design to move forward into the future. Until the proposed project is completed and the preferred alternative is identified, however, it is impossible to quantify the flood hazard and erosion risk reductions at this time. Completion of this proposed project will identify and quantify the reductions and expected benefits. However, key concepts guiding development of the long-term sustainable roads and public access alternative have been established and include:

1. A new, sustainable roads and public access system is needed to maintain public access, improve safety of residents, and support long-term restoration of natural riverine- floodplain and channel processes essential to maintaining salmon habitat.
2. The new road and public access system must be compatible with upper Quinault River salmon habitat restoration, restoration of floodplain and channel migration zone processes, Olympic National Park management goals for "at risk" rivers, and local stakeholder interests. Park and county road and public access maintenance plans must be compatible with long-term restoration goals for the upper Quinault River.
3. The planning process will determine how and where to move roads infrastructure and/or areas where conversion to an alternative form of public access is required to avoid inhibiting restoration or natural processes. Most likely road relocations would be to lower-risk areas outside or on the margins of the floodplains and channel migration zones.
4. Innovative designs and methods identified in the *Salmon Habitat Restoration Plan – Upper Quinault River* would be applied to address both localized and reach-scale flood hazards and erosion risks. These include but are not limited to road decommissioning, road realignments or relocations, strategic placement of engineered log jams (ELJs) to reduce risks of erosion and excessive channel migration, open channels, new bridges and culverts, alternatives to traditional road crossings (e.g., dry channel bed crossing structures) for alluvial fans and road segments

prone to debris flows, removal of fish passage barriers and undersized culverts, reconnection of lateral tributary channels, and conversion of road segments in high-risk areas to lower-impact forms of access.

5. The process must provide opportunity for open and honest discussions with the local stakeholders. Open lines of communication with private landowners and other local stakeholders must be maintained.
6. If easements or purchases of land for right-of-ways or easements, and restoration or conservation purposes, appraisal methods must provide fair market value for negotiation with willing landowners.
7. Local stakeholders and affected landowners will be involved in developing and choosing the preferred alternative and a final plan.
8. The long-term solution must serve the greater good for all stakeholders involved.

The proposed project area encompasses the floodplains and channel migration zones of the mainstem upper Quinault River from Lake Quinault upstream to the confluence of the East Fork and North Fork Quinault Rivers; and all tributaries within that reach (Figures 2 and 3). Upstream of the forks the project area continues up the East Fork to Graves Creek and up the North Fork to the North Fork Quinault trailhead. The project is different from others in the state: A major advantage for roads managers and other local stakeholders in the upper watershed is that current land and visitor uses, combined with limited commercial and residential development, provide an opportunity to purchase or relocate road easements and purchase land from willing sellers for restoration and conservation. Unwilling landowners may choose to establish land trusts or other forms of conservation easements that provide opportunity for continued uses of the land that are compatible with restoration or in the case of small forest landowners, land or timber trades.

The term 'roads infrastructure' includes all elements associated with standard vehicle transportation and access including but not limited to primary roads, secondary roads, right-of-ways, easements, bridges, culverts, and roads maintenance facilities. 'Alternative access' includes public access and recreation elements that could be designed then implemented as a sustainable, cost-effective alternative to vehicle access in sensitive areas where roads are determined no longer feasible, aren't cost effective or inhibit natural processes. For example, an extended trail system with new trailheads, interpretative trails, and low-impact day-use areas. Permanent facilities such as campground and ranger station could be relocated to a centralized location in a low risk area where sustainable vehicle access to the site remained feasible.

Flooding and impacts associated with riverbank erosion and channel migration are imminent hazards throughout the upper Quinault River watershed. Most of the road and public access system, private residences and public recreation sites are located within the 100-year floodplain or channel migration zone. There are approximately 28 miles of primary roads and 4 miles of secondary and private roads in the upper Quinault River watershed. Many road segments have been washed out or damaged by floods, erosion or channel migration since the first documented event in the 1930s. In all but a few cases involving minor realignment, emergency repairs and road protection were completed by installing riprap revetments (Figures 4 and 5) or in some cases excavating the streambed. The problem hasn't gone away. Many road segments are only one winter storm away from being eroded by the river.

Relocating or modifying roads infrastructure and removing the riprap, possibly replacing it with engineered log jams, would help restore floodplain processes and connectivity with terrace tributary channels and wetland habitats. There are about 65 full-time or seasonal residences located in the upper Quinault River floodplain and channel migration zone. The most common types of non-commercial structures include single family homes, barns, and low-impact recreation (camping) sites. Structures located in Olympic National Park include a ranger station, two roads maintenance facilities, and several houses used for seasonal housing by Park staff.

Since the first homesteaders settled the upper Quinault River valley in the 1890's local residents – both past and present – recognize the risks associated with flooding and consider it a common issue that most have accepted and dealt with. However, erosion and channel migration that threaten the roads infrastructure and safety of the local community is another issue.

During the winter storm of 2006 a family with young children was forced to evacuate as the river rapidly eroded the foundation under their home (Figure 6). Other people were trapped in their homes by relatively minor floodwaters because side channels and overflow channels with roads and driveways through them had filled with flowing water (Figure 7). This issue of flooding, erosion and channel migration isn't limited to just one roadway segment or property on the river. Most recently the historic Enchanted Valley Chalet located in the headwaters of the East Fork Quinault River in Olympic National Park was nearly lost to the river (Figure 8). Flooding, erosion, and river channel migration isn't the only significant hazard in the upper Quinault River watershed.

Other high-risk areas include alluvial fans and debris-flow-prone areas – most of which originate from valley wall tributaries. These natural geomorphic processes in the landscape introduce additional hazards to existing roads infrastructure, public access and public safety. The most well-known hazard of this type is associated with Finley Creek and its alluvial fan located in Olympic National Park (ONP). Impacts to Finley Creek Bridge (Figure 9) and associated road repair and maintenance costs are well understood by ONP staff that deal with Finley Creek and local community concerns each year. QIN is providing support to the local community and has formed a partnership with ONP and secured funding through the U.S. Department of Interiors Tribal Technical Assistance Program so the USBOR can evaluate geomorphic and hydraulic processes that will be used to develop restoration alternatives for Finley Creek and its alluvial fan. The planning and alternatives development work for Finley Creek that QIN, ONP, and USBOR are currently doing is expected to be completed by the time this project begins. The information from Finley Creek would be used to inform and help develop this project.

The purpose of the project is to develop and assess the feasibility of various alternatives to reduce risks and potential impacts of flooding, riverbank erosion, channel migration, and debris flows thereby improving public safety and reducing expenses associated with costly roads infrastructure repairs and maintenance.

3. Floodplain ecosystem protection or restoration element (*60 points*)

Scientific Foundation – The U.S. Bureau of Reclamation (USBOR) and a team of experts in coastal river system geomorphology and floodplain forest processes studied geomorphic processes associated with the upper Quinault River floodplain in 2002 (USBOR 2005). The study characterized the conditions and historic progression of physical habitat forming processes on the floodplain and recommended actions that could be taken to mitigate loss and degradation of aquatic habitats, especially salmon spawning and rearing habitats. The USBOR evaluated data collected during the study, historical aerial photographs, cadastral survey information, and documents containing firsthand accounts to evaluate potential causes of river and floodplain transformation and salmon habitat loss in the upper Quinault River.

The USBOR reported in the *Geomorphic Investigation of the Quinault River, Washington* that the upper Quinault was more stable and functioned as a natural, undisturbed river through most of the 1800s (Figure 10). The river channel had a course sediment and large woody debris load, and migrated slowly across its floodplain because dense, mature forests resisted erosion and avulsion. The gradual migration and occasional shifting of the river channel amid dense, mature forests resulted in a continual cycle of erosion of older forested surfaces while at the same time building new surfaces. The river consisted of one or two relatively narrow, deep main channels with an extensive network of adjacent side channels, terrace channels, and tributary channels winding through the forested floodplain. These channels provided a diverse range of habitat features that supported exceptional runs of blueback and other salmon.

The relative stability and natural habitat-forming processes were becoming degraded by the early 1900s. The upper river has transformed since the late 1800s, largely as a result of clearing of mature conifer forests and large woody debris from the historic floodplain in the late 1800s and early 1900s. As the mature trees and large woody debris were removed, relatively stable hardpoints formed by the root systems and stable logjams were gradually lost along the river and have not been naturally replaced. Once the channel containment provided by the remaining hardpoints was gone, the river was free to migrate across its floodplain at an increased rate. The more rapidly migrating river liberated large amounts of sediment stored in bars, terraces and vegetated islands. This increased localized sediment input caused the river channel to become wider, shallower, and more uniform. Deep pools and habitat complexity in the main channel disappeared. As the river channel widened it also migrated through the adjacent side channels and tributaries until only a few miles of the complex and productive network of salmon habitats remained. The altered channel condition has not recovered to a natural state because large woody debris and mature forested islands and terraces have not been restored in the system to recreate relative stability of the floodplain. The USBOR concluded convincingly that:

"the upper Quinault River will not heal on its own – human intervention is required."

The upper Quinault River today is characterized as a dynamic, sediment-rich river with high rates of bank erosion and channel migration (Figure 11). Estimated loss of terrace bank areas is occurring at a rate of approximately 34,000 m^2 per year (QIN 2008). One of the most significant, continuing impacts on the river is associated with young forested islands and developing floodplains that are unable to persist for more than a few decades before being reworked by the river. Floodplain vegetation consists of early- to mid-successional vegetation dominated by red alder with only a very minor conifer component.

The road and public access system located in the floodplain and channel migration zone has experienced significant impacts from erosion and channel widening. Approximately 5.2 miles of the road system has been eroded or damaged by the river since the first documented event in the 1930s. Rather than let the roads be lost to the river or relocating them, roads managers have tried to protect and maintain them by installing riprap revetments – a method that further impairs floodplains and salmon habitat. This approach has only been moderately successful as the roads and public access system continues to experience chronic erosion and maintenance problems. Road segments have washed out and been repaired only to have more of the same road wash out again. Millions of dollars have been spent on repairs and maintenance following flooding and erosion events. These problems will continue into the future unless a long-term solution is implemented. The science-based conclusions by the USBOR in combination with the well-documented decline in Quinault blueback salmon run sizes over the past 60 years (Figure 12) provided the evidence QIN needed to commit to restoring the upper Quinault River.

