

Columbia River Water Management Plan - Analysis of Impacts on Confederated Tribes of the Colville Tribes

Introduction

The following report presents an analysis of the impacts to the Confederated Tribes of the Colville Reservation (CCT) resulting from the proposed releases of water from Lake Roosevelt under the Columbia River Water Management Plan (CRWMP). The Washington Department of Ecology (Ecology) and the Bureau of Reclamation (BOR) are studying a drawdown that would divert or release a total of 82,500 acre-feet of storage from Lake Roosevelt during non-drought years and 132,500 acre-feet during drought years for a variety of purposes, as outlined in the DEIS prepared by Ecology for the project. These drawdowns will result in a variety of impacts to CCT members, tribal resources (cultural and natural), and the tribal economy.

The objective of this report is to present potential impacts to CCT and to present the value of these impacts, either monetarily or in projects that would mitigate for or restore impacts. The impacts that are the focus of this report are the following:

- Impacts on fish habitat
- Impacts on irrigation pumping costs
- Impacts on recreational uses that generate revenue for CCT
- Impacts on recreational areas managed by CCT
- Impacts on Gifford-Inchelium ferry operations
- Impacts to cultural resources

These impacts were chosen as a result of interviews conducted with tribal staff and businesses in September 2006. Additional discussions were held with tribal staff in January 2007 to refine a scope of work for a bathymetry survey that forms the basis of our analysis.

The following tables summarize costs to mitigate for each of these impacts. There are two tables. The first summarizes mitigation that requires one “one time” payment for capital projects. The second summarizes mitigation for impacts that would be incurred on a yearly basis. The final table summarizes all mitigation costs over 100 years by category of impact. Present value has been calculated for each of these yearly impacts using a 3.0% interest rate, which is the current real interest rate on 30-year treasury notes.ⁱ Present value was calculated assuming impacts would be felt for the next 100 years.

Table 1. Costs for One Time Mitigation Measures

Category of Impact	Mitigation Measure	Cost
Fish Habitat	Restoration	\$3,370,000
Ferry Operations	Lengthen Inchelium-Gifford Ferry Ramp	\$208,790
Recreational	Replace inadequate boat ramps at campgrounds	\$31,200

Cultural Resources	Off-Channel Storage Assessment	\$1,000,000
Total Cost		\$4,609,990

Table 2. Costs for Annual Mitigation Measures

Category of Impact	Mitigation Measure	Annual Cost	Present Value over 100 years
Ferry operations	Increased ferry terminal maintenance	\$2,832.80	\$90,000
Irrigation pumping costs	Increased electrical power costs for irrigation	\$11,557.52	\$279,928
Recreational	Loss in camping permitting revenues	\$4,250	\$140,000
Recreational	Impact to tribal business revenues	\$223,398	\$7,400,000
Cultural Resources	Archaeological Monitoring during August	\$20,000	\$640,000
Cultural Resources	Inadvertent Discovery of Human Remains	\$14,000	\$450,000
Cultural Resources	Traditional Cultural Property Studies	\$15,000	\$480,000
Cultural Resources	Protection of areas of concern	\$200,000	\$6,400,000
Cultural Resources	Increased patrols from April through August	\$50,000	\$1,600,000
Total		\$541,038.32	\$17,479,928

Table 3. Mitigation Costs by Type of Impact

Impact Category	Mitigation Cost
Fish Habitat	\$4,609,990
Irrigation Pumping Costs	\$279,928
Ferry Operations	\$186,180
Recreational	\$7,571,200
Cultural Resources	\$10,570,000
Total	\$23,217,298

In addition to these impacts, there are several other impacts that may be considered in the future that were beyond the scope of this report or that could not be adequately analyzed given current information. These impacts may include:

- Sloughing/erosion resulting from additional drawdown.

- Exposure of contaminated soil and associated health impacts from direct exposure to tribal members (i.e., skin impact) or exposure to airborne contaminants.
- Impacts on conventional water quality criteria (e.g., temperature and total dissolved gas).
- Impacts associated with the resuspension of hazardous materials.
- Impacts on groundwater flow and community wells.
- Cumulative impacts.

