hnt'k'wi̱pn
Management Plan

Coeur d'Alene Tribe
Wildlife Program
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ACKNOWLEDGEMENTS

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INTRODUCTION

In December of 2004, the Coeur d'Alene Tribe purchased a 913.13 acre[1] property known as the Hanson Property in fee title. In February of 2005, the Tribe purchased the 159.5 acre Allotment 331, known as the Felsman Property, which lies between Hanson Property parcels and across Hangman Creek. Allotments 1021, 333A and 333B, collectively known as the Kitt Property, were acquired in September of 2005. The Kitt Property also lies between Hanson Property parcels and along Hangman Creek, but is upstream of Allotment 331. The Allotments that make up the Kitt Property total 315.1 acres. The Allotments remain in Trust but are now held by the Department of Interior for the Coeur d'Alene Tribe rather than for individual Tribal members. One hundred and seventy four and nine tenths acres were not retained in the mitigation program. Excluding road right of ways, the remaining acreages total 1,195.2 acres. All of these properties were purchased by the Tribe with funds provided by the Bonneville Power Administration (BPA) for mitigation against Albeni Falls Dam construction and inundation losses. These mitigation properties are adjacent to one another (Figure 1) and were targeted because their potential wetland and riparian habitats provide appropriate mitigation for Albeni Falls Dam Target Species and because the streams the properties encompass can potentially support instream habitats for native redband trout (*Oncorhynchus mykiss gairdneri*). Since the properties are connected, they are treated as contiguous habitat in all the assessments, planning and management efforts orchestrated by the Coeur d'Alene Tribe. Coeur d'Alene Tribal elders named the collective mitigation properties *hnt'k'wipn,* which means "place for beginning" in Coeur d'Alene. The properties shall be referred to as the *hnt'k'wipn* Management Area for the purposes of this Plan.

BACKGROUND

The construction of Albeni Falls Dam was completed in 1955. Prior to construction, the dam was expected to alter approximately 6,300 acres. However, the loss assessment addressed the losses in terms of Habitat Units (HUs) (Martin et al. 1988). HUs are derived by multiplying the Habitat Suitability Index (HSI) by the number of acres in question. The HSI, in turn, is an index to the habitat carrying capacity for a specific species or guild of species based on a set of habitat performance measures and can be used to assess changes, both positive and negative, in habitat quantity and quality (USFWS 1980, 1980a). The HSI is derived through a HEP that is completed according to species or guild specific models. Variables defined in the models are measured on the landscape; and those measured values are rated according to the model to produce an index to the habitat's suitability. The HSI index ranges from 0.0 to 1.0. An HSI of 0.3 indicates that habitat quality/carrying capacity is marginal while an HSI of 0.7 suggests that habitat quality/carrying capacity is relatively good. Thus an acre of optimum habitat (HSI = 1.0) results in 1 HU. The construction and inundation of Albeni Falls Dam resulted in a loss of 28,587 HUs. This HU ledger was the sum of the losses for each of

[1] All acreages reported were derived through the Coeur d'Alene Tribe's GIS acreage calculation tool

the chosen target species, which were mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), redhead duck (*Aythya americana*), bald eagle (*Haliaeetus leucocephalus*), black-capped chickadee (*Parus atricapillus*), white-tailed deer (*Odocoileus virginianus*), yellow warbler (*Dendroica petechia*) and muskrat (*Ondatra zibethica*).

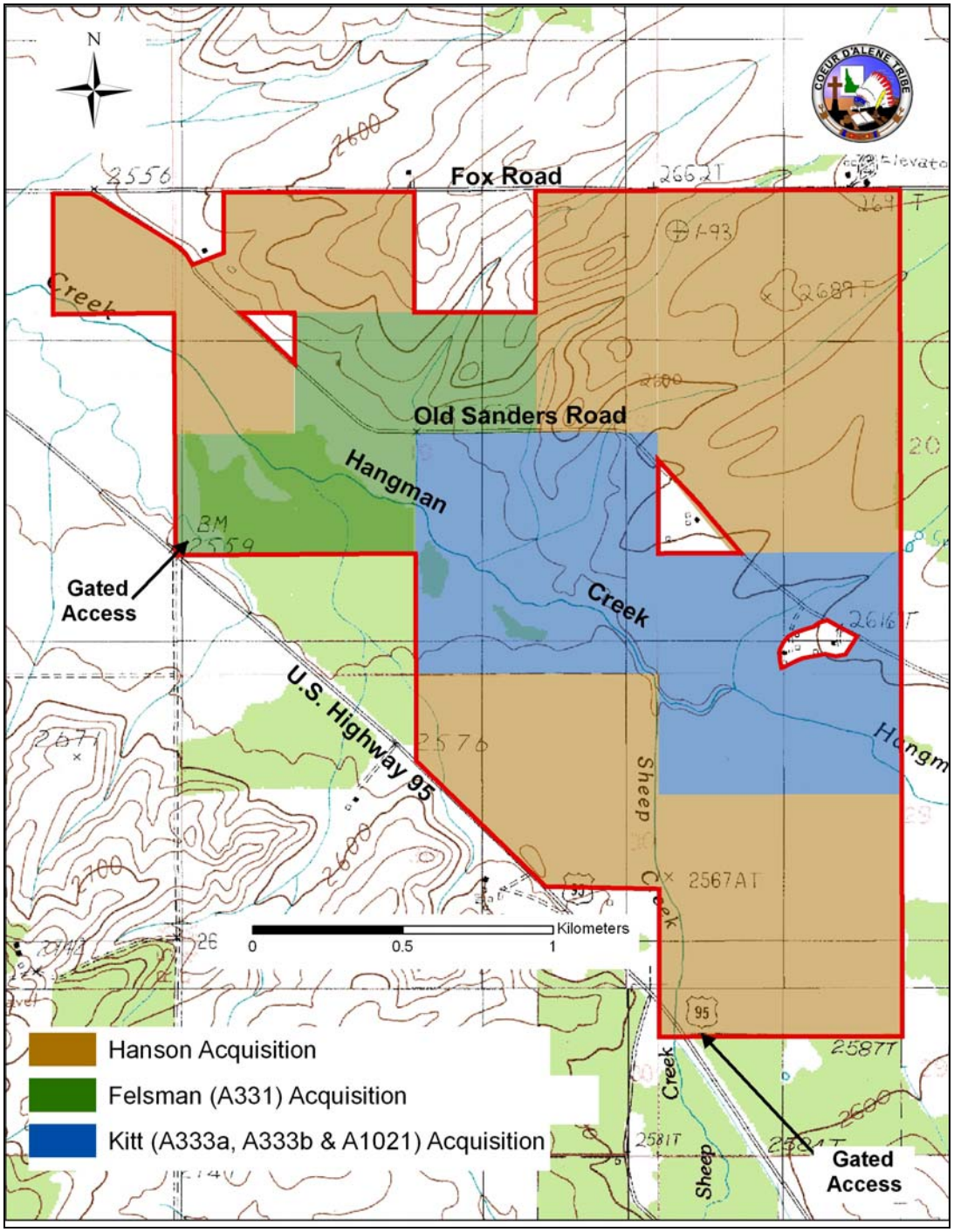

Figure 1. ***The relative position of the Trust and Fee lands acquired by the Bonneville Power Administration in the Upper Hangman Watershed in FY2005***

The PACIFIC NORTHWEST ELECTRIC POWER PLANNING AND CONSERVATION ACT (1980) made mitigating against losses associated with the Federal Columbia River Power System (FCRPS), of which Albeni Falls is a part, the responsibility of BPA. The Act also established the Northwest Power and Conservation Council (NPCC), which is responsible for, among other things, establishing the Fish and Wildlife Program to direct the mitigation process for both fish and wildlife losses associated with the FCRPS. The 2000 Fish and Wildlife Program established by the NPCC identified the completion of crediting against the established HU ledger (summarized in Table 11-4, beginning on page C-4) as the primary strategy to be completed for wildlife mitigation.

The Albeni Falls Interagency Work Group was formed specifically to address the HU ledger developed to quantify the losses attributed to building the Albeni Falls Dam in North Idaho. In 1998, the Idaho Department of Fish and Game, the Kootenai Tribe of Idaho, the U.S. Fish and Wildlife Service, the Kalispel Tribe, the Coeur d'Alene Tribe and the U.S. Army Corps of Engineers signed the Albeni Falls Interagency Work Group Operating Guidelines and Guiding Principles for Mitigation Implementation. The Guidelines formally established the Workgroup membership, responsibilities, working procedures and area of implementation. The Guidelines identified the Spokane River drainage upstream of the Idaho/Washington border as Focus Area 3. The Hangman Drainage, which includes approximately 43% of the Coeur d'Alene Reservation, is included in the portion of the Spokane River drainage identified as Focus Area 3.

The Coeur d'Alene Tribe and BPA established an Albeni Falls Mitigation Project Memorandum of Agreement (MOA) in September of 2001. The MOA defined the obligations of the Coeur d'Alene Tribe and BPA in the Tribe's purchase and management of lands to mitigate against Albeni Falls losses. The MOA also mandated the establishment of a management plan for each Albeni Falls mitigation property.

The Bonneville Power Administration (BPA) funded the acquisition of the *hnt'k'wi̲pn* Management Area, which is located in Albeni Falls mitigation Focus Area 3, in accordance with the NPCC's Fish and Wildlife Program and with the approval of the Albeni Falls Work Group, under an MOA between the Tribe and BPA. The Coeur d'Alene Tribe agreed, at the time of the purchases, that approximately 174.9 acres of the purchases would not be retained in the mitigation program. These 174.9 acres encompass uplands, a farmstead and residence that are not well suited to management for mitigation crediting and lie outside of the contiguous habitats that are addressed in this Management Plan. At the time of this Management Plan draft, BPA has been credited 364 HUs for purchase of the contiguous habitats of the *hnt'k'wi̲pn* Management Area. This Management Plan is presented as partial compliance with the Tribe and BPA's MOA to establish a process by which the original crediting can be protected and additional crediting can be accrued through enhancements.

PURPOSE AND NEED

This management plan describes all planned activities such as restoration, enhancement, operations and maintenance necessary to maintain and improve wildlife habitat consistent with the Northwest Power and Conservation Council's Fish and Wildlife Program. The *hnt'k'wipn* Management Area was purchased by the Coeur d'Alene Tribe using funds from the Bonneville Power Administration to mitigate for wildlife losses attributed to Albeni Falls Dam construction and inundation losses. Wildlife Mitigation according to the NPCC's Fish and Wildlife Program directs that mitigation properties be managed for the benefit of wildlife, and specifically in this case the target species associated with the Albeni Falls Mitigation Project. Habitats within the *hnt'k'wipn* Management Area are degraded but hold the potential to provide appreciable crediting against the Albeni Falls loss ledger that is defined in Table 11-4 of the 2000 Fish and Wildlife Program. Habitats within the *hnt'k'wipn* Management Area must be restored to achieve Coeur d'Alene Tribal objectives of reestablishing wetland functions, restoring wildlife habitat and expanding the populations of native fish in the Hangman Watershed. This habitat, once restored, will also provide the optimum crediting for wildlife HU losses as defined in the Fish and Wildlife Program.

This plan details long-term goals and objectives for the habitat management of the *hnt'k'wipn* Management Area and planned management strategies for achieving those goals. This plan will document natural resource issues and detail options to guide future management, restoration and enhancement activities for the property. This plan is intended as an instrument to ensure consistency between the BPA Wildlife Mitigation Program Final Environmental Impact Statement (DOE/EIS 1997) and the Columbia Basin Fish and Wildlife Authority's Guidelines for Enhancement, Operation, and Maintenance Activities for Wildlife Mitigation Projects (1998).

MANAGEMENT GOALS

Management actions within the *hnt'k'wipn* Management Area will strive to provide long term, self sustaining native habitat mosaics that support an abundance of native fish, wildlife and plant species that will in turn sustain important subsistence/cultural activities.

To fulfill the purpose of property management several broad scale strategies must be employed. The property currently provides wildlife habitats where vestiges of native vegetation exist and where native vegetation has been able to establish after severe disturbance. These habitats must be secured and, where appropriate, altered to optimize their diversity of and benefit to appropriate species. Monocultures of agricultural crops usurp the majority of the property; restoration of these segments must proceed via techniques that ensure desired responses of the vegetation community. Strategies such as channel stabilization, flood plane enhancement, vegetation establishment, that optimize the potential for in-stream habitats for native fish will be pursued. All strategies

employed on the property will serve to support native fish and wildlife populations and provide subsistence and/or cultural uses.

Four goals were selected to encompass the variety of needed actions on the *hnt'k'wi̱pn* Management Area. These goals are consistent with the directions provided by Coeur d'Alene Tribe Elders, Coeur d'Alene Tribal Youth, Tribal resolutions and policy, and BPA mandates and policy for mitigation crediting, as well as regional management directives. The goals also reflect both wildlife and fisheries needs within the property.

Goal 1. Protect, enhance, and manage wetland, riparian and forest habitats that support endemic, migratory and resident fish and wildlife species.

The *hnt'k'wi̱pn* Management Area encompasses 681.6 acres of drainage and floodplain landscape that will be devoted to supporting migratory and resident fish and wildlife populations.

Goal 2. Establish self sustaining terrestrial native plant associations where endemic plant communities were eliminated to allow agricultural production.

The *hnt'k'wi̱pn* Management Area encompasses 1034.5 acres of land that has been used to produce agricultural crops. These acreages will be restored to endemic plant communities that would persist in the absence of agriculture.

Goal 3. Promote hydrologic functions that support native wetland plant communities and instream habitats favorable to native salmonid populations.

Currently, approximately 231.5 acres of the *hnt'k'wi̱pn* Management Area is underlain with drain tile. Additionally, Hangman Creek, Sheep Creek and the drainages that empty into Hangman and Sheep Creeks total 82.2 acres. Some time in the last century, the creeks and all the drainages were modified in some fashion to remove water from the landscape as quickly as possible to facilitate agricultural production. This removal of water through the artificial drainage network dramatically effects habitats within the *hnt'k'wi̱pn* Management Area by causing the wetlands, and thus streams, to dry quickly during the growing season. Management actions will alter the 231.5 acres of wetlands to promote functioning wetlands and maximize base flows in Hangman and Sheep Creeks.

Goal 4. Maintain habitats in perpetuity that will support subsistence and cultural activities while maintaining native fish and wildlife populations.

Management will strive to achieve and maintain an average of 2 HUs per acre within the floodplain, wetlands and riparian portions of the *hnt'k'wi̲pn* Management Area.

PHYSICAL ENVIRONMENT

General Site Description

The *hnt'k'wi̲pn* Management Area is bounded by Universal Transverse Mercator Zone 11 coordinates 507389 - 510391 km east and 5221791 - 5218839 km north. It is located in the southern portion of the Coeur d'Alene Indian Reservation, is in the southwestern portion of Benewah, County, Idaho, and is approximately 10.5 kilometers east of the Washington-Idaho State Boundary (Figure 2). Hangman Creek, the central drainage of the Hangman Watershed, flows north and west through the property and continues its northwest course for approximately 83.5 air kilometers till it meets with the Spokane River just west of the city of Spokane.

Elevations within the properties range between 2,552.3 feet and 2,710.3 feet (LiDARProducts.SDE.BARE_EARTH_DEM) and it lies on the eastern edge of what Bailey (1995) referred to as the Dry Steppe portion of the Temperate Steppe Division, more commonly known as the Palouse Prairie. Native upland forest types associated with the edge of the Palouse habitats are largely ponderosa pine with grasses established under a widely scattered forest canopy (Cooper et al. 1991). Mixed coniferous/deciduous forest, scrub - shrub and camas meadow are appropriate wetland vegetation communities for the Upper Hangman Watershed (Jankovsky-Jones 1999). While ponderosa pine is largely considered a dry forest species, it also forms a wetland/floodplain plant association under broad, low elevational floodplain conditions that are prevalent within the *hnt'k'wi̲pn* Management Area. The Ponderosa Pine / Common Snowberry – Floodplain Plant Association (Crowe and Clausnitzer 1997) occurs within broad floodplains of Hangman Creek that dry substantially during the growing season. This Ponderosa Pine / Common Snowberry Association is very similar in description to the Black Cottonwood / Common Snowberry Plant Community and Quaking Aspen / Common Snowberry Plant Community Types also described by Crowe and Clausnitzer (1997) and the former is considered the community potential for these cottonwood and aspen associations. Hansen et al. (1995) described similar floodplain / wetland community types in Montana where again the ponderosa pine types (Ponderosa Pine / Common Chokecherry and Ponderosa Pine / Red-Osier Dogwood) were considered the late seral to climax stages to the black cottonwood (*Populus trichocarpa*) dominated plant communities.