This commitment was demonstrated in 2005 when the QIN tribal government formally resolved that restoration of the upper Quinault River and Quinault sockeye (blueback) salmon one of its highest priorities (QIN 2005). The Quinault Department of Fisheries responded by securing funding and forming a team of experts to develop the *Salmon Habitat Restoration Plan – Upper Quinault River* (Plan) and restore the river. Completed in 2008, the plan is based on scientific research conducted in the Queets River to restore natural riverine-forest-salmon habitat-forming processes in the upper Quinault River. The Plan provides the strategy, procedures, methods, typical engineering and planting designs – including recommendations about how to address the roads and public access system problem.

QIN wasted no time implementing the plan. Restoration of the upper Quinault River started the same year the plan was completed and has been underway since 2008. Thirty-seven engineered log jams have been installed since 2008 to slow erosion and excessive channel migration, improve river and floodplain development processes, restore salmon habitat, and protect private property. Approximately 1 mile of mainstem river channel and 1.2 miles of side channel habitat have been restored with approximately 35 acres of new floodplain currently developing as a result of restoration activities. Roads infrastructure and private landowners have also benefited. About 50 acres of private land has benefited from reduced erosion risk; 0.7-miles of the South Shore Road and eight homes in Grays Harbor County will benefit from

reduced risk of channel migration. QIN recently completed restoration planning and a construction-ready site plan for a 10-mile reach of the river from near Lake Quinault to the forks of the river (see Section 13).

Limiting Factors – The trophic productivity of 3,720-acre Lake Quinault and the quality and quantity of salmon habitats in the upper watershed are the primary limiting factors to recovery of upper Quinault River salmon populations (Eco-Logic 2000; USBOR 2005; QIN 2008). The roads and public access system are limited by outdated management paradigms, being located next to the river and in the floodplain and channel migration zone, and costly, unsustainable methods of maintenance and protection.

Lake Quinault forms a natural physical and hydrologic boundary between the upper and lower Quinault River. The lake provides critical rearing habitat for blueback salmon juveniles. The lake also provides habitat for spring and fall chinook, coho, chum, and steelhead. The degraded condition of freshwater habitats upstream of the lake combined with significant reductions in salmon biomass that provide sources of marine derived nutrients have created a "bottleneck" in the lake environment to blueback salmon restoration (Eco-Logic Ltd 2000; QIN 2009). QDFi has been enhancing nutrient concentrations in the lake since 2004 by applying liquid fertilizers containing phosphorus and nitrogen to improve lake productivity and blueback rearing conditions.

Essential salmon habitats in coastal rivers like those in the upper Quinault River watershed are found in mainstem river channels, side channels, tributaries, off-channel ponds, and wetlands. These habitats provide a suite of physical and ecological functions that meet specific life history needs for the salmon species that utilize them. Stable side channels and lower gradient tributaries are especially important as spawning habitat for blueback, coho and chum salmon whereas spring and fall chinook and steelhead are more dependent upon mainstem river channel and larger tributary habitats for spawning. All of these habitat types are created and maintained by interactions of the river systems hydrology, sediment supply, floodplain forests, large woody debris, and relative stability of the floodplain and terrace surfaces (Abbe and Montgomery 1996; Collins and Montgomery 2002; Collins et al. 2012; Fetherston et al. 1995; Montgomery and Abbe 2006; O'Connor 2003).

Information from the USBOR and other analyses in the upper Quinault River identified measurable impairments associated with locations of roads infrastructure and riprap revetments. These include segments of roads protected by riprap, the Bunch Field levee, and the NPS Bridge (Figure 13). Filled or blocked overflow channels were also identified as impairments to riverine-floodplain processes, floodplain connectivity, and salmon habitat (USBOR 2005; QIN 2008). The restoration strategy for the upper Quinault River and its salmon habitats applies a landscape-scale, science based approach for the floodplain and channel migration zone. Within this area physical and ecological processes and many of the desired human uses in the area may be achievable, but only with modification of existing management practices and change from the status quo. Restoration elements include strategic placement of engineered log jams, forest restoration, reconnecting isolated tributary channels, and conservation of sensitive areas in the floodplain. Combined with implementing a new roads infrastructure and public access system many of the existing habitat impairments can be reversed. In areas where erosion and channel migration are undesirable or can be mitigated, engineered log jams could be constructed to improve instream habitat complexity and encourage development of new floodplains between the river channel and road segments. Hydraulic issues such as high flow rates along the face of riprap revetments can be reversed and channel bank roughness restored. Side channels, islands and other riparian areas will be protected or enhanced by constructing engineered log jams or stabilizing existing log jams. Islands and riparian areas where floodplain forests are degraded or conversion to conifer is desired, will be replanted then managed in a way that restores floodplain conifer forest regeneration cycles to improve riparian functions.

The road and public access system can be improved by implementing an alternative approach that provides sustainable means of public access, improves public safety, reduces potential for future impairment, and is compatible with restoration of the upper Quinault River.

The outcomes of this project when implemented in combination with habitat restoration will help to reestablish more natural rates of erosion and channel migration, thereby restoring sediment inputs that are otherwise contributing to the continued degradation of the river and its salmon habitats. Treatments that mimic or encourage improvements to instream habitat complexity (e.g., more pools), stable side channel and tributary channel formation, reduced erosion, and more natural rates of channel migration can be reestablished by using a combination of engineered log jams, riprap and levee removals, road decommissioning, and road relocation.

The primary processes that regulate and maintain riverine, floodplain, and salmon habitat development in the upper Quinault watershed include interactions of the system's hydrology, sediment supply, floodplain forests, large woody debris – these processes would be restored across much of the project area. Restoring surface water connectivity with lateral tributary channels adjacent to the main river channel is essential to restoring floodplain and hydrologic processes and would be addressed where feasible as would areas prone to debris flows from valley wall tributaries. Culvert and barrier removal by installing new culverts or bridges, including addressing impairments caused by the NPS Bridge on channel processes and isolation of the adjacent floodplain, will be addressed.

4. Is your project in a Puget Sound Partnership Priority Floodplain? *(5 points)*

No. The proposed project is not in a Puget Sound Partnership priority floodplain.

5. Other benefits (*40 points*)

a. **Agricultural viability**. There is a long history of agriculture and forestry in the upper Quinault River Valley dating back to the 1890s with the clearing of the old-growth forests to establish homesteads and begin farming. Timber harvest for commercial purposes didn't really begin until the onset of World War I when select stands of Sitka spruce were targeted by the U.S. War Department's Army Spruce Production Division to build airplanes. Large-scale timber harvests were limited to the 12-mile reach of the river upstream of Lake Quinault following conversion of the U.S. Forest Service Preserve into the Olympic National Park in the 1950s.

   Today agricultural activities include mostly small-scale hay farming and limited cattle grazing on private lands. Timber harvest in the upper Quinault River watershed is limited to small forestlands outside of Olympic National Park and Olympic National Forest. Remaining merchantable timber within Olympic National Forest is protected from harvest in riparian conservation management zones. Timber harvest and active forest management activities following state forest practices are limited to about 1,390 acres of small forest and agricultural land (B. Lutz, personal communication). Improved and better-located roads that may ultimately result from this project could help ensure access for management of agricultural and forest lands at current levels of scale and productivity. A more stable river channel may reduce erosion and channel migration risk to approximately 900 acres of the agricultural and small forestlands in the valley, thereby providing continued harvest opportunities within state regulatory guidelines.

b. **Water quality improvement**. Anthropogenic sources of pollution or discharge that could degrade water quality are unknown but are surmised to be minimal due to the large expanse of the watershed drainage area located within Olympic National Park and low-density residences in the rural setting. Most of the development in the form of homes and cleared agricultural land is located on the south side of the river in the five-mile reach immediately upstream of Lake Quinault in Grays Harbor County. Olympic National Park operates several campgrounds, a ranger station, and two maintenance facilities in the area.

   In terms of water quality, this project's biggest contribution will be toward long-term improvements in riparian forest and forested wetland functions. Improvements will help with flood attenuation, soil

filtration of precipitation and runoff, maintaining riparian micro-climate conditions (i.e., air temperature, shading, canopy-derived precipitation, and relative humidity), and instream habitat complexity (e.g., deep pools -> connectivity of surface waters with cool, nutrient-rich hyporheic waters). Relocation of roads and removal of barrier culverts, road fill or other in-channel obstructions will improve hydrologic connectivity, water storage and energy dissipation in the floodplain that will benefit terrace tributaries and associated wetlands. As floodplains stabilize and become forested, both groundwater and fine sediment storage capacity should increase (e.g., reduced turbidity from erosion).

c. **Public access and recreation**. Discussions with landowners and other stakeholders about restoration of the river, the status of its salmon runs, and their varied interests have yielded significant insight into the values held by the local community and visitors to the watershed. Recreational uses in the area include fishing, wildlife viewing, camping, hiking, sightseeing, mushroom-gathering, and hunting. ***Maintaining safe public and recreational access that doesn't ruin the river and salmon runs has been identified as a priority for all stakeholders.*** An improved roads and trail system that ultimately may result from this planning and design phase will be designed to provide consistently safer access to the upper Quinault River. There may be opportunities to relocate campgrounds and other recreational support facilities to lower-risk areas in the valley, thereby maintaining or even increasing recreational opportunities and visitor use in the area. Marketing restoration of the river and conversion of decommissioned road segments into an expanded trail system would bring about significant ecological benefits and wildlife viewing opportunities for Park visitors. A new interpretative trail describing the restoration of the upper Quinault River is another likely outcome of this project that would be used for local youth education and outreach programs and enjoyment by visitors.

d. **Other floodplain values or services of local importance**. The proposed project is strongly linked with the Department of Ecology Floodplains by Design goals to achieve multiple objectives. Specific objectives that will be addressed by this project include:
   i. Improving public safety. Critical infrastructure (roads and residences) may be removed or relocated from areas at high risk of flooding and erosion. Some private properties may receive benefits associated with a return to more natural channel migration and erosion rates. At the same time, new and improved roads will provide public access to recreational opportunities in the Olympic National Forest and Olympic National Park.
   ii. Habitat restoration and salmon recovery. Re-engineered and possibly relocated roads will protect the upper Quinault River channel migration zone and remove the need to armor banks. Engineered log jams built within the river will stabilize hydrology and restore natural ecosystem processes, thereby improving habitat for salmon species and other fish and wildlife.
   iii. Long-term cost savings. Alternative project plans (solutions) will be analyzed, in part, according to long-term cost-effectiveness. Current annual costs of maintaining a failing roads system will be compared to costs of a better-designed roads system built in lower-risk areas outside of the floodplain and channel migration zone.