These topics should be revisited as additional information becomes available that could shed light on the nature and extent of these impacts.

Impacts to Fish Habitat

Drawdown may result in exposure of spawning habitat for a variety of fish with habitat in Lake Roosevelt. In order to estimate impacts and required mitigation, we have developed a habitat equivalency analysis (HEA), an economic tool commonly employed to determine required restoration as a result of environmental impacts. HEA uses a common metric to equate impacts and restoration. The most common metric (and the appropriate one in this case) is an acre-year, defined as the value of an acre of habitat over a year. The first step of the HEA process is to determine habitat losses over the “life” of the drawdown in terms of acre-years. The second step is to determine the number of acre-years provided by one acre of a restoration project.

The following assumptions are built in to the first step of the HEA:

- In the worst case scenario, approximately 300 acres of habitat will be affected. This amount is based on an examination of bathymetric data focusing on shallow-grade areas that are exposed. The worst-case scenario is based on a May drawdown, which entails the greatest elevation change. In 96% of years, drawdown will be 2.45 feet. In the remaining 4%, drawdown will be 3.96 feet.
- Drawdown will occur for 100 years.
- An annual discount rate of 3% is used to calculate present value of impacted fish habitat.

Based on these assumptions, we estimate that 9,764 acre-years of habitat will be impacted as a result of drawdown.

We are assuming that restoration projects will begin in 2009 and will reach full maturity within three years. Using the 3% discount rate, each acre restored will contribute 31.4 acre-years of habitat. Thus, the required number of acres for restoration is $9,764/31.4$, or 311 acres.

Costs for restoration may vary widely based on existing conditions, type of restoration, remoteness of site, etc. As an initial estimate, we have used costs of 2006 projects funded by the Washington Salmon Recovery Funding Board. We have limited examination of costs to those for which the number of acres restored was available, and those in the Upper Columbia, Snake River, and Northeast Regions. The following table details costs of these projects.

Project	Total Cost	# of acres	Cost/acre
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Nason Creek Oxbow	\$402,642	34.5	\$11,700
Irwin Riparian Areas	\$68,327	1.63	\$41,900
Methow Valley Riparian Areas	\$425,500	107	\$3,980
Hefflefinger Passage Barrier	\$28,860	23.2	\$1240
Bolles Conservation Easement	\$198,077	78	\$2540
Kooskoskie Conservation Easement	\$13,867	3.8	\$3650
Average Cost per Acre			\$10,835

Using the average cost per acre, the cost of restoring 311 acres is \$3.37 million.

Impacts on Irrigation Pumping Costs

An analysis of the impact of the Columbia River Water Management Plan (CRWMP) proposals for drawdown of Lake Roosevelt on electrical power costs of future irrigation by the Confederated Tribes of the Colville Reservation is provided in Table 1.

With drawdown of 132,500 acre feet during drought years with CRWMP, annual costs for 1,000 acres of irrigation were estimated at \$493 and for 30,000 acres of irrigation at \$14,786 annually. With drawdown of 82,500 acre feet during non-drought years, annual costs for 1,000 acres of irrigation were estimated at \$381 and for 30,000 acres of irrigation at \$11,423.

Present value of annual pumping cost increases for 30,000 acres using a discount rate of 4% and 100 year project life, was projected at \$279,928 with non-drought conditions. Present value of added costs for 30,000 acres of future Colville irrigation pumping with 132,500 acre feet of drawdown over a 100 year period at 4% was projected at \$362,327, but the higher level of drawdown is expected in only 1 of 26 years, not continuously over a 100 year time frame. Therefore, the present value of additional pumping costs of \$279,928 based on non-drought years was considered a proper measure of cost impact.

It was assumed that future Colville irrigation would require 8 gallons per minute per acre with an annual water duty of 4 acre-feet per acre. Pumping at the selected rate would require 2,715 hours of operation. Monthly demand charges of \$12 were used from the current irrigation rate of Ferry County PUD, Schedule 30. Energy costs of Ferry County PUD are currently \$0.04564 per kilowatt hour.¹ Average drawdowns presented in Table 1 were used in the computations. The lower half of Table 1 provides the monthly and seasonal computations of horsepower and kilowatt hours per acre used in developing total power cost per acre for alternative drawdowns of 82,500 and 132,500 acre feet during the April through September time frame. The costs per acre of \$0.381 and 0.0493, respectively, can be used for any determination of future irrigable acreage departing from the three levels of irrigation at the top of Table 1.