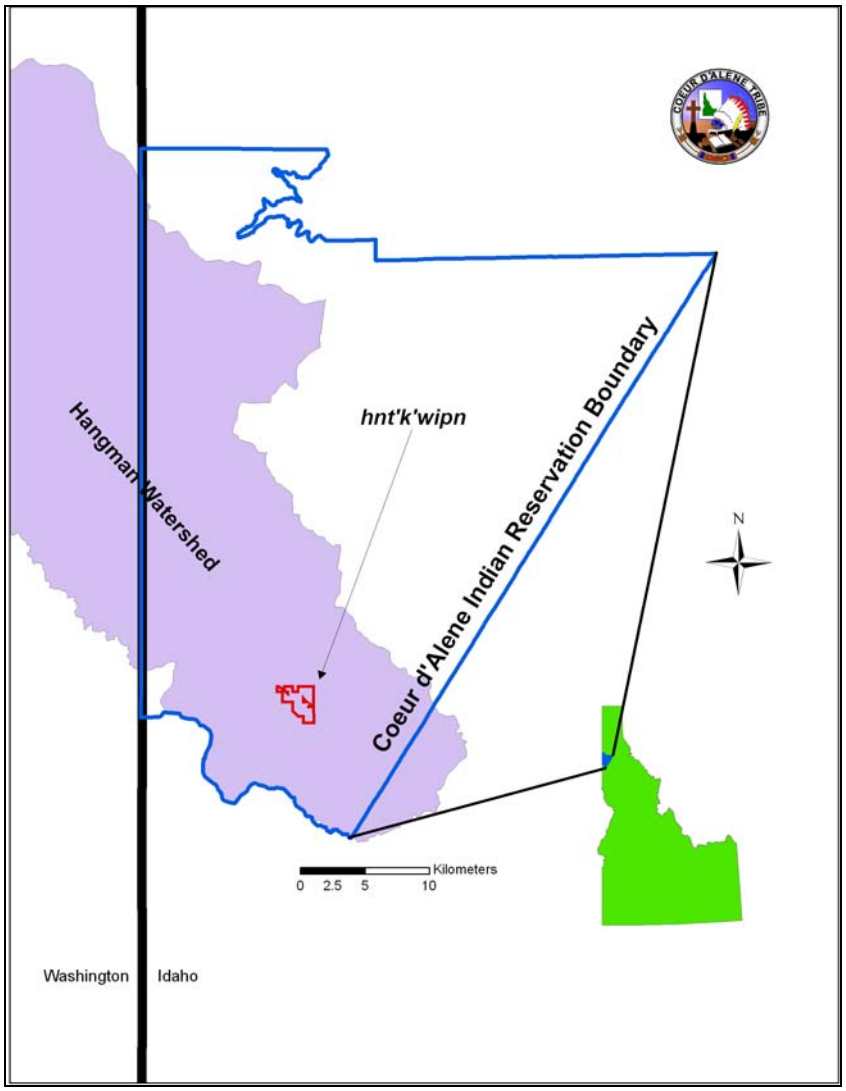

Figure 2. ***The location of the hnt'k'wipn Management Area within the Hangman Watershed on the Coeur d'Alene Indian Reservation.***

The *hnt'k'wipn* Management Area encompasses approximately 0.73 miles of Sheep Creek and 2.06 miles of Hangman Creek in the Upper Hangman Watershed. The high potential of this *hnt'k'wipn* Management Area to support riverine/native fish habitat was a primary factor in its selection for acquisition (Green and Roberts, 2003). While the properties were purchased as mitigation for wildlife losses attributed to Albeni Falls Dam and are intended to provide sufficient benefit for that purpose alone, the *hnt'k'wipn* Management Area is centered among the remnant redband trout populations that occur in upper reaches of forested streams within the surrounding mountains. Restoration of the *hnt'k'wipn* Management Area will not only credit towards Albeni Falls losses, but will also benefit the native trout of the Upper Hangman Watershed by providing connective habitats between what are now isolated populations.

Climate

The climate of the Upper Hangman Watershed is sub-humid temperate with cool, wet winters and warm, dry summers. Average total annual precipitation at Tensed, Idaho for the years 1963-1983 was 25.2 inches (www.wrcc.dri.edu). During those years, a distinct precipitation season typically began in October or November and continued through March. Approximately two-thirds of annual precipitation occurred during this period and rain-on-snow events generated by moisture laden Pacific air masses were common in the late winter months (Bauer and Wilson 1983). Temperatures in the watershed were mild overall with the daily maximum temperature for August, the warmest month of the 1963-1983 reporting period, averaging 82.2° F. The average daily minimum for January, which was the coldest month of the year, was 20.9° F.

Hydrology

Two assessments were recently completed that reflected both the wetland and stream channel conditions within *hnt'k'wipn* Management Area (Inter-Fluve, Inc. 2006, Uhlman 2007). Both assessments detailed hydrologic conditions that have been greatly altered in order to produce agricultural crops.

Inter-Fluve, Inc. (2006) detailed a stream network system in Hangman and Sheep Creeks that is substantially entrenched with channels running between three to five feet below historic elevations. Conditions reflect a flashy hydrologic cycle with floodwaters from most years confined to the stream channel. Only discharges greater than the 20-year flood begin to flow out over the historic floodplain. Hangman and Sheep Creeks have followed the natural progression that occurs after a major disturbance to a stable system. In the original stable system flood waters spread out over broad floodplains, but a major disturbance in the system, as in Hangman and Sheep Creeks, often causes the streams to entrench. This entrenchment traps flood waters and energies within the stream channel, which in turn causes high rates of sediment delivery to the stream as floods erode the banks of the entrenched stream until a new flood plain is built at a lower elevation that is large enough to dissipate flood energies without further harm to the system. Once the

new floodplain is completely eroded out of the landscape, the former, higher elevation floodplain becomes a terrace that flood waters no longer access. The Inter-Fluve report concludes that Hangman and Sheep Creeks are in the early stages of forming a new, lower elevational floodplain three to five feet below the former floodplain. The report recognizes two main options for stabilizing both Hangman and Sheep Creeks and stopping the massive erosional processes that are now occurring. The first option, which is preferred by the authors of the report, is to raise the beds of the current stream channels within the *hnt'k'wi̲pn* Management Area to the former elevations to allow flood waters full access to the valley bottom floodplains. The authors state that the benefits to fish, wildlife, riparian habitat, and base flows would be "unsurpassed." The second option for stabilizing the system is to "fast forward" the erosional process by pulling back the current channel banks to effectively widen the floodplain that is slowly being built at the new, lower elevation. Both options are expensive; however, the expense of altering Hangman Creek is much greater because it's so much larger than Sheep Creek. Altering Hangman Creek would also bear a high risk of failure because alterations within the *hnt'k'wi̲pn* Management Area would not address the problems of stream entrenchment that persist in the larger Hangman Watershed.

The second assessment (Uhlman 2007) included a MODFLOW modeling effort as a way of identifying the potential for wetlands in the valley floors on either side of Sheep and Hangman Creeks. The MODFLOW modeling effort is a quantitative evaluation of site and regional hydrogeologic and hydrologic data by delivering predictions of ground water elevations for specific seasons or for annual averages. The purpose of the modeling was to determine the effect of a drain tile network that lies four to five feet under the surface of approximately 200 acres of agricultural fields on either side of Sheep Creek (Figure 3). An additional 31.5 acres north of Hangman Creek and downstream of the Sheep Creek/Hangman Creek confluence that drained with tile was not examined in the report because of a lack of specific data on tile location and extent. The modeling effort identified the drain tile network as a sink that deprived the soils within those agricultural fields of saturated conditions throughout the growing season. Without the tiles, the soils in this area would function hydrologically as wetlands. The model predicted wetland conditions within the entire valley floor along Hangman Creek as well. It was beyond the ability of the model to predict the specific types of wetlands that would develop in the absence of the artificial drain systems currently in place within the *hnt'k'wi̲pn* Management Area. However, it can be stated with certainty that once the drainage ditches are filled in and the tile disrupted, the water table will rise and soil moisture will persist longer into the dry season. The presence of increased soil moisture will effect the vegetation types, stream flow and may even in the long term assist in alleviating the entrenched condition of the streams within the *hnt'k'wi̲pn* Management Area.

Both of these reports are consistent with historical and anecdotal information on the original conditions in the Hangman Watershed and the disturbances that occurred in the 20th century. Tribes from throughout the region and particularly the Coeur d'Alenes gathered in the Upper Hangman Watershed during early summer to gather camas that grew abundantly in extensive, broad floodplains (Seltice 1990, Edelen and Allen 1998).

Salmon and steelhead were also harvested from an area of riffles that are now just upstream of the town of Tekoa, Washington (Seltice 1990, Edelen and Allen 1998), which is approximately 14.2 air kilometers downstream of the *hnt'k'wipn* Management Area. An abundance of camas and the harvesting of anadromous fish attest to the greater availability of water in the Upper Hangman Watershed prior to the manipulation of the landscape to favor the production of agricultural crops.

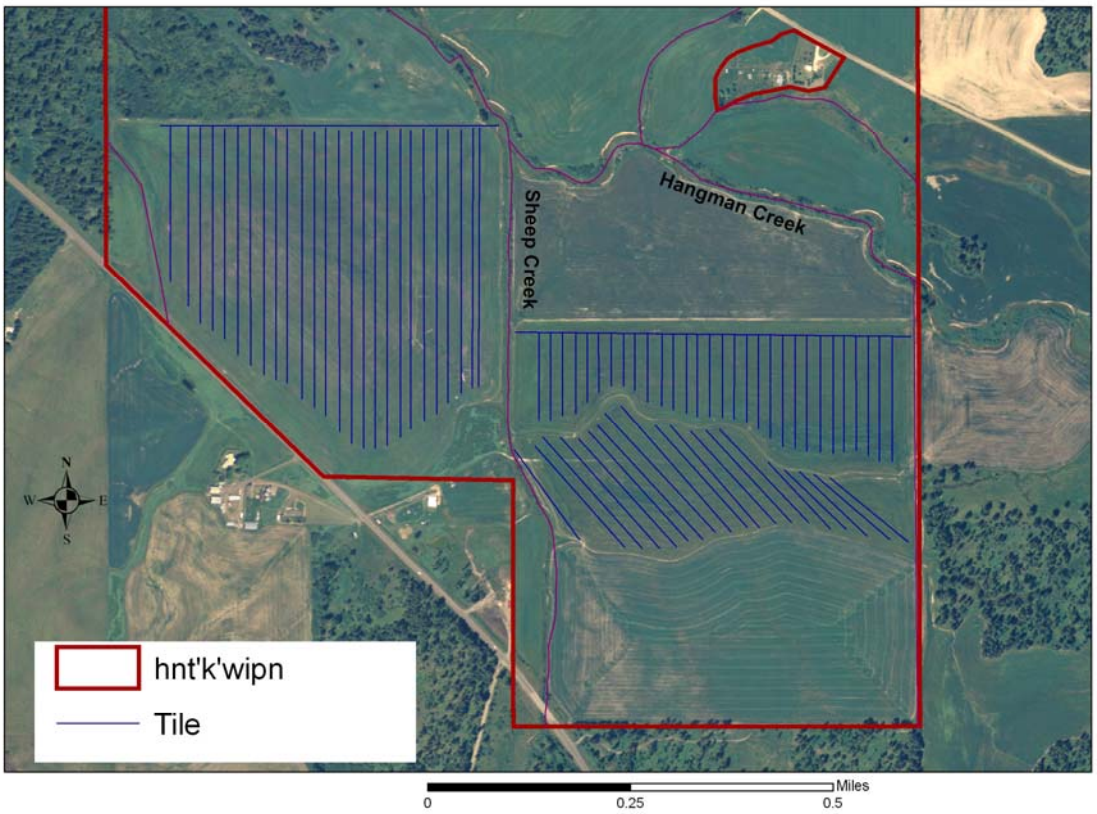

Figure 3. ***The arrangement of drain tiles within the hnt'k'wipn Management Area that lie under the agricultural fields to the east and west of the lower reaches of Sheep Creek.***

In the 1950s, Hangman Creek below U.S. Highway 95 was straightened and dredged to increase the available arable land in the Watershed (Figure 4). Apparently, this dredging and straightening downstream of U.S. Highway 95 caused a headcut that moved upstream and entrenched Hangman. There is no recorded evidence that Hangman Creek was realigned upstream of Highway 95 and longtime landowners of the Upper Hangman Watershed attest that little straightening of the stream channel was completed above Highway 95. Although the stream was "cleaned" of woody material to allow water to flow unimpeded (Al DeShields pers. com., Eldon Shaw pers. com.).

In addition to these assessments of conditions within the *hnt'k'wipn* Management Area, a recent study of the hydrologic processes of the larger Upper Hangman Watershed was funded by the Environmental Protection Agency beginning in the spring of 2005. The results of that undertaking are being finalized and they indicate that conditions downstream of any point in the Hangman Watershed more strongly correlate with whether that location is saturated with moisture than conditions upstream (Callery 2007). This downstream effect is consistent with the indications that dredging and straightening downstream of Highway 95 were and are a major contributor to the entrenchment of streams and the flashy hydrologic cycle that characterizes current conditions.

Figure 4. Dredge line working in Hangman Creek downstream of U.S. Highway 95 in 1951

Taken together these bits of evidence, the use of the Upper Hangman Creek prior to the era of modern agriculture, the alteration of Hangman Creek through dredging and straightening, the resulting head cutting, the current flashy conditions, entrenchment and de-watering, indicate a potential that is far different than the current conditions. These bits of evidence also suggest that conditions beyond the boundaries of the *hnt'k'wipn* Management Area strongly effect the hydrologic cycle and wetland potential of the property. Figure 5, which provides a comparison of 1960 verses 2007 conditions,

provides some indication of the potential stream flows for Hangman Creek. The August 1960 photograph illustrates the high, vertical stream banks that evidence of a major, recent disturbance in the system. Also, the stream flow illustrated in the 1960 photo far exceeds current flows in Hangman Creek during the dry month of August.

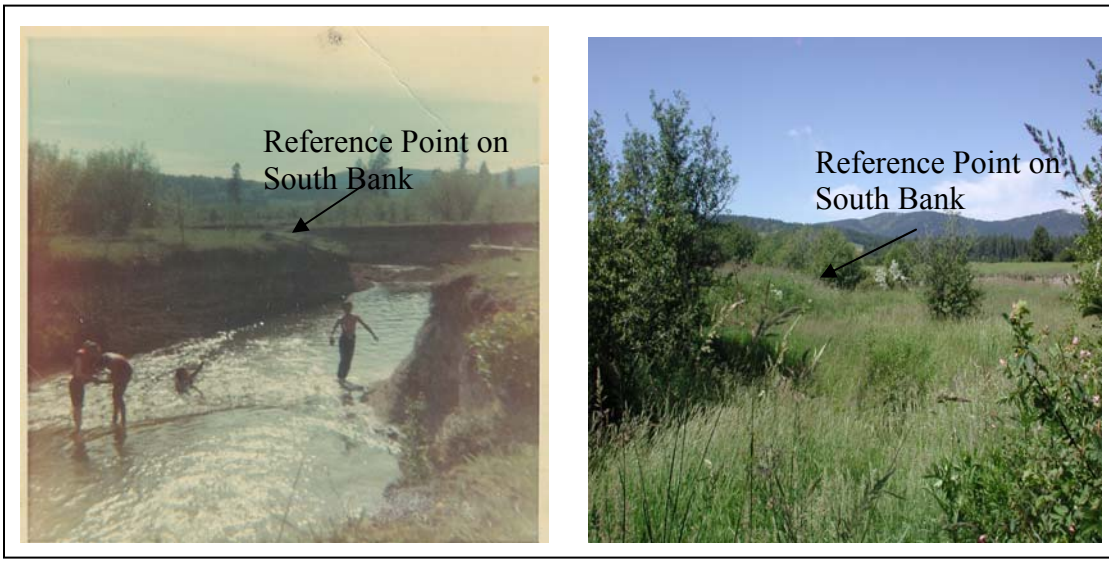

Figure 5. ***Landscape reference photographs taken in 1960 and 2007.***
The photograph on the left was taken in August of 1960. The photograph on the right was taken from the same location on June 26, 2007. Note the vertical stream banks indicating recent entrenchment of the stream channel in the 1960 photograph. Hangman Creek in the 2007 photograph is out of view and flows from near left to far right. The new, lower elevational floodplain in the 2007 photograph that is building on the point bar as Hangman Creek meanders farther to the north (to the right & beyond the bounds of the2007 photograph) than in the 1960 photograph.