6. Cost-effectiveness (*20 points*)

a. The project budget is based on actual cost estimates developed by QIN and its restoration team of contractors to complete the scope of work. Since the restoration program began in 2005, we have made refinements wherever possible to achieve efficiencies in our planning and design process, including ways to be more cost-effective. Based on our experience leading restoration of the upper Quinault River and the planning processes completed thus far, we are confident that our proposed project, including estimates of time and expenses, are accurate and achievable. The restoration process has and will continue to involve organized coordination with multiple agencies, contractors, partners and local stakeholders. The experience of our project leader and restoration team's success

with the *Salmon Habitat Restoration Plan*, NEPA compliance process, and restoration project planning and completion to date, demonstrate that we are highly effective at completing planning, public scoping, project design and construction projects on time and within budget.

b. The upper Quinault River restoration program is never static and by design is a phased project in itself. We are continually seeking to renew existing funding streams as well as find new sources of funding to complete project work and restore the river. We are working with committed project partners to identify and pursue new funding opportunities. Our track record in securing approximately $6 million in funding whether it be grants, donations or state legislature appropriations demonstrates our success to date and commitment to the program. In addition to the interlocal agreements required for Department of Ecology grant funding, we plan to maintain the restoration project for the long term by entering into interagency agreements with the agencies involved in this project. These formal agreements will maintain continuity and involvement from the project partners to complete future phases of this project as well as other restoration project phases. Already QIN has or is planning to enter into interagency agreements with the National Park Service, Jefferson County, Grays Harbor County, and Washington Department of Natural Resources. The QIN and project partners will be requesting additional federal and state funding to implement the entire river restoration program and the new road and public access plan.

c. This project has been developed using a phased approach to provide a clear understanding of the scope of work tasks and timelines necessary for project team planning and local stakeholder involvement. If all three phases of the project cannot be fully funded, we would request a grant sufficient to complete Phases 1 and 2 then pursue other potential funding sources to complete Phase 3. Completion of Phases 1 and 2 are essential to complete necessary planning and analysis, design concepts and cost-benefits analyses. Phases 1 and 2 would provide the minimum information that project partners need to proceed with the environmental compliance process and acquisition of additional funding.

7. Long-term cost avoidance: (*30 points*)

a. The roads and infrastructure improvements costs information provided here is based on information in the *Salmon Habitat Restoration Plan* (QIN 2008) and will be updated during Phase 1 and Phase 2 of the project. Estimated cost savings or eliminations associated with emergency repair, maintenance, operation and emergency response will be provided once the cost-benefits analysis is completed during Phase 1. Historical costs from the NPS and county road management departments are not available at this time.

However, based on our experience dealing with roads along the upper Quinault River in Olympic National Park and Jefferson County, we estimate that emergency repairs and planned protection actions using typical riprap revetments, including mitigation costs, range from $120,000 to more than $3 million per road mile. One recently constructed road protection project involved installing a riprap revetment along a 0.2-mile section of the Graves Creek Road at a cost of more than $1 million. Fish barrier removals for paved roads in Olympic National Park and Olympic National Forest have ranged from approximately $350,000 to more than $1 million per crossing.

National Park Service Bridge – Removing or modifying the NPS Bridge is a recommended priority necessary to restore natural geomorphic and floodplain processes in a 2-mile reach of the river in Jefferson County. Because the bridge is not long enough, it is constricting the channel. The constriction is affecting channel geomorphology and hydrology for a distance of several miles or more downstream. The bridge has effectively straightened the river channel and is impairing connectivity of the river with its floodplain in this reach. Incision of the riverbed has been documented and evidence suggests that sediment transport to areas downstream has increased and that flood storage capacity has decreased. Approximately 2.5 miles of side channel habitat has been lost or impaired as

the river responded to the bridge constriction.

- Approximate costs of NPS bridge removal (or improvements) are as follows:
  - Bridge removal: $1.4 million (FHWA 2006)
  - New bridge construction: $3.5 million (FHWA 2006).

Roadway Improvement Costs – Relocating the North Shore and South Shore roads to corridors outside the floodplain and channel migration zone, away from the mainstem river and side channel habitat areas is a recommended priority. Roadway removal or relocation would include removal of road protection structures such as levees and riprap revetments. Removing or relocating both South Shore and North Shore road is recommended to restore channel connectivity across the floodplain, restore the natural forest-river-large wood cycle, and increase potential side channel habitat. As part of road removal or relocation, the existing roadway surfaces would be removed.

- Approximate costs of roadway improvements are as follows:
  - Road removal (decommissioning), two-lane paved roadway: $0.39 million per mile (WSDOT 2006)
  - Road relocation, two-lane paved roadway: $1.55 million per mile (WSDOT 2006)
  - Road relocation, unpaved lane: $1.12 million per mile (WSDOT 2006)

Levee Removal or Setback Costs – A levee originally built to protect the North Shore Road is located along Bunch Field downstream of the NPS Bridge. This levee contributes to channel constriction along this reach and impairs floodplain connectivity with the Quinault River. Removal of the levee would help to alleviate the constriction and improve conveyance of flood waters through side channels and across the floodplain. The estimated cost to remove the levee is approximately $112,000 (2006 values). The estimated cost includes rock removal, embankment removal, and re-grading the levee footprint.

Culverts and Fill Removal and Replacement Costs – Undersized or perched culverts (including filled channels) can impede or block fish passage as well as interfere with hydraulic regime of a tributary or overflow channel. Culvert and barrier removal includes removing the culvert or other material from the stream channel. Re-grading of the channel may be necessary to allow fish passage or restore natural hydraulic flow through the channel. Culvert and other barrier removal costs vary widely depending on the extent of the work. Types of projects range from simple open channel designs to more extensive culvert and bridge installations that must satisfy federal and state standards. Approximate costs range from $5,000 to more than $350,000 respectively.

Future costs savings from the new roads and public access system developed by this project is impossible to quantify until the alternatives are developed and analyzed. We surmise, however, that typical maintenance and operation costs would be similar or less than current costs. Long-term cost savings for standard maintenance and operation would be probably be significant due to the inherent hazards to roads infrastructure due to erosion and channel migration, let alone the high cost to repair and protect them using conventional riprap methods. We expect that the short- and long-term benefits to jobs and improvements in the local economy through restoration of the river, its floodplains, salmon habitats and improved economic opportunities from restoration, construction, tourism, and salmon fisheries would more than mitigate for the initial costs.

b. Our upper Quinault River restoration program is never static – we are continually adapting to changes to the river channel by updating site plans and selecting project sites that provide cumulative benefits to restoration, job creation, and landowner benefits. The proposed restoration approaches, methods, and design concepts provide opportunity for adjustment and adaptation over time. We are also monitoring river processes and channel responses to our actions. By applying a pro-active planning approach we have been able to adapt to observed changes in river channel morphology. We will continue this pro-active approach for the proposed project to stay in front of changes that might otherwise impair reestablishment of physical and ecological conditions that could mitigate some of the future impacts associated with the changing climate (hydrology, sediment regimes, water supply,

increased winter flows, decreased summer flows). We have already recognized macro-level changes in the environment associated with climate change such as loss of the Anderson Glacier in the headwaters of the Quinault River and what appears to be a trend toward extremely low summer flows. Most of our restoration activities to date (e.g., installing ELJs to mimic stable large woody debris) have resulted in localized effects that are already mitigating for some of the past actions and habitat degradation. As cumulative benefits of our site specific restoration actions begin working together first in river reaches then across the landscape, we expect to observe and achieve the greatest benefits.

8. Demonstration of need and support (*30 points*)

a. The proposed project is a long time in coming. Road washouts and emergency repairs have been a chronic costly problem for roads managers and maintenance crews for decades. The methods used to repair and protect roads located in the high risk areas of the floodplain and channel migration zone is damaging to salmon habitat and inhibits restoration of the river and its salmon populations.

The proposed project concepts are identified in existing planning documents for the upper Quinault River floodplain including the *Salmon Habitat Restoration Plan – Upper Quinault River*, *Upper Quinault River Salmon Habitat Restoration Environmental Assessment*, and *National Park Service – General Management Plan for Olympic National Park.* ONP also has a report that details ELJs and access alternatives similar to the Quinault's restoration plan. During government-to-government discussions about the park's general management plan, QIN negotiated inclusion of language that identifies the upper Quinault River as an "at-risk-river". Through that designation the park has committed to working with QIN to restore the river and its salmon habitats. Both Jefferson and Grays Harbor counties have expressed their interest in working with QIN and the park to develop a sustainable access solution for the upper Quinault. We are currently in discussions with the park, both counties, and WSDOT regarding their roles in the project. The Army Corp of Engineers has committed staff resources to work with QIN and other project partners on the project.

The stage is set to begin a multi-year project that will fully assess the issues affecting the upper Quinault River roads and public access system and develop a plan to improve public safety, restore fish and wildlife habitat and reduce the annual costs to the National Park Service, counties, and state to repair and maintain roads and public access.

b. Primary organizations with floodplain interests with decision-making capabilities that will be serving on the multi-disciplinary team include the National Park Service, Jefferson County, Grays Harbor County, and Washington State Department of Natural Resources. The organizations representing floodplain interests within the upper Quinault River watershed that will be serving on the multi-disciplinary team and will provide technical and/or regulatory authority support in various capacities include the following: Army Corp of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington State Historical Preservation Office, Washington State Department of Transportation, U.S. Forest Service, Bureau of Indian Affairs, and Quinault Division of Natural Resources. Representatives of the local community members and landowners remain to be determined.