TABLE 1

IMPACT ON COLVILLE IRRIGATION POWER COSTS
OF LAKE ROOSEVELT DRAWDOWN FOR CRWMP

Acres	Annual Costs		Present Value, 100 yrs, 4%	
	Drought	Normal	Drought	Normal
1,000	\$493	\$381	\$12,078	\$9,331
10,000	4,929	3,808	120,776	93,309
30,000	14,786	11,423	362,327	279,928

Period	Water Level Change with CWRMP, feet					
	82,500 afa Drawdown			132,500 afa Drawdown		
	Max	Average	Minimum	Max	Average	Minimum
April 1	-1.57	-1.26	-1.10	-2.52	-2.03	-1.77
April 15	-1.72	-1.20	0.00	-2.76	-1.93	0.00
May	-2.45	-1.12	0.00	-3.93	-1.80	0.00
June	-0.87	-0.87	-0.87	-1.39	-1.39	-1.39
July	-1.17	-1.06	-0.99	-1.88	-1.71	-1.69
August 1	-1.39	-1.11	-1.05	-2.23	-1.79	-1.77
August 15	-1.12	-1.11	-1.11	-1.81	-1.78	-1.77
September	1.09	1.05	1.04	1.75	1.69	1.67

Note: Drawdown from CRWMP relative to 2000 BIOP (-) is reflected April through August. September reflects filling reservoir (+) exclusively with CRWMP relative to 2000 BIOP.

Irrigation Power Rates

Ferry County PUD, Schedule 300
 All energy - \$0.04564 per KWH \$ 0.04564
 \$12.00 per connected horsepower per month \$ 12.00
<http://www.fcpud.com/irrigation%20service.htm>

Factors

Horsepower conversion 1.341 hp/kw
 Application Rate 8 gpm/acre
 Motor/Pump Efficiency 0.78

Period	per acre with 82,500 afa Drawdown					Water Duty (af/ac)
	hp	kw	hours	kwh	Cost	
April 1	0.0033	0.0024	226	0.552	0.064	0.33
April 15	0.0031	0.0023	226	0.526	0.061	0.33
May	0.0029	0.0022	453	0.978	0.079	0.67
June	0.0022	0.0017	453	0.757	0.061	0.67
July	0.0027	0.0021	453	0.928	0.075	0.67
August 1	0.0029	0.0022	226	0.487	0.057	0.33
August 15	0.0029	0.0021	226	0.484	0.057	0.33
September	-0.0027	-0.0020	453	-0.921	(0.075)	0.67
Seasonal			2,715	3.792	0.381	4.00

Period	per acre with 132,500 afa Drawdown					Water Duty (af/ac)
	hp	kw	hours	kwh	Cost	
April 1	0.0053	0.0039	226	0.887	0.040	0.33
April 15	0.0050	0.0037	226	0.845	0.099	0.33
May	0.0047	0.0035	453	1.570	0.128	0.67
June	0.0036	0.0027	453	1.216	0.099	0.67
July	0.0044	0.0033	453	1.490	0.121	0.67
August 1	0.0046	0.0035	226	0.782	0.036	0.33
August 15	0.0046	0.0034	226	0.778	0.091	0.33
September	-0.0044	-0.0033	453	-1.479	(0.120)	0.67
Seasonal			2,715	6.090	0.493	4.00

Impacts to the Ferry System

Drawdown from CRWMP has two impacts to the Inchelium-Gifford ferry system operated by CCT: (1) The drawdown may cause water levels to fall below the end of the ferry ramp, and (2) drawdown will increase the need for removal of debris (logs and other matter) from the ferry ramp to ensure continuity in operations. The following presents an estimate of the cost of such impacts to CCT. These costs include cost of lengthening the ferry ramp at both termini and costs for additional days of maintenance.