Soils

Soils mapped in 1980 within the property can be divided primarily into three groups: hydric, mollisol or mollic soils (Figure 6). The hydric soils retain the potential to support wetlands, even through large segments are devoted to the production of agriculture. Both mollisol and mollic (mollisol like) soils developed under grassland habitats or habitats that have an open grassland component in a coniferous forest understory and retain the prospect of supporting those habitats even though these soils are almost entirely devoted to the production of agriculture. Hydric soils either support or hold the potential to support riparian/wetland plant communities.

Mollisols soils are primarily located in the northeastern portion of the property. A series of 5 drainages fall from the northeast to the southwest through this northeastern portion of the property. The orientation of the drainages results in southwest exposures that results in dry growing season conditions and are well suited to supporting either

grassland or a short grass prairie component under and open forests overstory. Mollisols found within the *hnt'k'wipn* Management Area include Larkin, Setters, Southwick, Taney and Tensed-Pedee soils.

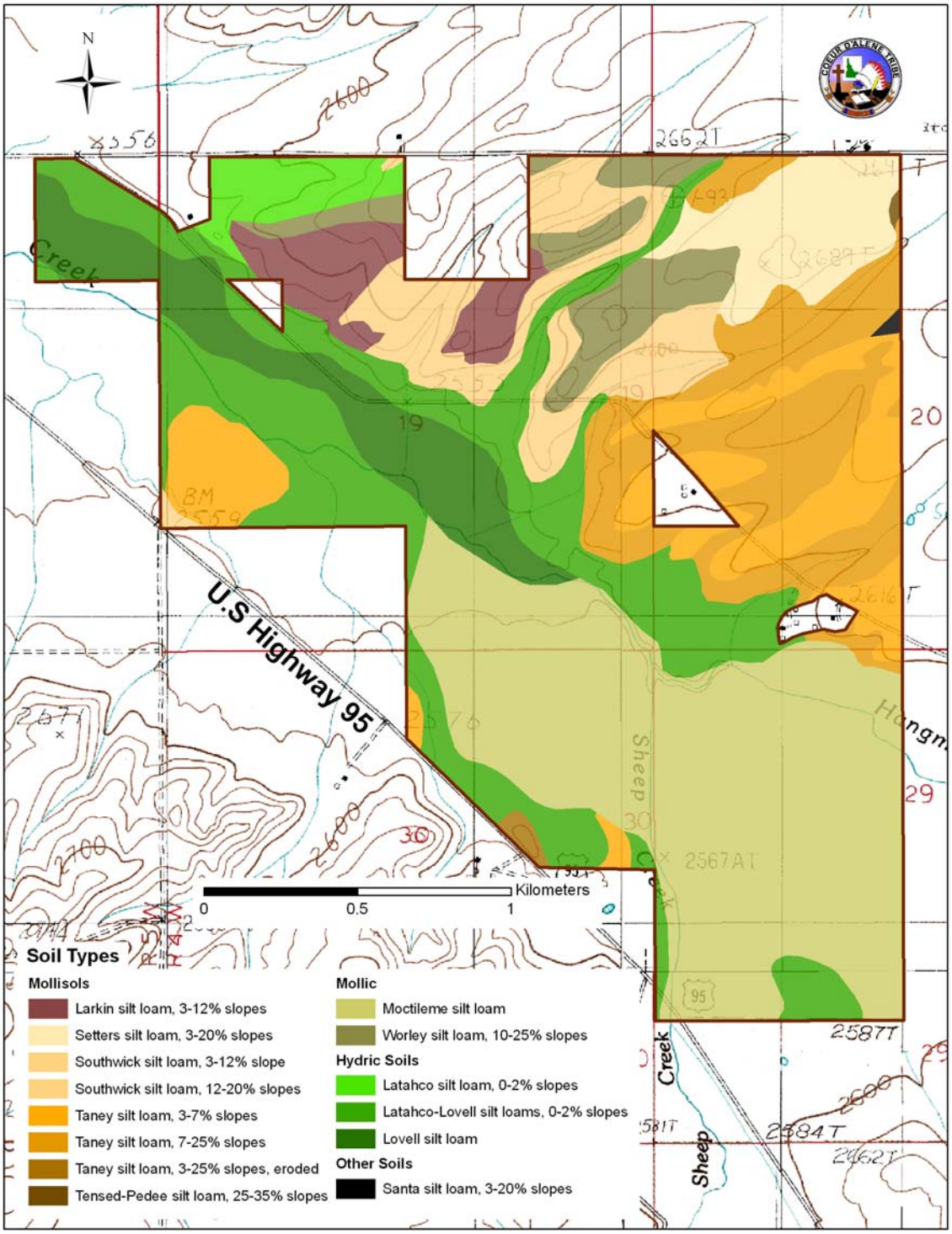

Figure 6. ***Soil types within the hnt'k'wipn Management Area mapped in 1980.***

Mapped hydric soils declined in coverage from 722.6 acres of floodplain and drainage bottom in 1930 (Figure 7) to 347.7 acres in 1980 (Figure 6). Some of this discrepancy can be the result of errors in the mapping process or the variation between methods employed between each of the mapping exercises. However, errors and discrepancies between methods used cannot account for the entirety of the reduction in hydric soils coverage. Much of ditching, tiling, channel straightening and dredging that was meant to quickly remove water from Hangman Creek to allow for agricultural production occurred in the years between the 1930 soil survey and the 1980 soil survey. Drain tiles were installed in the southern portion of the *hnt'k'wipn* Management Area in the late 1960s (Figure 3) and the flat topography to the east and west of the current lower Sheep Creek alignment is now devoted to agricultural production. This drain tile network altered the hydrologic cycle (Uhlman 2007) and it is assumed that the artificial drainage network along with recent agricultural production has resulted in the shift in soil types in the southern portion of the *hnt'k'wipn* Management Area. Currently the soils along either side of the lower reaches of Sheep Creek are classified as Moctileme Silt Loam which is mollic soil (Figure 6).

The remaining mollic soil, the Worley Silt Loam, is located in the north central portion of the property (Figure 6) and appears to be an intermediate between the mollisol and hydric soil types. This mollic soil is a small fragment of Santa Silt Loam extends into the north east quart of the property along or near a ridge line. This soil is noted for its very dense subsoil that allows very low permeability.

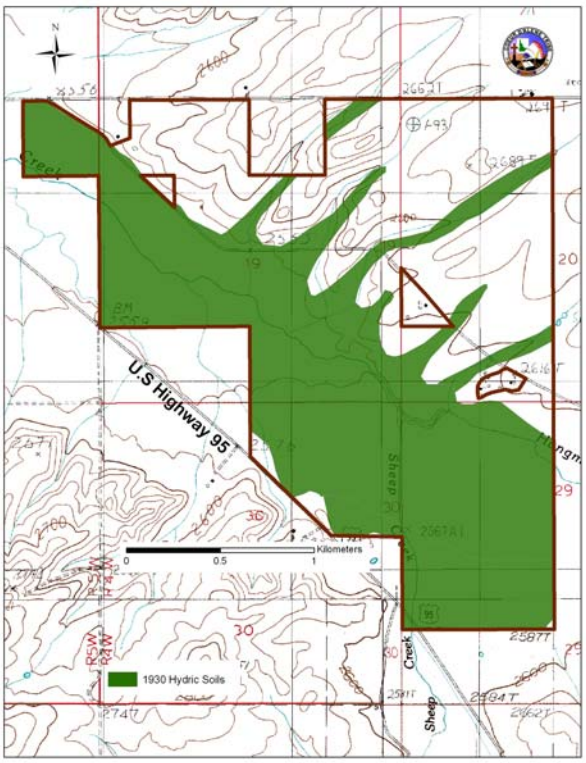

Figure 7. ***Hydric soils within the hnt'k'wipn Management Area mapped in 1930.***

Fisheries

The Coeur d'Alene Tribe Fisheries Program recently conducted surveys of fish populations throughout the Hangman Watershed. They found speckled dace (*Rhinichys osculus*), redside shiner (*Richardsonious balteatus*), longnose suckers (*Caostomus catostomus*), and Sculpin spp. in streams that flow through heavy agricultural lands, such as what now exist within the *hnt'k'wipn* Management Area (Peters et al. 2003). Remnant populations of redband trout (*Oncorhynchus mykiss garideini*) were found in headwater streams in the Upper Hangman Watershed where forest cover remains high. Native redband trout were found in the headwaters of Mission Creek, Sheep Creek, Nehchen Creek, Indian Creek, and Upper Hangman east of the Coeur d'Alene Reservation, with the closest population found in the headwaters of Sheep Creek (Figure 8). The Fisheries Program found a pattern of increasing temperatures and sediment loads as streams left forested areas and passed through agricultural lands and concluded that water quality was the cause of the restricted distribution of salmonids (Peters et al. 2003). The location of the *hnt'k'wipn* Management Area is strategic for the eventual expansion of the remnant salmonid populations since improved habitats within the property could not only expand populations but also provide connectivity between those isolated populations.

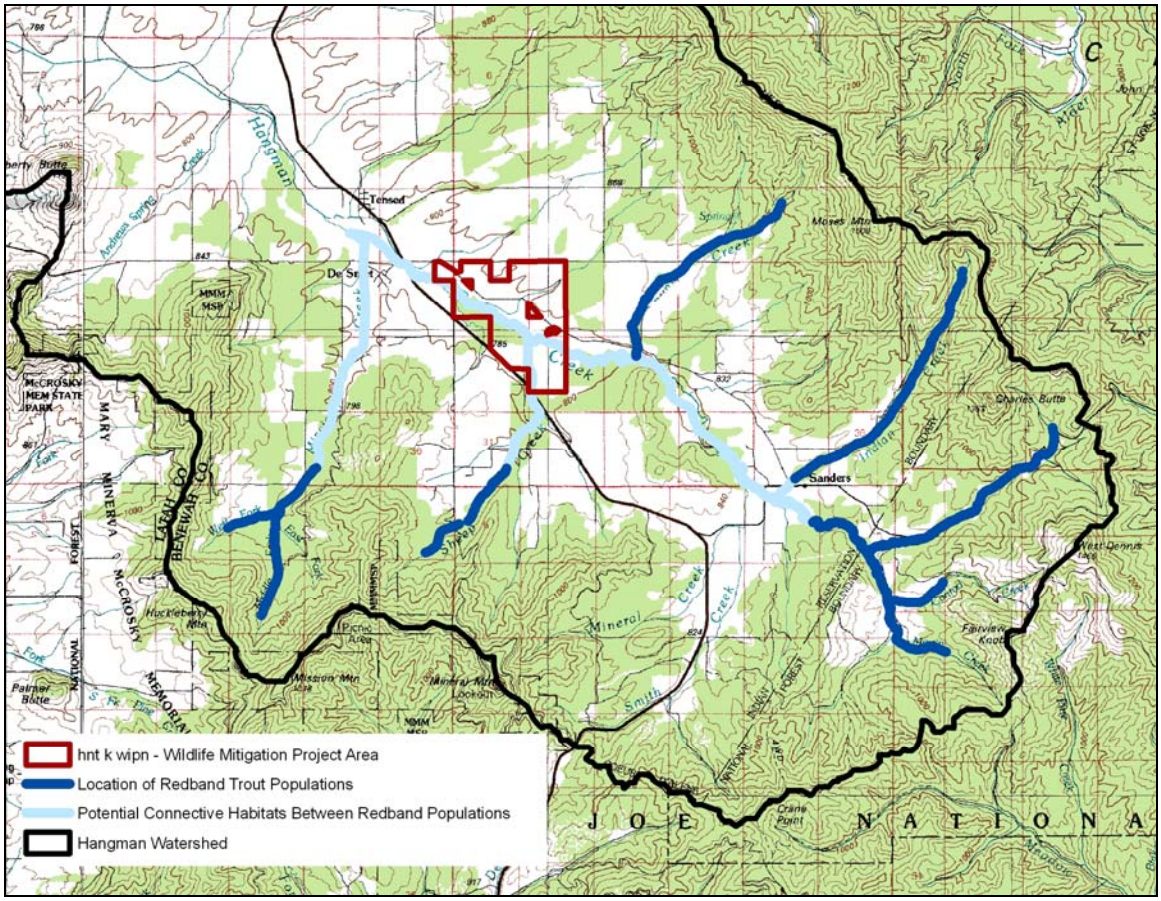

Figure 8. ***Location of the hnt'k'wipn Management Area with respect to populations of native salmonids within the Upper Hangman Watershed.***

Cultural Resources

A series of 5 cultural resource reports were written in 2003 and 2004, after surveys were completed on the properties that now comprise the *hnt'k'wipn* Management Area (Hanson, Kitt and Felsman, Figure 1). Six sites were identified within the reports but only one was recorded prior to the 2003-2004 survey period. Five of the sites were prehistoric and one historic. The past century of agricultural use has scattered the surface level cultural resources within the *hnt'k'wipn* Management Area. Also, the *hnt'k'wipn* Management Area was known for the availability of artifacts and long time local residents attest to the frequency with which people visited the floodplains along Hangman Creek within the *hnt'k'wipn* Management Area to gather artifacts such as stone knifes and arrowheads (Perry Kitt pers. com.). The Coeur d'Alene Tribe used the *hnt'k'wipn* Management Area prior to the arrival of the Euro-Americans as is evidenced by the name given to it by Tribal elders. This evidence suggests that sites are expected to be uncovered if any land disturbing activities, such as wetland enhancement or stream channel realignments are undertaken. The implementation of this Management Plan will follow the recommendations of the Cultural Resource reports that continual cultural resource monitoring be incorporated in any ground disturbing activities.

A trained archaeologist technician under the supervision of a professional archaeologist and/or a Coeur d'Alene Tribal Elder, will remain on site during the ground disturbing activities. The THPO (Tribal Historic Preservation Officer) and/or CRMP (Cultural Resource Management Program) Archaeologist, will be notified IMMEDIATELY if any human remains and/or cultural resources OR items that could potentially be human remains and/or cultural resources are discovered. In the event Human Remains or Cultural Resources are discovered during ground disturbing activities the following protocols will be followed.

Cultural Resources

1. In the event that Cultural Resources are discovered within the project, or at locations associated with the project including but not limited to rock sources and borrow pits used, in use, or planned for use on the project; all work within 50 ft in all directions will cease and the area will be cleared of all unnecessary personnel. On site staff will secure the area.

2. Staff will immediately notify an appropriate CRMP staff member (in this order of priority: the CRMP Archaeologist, THPO/Program manager, or Cultural Resource Information Systems (CRIS) manager; or their successors);

CRMP Archaeologist:	Jill Wagner		208-686-1572
		cell	208-582-1347
THPO/Program Manager:	Quanah Matheson		208-686-0675
		cell	208-699-3570
CRIS Manager:	John Hartman		208-686-8402
		cell	208-301-0014

3. All appropriate laws and policies will be followed to the best of Tribe staff abilities.

Human Remains

***All items that could potentially be Human Remains or Cultural Resources are to be treated as if they are Human Remains or Cultural Resources until a clear determination is made.**

1. In the event that Human Remains with or without associated CRs are discovered within the project, or at locations associated with the project including but not limited to rock sources and borrow pits used, in use, or planned for use on the project; work with line of site to the Remains or within 150feet of the Remains, whichever is the greater area; will cease and the area will be cleared of all personnel other than one (1) or two (2) staff member(s) who will stay with the Remains until Tribe CRMP staff, Tribal Police, or other appropriate personnel are on site. Staff will secure the area.

2. Staff will immediately notify an appropriate CRMP staff member (in this order of priority: the CRMP Archaeologist, THPO/Program Manager, or Cultural Resource Information Systems manager; or their successors). If these CRMP staff cannot be reached staff will notify the Natural Resources (NR) Department Director.

3. No photography of human remains is allowed. No one will photograph the Remains. No one will allow or cause anyone to photograph the Remains.

4. Until CRMP staff arrives, the Remains will be completely covered with loose soil from the immediate vicinity at a depth of up to 12inches. No new ground disturbance should occur if at all avoidable. The source of the soil must be noted and communicated to CRMP staff. If no soil source is available, the Remains may be covered with a tarp or plain piece of cloth such as a rug, towel, or blanket.

5. The Remains will not be touched, moved, or in anyway caused to change position from that noted upon discovery.

6. All information related to the discovery will be held in strictest confidence.

7. All information related to the discovery known to contractor or staff will be provided to the Tribal Police and CRMP Archaeologist.

8. The Bonneville Power Administration (the funding agency) will be notified of the cease work order.

9. Actions taken in response to a discovery of Human Remains will be consistent with the National Historic Preservation Act Section 106, and any other state, local, federal and Tribal codes that apply.

10. All appropriate laws and policies will be followed to the best of staff abilities.

All Tribe staff and contractors will keep all cultural resources information strictly confidential. Information will only be shared with a contractor or subcontractor with the concurrence of the CRMP archaeologist, program manager or CRIS manager (contacted according to the protocols given above).