9. Readiness to proceed and complete the proposed phase of the project (*25 points)*

The QIN is prepared to implement the project as soon as funding is secured. Impacts of the road system on the river, salmon habitat, and floodplain processes were described and quantified in the *Salmon Habitat Restoration Plan – Upper Quinault Rive.* Road removal, realignment and alternative forms of access in high-risk areas were recommended. Local landowners, businesses and land managers are familiar with the ongoing project as are an array of consultants who serve as the restoration team organized by the QIN to provide scientific and engineering expertise necessary to restore the river.

In 2013 the QIN was awarded $1.8 million in state capital funds to continue work on the upper Quinault River. An Intergovernmental Agreement (IAA) was signed by the QIN and WDNR detailing responsibilities and protocols. Environmental permits are in order. QIN recently completed permit-level river and floodplain forest restoration designs for a 10-mile reach of the river from Lake Quinault upstream to near the confluence of the East Fork and North Fork Quinault Rivers. The outcome of this project will be incorporated into the existing program.

In 2014 the QIN established a permanent Habitat Restoration Scientist position that has been filled by the project lead for all upper Quinault work since 2005 (Bill Armstrong). Based on his experience, knowledge of the area, and familiarity with affected landowners, Mr. Armstrong will be the Project Lead for this proposed project. He will oversee all work conducted by consultants and assist with negotiation of agreements. The QIN council will appoint a representative to serve as the liaison between the QIN and partners. Mr. Armstrong is supported by the QIN's Fisheries Department administrator, the QIN Reservation Attorney, and the QIN Grants and Contracts Department.

10. Pilot project and leverage opportunities *(25 points)*

a. The upper Quinault River restoration program is one of the largest in the State of Washington in both scale and effect. It is a program that provides an example of how to be pro-active and apply a science-based approach (funding, assessment, landowner agreements, planning, community involvement and education, project design, construction, and monitoring) to achieve goals and cumulative benefits. This project will result in a model that is useful for road managers, restoration planners and tribally-led decision-making processes to address varied stakeholder interests through partnerships with public agencies and a local community. Successful completion of the proposed project will provide information and alternatives that are applicable in other watersheds in the state with similar issues and constraints. It will demonstrate that through careful consideration of local stakeholder interests, various alternatives that result in new approaches for roads and public access can meet the goals of reducing the risk of flooding and erosion, reducing the costs of road maintenance and repair, and improving fish and wildlife habitat.

b. The proposed project builds upon and leverages multiple assessments, planning and design work, road repairs, restoration actions completed over the past decade, and current funding including:

- *Geomorphic Analysis of the Quinault River, Washington* (USBOR 2005)
- Public education and outreach (2005-ongoing)
- South Shore Road emergency repairs (Jefferson County 2006-2008)
- North Fork Quinault Road Realignment (ONP 2007)
- North Fork Quinault Campground Repairs (ONP 2007)
- *Salmon Habitat Restoration Plan – Upper Quinault River* (QIN 2008)
- Alder Creek Engineered Logjam Construction – Pilot Project (QIN 2008)
- Alder Creek Forest Restoration Planting – Pilot Project (QIN 2009)
- River restoration planning and design (2007-ongoing)
- Alder Creek Engineered Logjam Construction – Phase 2 (QIN 2011)
- Environmental Assessment – Quinault River Salmon Habitat Restoration (QIN/BIA 2011)
- Graves Creek Road emergency repairs (ONP 2000-2012)
- Finley Creek Geomorphic and Hydraulic Assessment (ONP/QIN/USBOR 2011-2014)
- Finley Creek Restoration Alternatives Development (ONP/QIN/USBOR 2014-2015)
- South Shore Road Repair and Mitigation Project (Jefferson County/FHWA 2012-2016)
- Engineered logjam construction and forest restoration planting (2014-2015)

Funding for these actions was provided by grants, donations, and state legislative appropriations totaling more than $7.3 million from the following organizations:

- Salmon Recovery Funding Board

- Washington Department of Natural Resources
- Pacific Coast Salmon Recovery Fund
- Pacific Coast Salmon Coalition
- Wild Salmon Center – Mitsubishi Foundation
- The Nature Conservancy – Collins Foundation
- The Nature Conservancy – NOAA Community Based Restoration Fund
- U.S. Bureau of Reclamation – Tribal Technical Assistance Program
- USFS Title II Grant Program
- Jefferson County Mitigation Funds
- Olympic National Park (materials and in-kind donations)
- Federal Highways Betterment Funds* ($1.3 million; 2013-2016)
- Quinault Indian Nation* ($201,000 = $85,000 cash + $116,500 in-kind)
- Washington State Legislature Capital Budget Appropriation* ($1.8 million; 2013-2015)

Technical support services (values unreported) were provided by: U.S. Fish and Wildlife Service, National Marine Fisheries Service, Army Corp of Engineers, Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington State Department of Natural Resources, Washington State Historical Preservation Office, Northwest Indian Fisheries Commission, U.S. Forest Service, National Park Service, Bureau of Indian Affairs, Quinault Division of Natural Resources, University of Washington, University of British Columbia, and Grays Harbor Community College.

c. *Socio-Cultural Benefits* – The salmon resources produced from the upper Quinault River watershed, including the right to harvest them, are a treaty-protected right of the Quinault People. Central to Quinault identity was and still is the blueback salmon that spawns in the upper Quinault River system and rears exclusively in Lake Quinault. The lower Quinault River bisects the reservation flowing from Lake Quinault through the Reservation's interior 35 miles to the Pacific Ocean. The QIN owns and manages Lake Quinault – its bed and waters – to the ordinary high water mark. For generations the glacier-fed lake, which forms a natural, unregulated reservoir along the 68-mile-long Quinault River – the home river and lifeblood of the Quinault people.

The social and economic benefits of restoration are significant to the QIN, local communities and the region. The members of the QIN are among the small number of Native Americans who can walk the same beaches, paddle the same waters, and hunt the same lands their ancestors did a century ago. The proposed project will benefit the underserved communities of the Quinault Indian Nation downstream. The reservation population is 1,408 (2010 census), the majority of whom live at the mouth of the lower Quinault River in Taholah. Fishing and timber harvest are the primary economic drivers on the reservation. Median household income on the reservation is $26,488. About 32% of families with children under the age of 18 and 42% of families with children under the age of 5 are living below the poverty line.

The other beneficiary from this project will be members of the upper Quinault River community, many of whom retain a rich family heritage dating back to the original homesteaders of the valley. Employment in the area is still mostly dependent on the natural resources (logging and fishing) and local tourism and services industry. In the past 15 years, jobs have been lost, young adults are leaving, and school enrollments are decreasing. Unemployment rates in Grays Harbor and Jefferson County in February 2014 was 11.9% and 9.4%, respectively. An improved road and public access system to access the river and surrounding forests could boost tourism and bring new jobs and sources of income to the local economy.

The value of restoring the upper Quinault River and the salmon species that depend on the river is their legacy.

Also important is safety of the local community and implementation of sustainable means of public access that allows for restoration of the river and salmon habitats while minimizing potential for future impairments. The QIN has taken the leadership role and is committed to working with all the local stakeholders to address land-use, access, salmon habitat, bank erosion and channel migration issues.

Economic Benefits – The upper Quinault River watershed contains one of the few remaining coastal temperate rainforests in the Pacific Northwest. The Quinault Valley provides a gateway to the west side of the Olympic Mountains and Olympic National Park. The area is a popular recreation and tourism destination for visitors from all over the world. Improved roads and possibly trails resulting from this planning project will increase access and safety for hiking and other activities along the upper river. The completed restoration sites are a destination for local tours provided by the Quinault Lodge. Visitors will likely increase due to eco-tourism, education and outreach activities, and improved access.

Unemployment rates in Grays Harbor County (11.9%) and Jefferson County (9.2%) during February 2014 were among the highest in Washington State (U.S. Bureau of Labor Statistics). The primary sources of jobs and income in the area are associated with natural resources such as commercial and recreational fishing, timber and forest products, and tourism. Now restoration has been added to the list. Restoration of the upper Quinault River is becoming an increasingly important source of income and revenue for local logging, construction, and tourism based businesses. Support services that provide lodging, meals and other needs for restoration crews and visitors round out the local economic opportunity. On the regional scale, restoration of the river is providing increased opportunity for bridge materials and heavy equipment suppliers, environmental and restoration consulting firms, and other technical expertise (e.g., LiDAR providers) not available in the local area. The proposed project will develop a multi-year road and public access plan that ultimately will maintain or increase local (and regional) job opportunities primarily in the engineering and construction sectors, but also river restoration, fishing, and tourism industries. Initially jobs will be created to construct or modify infrastructure, public and landowner safety, and alternative forms of public access. Recreational and tourism-based economies are expected to improve in response to access and habitat improvements and improved fishing opportunities.

Economic benefits of the roads and public access plan to local businesses and services and project related jobs created will be determined as the cost-benefits analysis is completed during Phase 1 of this project. We anticipate that the roads and public access plan, when added to the restoration program, will provide significant benefits to the professional, engineering, construction, labor, and service industry jobs in both local and regional areas.

We do have information from an economic analysis completed by ENTRIX in 2009 that estimates benefits and outcomes of restoration plan elements and improved salmon fisheries (Table 1). The QIN identified that the decline of blueback spawning habitats have severely impacted the Quinault tribal fisherman (Comprehensive Economic Development Strategy, 2008). The restoration of the river and salmon habitat will restore pride and provide incentives for economic opportunity in a deprived community. The long-term benefits to the QIN and local stakeholders will be financial stability in the following sectors: fisheries, tourism, guide services, and recreational use.