Ferry Ramp Impacts

For the Gifford-Inchelium ferry to continue operating, the ramps must be lengthened to accommodate for the lowest possible water levels in drought years. During the period from April to August, the lowest water levels occur between April 15 and April 30. Under 2000 Biop model runs, the lake levels are as low as 1220 feet in 10% of years and reached as low as 1209 feet. Drawdown is estimated to lower levels an addition 2.76 feet to 1206.24 feet. According to conversations with ferry operators, the ramps currently run to 1229 ft. Thus, the ramps would need to be extended to reach an additional 23 feet of depth. As a precaution and to plan for an extended drought period, we have calculated the costs to run the ramp from its current end at 1229 feet to a depth of 1203 feet. Although the bathymetry data developed for this project do not reach as deep as 1223', we have extrapolated the necessary length based on the deepest 20 feet of data (from 1225 to 1245) at the Inchelium ferry terminal (Figure 1). Based on this information, we estimate will require an additional 260' of ramp length on both ferry termini, having an average slope of 10%.



Figure 1. Estimated Length for Extending Inchelium Ferry Ramp

The estimated cost of lengthening both sides of the ferry dock is \$208,790. Details of these costs are below.

Item	Units	Cost per Unit	Amount	Total Cost
Concrete Paving- 6" Thick ⁱⁱ	SY	\$26.50	1,700.00	\$45,050.00
Reinforcing Steel ⁱⁱⁱ	SY	\$7.85	1,700.00	\$13,345.00
Rip Rap / Erosion Control	CY	\$30.00	200	\$6,000.00
Engineering & Construction oversite	LS	\$20,000	\$20,000	\$40,000
Total per ramp				\$104,395
Total for two ramps				\$208,790

Need for Increased Maintenance of Ferry Ramps

In order to clean the ferry ramp as a result, the ferry operator estimated that 4 personnel would be needed for 3 days to remove and dispose of debris. We are estimating an hourly wage of \$15/hour for each personnel. Other costs and total annual maintenance costs are outlined below.

Item	Note	Cost
Personnel	Crew (96 hours)	\$1440
Fringe Benefits and Indirect	Based on 62.0% of personnel costs	\$892.80
Other	Truck rental (3 days)	\$300
Other	Mileage	\$200
Total		\$2,832.80

If the State of Washington wishes to reimburse CCT on an annual basis, this amount should be indexed to inflation. If additional maintenance costs are to be reimbursed as a lump sum, the annual amount should be treated as an annuity *ad infinitum*. Using federal Office of Management and Budget guidelines for cost benefit analysis, the annual amount should be divided by the real interest rate on 30-year treasury notes, or 3.0 percent. This calculates to a lump sum payment of \$94,426.

Impacts on Campgrounds/Recreational Values

Impacts on permit fee collection and maintenance of CCT-run campgrounds

CCT generates revenue from the collection of fees from non-tribal members recreating on Lake Roosevelt within CCT reservation boundaries. The CCT Parks and Recreation department operates several campgrounds on Lake Roosevelt at the following locations:

- Rogers Bar
- AA Camp (Inchelium)

- Wilmont Creek
- Barnaby Creek
- Keller Park (San Poil River)

In addition, CCT collects fees from “random campers” with RVs or boats moored or anchored to the Reservation zone. These fees range from \$10-\$200 for random campers depending on length of stay and from \$15 to \$350 for those camping at designated campgrounds.

CCT campgrounds are very popular during the proposed drawdown period. Camping permit data indicate that more than 90% of permits are collected from April to August. (Figure 2).