Wildlife

The mallard, redhead, muskrat, black-capped chickadee, yellow warbler, bald eagle, Canada goose, and white-tailed deer are identified as the Albeni Falls target species (Martin et al. 1988). Of these species; mallard, black capped chickadee, yellow warbler, bald eagle, and white-tailed deer have been observed within the *hnt'k'wi̲pn* Management Area. Broods of mallards have been observed in water courses in April, May and June. Black capped chickadees are common in the forests, and yellow warblers are common along the abandoned stream channels within the forest. Bald eagles are commonly observed in the Upper Hangman Watershed during the winter. White-tailed deer are permanent residents of the *hnt'k'wi̲pn* Management Area and the surrounding landscape.

In addition to the white-tailed deer, other ungulates that are frequently seen foraging within the *hnt'k'wi̲pn* Management Area are Rocky Mountain elk (*Cervus elaphus nelsoni*) and moose (*Alces alces*). The mitigation property is within the range of the mule deer (*Odocoileus hemionus*), however there are no recent reports of mule deer in that vicinity. A variety of other mammals use the property including, black bear (*Ursus americanus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*) and snowshoe hare (*Lepus americanus*). The bobcat (*Lynx rufus*) and cougar (*Puma concolor*) range near the property but no evidence has been gathered to indicate their presence.

Point counts were conducted within the *hnt'k'wi̲pn* Management Area in 2005 and 2006. Not surprisingly, the forest cover type showed the highest index of species abundance and the savannah sparrow (*Passerculus sandwichensis*) was by far the most common bird in the agricultural lands.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service lists Canada lynx (*Lynx canadensis*), bull trout (*Salvelinus confluentus*), Spaldings catchfly (*Silene spaldingii*) and water howellia (*Howellia aquatilis*) as Threatened Species that occur in Benewah County, Idaho. The grey wolf (*Canis lupus*) is listed as an Experimental/Non-essential species that occurs in

Benewah County. However, as is summarized below, none of these species have been reported from the Upper Hangman Watershed near the *hnt'k'wipn* Management Area.

Canada Lynx

The elevation of the *hnt'k'wipn* Management Area is well below the mountainous terrain that receives snow in quantities that would allow the lynx to thrive and the nearest critical habitat for the lynx is in Montana (USFWS 2006).

Bull Trout

Bull trout occur only in the Coeur d'Alene Basin, which borders the Hangman Watershed to the east, and there is no evidence to suggest the bull trout was native to waters that flow through the *hnt'k'wipn* Management Area (Behnke 1992).

Spalding's Catchfly

Spalding's catchfly is a member of the pink family (Caryophyllaceae) that is found in open, mesic grassland or sagebrush-steppe communities (USFWS 2007). The nearest known populations of Spalding's catchfly is centered in remnant Palouse Prairie stands near Moscow, Idaho, which is approximately 45 kilometers south of the *hnt'k'wipn* Management Area (USFWS 2007). No reports of Spalding's catchfly are recorded from the Upper Hangman Watershed and since little to no mesic grassland is found within the *hnt'k'wipn* Management Area, the probability of a Spalding's catchfly persisting within the *hnt'k'wipn* Management Area is low.

Water Howellia

Water howellia is an annual aquatic species of the Campanulaceae family that is adapted to vernal freshwater wetlands (USFWS 1996). The major population centers for water howellia are in Montana and Washington, however one population was found in Latah County, Idaho (USFWS 1996). The Idaho population is approximately 22 kilometers south of the *hnt'k'wipn* Management Area. No populations have been identified in the Hangman Watershed, and while the wetland habitats within the *hnt'k'wipn* Management Area may hold the potential to support a population of water howellia; there are no representatives of the species currently within the Management Area.

Grey Wolf

Individual grey wolfs have been reported in the lower St. Joe River Watershed east of the town of St. Maries and a pack has been documented in the Marble Creek area of the St. Joe Watershed (IDFG 2007). However, no confirmed reports of wolf activity have come from nearer than 32 kilometers from the *hnt'k'wipn* Management Area (IDFG 2007). The distance to the nearest confirmed sighting indicates that the *hnt'k'wipn* Management Area is within the

range of a dispersing individual wolf. However, the lack of confirmed sightings within the Hangman Watershed indicates that wolves do not use the *hnt'k'wi̲pn* Management Area.

Despite the lack of evidence to indicate the presence of any endangered species within the *hnt'k'wi̲pn* Management Area, the Endangered Species Act Section 7 consultation process will be followed prior to implementing restoration and management activities.

Covertypes

The *hnt'k'wi̲pn* Management Area HEP (Green 2007) report completed in February of 2007 identified 5 cover types within the property. These covertypes were identified according to prominent plant species or topographic characteristics and include the Conifer Forest, the Riparian Drainage, the Grass Meadow, the Reed Canarygrass / Hawthorn and the Agricultural Covertypes (Figure 9).

Conifer Forest

The Forest Cover Type covers 6.2% (74.4 acres) of the west central portion of the *hnt'k'wi̲pn* Management Area. Ponderosa pine (*Pinus* ponderosa) is the overstory species within this covertype and the plant community is consistent with the Ponderosa Pine / Common Snowberry – Floodplain Plant Association described by Crowe and Clausnitzer (1997) and closely resembles the ponderosa pine cover types described by Hansen et al. (1995). The Coeur d'Alene Tribe Wildlife Program conducted a cruise of the timber within this covertype in the spring of 2005 (Coeur d'Alene Tribe Wildlife Program 2005). Ten transects were established and data were taken at 69 plots along those transects. The 2005 cruise results indicated the timber stand contains an average of 53 trees per acre greater than 18 inches DBH. This high stocking density of large trees indicates that, if thinned, the stand could attain the Coeur d'Alene Tribe's goal for low elevational ponderosa pine old growth forests, which is 5-20 trees per acre >20"DBH (Coeur d'Alene Tribe 2002). Douglas fir (*Pseudotsuga menziesii*) trees were found only in trace amounts in the 5 to 8 inch DBH size class with an average of two trees per acre. The cover type contains a sufficient number of snags to maintain snag dependent wildlife species since an average of three snags per acre greater than 18 inches DBH were recorded during the timber cruise (Coeur d'Alene Tribe Wildlife Program 2005) and an average of 4 snags / acre between four and ten inches dbh were recorded during data gathering efforts to document extant HUs (Green 2007).

At the time of purchase, this Cover Type contained pockets of dense ponderosa pine regeneration with an average of 605 stems per acre less than five inches DBH (Coeur d'Alene Tribe Wildlife Program 2005). This dense regeneration presented a threat to the forest stand in that could serve as ladder fuels that would carry a wildfire into the forest canopy. For the sake of securing the current habitats and for reducing or eliminating the potential damage to neighboring landowners should a wildfire spread through these habitats.

A plant species inventory of the Forest Cover Type completed in May and June of 2005 recorded snowberry (*Symphoricarpu albus*), rose (*Rosa sp*.), hawthorn (*Crataegus douglasii*) and serviceberry (*Amelanchier alnifolia*) shrubs in the understory. Camas (*Camasia quamash*) and meadow foxtail (*Alopecurus pratensis*) were the dominant forb and grass species in the more open portions of the Forest Cover Type.

Riparian Drainage

The Riparian Drainage Cover Type encompasses approximately 6.2% (73.9 acres) of the *hnt'k'wipn* Management Area and includes the Hangman and Sheep Creek Channels, drainage ditches through the agricultural fields, and abandoned stream channels that wind through the Forest Cover Type. In 2006, the Coeur d'Alene Tribe contracted an assessment of options for stabilizing the Hangman and Sheep Creek channels that run through the *hnt'k'wipn* Management Area (Inter-Fluve, Inc. 2006). The descriptions of Hangman and Sheep Creek channels presented in the report can, in general, be applied to the Drainage Cover Type at large. Drainages were formed by stream channels that were entrenched within the former valley bottom floodplain surfaces. Floodwaters of less than a 20-year flood capacity are typically confined to the channels. However, stream banks are steep and rates of bank erosion are high since energy from high water cannot dissipate across a floodplain. Hangman and Sheep Creeks are in the midst of building new flood plains three to five feet below previous elevations. In the vicinity of the Sheep Creek and Hangman Confluence the pre-disturbance plan form belt width, which is an estimation of the minimum flood plain width necessary to effectively dissipate flood water energies, was calculated at approximately 300 feet across. Banks within the entrenched channels have eroded a maximum of 125 feet at specific locations. The narrow floodplain compared to the original plan form belt width indicates these stream banks will continue to erode well into the future unless action is taken to moderate sheer stress within the channels. An extensive system of deep drainage ditches within the agriculture segments of the property to deliver runoff to the streams at the elevation of their entrenchment is included in this covertype.

Vegetatively, the Riparian Drainage Covertype includes sites that are currently devoid of shrubs as well as complex (multi layered) mature shrub communities. Hawthorn (*Crataegus douglasii*) is the major shrub with willow (*Salix spp.*), red-osier dogwood (*Cornus stolonifera*), alder (*Alnus spp*.) and snowberry widely scattered within the cover type. Reed canarygrass (*Phalaris arundinacea*) dominates the herbaceous plant community and ponderosa pine is only occasionally represented.

Grass Meadow

The Grass Meadow Cover Type makes up 1.9% (22.9 acres) of the *hnt'k'wipn* Management Area. The topography is flat and the plant communities are largely introduced grasses and forbs that supported past grazing and hay production. Herbaceous species include clover (*Trifolium spp*.), bromes (*Bromus spp.*) meadow foxtail. Reed canarygrass is present in some small moist areas of the Covertype.

Reed Canarygrass/Hawthorn Wetland

Approximately 0.7% (8.3 acres) of the *hnt'k'wi̲pn* Management Area was identified as reed canarygrass/hawthorn wetland. The plant species composition and drainage wetlands of this cover type are similar to the Riparian Drainage covertype. However, the density of the hawthorn shrub layer (90%+) clearly exceeded the shrub densities in the Riparian Drainage Cover Type so a separate cover type was assigned to this wetland area.

Agriculture

Approximately 85.0% (1,015.7 acres) of the *hnt'k'wi̲pn* Management Area is cropland. Location and extent of crop types vary annually, however, wheat (both winter and spring wheat) is the dominant crop produced. Other crops include oats, and bluegrass.

Topography of the Agricultural Cover Type is flat in the vicinity of Hangman and Sheep Creeks, which are in the central and southern portions of the property. In 2006, 118 acres of the flood plain/terrace along Hangman was taken out of agricultural production because inundated soils reduced crop production to unprofitable levels. Drain tiles were installed in the mid to late 1960s in three agricultural fields along the lower reaches of Sheep Creek totaling approximately 200 acres. These fields remain in agriculture production and the effects of these tile networks on soil moisture were evaluated using a simulated groundwater elevation modeling effort known as MODFLOW. The model identified the tiled network as a sink that removed water from the fields during the wet season. Without the tile network, simulated ground water elevations exceeded landscape surface elevations, indicating that hydrologically these fields should function as wetlands in the absence of the tiles. The model could not predict when the simulated groundwater elevations would fall below the actual land elevations so no prediction could be made of the type of wetlands that could be supported in the absence of tiles.

An additional 31.5 acre field in the northwest corner of the *hnt'k'wi̲pn* Management Area is underlain with drain tile. This area was not included with the 200 acres examined by the MODFLOW model because of the lack of data on tile location and extent. This 31.5 acres will be treated as the larger tiled acreage is treated during the implementation of this Management Plan.

The Agricultural Cover Type also encompasses the gently rolling hills and drainages north of the Old Sanders Road (Figure 9). Drainages within the *hnt'k'wi̲pn* Management Area north of Old Sanders Road flow to the southwest and that orientation contributes to the relatively dry characteristics of the area's ridges and humps. This area north of Old Sanders Road is the driest portion of the *hnt'k'wi̲pn* Management Area. Data from the 1905 Public Land Survey indicate that portion of the *hnt'k'wi̲pn* Management Area north of the Old Sanders Road may have been the easternmost extent of the Palouse Steppe within the Hangman Watershed.

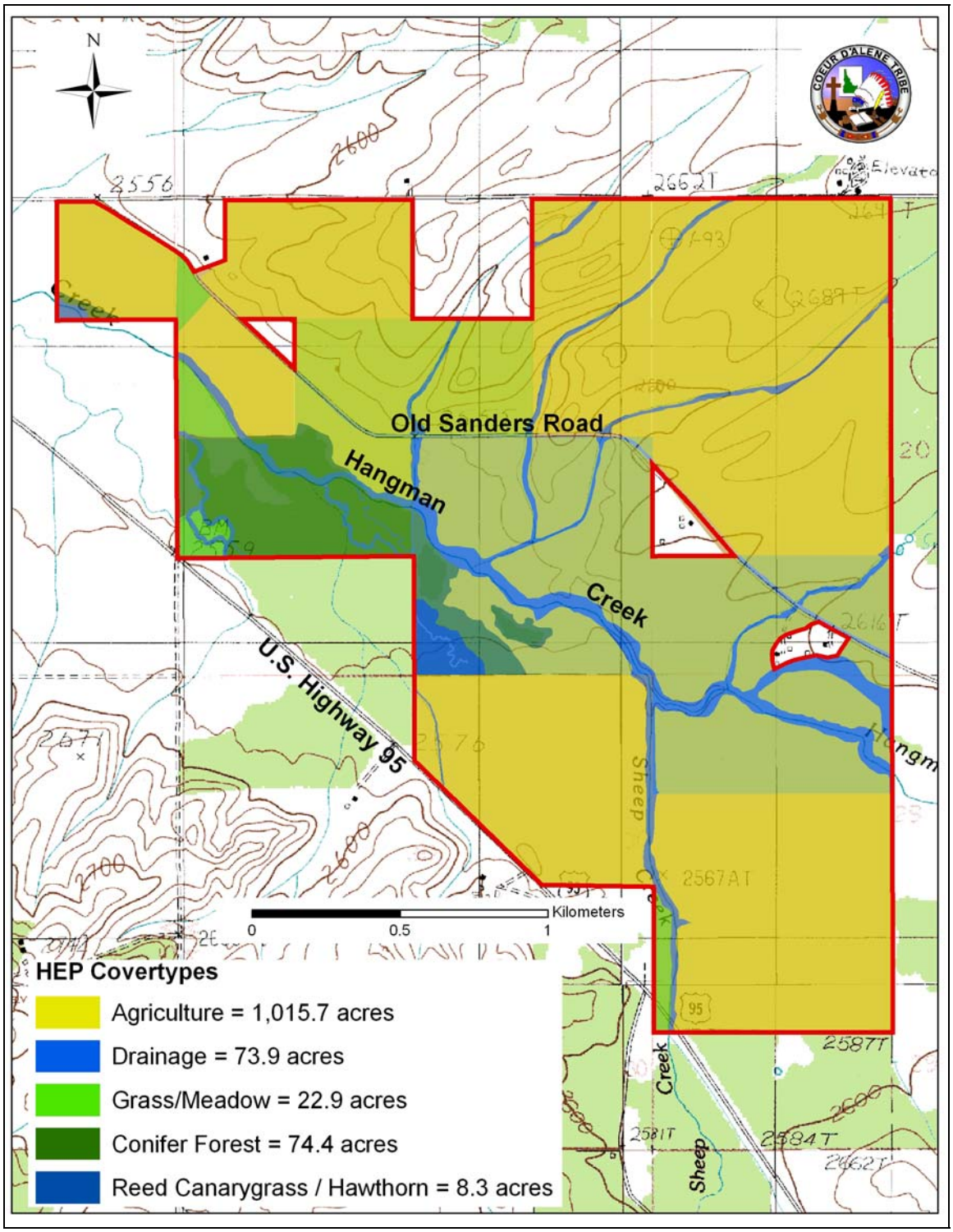

Figure 9. ***The hnt'k'wipn Management Area with covertypes color coded separately.***

HABITAT EVALUATION PROCEEDURE (HEP)

The Bonneville Power Administration was guaranteed a minimum of 364 protection HUs for the purchase of the *hnt'k'wipn* Management Area by the Albeni Falls Work Group. The field work for the baseline HEP was completed in 2005 and the report that summarized the findings was completed in February of 2007 (Green 2007). The HEP report documented 317.7 extant Albeni Falls Target Species HUs. Overall, the low HU to acre ratio (0.266/1.0) was attributed to the high percentage of the property devoted to agricultural production (Table 1). Restoration of the Agriculture Covertype acreages in the broad floodplain and wetland habitats along Hangman and Sheep Creeks offers the greatest opportunity to achieve high enhancement HU returns. These acreages offer the opportunity to bring HU crediting from 0 HUs per acre to at least the 1.8 HUs per acre for Target Species that is currently realized in the 5 non-Agriculture Covertypes.