The QIN recognizes the benefits of creating jobs and promoting a sustainable economic recovery. The economic analysis is consistent with the US Army Corps of Engineers (USACE) approach to federal planning. Short-term economic benefits are described in terms of National Economic Development (NED) benefits. Estimation methods include the use of an industry standard economic model, IMPLAN and benefits transfer methodology.

Table 1. Summary of jobs and economic benefit from upper Quinault River restoration (ENTRIX 2009).

Economic Metric	Units	Short-term		Long-term			Total
		Direct	Indirect	Monitor	Fishing[(a)]	Recr./Tourism	
Total Jobs	Average Jobs/Sector	119	210	0-8	0-77	22	329-537
Present Value Labor & Income	x 100,000	$ 6.5	$ 9.1	$ 1.6	$ 50.0	$ 7.0	$ 74.2

[(a)] Includes both commercial and recreational fishing

The average annual wage for jobs directly related to restoration is $57,032, and wages for the indirect (and induced) jobs are valued at $45,192 per annum. Job numbers are a conservative estimate of the total number of people that may be employed by the project; it can be assumed that more than one person may be hired per job providing two part-time opportunities. The QIN recognizes the potential for long-term job growth in the restoration industry available through training and experience garnered on the upper Quinault over the projects longevity. The long-term benefits of restoration contribute to sustainable ecological objectives to restore and recover the economy through 77 jobs created in the commercial and sport fishing industry, as well as the 22 jobs created or sustained in the recreation and tourism industry. The information is based on the present value of the National Economic Development (NED), benefits from all this economic activity is $74.2 million using a three percent discount rate. Measurable results for improving short and long-term economic conditions of the area include short-term economic benefits associated with restoration including 329 jobs in two counties, expenditures and local taxes on materials as a result of restoration and annual income of $57,032 per job per year. The "ripple" effect will increase the annual income by $45,192 per job per year. A significant long-term economic and ecosystem benefit will be associated with restoration of the blueback and other salmon populations. As floodplain and salmon habitat conditions improve salmon populations are expected to respond. Long-term economic benefits associated with restoration include 77 jobs created in commercial fishing; tribal, non-tribal, and sport, an additional 22 jobs created in the recreational and tourism sector in the upper watershed, with total economic activity benefits of $72.7 million through recovery of salmon runs.

11. Budget

Task	Amount Requested From Ecology	Other Funding for Project** (20% of Total Cost Minimum)	Total Cost (lump sum)
Task 1 - Administration	$ 0	$ 1,616	$ 1,616
Task 2 - Feasibility Study	$ 217,360	$ 17,795	-
(QIN cash match)		$ 29,000	$ 264,155
Task 3 - Conceptual Design	$ 143,180	$ 17,795	-
(QIN cash match)		$ 28,000	$ 188,975

Task 4 - Environmental Compliance	$ 199,460	$ 17,794	-
(QIN cash match)		$ 28,000	$ 245,254
Total	**$ 560,000**	**$ 140,000**	**$ 700,000**

The total estimated cost of the project is $700,000 based on cost estimates developed by QIN and a qualified contractor to complete the scope of work. Floodplain by Design grant funds in the amount of $560,000 will be used entirely to pay contract costs.

The QIN has committed an $85,000 cash match for this project (Resolution # 14-111-93, attached). Additional in-kind match in the amount of $55,000 includes:

- QIN project management (Bill Armstrong), 40 hrs @ $40.39/hr (wage + fringe) = $1,616.
- Estimated $53,384 contributed by project partners over two years in staff time, travel and materials. Commitments will be detailed in interlocal agreements if this project is funded. The project manager has discussed the project with a number of partners. They are excited to move forward. We anticipate at least four agreements (Olympic National Park, Grays Harbor County, Jefferson County, WA Dept. of Transportation). We intend to forward their letters of interest by the DOE's Sept. 22 deadline.

12. SCOPE OF WORK: The project will be completed in three phases beginning in 2015:

Phase 1: Feasibility Assessment (July 2015 through March 2016) – The feasibility assessment will: provide the bio-geographical, legal and social information needed to establish clearly defined goals and objectives for the project; evaluate and identify areas prone to flooding, erosion, channel migration, and debris flows; conduct field reviews; and develop alternative solutions for consideration. A right-of-way evaluation for property and easement acquisitions will be completed. Alternatives analysis will include a "no-action" alternative. Public meetings will be conducted with public and private landowners, local businesses, and others with an interest in the project area. Deliverable for this phase will be a final report that assesses the feasibility of various alternatives with consideration of economic, social and environmental needs and trends.

Phase 2: Conceptual Design (April through August 2016) – This phase of the project includes the preliminary designs for the alternatives. Conceptual designs of will be developed in CAD format. Conceptual engineering designs will likely include roads, culverts, bridges, and engineered log jams. A conceptual design package will be developed that will include design plans, cost estimates, and a draft basis of design report. This phase of the project also includes a "design charette" meeting for the planning team. Results of the design charette and the draft conceptual design package will be presented at a public meeting to provide opportunity for input and review by local stakeholders. Deliverables for this phase include a final conceptual design package for the chosen alternative including design plans, cost estimates, and basis of design report.

Phase 3: Environmental Compliance (September 2016 through June 2017) – For the third phase of the project an Environmental Assessment will be completed to satisfy federal National Environmental Project Agency (NEPA) requirements in order to implement the selected alternative. Based on our experience during the NEPA compliance process for the *Salmon Habitat Restoration Plan*, we plan to request the Bureau of Indian Affairs to be the lead federal agency in support of QIN for areas outside of federal lands and request the National Park Service to be the lead for areas within the boundaries of Olympic National Park. We expect the U.S. Forest Service will use its existing NEPA process to satisfy compliance requirements for actions within boundaries of Olympic National Forest.

The Scope of Work for the proposed project is illustrated in the table below in the context of the long-term (20-years) restoration plan for the upper Quinault River.

	Activity	Timeframe	Cost
Previous work	Planning, engineering and planting designs, environmental compliance; permitting and ESA consultation; restoration of salmon habitat; construction of 37 engineered log jams; response monitoring and reporting; public meetings and outreach; landowner easement agreements; reach scale geomorphic and hydraulic analysis; LiDAR data update; road repair mitigation and design.	2008-2014	Approximately $ 5.0 million
Concurrent work	Planning, forest restoration project planning; permitting and ESA consultation; land easement agreements; restoration of salmon habitat, build up to 50 engineered log jams 2015-2017; road repair mitigation project planning and design with construction in 2016; response monitoring and reporting; Finley Creek restoration alternative development; public meetings and outreach; land appraisals; spring plantings and invasive plant treatments.	2015-2017	$ 1.0 million
Phase I Feasibility Assessment	Conduct feasibility study on various alternatives to improve roads, public access, and riverine processes and habitats along the upper Quinault River (UQR) and reduce flooding	July 2015 to March 2016	$ 262,610
	1. Data collection and review; 1.1. GIS Database (Roads, culverts, bridges, parcels, repair locations, habitat types, hydraulics/geomorphology) 1.2. Maintenance history and costs, operation costs (from Jeffco and ONP)		
	2. Goal and objective refinement		
	3. Identify flood/erosion prone areas along; 3.1. South Shore Road (relocation along valley margin, replace riprap with ELJs) 3.2. North Shore Road (removal of training structures, replace riprap with ELJs) 3.3. North Fork Road 3.4. East Fork Road (possible abandonment, removal of training structures, replace riprap with ELJs)		

	4. Field review of identified sites		
	5. Alternative Development 5.1. Pre-concept sketches of 1-3 alternatives per identified site 5.2. Stakeholder meeting/charette to finding and pre-concept sketches 5.3. Incorporate input to refine alternatives 5.4. Cost estimates		
	6. ROW Evaluation (Right of Way evaluation for property and easement acquisitions)		
	7. Cost-Benefit Analysis		
	8. Alternative Evaluation 8.1. Evaluate alternatives relative to "do nothing" and project criteria 8.1.1. Flooding 8.1.2. Erosion 8.1.3. Habitat 8.1.4. Access 8.1.5. Life cycle cost		
	9. Reporting 9.1. Draft/Final report		
	10. Public involvement 10.1. Meeting facilitation 10.2. Public meeting Amanda Park (before report issued, discuss findings, recommendations, potential alternatives)		
Phase II Conceptual Design	Develop conceptual designs and cost estimates for alternatives	April 2016 to August 2016	$ 195,555
	1. Conceptual design of preferred alternative(s) within project areas a. Draft Conceptual design package i. Design plans ii. Cost estimate iii. Basis of design report b. Stakeholder meeting/charette c. Final Conceptual design package i. Design plans ii. Cost estimate iii. Basis of design report		
	2. Public involvement a. Meeting facilitation		

	b. Public meeting Amanda Park (before report issued, discuss findings, recommendations, potential alternatives)		
<u>Phase III</u> Environmental Compliance	Conduct public scoping and environmental compliance	September 2016 to June 2017	$ 251,835
	1. Public Meeting		
	2. Environmental scoping (assume EA process)		
	3. Agency consultation (BIA/ONP/ONF lead agency)		
	4. Environmental assessment (assist QIN/ONP. Assume FONSI decision and no need for EIS) 4.1. Wildlife 4.2. Wetlands 4.3. Cultural 4.4. Floodplain 4.5. River/stream 4.6. Forest 4.7. Geology		
	5. Project management		
Phase IV – *These activities are not part of the current funding request.*	Purchase properties from willing sellers if necessary to facilitate long-term solutions; establish road easements and right-of-ways; purchase properties from willing sellers for restoration and land conservation	April 2016 to March 2017	$ 300,000
	Construct engineered log jams and restoration planting, treatment of invasive plant species Other funding sources are being sought for this activity.	April 2016 to September 2018	Approximately $ 600,000 to $2,000,000 per year for 10 yrs.
	Construction and implementation of selected road and public access elements	April 2017 forward	TBD
Future phases	Continued restoration of river and forest development processes, restore floodplain forests and in-stream habitat including construction of ~250 additional ELJs; maintenance of new road and public access system.	2015-2030	TBD

13. Maps: Please attach at least two (2) maps to your application. The first map should be a vicinity map and the second should be a map of your project.