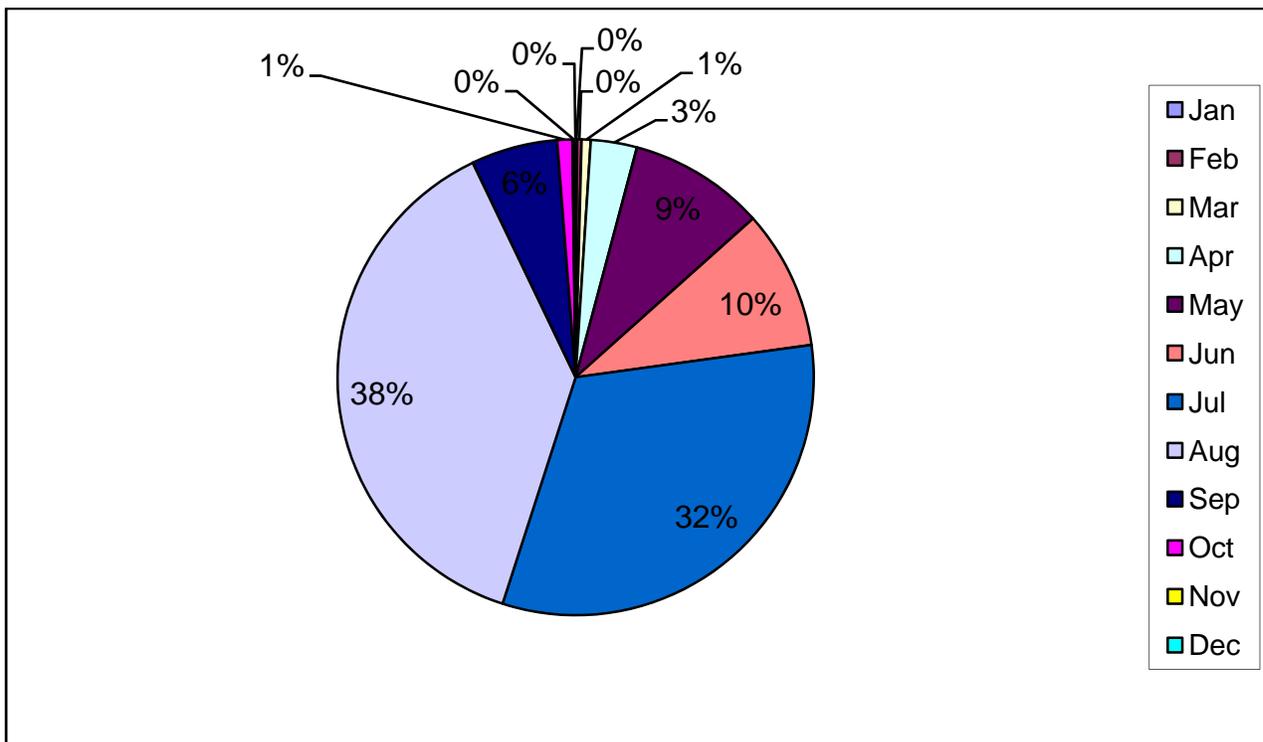


Figure 2. CCT Camping Permits by Month, 1993-2006

Drawdown has the potential to result in decreased fees and increased costs for CCT Parks and Recreation Department for a number of reasons, as follows:

Need for extending/replacing boat docks. Drawdown may impact several boat docks that are maintained by CCT at campgrounds. During drawdown periods, such docks may not reach the water. As a result, appropriate mitigation is for upgrading docks so that they are longer or replacing the docks with new structures that will reach lower water levels during drawdown.

We estimate that the cost for replacing one boat dock is \$5,200^{iv}. We are assuming that six docks need replacing – one at each campground managed by CCT Parks and Recreation Department. The total cost of replacing these docks would be \$31,200

Difficulty enforcing permit fees for random campers and decrease in number of visitors.

Currently, the only means that CCT Parks and Recreation has to enforce permitting from random campers is patrolling Lake Roosevelt in boats. Drawdown will make patrolling more difficult if water levels are lower and Parks and Recreation staff are not able to reach random campers.

In addition to enforcement problems, drawdown may significantly affect the attractiveness of certain campgrounds and cause vacationers to recreate in more remote locations on Lake Roosevelt (i.e., become random campers) or recreate elsewhere altogether. For example, drawdown may result in temporary drying up of the swimming hole at the AA Campground, the most popular Lake Roosevelt campground run by CCT Parks and Recreation Department (Figure 3). The resulting decrease in camp users would result in a loss of permitting revenues.

In 2003, the last year for which complete permitting data is available, a total of 413 camping permits were written by CCT. More of these were written in August (170) than in any month. An absolute worst-case scenario would imply that drawdown would prevent CCT from collecting *any* permits in August. We have estimated that an average cost per permit is approximately \$25. Thus, a worst case annual loss in revenue would be \$4,250.