This 1.8 HU/acre ratio does not mark the upper limit of Target Species HU production for the mitigation property. The non-Agriculture Covertypes, from which all the current HU credits were derived, can themselves be enhanced and the prospect of increased diversity of adjacent habitats and covertypes offers the potential for synergistic benefits to HU production. Adjustments in hydrophytic shrub cover and wetland diversity within the Coniferous Forest, Riparian Drainage, Grass Meadow and Reed Canarygrass/Hawthorn Covertypes will result in enhancement HUs. Wet meadow openings within the Coniferous Forest Cover Type are populated by camas and widely scattered hawthorn. Thinning of dense forest regeneration and selectively opening the coniferous overstory will allow establishment of a diverse hydrophytic shrub understory which will result in increased HU production for white-tailed deer and yellow warbler without compromising the HUs for black capped chickadees. Increasing the proportion of hydrophytic shrubs in the Riparian Drainage and Grass Meadow Cover Types will improve HU production in those cover types. An increase in diversity within the Reed Canarygrass / Hawthorn wetland will improve yellow warbler HU production and eventually provide HUs for the black-capped chickadee.

The lack of HU production for Albeni Falls Target Species within the Agricultural Covertype within the *hnt'k'wipn* Management Area represents a gap in crediting to the Bonneville Power Administration for the purchase of the property. Several avenues are available to provide crediting for this portion of the mitigation land. Albeni Falls Target Species HUs will accumulate over time as restoration and enhancements change the habitats and one avenue of crediting is to rely on the natural accumulation of Target Species HUs as habitats mature. However, it is forecasted that these Target Species HUs will not accumulate substantially until native vegetation communities begin to mature, which could take 15 years. The Coeur d'Alene Tribe recognized that other options are available for more immediate crediting. One avenue would be to select other species for which models are available that will provide HU crediting on agricultural lands. Models available for Rocky Mountain Elk, mourning dove (*Zenaidura macroura*), and a recent white-tailed deer model would attribute HUs to the agricultural lands. One additional option for crediting would be for the Coeur d'Alene Tribe, the Albeni Falls Work Group and BPA can agree on a minimum number of HUs per acre to credit for habitats not

suited to Target Species. At the time of completion of this draft of the Management Plan, no crediting scheme for current crediting of the agricultural lands has been agreed upon.

It must be remembered, however, that this particular property was targeted for the dual benefits that habitat restoration will provide. Native redband trout populations inhabit the forested upper reaches of Hangman and Sheep Creeks upstream of the *hnt'k'wi̲pn* Management Area. Restoring wildlife habitats within this mitigation property also bears the potential of connecting some of these isolated native salmonid populations.

Table 1. The *hnt'k'wipn Management Area cover types, habitat suitability indices (HSI), and habitat units (HUs).*

Cover Type	Acres	Species	HSI	HUs	Quality	Limiting Factors
Conifer Forest	74.4	Wintering Bald Eagle	0.44	33.3	Marginal	Distance to water body too great to support reproduction Low prey/food base within five miles of winter perch sites
		Black-capped Chickadee	1.00	74.4	Good	None
		White-tailed Deer	0.77	57.3	Good	Less than optimum winter browse
Riparian Drainage	73.9	White-tailed Deer	0.63	46.6	Fair	Less than optimum winter browse
		Yellow Warbler	0.63	46.6	Marginal	Less than optimum hydrophytic shrub cover
		Mallard	0.40	29.6	Marginal	Less then optimum shoreline emergent and/or scrub-shrub wetland vegetation
Grass Meadow	22.9	Mallard	0.30	6.9	Marginal	Less than optimum shoreline emergent and/or scrub-shrub wetland vegetation
Reed Canarygrass - Hawthorne Wetland	8.3	Yellow Warbler	0.87	7.2	Good	Less than optimum deciduous shrub cover
		White-tailed Deer	1.00	8.3	Optimum	None
		Mallard	0.90	7.5	Optimum	None
Agriculture	1021.7	Bald Eagle	0	0.0	N/A	Insufficient prey base and lack of nesting/perching trees
		Black-capped Chickadee	0	0.0	N/A	Lack of tree canopy cover and snags
		White-tailed Deer	0	0.0	N/A	Absence of shrubs for winter browse
		Yellow Warbler	0	0.0	N/A	Absence of hydrophytic shrubs
		Canada goose	0	0.0	N/A	Absence of surface waters and wetlands
		Mallard	0	0.0	N/A	Absence of surface waters and wetlands
		Muskrat	0	0.0	N/A	Absence of surface waters and wetlands
		Redhead	0	0.0	N/A	Absence of surface waters
TOTAL	**1,195.2**			**317.7**		

WORK ELEMENTS AND MILESTONES

The following Work Elements and Milestones are those chosen from the available BPA sponsored PISCES list on 4/30/2007. The list of Work Elements is not intended as an exhaustive list of all Work Elements that will ever be employed throughout the duration of mitigation management within the *hnt'k'wi̱pn* Management Area. Rather, the list is as complete as can be predicted from the understanding the future management needs at the time of completion of this Management Plan. Work Elements are not presented in any order other than that presented in the BPA PISCES program. The order of Work Element listing does not present any priority or sequence of implementation for management actions.

This Management Plan, and thus the Work Elements presented, is intended to be a living document that will be revised and updated in accordance with adaptive management strategies and will be changed to reflect future developments in management strategies and research findings.

BPA Internal Operations Work Elements

Work Element #165 Produce Environmental Compliance Documentation

Milestone A: Complete application matrix prior to herbicide treatment of noxious weeds.

Milestone B: Complete environmental compliance prior to initiation of activities that may impact the environment.

Planning and Coordination Work Elements

Work Element #99 Outreach and Education

Milestone A: Inform Tribal members of management progress through articles submitted to the Coeur d'Alene Tribe's Natural Resources quarterly newsletter or through the Tribal Council Fires Newsletter.

Milestone B: Conduct at least 2 public meetings per year to inform local landowners of management issues within the *hnt'k'wi̱pn* Management Area.

Work Element #119 Manage and Administer Projects

Milestone A: Establish annual tasks and define associated funding to accomplish Biological Goals through stepwise implementation of this management plan.

Milestone B: Administer budgets and establish budget projections to ensure cost effective implementation of this management plan.

Work Element #175 Produce Design and/or Specifications (wetland / stream restoration plans)

Floodplain/Wetland Design

Milestone A: Release request for proposals to design 3 floodplain/wetland and intermittent stream channel configurations for floodplains within the *hnt'k'wipn* Management Area

Milestone B: Select sub-contractor to design 3 floodplain/wetland and intermittent stream channel configurations for floodplains within the *hnt'k'wipn* Management Area.

Milestone C: Establish contract with chosen sub-contractor to design 3 floodplain/wetland and intermittent stream channel configurations within the *hnt'k'wipn* Management Area.

Milestone D: Review and finalize designs for 3 floodplain/wetland and intermittent stream channel configurations within the *hnt'k'wipn* Management Area.

Sheep Creek Stream Channel

Milestone E: Release request for proposals to design Sheep Creek channel realignment & floodplain configuration within the *hnt'k'wipn* Management Area.

Milestone F: Select sub-contractor to design stable Sheep Creek channel realignment & floodplain configuration.

Milestone G: Establish contract with subcontractor to design Sheep Creek channel realignment & floodplain configuration.

Milestone H: Review and finalize Sheep Creek channel re-alignment and floodplain configuration.

Hangman Creek Stream Channel

Milestone I: Release request for proposals to design stable Hangman Creek channel realignment and floodplain configuration within the *hnt'k'wipn* Management Area.

Milestone J: Select sub-contractor to design stable Hangman Creek channel realignment and floodplain configuration within the *hnt'k'wipn* Management Area.

Milestone K: Establish contract with chosen subcontractor to design stable Hangman Creek channel realignment and floodplain configuration.

Milestone L: Review and finalize design for stable Hangman Creek channel realignment and floodplain configuration.

Work Element #189 Regional Coordination

Milestone A: Coordinate with other Coeur d'Alene Tribal programs and departments to ensure plans and activities are consistent with the directives and intentions of each Tribal department.

Milestone B: Coordinate with other agencies and offices directly involved with management of lands within the Hangman Watershed to ensure consistency between objectives.

Milestone C: Coordinate with regional efforts that effect implementation of the management plan through involvements with UCUT, NPCC, CBFWA, BPA, the Albeni Falls Work Group and others.

Work Element #132 Produce Annual Report

Milestone A: Produce final annual report accounting for all management actions taken and expenses incurred within each year.

Work Element #183 Produce/Submit Scientific Findings

Milestone A: Produce research and evaluation reports that review information on the effectiveness of management and/or restoration activities within the *hnt'k'wi̲pn* Management Area.

Work Element #185 Produce Pisces Status Report

Milestone A: Produce quarterly status reports within the BPA PISCES program to indicate progress toward completion of work elements and milestones within the given quarter.

Habitat Improvement Work Elements

Work Element #29 Increase Instream Habitat Complexity

Sheep Creek

Milestone A: Install instream structures designed for Sheep Creek through accomplishment of Milestone H of Work Element #175.

Milestone B: Increase availability of woody debris to increase instream habitat complexity within Sheep Creek.

Hangman Creek

Milestone C: Install instream structures designed for Hangman Creek through accomplishment of Milestone L of Work Element #175.

Milestone D: Increase availability of woody debris to increase instream habitat complexity within Hangman Creek.

Work Element #30 Realign, Connect, and/or Create Channel

Sheep Creek

Milestone A: Realign and/or alter Sheep Creek channel and floodplain according to designs derived from accomplishing Milestone H of Work Element #175.

Hangman Creek

Milestone B: Realign and/or alter Hangman Creek Channel according to designs derived from accomplishing Milestone L of Work Element #175.

Work Element #181 Create, Restore, and/or Enhance Wetland

Milestone A: Remove and/or disrupt drain tiles that underlay agriculture crop fields along both the east and west sides of the lower reaches of Sheep Creek within the *hnt'k'wi̱pn* Management Area.

Milestone B: Construct wetlands within Sheep and Hangman Creek flood plain and terraces according to designs created through completion of Milestone D of Work Element #175.

Work Element #53 Remove Vegetation

Milestone A: Eliminate competitive vegetative ground cover by applying chemical herbicides to areas formerly managed for agricultural production and scheduled to be planted with native vegetation within 1 year after herbicide treatment.

Milestone B: Thin stand of mature conifer forest within the *hnt'k'wi̱pn* Management Area to approximate tree densities present in historic pine open woodlands as defined by the Coeur d'Alene Tribe Forest Management Plan (2002).

Work Element #31 Conduct Controlled Burn

Milestone A: Conduct controlled burns of mature conifer forest to maintain tree densities and vegetation patterns consistent with historical pine open woodland habitats.

*Work Element #36 Develop Terrestrial habitat Features (snag development)

Milestone A: Maintain snag density and composition consistent with optimum HU production for targeted wildlife species and for other snag dependant wildlife species within the current and future forests of the *hnt'k'wipn* Management Area.

Work Element #40 Install Fence (protection from ungulates, beaver and rodents)

Milestone A: Construct perimeter fence around establishing deciduous shrub and tree species to protect from depredation by ungulates and/or rodents.

Milestone B: Erect protective coverings around individual deciduous shrub and tree species as necessary were perimeter fence cannot be established and/or probability of depredation is particularly high (within stream channels for example).

Milestone C: Remove or move fencing and/or protective coverings once deciduous shrub and tree species are sufficiently established (i.e. providing effective habitat for wildlife and producing progeny that survive beyond the boundary of protection).

*Work Element #47: Plant Vegetation

Milestone A: Sow native grass seed as a first phase of establishing native habitats within areas taken out of agriculture crop production.

Milestone B: Seed native broadleaf plants to promote native habitat establishment in areas previously planted with native grasses and where those native grasses are forming plant communities capable of hindering encroachment by noxious weeds.

Milestone C: Plant native deciduous shrubs and tree species to promote native habitat establishment in areas previously planted with native grasses and where grasses are forming plant communities capable of hindering encroachment by noxious weeds.

Milestone D: Plant cuttings and root stock of native deciduous shrub and tree species within the open woodlands of the *hnt'k'wipn* Management Area with concentrations highest along narrow linier wetlands.

Milestone E: Plant cuttings and root stock of native deciduous shrub and tree species along stream banks, floodplains and former agriculture lands within the *hnt'k'wipn* Management Area.

Work Element #48: Practice No-till and Conservation Tillage Systems

Milestone A: Continue agricultural production using no-till and conservation tillage systems to control noxious weeds in areas that are awaiting habitat restoration activities.

Habitat/Passage O&M Work Elements

Work Element #22 Maintain Vegetation

Milestone A: Apply herbicide to control noxious weeds within areas where native vegetation is established.

Milestone B: Irrigate recent plantings if needed in order to establish native vegetation communities and reduce the presence of noxious weeds.

Milestone C: Enhance soil fertility if needed in order to establish native vegetation communities and reduce the presence of noxious weeds.

Milestone D: Use grazing as a vegetative management tool to favor the production and expansion of forbs, shrubs and trees.

Work Element #26 Investigate Trespass

Milestone A: Investigate potential damaging use of the *hnt'k'wipn* Management to discover the source and viable means of preventing further occurrences of such use.

Work Element #27 Remove Debris

Milestone A: Remove any non-cultural resource debris from past use of the *hnt'k'wipn* Management Area or from illegal dumping that may occur on the property.

Work Element #188 Provide Public Access/Information

Milestone A: Post signs that clearly indicate land ownership and use restrictions at access points and where appropriate along property boundaries.

Milestone B: Establish and/or maintain gates where needed to restrict use of the *hnt'k'wipn* Management Area to approved activities.

Work Element #87 Prepare HEP Report

Milestone A: Complete HEP at 5 year intervals, or more frequently if needed, to maintain HU crediting and ensure management actions are producing desired results.

RM & E and Data Management Work Elements

Work Element #156 Develop RM&E Methods and Designs

Milestone A: Establish monitoring and evaluation methods for determining survival and growth of grass, forb, shrub and tree plantings.

Milestone B: Review and update RM&E Methods and Designs as needed.

Work Element #157 Collect/Generate/Validate Field and Lab Data

Milestone A: Collect monitoring and evaluation data to determine effectiveness of management implementation.

Milestone B: Collect survival and growth data on plantings to determine need for additional plantings or the suitability of an area to specific species.

Work Element #159 Submit/Acquire Data

Milestone A: Transfer field data to regionally used spread sheets

Work Element #160 Create/Manage/Maintain Database

Milestone A: Establish and maintain database of effectiveness monitoring and HEP data that is consistent with regional data management efforts.

Work Element #161 Disseminate Raw/Summary Data and Results

Milestone A: Release data, data summaries, and maps to regional managers via coordinated data bases.

Work Element #162 Analyze/Interpret Data

Milestone A: Analyze and interpret effectiveness monitoring and HEP data to illustrate the progress toward achieving management goals.

MANAGEMENT ALTERNATIVES

Three alternatives are presented as viable means of achieving the goals set forth in this *hnt'k'wipn* Management Plan. Each option has its merits and is evaluated along side the other alternatives as part of the process to select a course of management that achieves the Coeur d'Alene Tribe's objectives for the property as well as fulfilling BPA's mitigation responsibility. The three alternatives are presented from least manipulative in terms of landscape alterations to most manipulative and are four points along a continuum of potentials for management actions. Each succeeding alternative involves additional landscape alteration while including the management actions prescribed in the previous alternative(s).

Alternative A; Replant and establish native vegetation.

This alternative uses the single primary strategy of planting native vegetation where it is currently lacking within the *hnt'k'wipn* Management Area. No landscape alterations would be made under this alternative to accommodate native plant species, or to take advantage of drainages to restore or enhance wetlands or potential stream flow.

Upland areas within the *hnt'k'wipn* Management Area would be planted to native grasses, forbs and shrubs capable of thriving within the Festuca-Agropyron community type described by Daubenmire (1942). Floodplains associated with Hangman and Sheep Creeks would be planted with grasses, forbs and shrubs that can thrive in early season moist to wet conditions associated with the deciduous forest, scrub – shrub and camas meadow communities described by Jankovsky-Jones (1999) or the ponderosa pine floodplain plant associations described by Crowe and Clausnitzer (1997) and Hansen et al. (1995).

Serious efforts will need to be undertaken to control noxious weeds and competition from plants that could hinder the establishment of native vegetation. However, this alternative makes no provision to do more than establish native vegetation under the field drainage and stream channel entrenchment conditions that currently exist on the property.