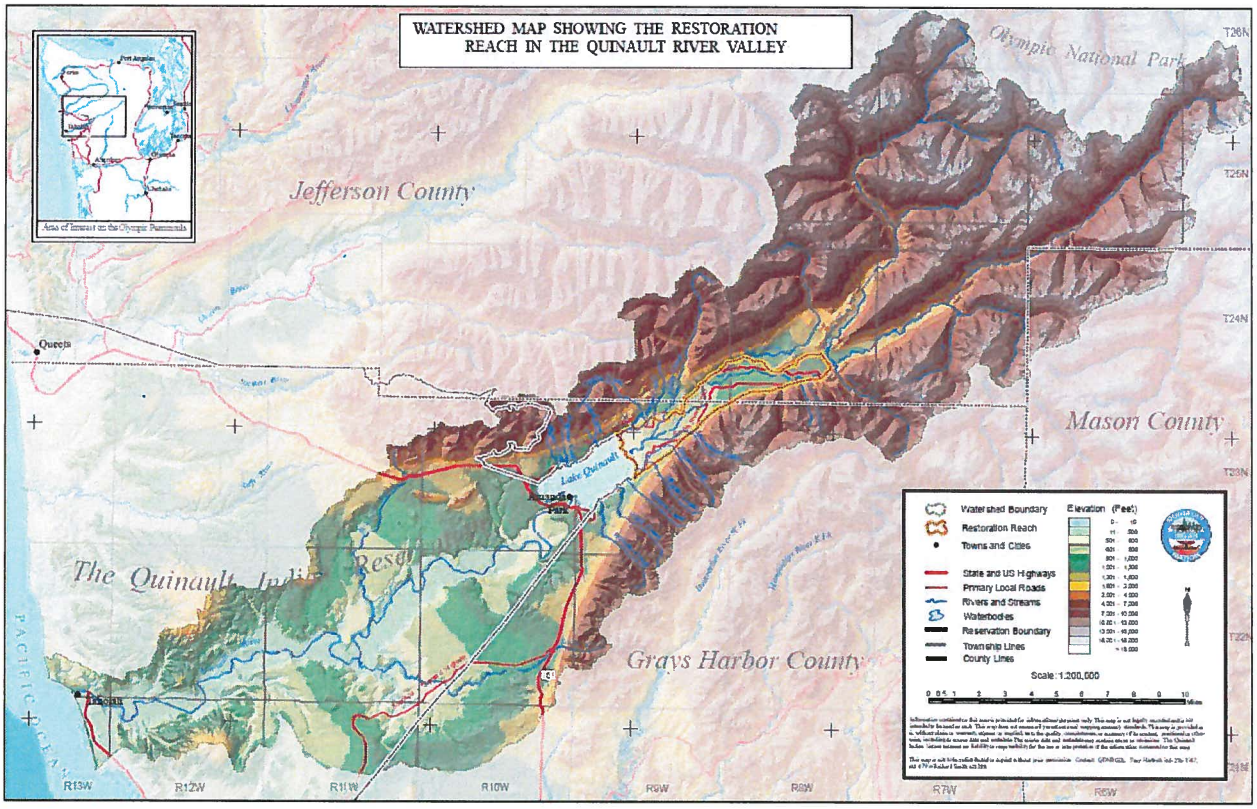

Figure 1. Vicinity map of the Quinault River watershed.

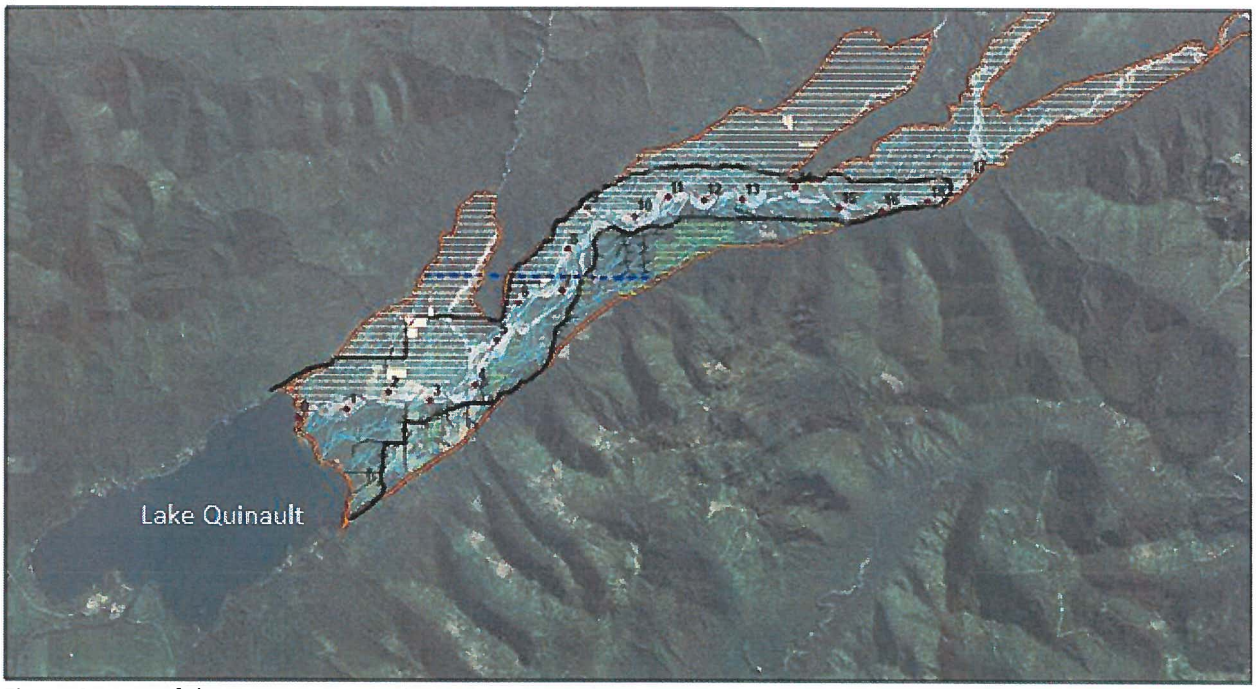

Figure 2. Map of the project area in the upper Quinault River. The project is bound by the geologic floodplain indicated by the orange line.

Figure 3. Aerial photograph of the upper Quinault River project area.

14. Planting Maintenance/Survival: If your project includes plantings, please provide a description of how you will ensure plant survival and maintenance.

The proposed project is a planning project so does not include planting or maintenance activities.

15. Photos: Photos are not required, but if you think they enhance our understanding of your application, please include them. We are particularly interested in *"before"* photos that can be matched with *"after"* photos.

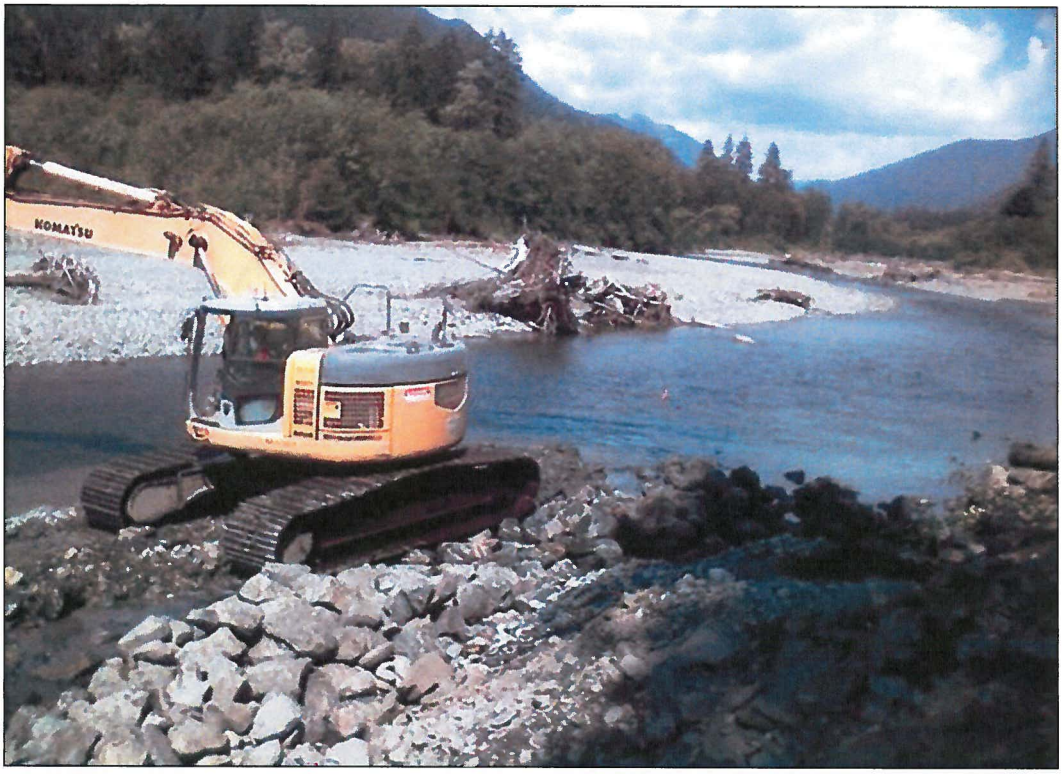

Figure 4. An excavator installing a riprap revetment in the middle of the East Fork Quinault River to repair the Graves Creek Road in Olympic National Park.

Figure 5. A finished riprap revetment along the East Fork Quinault River in Olympic National Park.

Figure 6. A family home on the edge of the river.

Figure 7. A flooded roadway located in a high flow channel.

Figure 8. The historic Enchanted Valley Chalet on the river's edge.