Figure 3. Swimming Hole at AA Campground during Low Water

Impacts on Tribal Business Revenue

In addition to permit revenues collected by CCT, Tribal-run businesses, such as the Inchelium Community Store and Roosevelt Recreational Enterprises obtain revenue from visitors to Lake Roosevelt. Thus, any affect on visitation to the Lake would result in a compounding affect on the CCT economy.

We have looked at previous “travel-cost” models of camping values to estimate the potential resulting revenue decrease. Travel-cost models use the amount that people spend in a given activity (costs for travel, gear, groceries, etc.) as an estimate for the value of the activity. The

implicit assumption here is that a portion of people’s travel expenditures for trips to Lake Roosevelt include spending at tribally-run businesses.

The Natural Resources Conservation Service has compiled the results of hundreds of economic studies nationwide looking at a variety of recreational values. In a survey, the National Park Service estimated that the vast majority of overnight campers at Lake Roosevelt Natural Recreational Area state that their primary purpose for visiting is camping. As such, we have limited our search of travel-cost surveys to those that focus on camping. Studies were further narrowed as follows:

- Only studies employing travel-cost models were considered.
- Studies had to be focused in Washington, Oregon, and Idaho.

These criteria narrowed the list down to six studies, which are summarized below.

Study	Camping value per person per day, 2004 dollars	Camping value, 2007 dollars
Bergstrom, et al. ^v	\$75.28	\$82.06
Englin and Mendelsohn ^{vi}	\$110.16	\$119.96
McKean and Taylor ^{vii}	\$100.73	\$109.79
Findeis and Michaelson ^{viii}	\$52.40	\$57.11
Michaelson ^{ix}	\$76.87	\$83.79
Michaelson and Gilmour ^x	\$15.36	\$16.74
Average	\$71.80	\$78.27

The relevant population for impacts to tribal-run businesses is *all* recreational users of Lake Roosevelt, not just those who recreate on the Lake within CCT lands, as many of these users may spend their money at CCT businesses including the Trading Post in Nespelem, the IncheIium Community Store, the Keller Community Store, and Roosevelt Recreational Enterprises. A worst-case scenario for impacts is in the month with the highest visitation rate. According to visitation data from the Lake Roosevelt National Recreational Area, visits to the park in August averaged 285,306 between 1979 and 2006.

Our worst-case scenario assumes that 10% of an average recreational user’s travel cost (\$7.83) is spent at CCT businesses and that drawdown would result in 10% of annual users (28,531) would spend their money elsewhere as a result of drawdown impacts. The resulting impact would be \$223,398.

Cultural Resource Impacts and Mitigation Measures

Archaeological Monitoring during August (the last month of the drawdown)

- **Why:** Drawdown creates increased erosion to and exposure of banks and sediments during the peak recreation period. This increases the number and visibility of archaeological materials and human remains. Wakes and shoreline recreation related to

boat and jet-ski activities will result in increased erosion because impacts will not be along vegetated shores and high water erosion protection. More erosion, more exposure, more people means archaeological and burial site materials will be exposed. Even when looting sites, criminals and the public do not pick up all artifacts or remains. These artifacts and remains are evidence of new sites or of changes in known site boundaries. Archaeologists have to monitor the shoreline and visit sites.