Alternative B; Wetland Enhancement

Artificial drainage systems in the agricultural lands of Hangman serve to rapidly remove winter and spring moisture from the fields to allow agricultural crop production. Within the *hnt'k'wipn* Management Area, these systems include approximately 25,186 meters of drainage tile under approximately 200 acres that lay on both sides of the lower reaches of Sheep Creek (Figure 3) and numerous drainage ditches leading from upslope drainages across the floodplains and into Hangman Creek. Even with the drainage systems in place, 118 acres of the *hnt'k'wipn* Management Area had to be taken out of production in 2006 because high soil moisture levels prevented crop production. There are five

locations within the valley bottoms north of Hangman Creek and two locations along Sheep Creek where substantial improvements in wetland habitats can be made by lowering the current surface elevation and using the fill to cover over drainage ditches (Figure 10). A drainage ditch either cuts through these areas or a drainage ditch is close by that shunts water off the landscape during periods of high moisture availability. Of course, the Sheep Creek sites are de-watered by the drain tile in addition to the drainage ditches. Alternative B would add the restoration of wetlands and wetland functions by removing drain tiles, contouring the valley bottoms to create depressions where wetland habitats can flourish and using the excess earthen fill from the created depressions to cover over the drainage ditches. The exact configuration of these constructed wetlands will need to be carefully engineered to ensure the desired outcomes.

Alternative B includes the actions proposed in Alternative A. However the native vegetation that is expected to flourish in the areas of floodplain alteration would include emergent wetlands and a much more extensive and robust deciduous forest, scrub – shrub and camas meadow communities described by Jankovsky-Jones (1999) and more a restricted coverage of ponderosa pine floodplain plant associations of the type described by Crowe and Clausnitzer (1997) and Hansen et al. (1995).

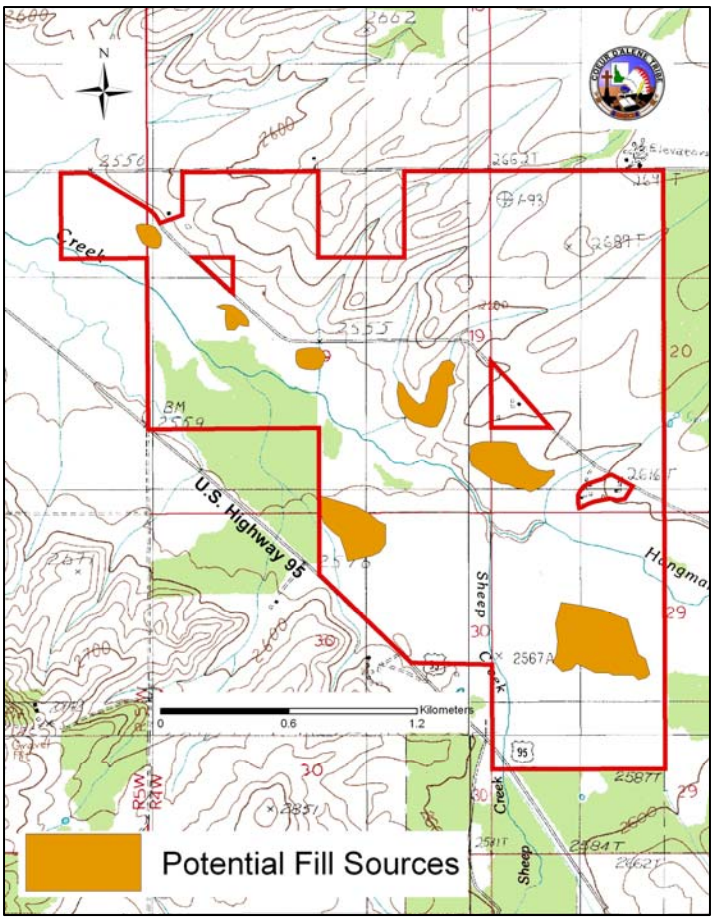

Figure 10. ***Seven sites within the valley bottom of the hnt'k'wipn Management Area that can supply fill to cover over drainage ditches.***

Alternative C; Sheep Creek Channel Realignment

This alternative adds the realignment of Sheep Creek (Figure 11) to both the development and/or enhancement of wetlands in the valley bottoms proposed in Alternative B and the native plant establishment proposed in Alternative A. Sheep Creek currently follows a parcel boundary straight north for essentially its final 1.1 kilometers before emptying into Hangman Creek. The original Sheep Creek alignment turned to the northwest after flowing under Highway 95 and emptied into Hangman Creek far downstream of the current Sheep Creek, Hangman Creek confluence (Inter-Fluve, Inc. 2006). Alternative C proposes to add the re-routing of Sheep Creek to approximate its original flow through what is now the *hnt'k'wi̱pn* Management Area by realigning the channel to the northwest away from its current position and raising the stream bed to an elevation that will facilitate that alignment.

The wetland configurations proposed in Alternative B would not change under Alternative C. The extent of deciduous forest and scrub – shrub wetland communities that would develop under this Alternative is expected to exceed that of the previous two alternatives because the lower reaches of Sheep Creek would be raised and lengthened. In addition, the elevation of the land surface along a portion of the new Sheep Creek alignment would be lowered to present a floodplain that could effectively dissipate flood water energies. Raising and lengthening Sheep Creek and lowering some of the floodplain elevations along the new alignment will present conditions favorable to the establishment of deciduous forest and scrub – shrub wetland communities.

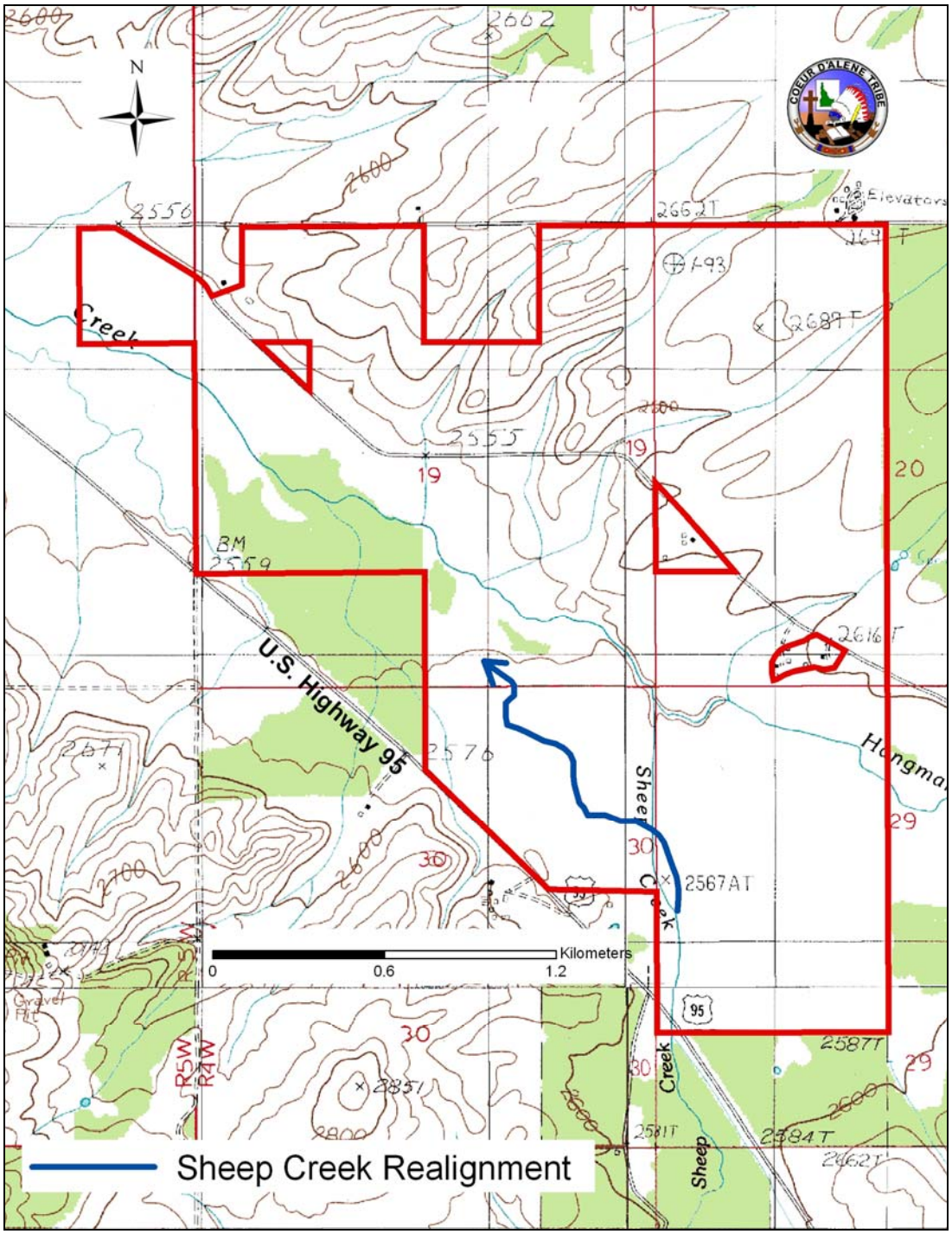

Figure 11. ***Proposed Sheep Creek realignment.***

Alternative D; Hangman Flood Plain Expansion

An analysis of the Hangman Creek Channel through the *hnt'k'wipn* Management Area was completed in 2006 (Inter-Fluve, Inc. 2006). The results of that analysis describe a stream channel recovering from an imposed entrenchment. Hangman Creek is establishing a new flood plain at a lower elevation and is unstable in its current condition. Flood waters trapped in the narrow entrenchment rapidly erode the stream banks and a new flood plain 3-5 feet below the valley bottom is developing as the banks are eroded.

The Inter-Fluve report presents 2 basic alternatives for stabilizing the channel. The report proposes to either raise the stream bed to its former elevation to allow flood waters access to the higher elevational, broad flood plain or to expand the flood plain developing at the new, lower elevation to a width that will dissipate flood water energies. Given that the entrenchment of Hangman Creek extends far beyond the boundaries of the *hnt'k'wipn* Management Area, the higher cost of raising the stream channel through *hnt'k'wipn* presents considerable risk of failure since Hangman Creek would remain at the lower elevation beyond the boundaries of the *hnt'k'wipn* Management Area. The increased risk and costs associated with raising the bed of Hangman Creek through the *hnt'k'wipn* Management Area render that option for the fourth Alternative less desirable. Alternative D proposes to widen the flood plain of Hangman at its new, lower elevation. This Alternative essentially "fast forwards" the flood plain construction process that is occurring to achieve a stable flood plain without loosing the soils to erosion and contributing to the high levels of stream sediments during flooding.

Adding the construction of a lower elevational flood plain for Hangman Creek would not cause any additional alterations to the Sheep Creek realignment of Alternative C. However, the flood plain alterations proposed in Alternative B would need to be completely re-evaluated in the light of a lower elevational Hangman floodplain. The establishment of deciduous forest and scrub – shrub wetland communities are not expected to exceed their cover under the previous alternatives.

ALTERNATIVE BUDGET PROJECTIONS

Table 2. ***Budget projections for implementing each of the alternatives.***

Planning and Coordinating Work Elements	Alternative A	Alternative B	Alternative C	Alternative D
WE #165 - A	$790.26	$790.26	$790.26	$790.26
B	**$6,322.06**	**$16,898.00**	**$30,117.92**	**$45,981.82**
WE #99 – A	$12,644.12	$12,644.12	$12,644.12	$12,644.12
B	$6,322.06	$6,322.06	$6,322.06	$6,322.06
WE #119 – A	$18,228.80	$18,228.80	$18,228.80	$18,228.80
B	$315,074.76	$315,074.76	$315,074.76	$315,074.76
WE #175 – A		$948.31	$948.31	$948.31
B		$316.10	$316.10	$316.10
C		$360,948.31	$360,948.31	$360,948.31
D		$948.31	$948.31	$948.31
E			$948.31	$948.31
F			$316.10	$316.10
G			$126,000.00	$126,000.00
H			$948.31	$948.31
I				$948.31
J				$316.10
K				$200,000.00
L				$948.31
WE #189 – A	$15,805.15	$15,805.15	$15,805.15	$15,805.15
B	$15,805.15	$15,805.15	$15,805.15	$15,805.15
C	$15,805.15	$15,805.15	$15,805.15	$15,805.15
WE #132 – A	$9,483.09	$9,483.09	$9,483.09	$9,483.09
WE #183 – A	$79,025.74	$79,025.74	$79,025.74	$79,025.74
WE #185 - A	$50,576.48	$50,576.48	$50,576.48	$50,576.48
Total for P&C	**$545,882.81**	**$919,619.78**	**$1,061,052.42**	**$1,279,129.04**

Table 2. ***Continued***

Habitat Improvement Work Elements	Alternative A	Alternative B	Alternative C	Alternative D
WE #29 – A			$46,588.24	$46,588.24
B			$64,630.72	$64,630.72
C				$186,352.94
D			$64,630.72	$64,630.72
WE #30 – A			$400,000.00	$400,000.00
B				$4,800,000.00
WE #181 – A		$31,200.58	$31,200.58	$31,200.58
B		$85,151.87	$85,151.87	$85,151.87
WE #53 – A	$18,560.21	$18,560.21	$18,560.21	$18,560.21
B	$0.00	$0.00	$0.00	$0.00
WE #31 – A	$27,337.21	$27,337.21	$27,337.21	$27,337.21
WE #36 – A	$9,694.61	$9,694.61	$9,694.61	$9,694.61
WE # 40 – A	$17,737.06	$17,737.06	$17,737.06	$17,737.06
B	$7,668.39	$7,668.39	$7,668.39	$7,668.39
C	$3,500	$3,500	$3,500	$3,500
WE #47 – A	$102,000.00	$102,000.00	$102,000.00	$102,000.00
B	$32,315.36	$32,315.36	$32,315.36	$32,315.36
C	$660,004.17	$660,004.17	$660,004.17	$660,004.17
D	$20,847.30	$20,847.30	$20,847.30	$20,847.30
E	$63,247.30	$63,247.30	$63,247.30	$63,247.30
WE #48 – A	$0.00	$0.00	$0.00	$0.00
Total for Habitat Improvement	**$962,911.60**	**$1,079,264.05**	**$1,655,113.73**	**$6,641,466.67**

Table 2. ***Continued.***

Habitat O&M Work Elements	Alternative A	Alternative B	Alternative C	Alternative D
WE #22 – A	$95,250.00	$95,250.00	$95,250.00	$95,250.00
B	$9,730.07	$9,730.07	$9,730.07	$9,730.07
C				
D	$0.00	$0.00	$0.00	$0.00
WE #26 – A	$6,464.06	$6,464.06	$6,464.06	$6,464.06
WE #27 – A	$6,464.06	$6,464.06	$6,464.06	$6,464.06
WE #188 – A	$6,464.06	$6,464.06	$6,464.06	$6,464.06
B	$6,464.06	$6,464.06	$6,464.06	$6,464.06
WE # - 87 – A	$9,484.54	$9,484.54	$9,484.54	$9,484.54
Total for O&M	**$140,320.84**	**$140,320.84**	**$140,320.84**	**$140,320.84**
RM&E and Data Management Work Elements				
WE #156 – A	$948.45	$948.45	$948.45	$948.45
B	$3,161.51	$3,161.51	$3,161.51	$3,161.51
WE #157 – A	$146,358.02	$146,358.02	$146,358.02	$146,358.02
B	$36,589.50	$36,589.50	$36,589.50	$36,589.50
WE #159 – A	$19,392.17	$19,392.17	$19,392.17	$19,392.17
WE #160 – A	$4,742.27	$4,742.27	$4,742.27	$4,742.27
WE #161 – A	$948.45	$948.45	$948.45	$948.45
WE #162 - A	$18,969.07	$18,969.07	$18,969.07	$18,969.07
Total for RM&E	**$231,109.45**	**$231,109.45**	**$231,109.45**	**$231,109.45**
Total	**$1,880,224.70**	**$2,370,314.12**	**$3,087,596.44**	**$8,292,026.00**
Costs per Acre	$1,573.15	$1,983.19	$2,583.33	$6,937.77

COMPARISON OF ALTERNATIVES

Alternative A alone would improve wildlife habitats by establishing native vegetation. The alternative, however, does not address the disruptions to the natural hydrologic functions that the artificial drainage systems have caused. These drainage systems serve to rapidly move water through the landscape and dry the soils to favor agricultural crop production. These drainage systems reduce the availability of soil moisture during the growing season and will limit management success in providing habitats that will benefit native fish and wildlife including Albeni Falls mitigation target species.

Alternative B would greatly enhance the probability of establishing mesic and hydric conditions that would favor deciduous forest and shrub communities. Disrupting the artificial drainage systems that include the drain tile network and many ditches on the properties will re-establish much of the wetland capabilities within the valley bottoms. However, Sheep and Hangman Creeks will remain entrenched and this entrenchment will continue to limit the valley bottom's capability to support mesic and wetland habitat types. This alternative does not address the degraded habitats for redband trout within the property, which was the main criteria used to identify the *hnt'k'wi̲pn* Management Area as a priority for acquisition.