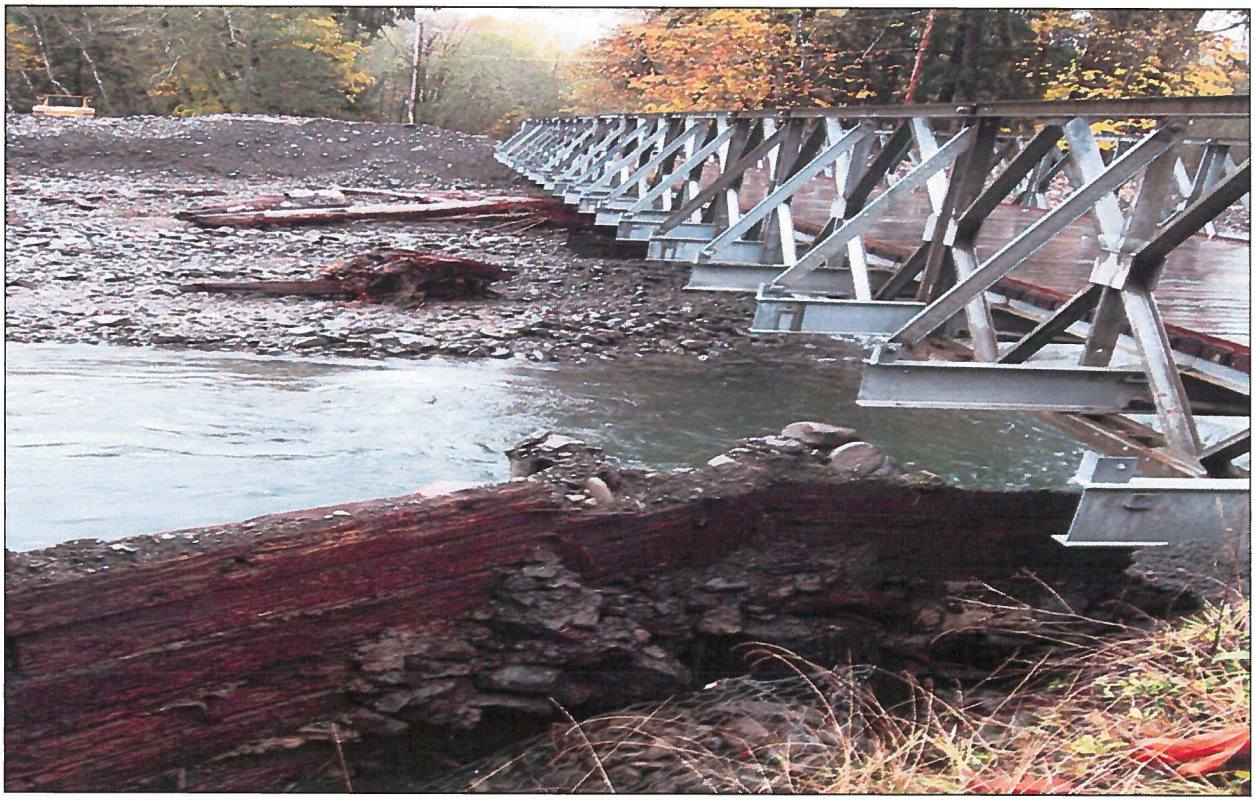

Figure 9. Photograph of a damaged abutment of the Finley Creek Bridge.

Figure 10. The Taiya River in southeast Alaska. TheTaiya represents what the upper Quinault River valley would have looked like prior to forest removal. (Photo Courtesy of Tim Abbe)

Figure 11. The upper Quinault River valley today.

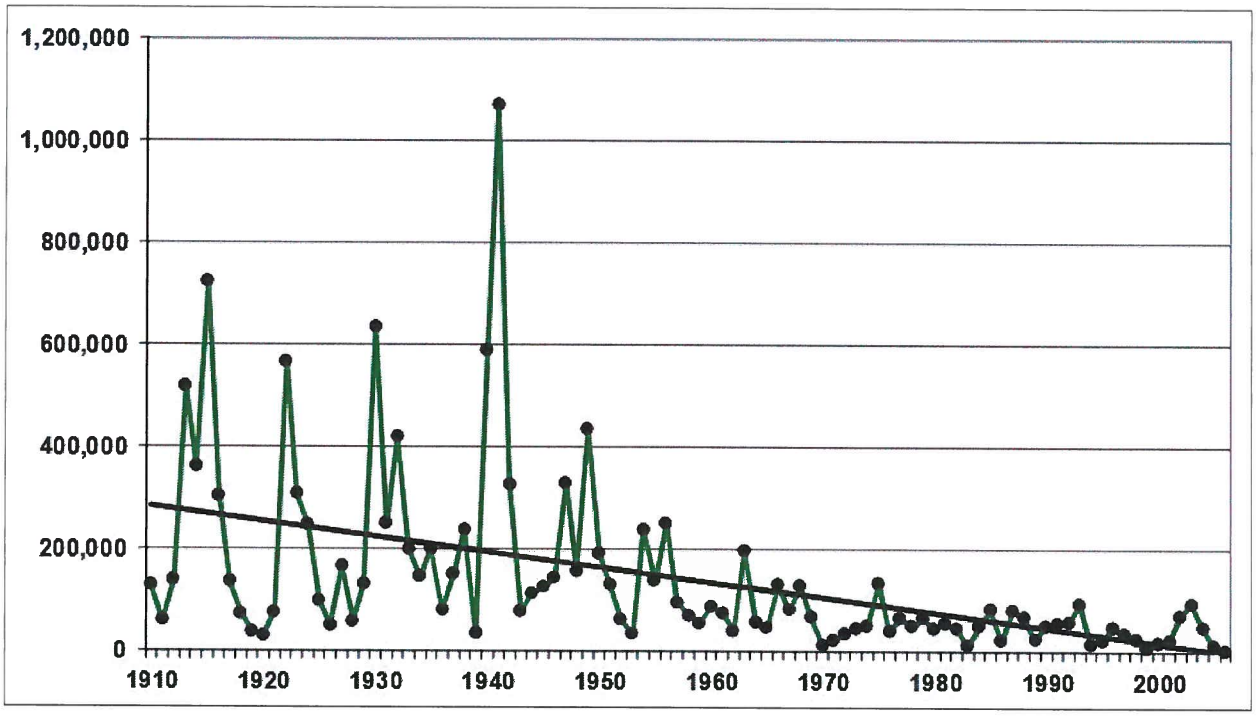

Figure 12. Estimated run sizes of adult blueback salmon to the Quinault River since 1910 (QDFi 2008).


Figure 13. The NPS Bridge near the forks of the upper Quinault River constricts the mainstem river channel to a width of about 300-feet. Discharge through the crossing has increased significantly due to a funneling-effect on the river causing incision and straightening of the mainstem river channel; and transport of sediments through the crossing to areas further downstream. Other impacts include loss of channel meanders and side channels, reduced floodplain and side channel connectivity for a distance about 2-miles downstream (QIN 2008).

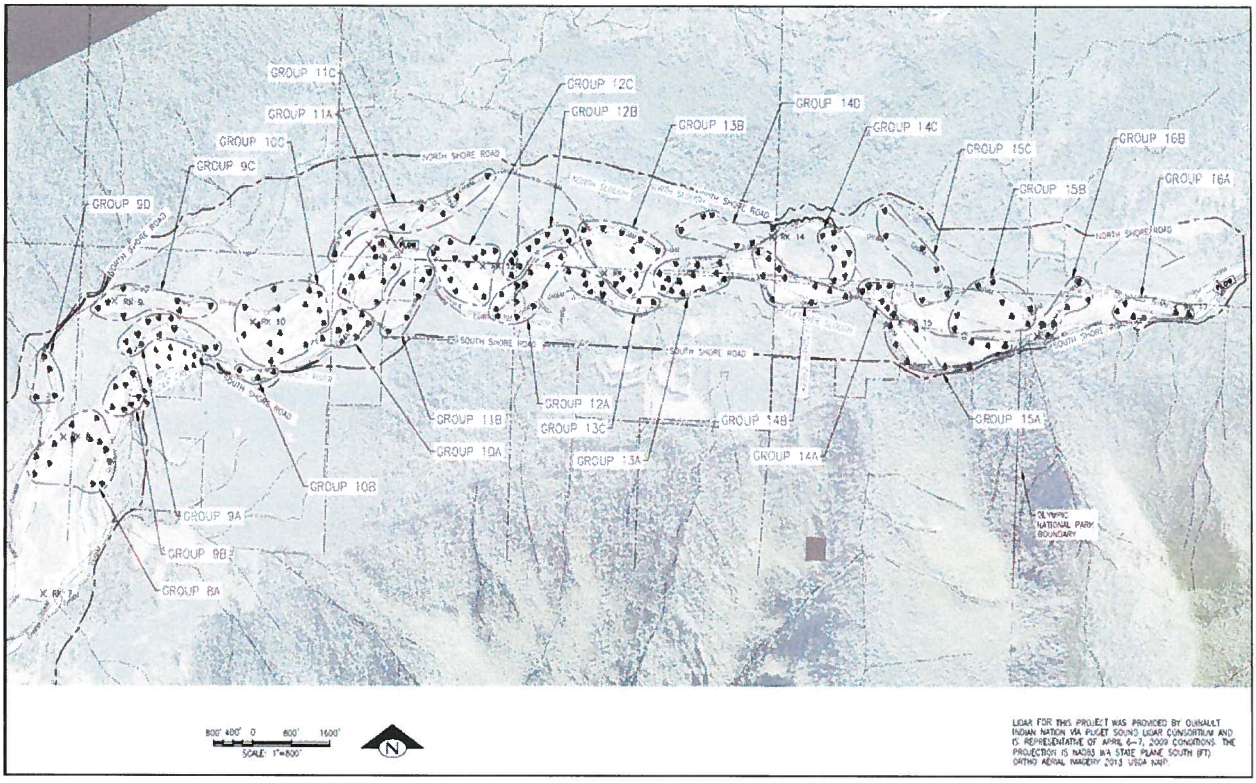

Figure. Restoration site plan for the 7-mile long Jefferson County project reach in the upper Quinault River.