- **Recommendation:** During the last month of the drawdown, a team of three archaeologists and technicians will travel by boat to monitor areas with a high density of known sites and areas identified during the ARPA patrols to update old site forms and create new site forms if necessary.
- **How:** Daily journals of activities are maintained – personnel present, work hours, sites visited, location, reservoir level, weather conditions, and visibility characteristics. Standardized site update forms will be completed This is not site re-mapping, just spot monitoring along the upper limit of the reservoir to characterize the nature and extent of erosion and to quantify and describe cultural materials exposed on the banks and shores of the lake. Recommendations for mitigation of impacts are prepared.
- **Where:** a.) From Keller Ferry to Lundstrom and Moonshine Bays including the mouth of the Sanpoil River – RM615 to RM625. b.) From Rattlesnake Mountain area to the end of the reservoir, past Scriver Creek - RM670 to RM741. This includes the lower stretch of the Kettle River from Napoleon Bridge to the Columbia River and excludes the Spokane Tribe of Indians zone between Hunters Creek and Hawk Creek and the Spokane River.
- **Costs:** The cost for one session (8 10hr. days = 80 hrs x 3 people = 240 hrs) of survey with three people and subsequent write-up and form preparation including per diem, boat expenses, supplies, materials and administrative and clerical support. Total cost is estimated to be **\$20,000.00 per year**
- Inadvertent Discovery of Human Remains
 - **Why:** Thousands of Native Americans lived along the shores of the Columbia River for ten thousand years. Cemeteries are concentrated near villages, but burials may be encountered almost anywhere. The backwaters of Grand Coulee Dam inundate all the burial and cemetery locations along the river's original channel. As the old shorelines are eroded and exposed, the remains of tribal ancestors are exposed. Exposure of ancient remains is due to reservoir effects and, thus, the cost for recovery, treatment, reburial, and the associated reburial dinner are the responsibility those undertaking actions on the lake.
 - **Recommendation:** Repatriate all Native American Human Remains to the Colville Confederated Tribes and the Spokane Tribe, within their respective zones.
 - **How:** Policies and procedures for inadvertent discoveries of ancestral remains in the Lake Roosevelt area are being finalized between the CCT, STI and federal agencies. Those policies will be applied to the discovery of human remains found because of Columbia River Initiative activities on Lake Roosevelt. Policies and procedures will be consistent with the Native American Graves Protection and

Repatriation Act and its implementing regulations - 43 CFR Part 10. Inadvertently discovered ancestral Native American human remains will be repatriated.

- **Where:** All remains found on the east bank (left bank) of Lake Roosevelt (Columbia River) between Hawks Creek and Hunters Creek and all of the Spokane Arm of the reservoir will be repatriated to the Spokane Tribe, all other remains will be repatriated to the Colville Confederated Tribes. This will be done pursuant to and in recognition of 43 CFR Part 10.4. This understanding is based on the archaeology, ethnology, history, and oral traditions of Native Americans in and around the Lake Roosevelt area and in recognition of long standing agreements between the Confederated Tribes of the Colville Reservation and the Spokane Tribe of Indians. Under 43 CFR Part 10.6(a)(1), the only exception to this rule will be in the case of known lineal descendents. Otherwise, following 43 CFR Part 10.6(a)(2), only the Colville Confederated Tribes and the Spokane Tribe have tribal lands in the reservoir are likely to have the closest cultural affiliation, have aboriginal lands recognized by a final judgment of the Indian Claims Commission, and are the only tribes recognized as aboriginally occupying the land.
- **Costs:** It is anticipated that an average of two inadvertent discoveries will come to light per year. When human remains are inadvertently discovered through erosion or identified in drawdown zones, that individual's remains must be recovered, respectfully treated, and reburied with appropriate ceremonies. An estimate for recovery, staff time, burial supplies and materials, and all ancillary costs should not exceed more than \$7,000.00 per occurrence for an annual total of **\$14,000.00 per year.**
- Traditional Cultural Property Studies
 - **Why:** Erosion studies show us that ultimately the reservoir will virtually erode from bedrock to bedrock along the main stem of the Columbia River. Drawdown during peak recreation times will greatly accelerate this process. As the land goes, so goes the aboriginal home sites of our people. We mitigate for this consequence through the perpetuation of language, traditions, legends, place names and tribal histories.
 - **Recommendation:** Conduct traditional cultural property studies to gather, preserve and perpetuate the traditions of our people.
 - **How:** Much of the preservation and perpetuation of traditional information is conducted through the History/Archaeology Department's studies of traditional places. While there is a sophisticated, multi-step methodology employed for doing this, for the purposes of the Columbia River Initiative in Lake Roosevelt all that is required is the gathering and transcription of additional oral history interviews. Interviews are conducted by staff or contracted elders with knowledgeable informants.
 - **Where:** Anywhere within the reservoir and surrounding lands.
 - **Costs:** Inclusive of all costs, this is estimated at **\$15,000.00 per year.**

TOTAL ESTIMATED ANNUAL COSTS FOR HISTORY/ARCHAEOLOGY = \$60,040.00

Off-Channel Storage Assessment

We reviewed the several proposed off-channel sites. Of the 11 feasible candidate locations identified in the December 2005 WS Ecology and Reclamation Mainstem Off-Channel Storage Assessment report, all but Alder Creek, Rock Creek and Kalama River are in the traditional territory of the CCT.