Alternative C holds the best potential to establish native deciduous shrub and forest habitat and address limitations to redband trout distributions while keeping investments at reasonable levels. Re-aligning Sheep Creek will further contribute to reestablishing the naturally functioning hydrologic system that actions in Alternative B are focused toward. The re-alignment will closely approximate the original path of Sheep Creek, lengthen it and provide access to an adequate flood plain width. All this will contribute to the retention of moisture for native habitat establishment. In addition, the re-alignment of the lower 3/4 mile of Sheep Creek would contribute immensely to native fish habitats. The lower end of the new Sheep Creek alignment would empty into the "ribbon wetlands" that flow through the forested segment of the property. These ribbon wetlands are abandoned stream channels and are ready to accommodate the stream flows delivered from Sheep Creek. Additionally, raising the stream channel would contribute to enhancing stream habitats upstream since the head cut has altered in-stream habitats for a mile of the Sheep Creek channel above the *hnt'k'wi̲pn* Management Area. Given the additional in-stream habitat below the recommended re-alignment and the habitat above the *hnt'k'wi̲pn* Management Area that could be raised to more closely approach the original stream bed through natural aggradation, realigning the lower ¾ mile of Sheep Creek could potentially improve fish habitats for approximately 2 miles of stream.

Alternative D is by far the most expensive of the options. However, implementing Alternative D would incur a high degree of risk since altering Hangman Creek within the *hnt'k'wi̲pn* Management Area will not address the systemic hydrologic degradation within the Hangman Watershed. Additionally, once actions described in Alternatives A, B and C are implemented, the main additional benefits to widening the floodplain for Hangman Creek would be an increase in fish habitats along the 2 miles of Hangman Creek affected

by the pullback and a decrease in sediments delivered to Hangman. However, accomplishing the actions within the previous alternatives will establish an environment that may well, over time, reduce sediment delivery and improve fish habitats in Hangman without the added expense of Alternative D.

Alternative	A	B	C	D
Per Acre Costs	$1,573.15	$1,983.19	$2,583.33	$6,937.77
*Expected per acre production of HUs for Albeni Falls Species -Year 10-	0.8	1.1	1.2	1.2
Benefits to native redband trout	None	Minimal	2 miles of Stream Habitat Improved	4 miles of Stream Habitat Improved
% Accomplishment of Goal 1	50% no improvements in hydrologic function	70% stream channels remain entrenched	85% Hangman passively restored	95% high risk of failure
% Accomplishment of Goal 2	80% adaptive management will identify improvements to be made	80% adaptive management will identify improvements to be made	80% adaptive management will identify improvements to be made	80% adaptive management will identify improvements to be made
% Accomplishment of Goal 3	25% no landscape alterations to promote proper hydrology	50% wetlands created to promote proper hydrology within floodplain	75% Sheep Creek realignment and floodplain wetland creation	100% the maximum that can be done to promote proper hydrologic function
% Accomplishment of Goal 4	50% lacking proper hydrologic function	70% some moisture retention functions restored	85% passive, long-term, restoration of Hangman Creek	90% however, high risk of failure

Table 3. ***Cost benefits analysis for each alternative.***
HU production was assumed to accrue only within the historic hydric soils depicted in Figure 7 and only for white-tailed deer and yellow warbler during the first 10 years. HU production is based on a 1 foot per year growth rate for deciduous shrubs and trees, a 20% coverage of deciduous shrubs and trees for Alternative A, a 40% coverage of deciduous shrubs and trees for Alternative B, and a 45% coverage of deciduous shrubs and trees for Alternatives C & D.

Currently, extant Albeni Falls HUs within the *hnt'k'wipn* Management Area average 0.27 HUs per acre. Assuming a standard maturation rate for deciduous shrub and tree species and a moderate rate of survival for plantings, deciduous scrub-shrub and forest communities will reach early successional stages after the first 10 years of management. Growth and establishment of these communities to the extent that will produce substantial HUs will occur after this first critical 10 year stage of establishment. However, HUs are expected to accrue for white-tailed deer and yellow warbler during these first 10 years and the HUs produced in existing habitats are not expected to decline.

PREFERRED ALTERNATIVE

The costs verses benefits analysis of implementing each successive alternative indicates Alternative C would provide the best return for restoration investment (Table 2). Alternatives A and B each offers substantial improvements to terrestrial habitats but do not provide benefits to native fish. Alternative D is only expected to minimally improve HU production beyond Alternative C. Alternative D improves an additional 2 miles of stream length; however that improvement is achieved at almost 3 times the cost of Alternative C. Additionally, the improvements within the additional 2 miles of stream affected by Alternative D may still not provide sufficient habitat for native trout in the near future. Establishing native vegetation, disrupting the artificial drainage networks in the valley bottoms, and realigning Sheep Creek offer the best opportunities to reestablish hydrologic processes that will provide the basis for habitats supporting wildlife and fish species.

IMPLEMENTATION TIME LINE

The size of the *hnt'k'wipn* Management Area and the extent of the reduction in native vegetation coverage warrants a step wise implementation of restoration activities. To remove all the agricultural crop production and replace it with native vegetation in a single year would concentrate expenses, cause intense logistical problems, increase the probability of failure and generally increase the difficulty of structuring the landscape to favor a functioning hydrologic system. The Preferred Alternative will be implemented on a stepwise schedule, with the completion of each year's activities preparing the landscape and logistics for the next year's work. The following brief overview of project implementation is addressed by calendar year since much of this work must be planned in accordance with the seasons.

Central to ensuring success of establishing native vegetation is the underlying hydrology of the *hnt'k'wipn* Management Area. The major focus for the first 6 years of management plan implementation will be completing the landscape alterations that will allow reestablishment of hydrologic processes that hold moisture in the soils for longer

durations through the growing season. Design of floodplains, wetlands and stream realignments will consume the first year of management plan implementation (2008). Also in 2008, the drain tiles that underlie the agricultural fields on either side of Sheep Creek will be disrupted as this does not require engineering and must be completed prior to wetland establishment and stream re-alignment. Timing of landscape alteration will depend largely on the specifics of the floodplain, wetland and stream course designs that are developed in 2008. However, implementation will proceed with floodplain wetland enhancements completed before the realignment of Sheep Creek (Appendix B). The creation of wetlands within historic floodplains and using the fill to cover over drainage ditches will be completed in 2009. The realignment of Sheep Creek will occur in 2010 if the flood plain alterations and preparations for the realignment are completed. Completing the floodplain alterations first provide a floodplain hydrology that will support the Sheep Creek realignment.

Planting of native vegetation will proceed once it's established that no further disturbance will occur on a given sight. Initially, only small areas will be planted with native vegetation, but as landscape alterations are completed planting efforts will expand (Appendix B). In 2008, the forested segment of the *hnt'k'wipn* Management Area will be thinned to approximate pine open woodland conditions, burned to minimize fuel loads, release nutrients and clean the forest floor of debris that remains from the thinning project. The forest understory will then be planted with deciduous shrub and trees that are currently lacking under the conifer overstory. Establishing native vegetation on former agricultural lands is difficult in areas such as the *hnt'k'wipn* Management Area because of the invasiveness of noxious weeds. An established strategy for this region is to first use a broad range herbicide on the target area to eliminate all plant growth, then plant native grasses as a first phase of native vegetation establishment (Idaho/Washington Palouse Prairie SAFE Proposal 2007). Once the native grasses begin to establish, the area is then treated with an herbicide that will destroy the volunteer broadleaf plants. The broad leaf herbicide treatment post grass germination will prevent noxious weeds from establishing and allow grasses to flourish. After the successful establishment of native grasses, planting of native broadleaf and deciduous shrub and tree species will begin. Small segments of former agricultural land that are not going to be disturbed by landscape alterations will be planted with native grasses in 2008. In 2009, once it's verified that the native grasses sown in 2008 have established, planting of native forbs, shrubs and trees will begin on these areas. In succeeding years, new areas will be treated and planted with native grasses once landscape alterations are completed (Appendix B). And, generally planting with native forbs, shrubs and trees will follow native grass plantings by a year. The uplands within the *hnt'k'wipn* Management Area will be the final stage of native vegetation establishment. This first phase of management, which is the establishment of natural hydrological processes and native vegetation patterns is scheduled for completion in 2015, at that point management emphasis will shift to maintaining those amenities within the property boundaries.

ADDITIONAL MANAGEMENT ACTIONS

Grazing

If grazing is employed within the *hnt'k'wi̲pn* Management Area, its use will be restricted to strategies that benefit fish and wildlife habitats. Prior to grazing, this management plan will need to be revised to include a specific plan for how grazing will be used to benefit plant and animal communities. In general, grazing will be restricted to time periods and durations that favor the establishment and persistence of a diverse deciduous woody and forb communities within the floodplain/riparian zones of the *hnt'k'wi̲pn* Management Area. Grazing can be used to benefit these communities by reducing competition for desired plant species and reducing ground fuels that can carry and sustain wildfire. However, apportioning the available forage production, providing off stream water and mineral sources, and timing of livestock grazing must all be well defined. A management plan that specifically addresses each of these facets must be developed approved and strictly adhered to if grazing is to occur within the *hnt'k'wi̲pn* Management Area. Any changes in the management plan must be reviewed and approved by the Coeur d'Alene Tribe and provided to BPA for review and approval prior to implementation.

Timber Management

The conifer component of the forest overstory will be managed to approximate low elevational ponderosa pine old growth forests, which is 5-20 trees per acre >20"DBH (Coeur d'Alene Tribe 2002). This conifer stocking density will allow a strong deciduous woody component to develop within the pine open woodland overstory. The pine open woodland and deciduous woody combination will provide high HU values within the *hnt'k'wi̲pn* Management Area, provide high forage quality for ungulates while providing needed shade for streams. Pine open woodland covertypes with high densities of deciduous shrub and trees scattered amongst the open coniferous overstory will be the objective of timber management within the property. Currently, tree densities within 27.5 acres of the pine forest that are not within stream protection zones average 74 trees per acre (see Appendix C: Timber Cruise Report). The target tree density of 5-20 large trees (>20" dbh) will be achieved in FY2008 by selectively harvesting a majority (282,863 board feet) of the large trees from within this 27.5 acres where the stand is particularly dense. The health and vigor of the trees that remain after thinning will increase and will the diversity of species amid the forest understory.

Snag densities within the *hnt'k'wi̲pn* Management Area will be maintained to optimize habitats for snag depended wildlife species. Large diameter snags (≥ 20" dbh) will be maintained at densities of 1 to 2 snags per acre or higher (Coeur d'Alene Tribe 2002) for those species that depend on these large diameter snags. Small diameter snags (from 4" to 10" dbh) will be maintained at densities of 2 or more per acres to accommodate those species, such as the black capped chickadee that depend on these smaller snags. Stocking densities consistent with the pine open woodland covertype are sufficient to ensure snag

recruitment, however active alterations to standing trees, such as girdling, may be needed to maintain snag densities.

Prior to 1900, cool ground fires at intervals of 5 to 25 years promoted these open stands of ponderosa pine (Green et al. 1992). These cool underburns thinned the pine regeneration and can rejuvenate stands of deciduous tree and shrubs. Prescribed fire will be used as a tool within the *hnt'k'wipn* Management Area to achieve stand and snag densities as well as maintain the vigor of the deciduous shrub and tree components of the forest communities. Prescribed fires at intervals that approximate pre-1900 ground fire intervals will most likely achieve the stated purpose. However, those intervals will be adjusted as needed to achieve the stocking density, snag densities and deciduous vigor appropriate for high quality wildlife habitats.

In the event that prescribed fire is used to either maintain forest habitats or as cleanup after a thinning project, a prescribed burn plan will be developed to ensure the fire is conducted safely and any potential adverse effects are avoided. The prescribed burn plan will be developed in accordance with the **Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide** (USDA & USDOI 2006. see Appendix E for burn plan template). The specific management actions taken on each prescribed fire vary with topography, timing and personnel involved. Specifics actions to ensure the fire does not escape and management goals are achieved can only be generally described without a prescribed burn plan. Techniques to control the fire may include the use of fuel models to predict fire behavior, control of ignition, and the use of suppression techniques, however, the full scope of actions and strategies to control the prescribed fire will be completely spelled out in a prescribed burn plan prior to implementation The prescribed burn plan will also specify the ignition methods, expected fire behavior, smoke management considerations, a holding plan, mop-up standards, a contingency plan for fire escape, communications and coordination, monitoring and evaluation, and safety procedures.

Access

Walking access to the *hnt'k'wipn* Management Area is available from Fox and Old Sanders Road County roads and gated access points along Highway 95 (Figure 1). No provision is made within this management plan to enhance the general public's access to the property. Walking visitors to the property currently have a number of points where access is available simply due to the Benewah County Roads and the adjacent Highway 95 and walking visitation is not discouraged. However, there is a high probability that vehicular access to the *hnt'k'wipn* Management Area would degrade habitats and harm wildlife populations. Therefore, vehicular will be prohibited except for management access to conduct protection, restoration or enhancement activities.

Wetlands and streams within the property pose a barrier to hiking or walking within the property. One of the comments from a Coeur d'Alene Tribal School student that frequented the property as part of an educational class was a desire for easier and safer crossings over these narrow wetlands and streams. Rope or log crossings over these

barriers may be constructed, however, in order to prevent all terrain vehicle damage to the *hnt'k'wipn* Management Area, these bridges must be designed for foot traffic only. These crossings may be created only if the design for these crossings is approved prior to construction. Crossings may be placed across these wetland and stream barriers only by an established service organization or educational institution. No project monies will be devoted to providing wetland or stream crossings other than those needed to manage the property.

Wildlife and Highways

The Coeur d'Alene Tribal Wildlife Program conducts ongoing studies of the wildlife, particularly the ungulate populations, on the Coeur d'Alene Reservation. The Coeur d'Alene Tribe's Wildlife Program currently (2/8/2008) has 7 elk fitted with radio collars as part of ongoing efforts to study elk movement, habitat use and population dynamics within the Reservation. This ongoing effort was initiated in 2004 through a grant provided by the Rocky Mountain Elk Foundation (Coeur d'Alene Tribe Wildlife Program 2005b) and is continued through funds provided by the Coeur d'Alene Tribe and the Upper Columbia United Tribes. The first goal in initiating the study was to locate migration corridors. The Coeur d'Alene Tribe Wildlife Program continues the study by trapping and collaring additional elk to retain a continuing sample of elk as collars are lost and to expand the number of elk collared so as to expand the inference population. The Wildlife Program also conducts seasonal studies on ungulate population trends and distribution in response to direction and funding from the Coeur d'Alene Tribe. This second study is conducted using sightability models applied to specific survey routes. The Coeur d'Alene Tribe also maintains a database of ungulates killed in vehicle collisions as part of ungulate behavior and population monitoring efforts.

US Highway 95 forms part of the west and southwest boundary for the *hnt'k'wipn* Management Area and at this point the Coeur d'Alene Tribal Wildlife Program has no data to suggest that wildlife, particularly ungulates, cross US Highway 95 near the *hnt'k'wipn* Management Area in numbers that are greater than elsewhere on Highway 95. No evidence suggests that Highway 95 near the *hnt'k'wipn* Management Area is part of any ungulate migratory route or that ungulates favor the *hnt'k'wipn* Management Area more than other parts of the Coeur d'Alene Reservation. The Coeur d'Alene Wildlife Program fully plans to continue studies into ungulate population dynamics, habitat use and distribution as part of ongoing efforts. The Coeur d'Alene Wildlife Program also has a working relationship with the Idaho Transportation Department and if ungulate densities and travel or migration patterns change, the Wildlife Program will consult with the Idaho Transportation Department to see that appropriate signage is posted or that other appropriate measures are taken to minimize wildlife-vehicle accidents.

Wildlife Habitat and Mosquito Born Disease

Mosquitoes are a part of the environment and particularly wetland environments. Unfortunately, mosquitoes can be a vector for disease dispersal, so consideration must be given to mosquito populations in wetland design and restoration. Fortunately, functioning wetlands produce a variety of predators that include species of fish, waterfowl, passerines, amphibians, bats, and a variety of aquatic insects. Drained and disrupted wetlands often provide small puddles or depressions which are sufficient for mosquito production, but do not provide habitat for the predators of mosquitoes. States such as Missouri, Indiana, New Jersey, and Massachusetts promote wetland restoration as a means of controlling mosquito populations. Wetland designs and subsequent restoration and management within the *hnt'k'wi̲pn* Management Area will incorporate suggestions presented in such publications as New Jersey's *Best Management Plans for Mosquito Control and Freshwater Wetlands Management* to both minimize mosquito production and promote and abundance of mosquito predators.