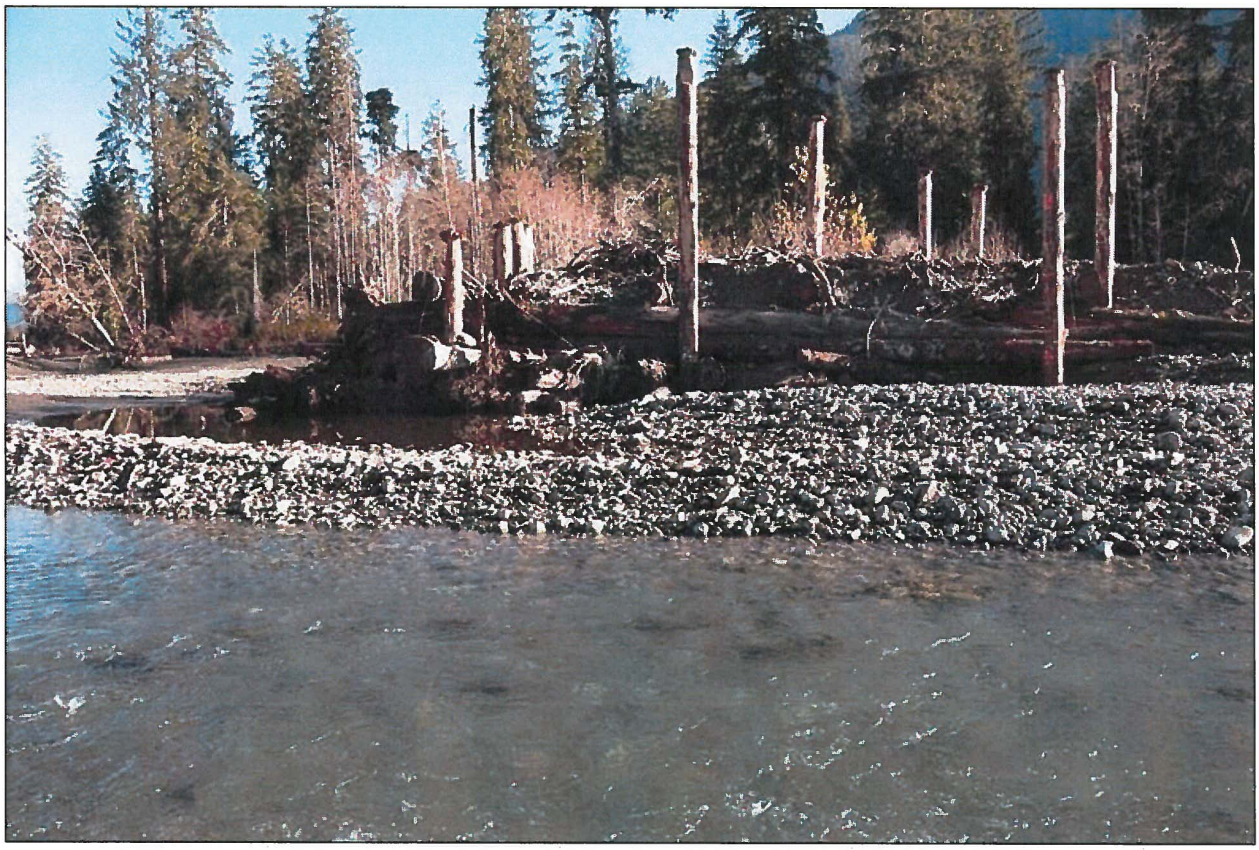

Figure . Photograph of an engineered log jam constructed in 2008 at the Alder Creek Project Area.

16. Executive order 05-05, Archaeological and Cultural Resources

The QIN will submit documents required by Executive Order 05-05 detailing potential impacts to cultural resources.

APPENDIX

Literature Cited

Abbe, T.B. and D.R. Montgomery. 1996. Large Woody Debris Jams, Channel Hydraulics, and Habitat Formation in Large rivers. Regulated Rivers: Research and Management 12:201-221.

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Climate Change

We were contacted by Mr. Mauger from the UW Climate Impacts Group on September 4th, 2014 and asked to provide additional information if we were interested in collaborating on climate change-related impacts for our project. Yes! The Quinault Indian Nation requests collaboration with NOAA, the UW Climate Impacts Group, and other partners to evaluate and quantify potential climate change impacts that could help to inform project designs, implementation, and effectiveness of the proposed project as well as the long-term upper Quinault River restoration program. We are at the beginning stages of a Climate Change Vulnerability Study funded through other sources and have established a Climate Change Committee within the Quinault Division of Natural Resources. We are interested in which trend-monitoring protocols would be best for collecting data to create a calibrated model specific to the upper Quinault to predict physical and environmental changes over seasonal and decadal scales to inform QIN decision makers about natural resources restoration and management. We have identified a suite of parameters and methods that are applicable to monitoring baseline conditions and responses to restoration activities.

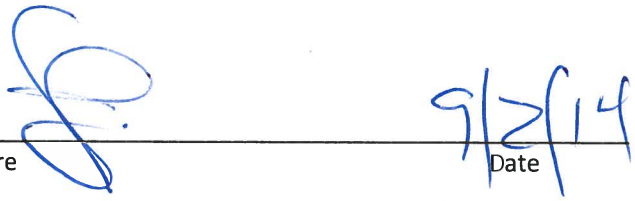
Ways in which the upper Quinault could be impacted by climate change:

- *Flooding.* As temperatures warm we expect the snow levels to shift and heavy precipitation events to increase; there is also some evidence that the flood season could begin earlier in the year with climate change, with big storms occurring as early as October. We have estimates of changing flood flows and sea level rise. The hydrology and flow patterns in the upper Quinault appear to be changing.
- *Inundation.* We aren't sure if flooding inundation depth and area will increase. However, engineered projects will need to be designed to account for more frequent floods that may also affect flooding frequency outside of the current range. Using a calibrated hydraulic model, could we could quantify both the changes associated with climate and changes in river geometry?
- *Sediment loads.* As frequency of flood events increase and the snowline recedes, there is the potential for additional transport of sediment and debris through the river. Effects depend on the details of the watershed and your project site(s), but it could have effects on scour and aggradation (i.e., changes in the river channel). We are interested in the effects of our restoration actions to improve sediment storage within restored floodplains and reestablished conifer stands.
- *Landslides.* Larger precipitation events, rain on snow, and reduced snowpack could lead to a greater risk of landslides in the upper Quinault watershed. We are interested in quantifying sediment loads and transport from the East Fork and North Fork Quinault Rivers to the mainstem river below the forks; document potential impacts to river and stream habitats associated with debris flows from valley wall tributaries
- *Low flows.* We expect summer minimum flows to decline in response to declining snowpack and warmer temperatures. These are also affected by reduction of groundwater storage. We are interested in determining if our project helps to mitigate these impacts by reconnecting more of the floodplain and allowing for a more complex network of channels and better exchange with groundwater as deeper pools are reestablished in the river channel
- *Water temperatures / Water quality.* Declining summer low flows could exacerbate water quality issues, especially given the additional warming from rising temperatures. We are concerned about impacts of rising water temperatures on distribution and survival of spring/summer chinook salmon and other species rearing in the river during low flow, summer months; inform our fisheries management and salmon restoration programs (e.g. captive broodstock to retain genetic traits; supplementation of natural populations to maximize production and survival of an at risk stock.

Most of our restoration activities to date (e.g., installing ELJs to mimic stable large woody debris) have resulted in localized effects that may already mitigating for some of the past actions and habitat degradation; possibly some of the climate-related concerns listed above. As cumulative benefits of our local restoration actions begin working together in the river-reach then landscape-scale, we expect to observe and achieve our greatest effects. Will this be enough to mitigate climate change impacts? We would like to test that hypothesis. There are other ideas and questions the science team here at the QIN nation would like to talk about. – Bill Armstrong

Certification

I certify to the best of my knowledge that the information provided above is true and correct and that I am legally authorized to sign and submit this information on behalf of the organization applying for this grant.



Signature 9/2/14 Date

Fawn R. Sharp, President

Printed name and Title

Quinault Indian Nation

Name of Organization Applying for Grant

Quinault Indian Nation
POST OFFICE BOX 189 ☐ TAHOLAH, WASHINGTON 98587 ☐ TELEPHONE (360) 276 - 8211

QUINAULT BUSINESS COMMITTEE
RESOLUTION No. 14-111-93

WHEREAS, the Quinault Business Committee is the recognized governing body of the Quinault Indian Nation under the authority of the Quinault Indian Nation's Constitution adopted by the Quinault General Council on March 22nd, 1975; and

WHEREAS, the Constitution of the Quinault Indian Nation Article V SECTION 3- Powers (a) to enter into agreements on behalf of the Nation with federal, state, and local government or agencies, and other public and/or private organization or persons; and

WHEREAS, Quinault River sockeye (blueback salmon) is central to the Nation's history, heritage, culture, and economy; and

WHEREAS, the upper Quinault River provides essential salmon habitat and Quinault River sockeye restoration is a QIN priority; and

WHEREAS, the road system along the upper Quinault River contributes to the degradation of fish habitat and threatens public safety with chronic flooding and washouts; and

WHEREAS, the QIN Strategic Plan Land Goal 6b stipulates: "Agree on the long-term future or legacy condition of the land and develop clear goals based on management alternatives that build better ecological resiliency into the landscape"; now

THEREFORE BE IT RESOLVED that the Quinault Division of Natural Resources is hereby authorized to apply for support from the Washington Dept. of Ecology ("Floodplains by Design") for up to $560,000 with $55,000 in-kind matching from QIN staff and collaborating agencies and $85,000 cash match from the QIN in FY16; and

BE IT FURTHER RESOLVED that the Quinault Division of Natural Resources is hereby authorized to accept support from the Washington Department of Ecology if awarded and President Sharp or her designee are authorized to sign any documents necessary for said grant award.

CERTIFICATION

AS SECRETARY OF THE QUINAULT BUSINESS COMMITTEE, I HEREBY CERTIFY THAT THE FOREGOING RESOLUTION WAS DULY ENACTED BY THE QUINAULT BUSINESS COMMITTEE ON THE 28TH DAY OF AUGUST, 2014 BY A VOTE OF 8 FOR, 0 AGAINST, AND 1 ABSTAINING.

Fawn R. Sharp, President
Quinault Indian Nation

Latosha L. Underwood, Secretary
Quinault Business Committee