- We predict the traditional community will be strongly opposed to any such developments.
- A standard measure for cultural resource costs for federal undertakings are up to 1% of total appropriations (Archeological and Historic Preservation Act of 1974 (7a). There would be subsequent costs for annual work. Based on the 1% figure and using the numbers on page 142, Table 6-1 in the assessment report, costs for cultural resource work could range as high as 1 million dollars.

Areas of Additional Concern

- Coordination with federal agencies. It is imperative to coordinate with federal agencies with the same or similar responsibilities in the Lake Roosevelt reservoir for efficiency and to avoid duplication of effort. However, it is important to avoid over complication and slow down of the process often created at the technical level at a cost to overall management and policy goals.
 - Site stabilization. Archaeological, ethnographic and traditional places eroding into the reservoir must often be stabilized. Previous shoreline stabilization efforts proved complicated, time consuming and costly. It will be important to identify sites requiring protection, assign responsibility for protection, prioritize protection areas and develop a long-range plan considering fiscal and engineering factors. **We estimate site protection costs at \$1,000,000.00 at one or two sites per 5-year period.**
 - It is important to remain flexible in any agreements. As the impacts of the undertaking are better understood, as new concerns arise and other concerns are resolved, and as costs change, there must be a mechanism with the structure of any agreements to revisit and modify understandings between parties.
 - Historic preservation officer concurrence with process. As with any undertaking involving federal and tribal lands, it is imperative to follow the National Historic Preservation Act, Section 106 implementing process. This will mean the early and continued involvement of, consultation with and concurrence by the State Historic Preservation Officer and the Tribal Historic preservation Officers.
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- Increased Patrols from April through August (the additional drawdown period)
 - **Why:** Drawdown creates increased erosion during the peak recreation period. This increases the number exposed and visibility of archaeological sites and human remains. More erosion, more exposure, more people means at least a threefold increase for the potential of burial and archaeological site looting and both intentional and naive destruction and desecration.

- **Recommendation:** A 20% increase in ARPA patrols with a minimum of at least one additional day a week being devoted to this task.
- **How:** Look for suspicious activities along beaches banks in areas with a high density of sites and keeping a detailed log of patrols. Logs are journals or entries on forms of activities – personnel present, work hours, sites or locations visited, distance traveled, reservoir level, weather conditions, and visibility characteristics. This includes a general characterization of observations when checking high recreation areas with limited public access [areas are often referred to as ‘party beaches’], check boats or camps along the shore where typical recreation activities are not observed, look for people with digging tools, screening and sifting devices, and any evidence of digging into beaches or banks.
- **Where:** a.) From Keller Ferry to Lundstrom and Moonshine Bays including the mouth of the Sanpoil River – RM615 to RM625. b.) From Rattlesnake Mountain area to the end of the reservoir, past Scriver Creek - RM670 to RM741, includes the lower stretch of the Kettle River from Napoleon Bridge to the Columbia and excludes the Spokane Tribe of Indians’ zone between Hunters Creek and Hawk Creek and up the Spokane River.
- **Costs:** History/Archaeology estimates annual patrolling costs of about \$50,000 per year.

ⁱ Office of Management and Budget, 2007. “Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, Appendix A: Discount Rates for Cost-effectiveness, Lease Purchase, and Related Analyses.”

ⁱⁱ Fixed form, finishing and curing, fixed for, 12 foot pass, unreinforced (32 13 13.23 Means Heavy Construction Cost Data, 2007)

ⁱⁱⁱ Reinforcing Steel, 12 lbs/SY (32 13 13.23 Means Heavy Construction Cost Data, 2007)

^{iv} 06 13 33.50 Means Heavy Construction Cost Data, 2007

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