No major metropolitan areas exists near the *hnt'k'wi̲pn* Management Area. However, visitation to the Area is expected since people are drawn to natural areas that produce an abundance of native habitats and a diverse assemblage of fish and wildlife species. Information in the form of brochures, web site addresses and pamphlets that provide information on West Nile virus will be provided to any visitor of the *hnt'k'wi̲pn* Management Area that requests such information.

The Idaho Department of Health and Welfare and the Idaho Fish and Game have developed surveillance protocol to assist in tracking the occurrence West Nile Virus in the State. Corvids and raptors are the primary species of interest, and any carcasses of these birds that is found within 48 hours of the bird's death will be collected and submitted to the Idaho Fish and Game for testing. Pertinent information such as species of bird, when and where the carcass was found will also be submitted. All appropriate precautions will be taken (i.e. the use of rubber gloves and plastic bags) when handling the carcasses.

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APPENDIX A

Comments Summary

Tribal Comments

Tribal Elder Comments
3/28/2007
Tribal elders Felix Aripa and Marie Irene Lowley discussed the *hnt'k'wi̱pn* Management Area and their experiences with the area. Both recalled many cottonwoods along Hangman Creek in the *hnt'k'wi̱pn* Management Area as well as beaver that helped to maintain the stream flow.

Felix conveyed that the beaver was referred to as *snqwe'ytet* (our gift) and *guɬ meymiyt* (they're smart ones) by his elders. Felix indicated he was told *lute'ytsme'ichtmet* (we don't bother them {when they have little ones}).

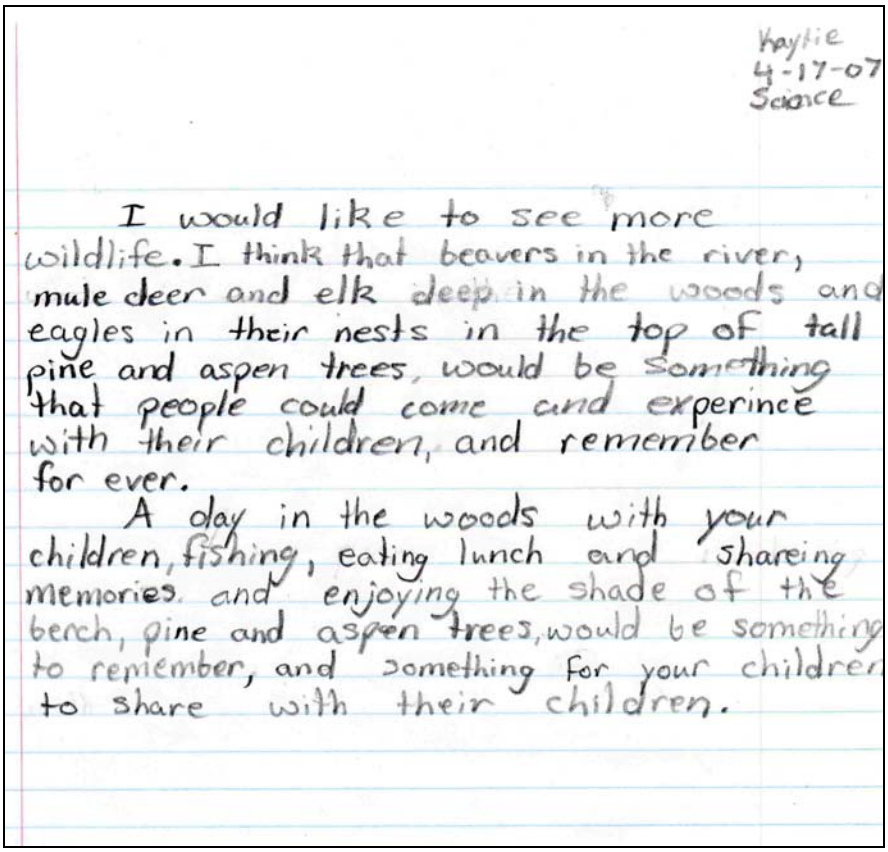
Felix also conveyed that cottonwoods *syeche'nshish khwe guɬ tt'mikhw* (they help the animals {referring to the trees and their shade}).

Both Felix Aripa and Marie Irene Lowley indicated they would like to see the cottonwood trees and the beaver return in abundance to the *hnt'k'wi̱pn* Management Area.

Tribal Youth Comments
5/15/2007

Seventh and eighth graders attending the Coeur d'Alene Tribal School in DeSmet, Idaho visited the *hnt'k'wi̱pn* Management Area 5 times between January 10 and May 8th of 2007. Students became familiar with property boundaries and current management. The majority of the visits were to the forested tract on Allotment 331 that retains vestiges of native forests and wet meadow habitats. Nine students submitted responses to a request for comments on the future management direction for the property. All comments expressed a desire for an increased abundance in floral and faunal populations as well as diversity. A desire to access the property was mentioned directly, or alluded to, in 4 comments. One student expressed a desire to more easily cross wetland barriers. A desire to swim in waters that flow through the property (which would require cleaner and more abundant water during the low flow summer season) was mentioned in two comments. One comment expressed a hope to spend leisure time with family on the property enjoying the natural surroundings. Comments reflected a Tribal history of accessing the area for hunting, gathering subsistence supplies and leisure activities such as swimming.

One comment was chosen from among those submitted by the students that seemed to capture the overall sentiment of Tribal youth for future management of the property. That comment is included below as part of the record of management plan development.



Kaylie
4-17-07
Science

I would like to see more wildlife. I think that beavers in the river, mule deer and elk deep in the woods and eagles in their nests in the top of tall pine and aspen trees, would be something that people could come and experince with their children, and remember for ever.

A day in the woods with your children, fishing, eating lunch and shareing memories and enjoying the shade of the berch, pine and aspen trees, would be something to remember, and something for your children to share with their children.

Public Comments

A public meeting was held on April 10, 2007, in Tensed, Idaho. The assessments that form the basis for the Management Plan alternatives were presented and discussed. Participants understood and agreed that the more intense restoration activities were far too expensive to implement within the *hnt'k'wipn* Management Area. Also, the fact that the problems inherent in Hangman Creek are much larger than the *hnt'k'wipn* Management Area was discussed. Participants expressed no specific desires for the future management of the *hnt'k'wipn* Management Area.

On June 6, 2007, a local citizen visited the Wildlife Program office to discuss *hnt'k'wipn* Management Area management plans and alternatives. The citizen expressed a support for the restoration of the *hnt'k'wipn* Management Area and that he looked forward to changes in that landscape.

On June 26, 2007, the Project Manager visited with a landowner who's property neighbors the *hnt'k'wipn* Management Area. The landowner first expressed a desire for the open nature of the agricultural fields to be retained. However, the landowner also expressed a desire for the streams and native habitats to be restored. These two desires

are mutually exclusive in that in order to restore the streams and native terrestrial habitats within the *hnt'k'wi̲pn* Management Area, riparian forests will necessarily generate. It appeared by the end of the discussion the desire to see the streams restored and habitats in their natural state surpassed the desire for an open view-scape.

The future management strategies for the *hnt'k'wi̲pn* Management Area were discussed with a Benewah County Commissioner on June 28, 2007. The discussion centered around the effect that restoring wetlands would have on county roads and the added expense of maintaining roads through wetland habitats. Strategies were discussed that could potentially reduce impacts of increasing soil moisture within the *hnt'k'wi̲pn* Management on County roads. However, the management plan was not altered at this time as the strategies discussed would require further discussion with Benewah County Commissioners and a complete scoping and planning process that will exceed the limitations of the current Management Plan.

A public meeting was held in St. Maries, Idaho on 9/26/2007 to discuss the future management of the *hnt'k'wi̲pn* Management Area. After a presentation of the management alternatives within the *hnt'k'wi̲pn* Management Plan, no public comments were received.

A public meeting was held in Tensed, Idaho on January 22, 2008. The *hnt'k'wi̲pn* Management Plan was a major topic of conversation. The meeting was attended by a Benewah County Commissioner. The Commissioner raised questions about the effect of wetlands restoration within the *hnt'k'wi̲pn* Management Area (as well as other mitigation properties) on the potential for the spread of West Nile Virus. The Commissioner also indicated that fences along the highways may be needed in the future to prevent ungulate-vehicle collisions as ungulates frequently travel to and from wildlife mitigation lands. Sections titled “Wildlife and Highways” and “Wildlife Habitat and Mosquito Born Disease” were added in response to the comments received on the evening of 01/22/2008.

APPENDIX B

Schedule of Implementation

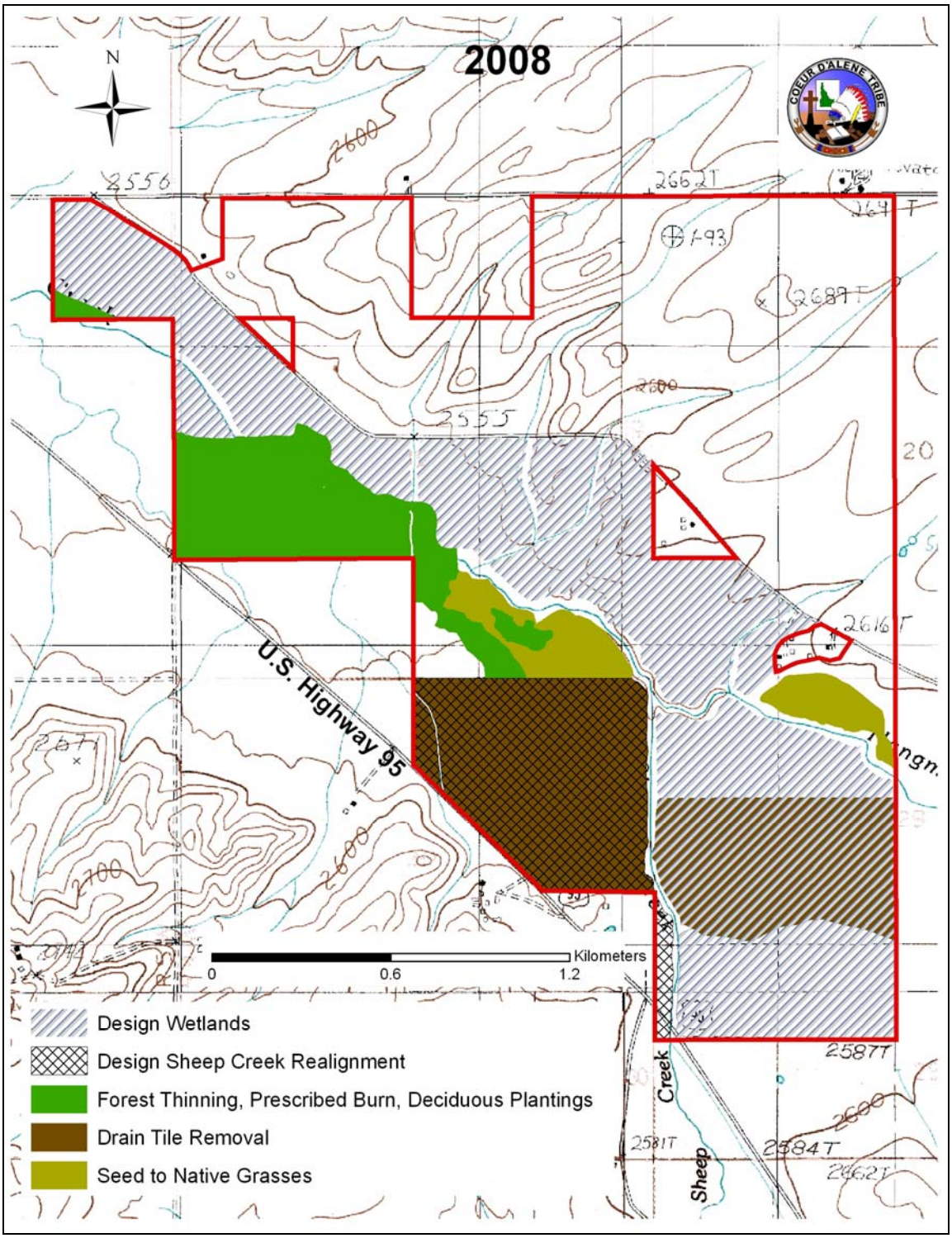


Figure B1. ***Schedule of 2008 Management Actions.***
During 2008; the drain tiles to the east and west of Sheep Creek will be removed/disrupted; the designs for the floodplain alterations and Sheep Creek realignment will be completed; the forest will be thinned to approximate pine open woodland, burned and planted with a full complement of deciduous vegetation native to that habitat; and small areas that are not scheduled to be altered will be planted with native grasses,

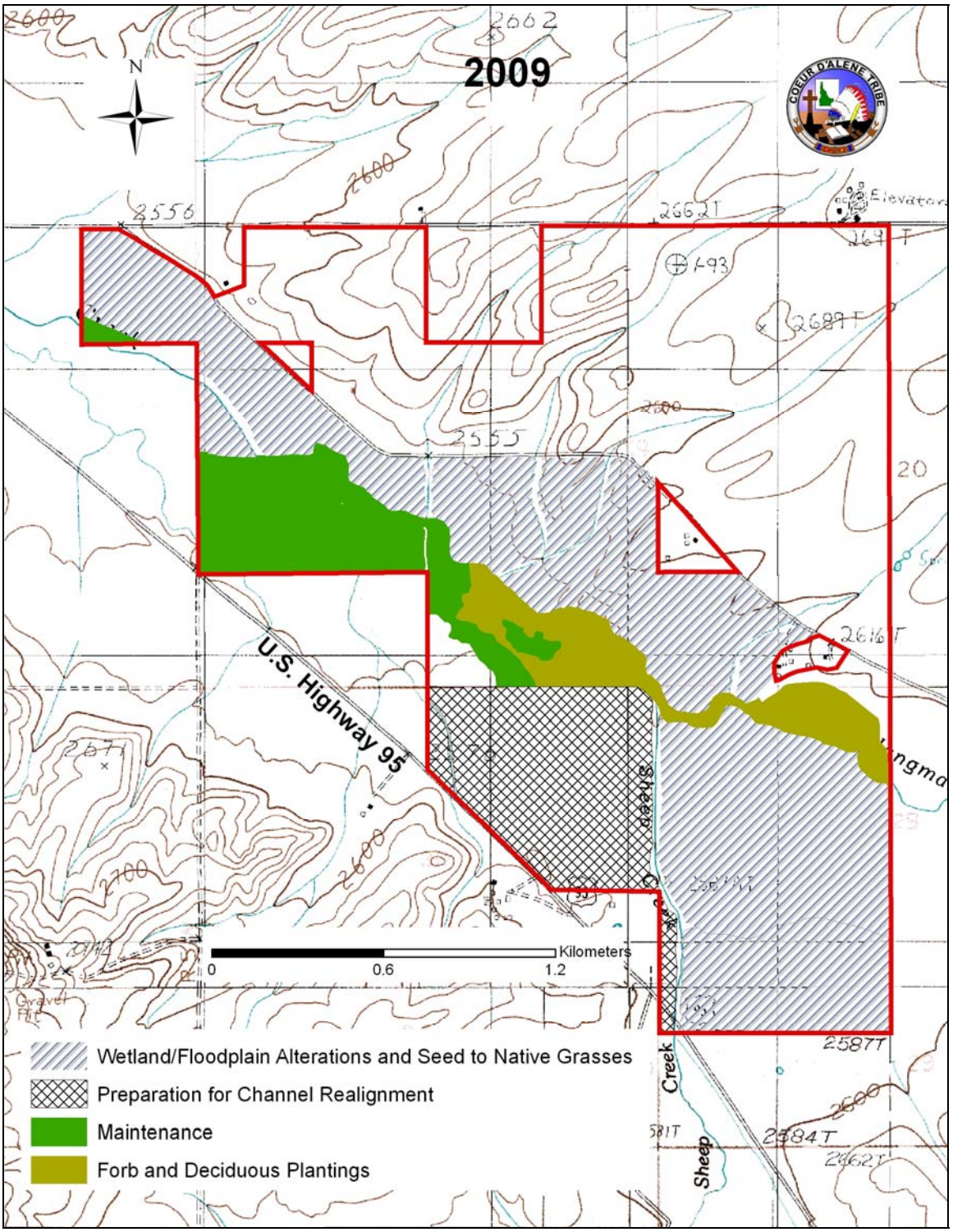


Figure B2. ***Schedule of 2009 Management Actions.***
During 2009; the wetland floodplain alterations will be completed and those areas will be planted to native grasses; preparations will be made for the Sheep Creek realignment; areas first planted to native grasses in 2008 will be planted with native forbs and deciduous component; and the native vegetation established in the forested areas will be maintained by herbicide treatments and/or replanting.

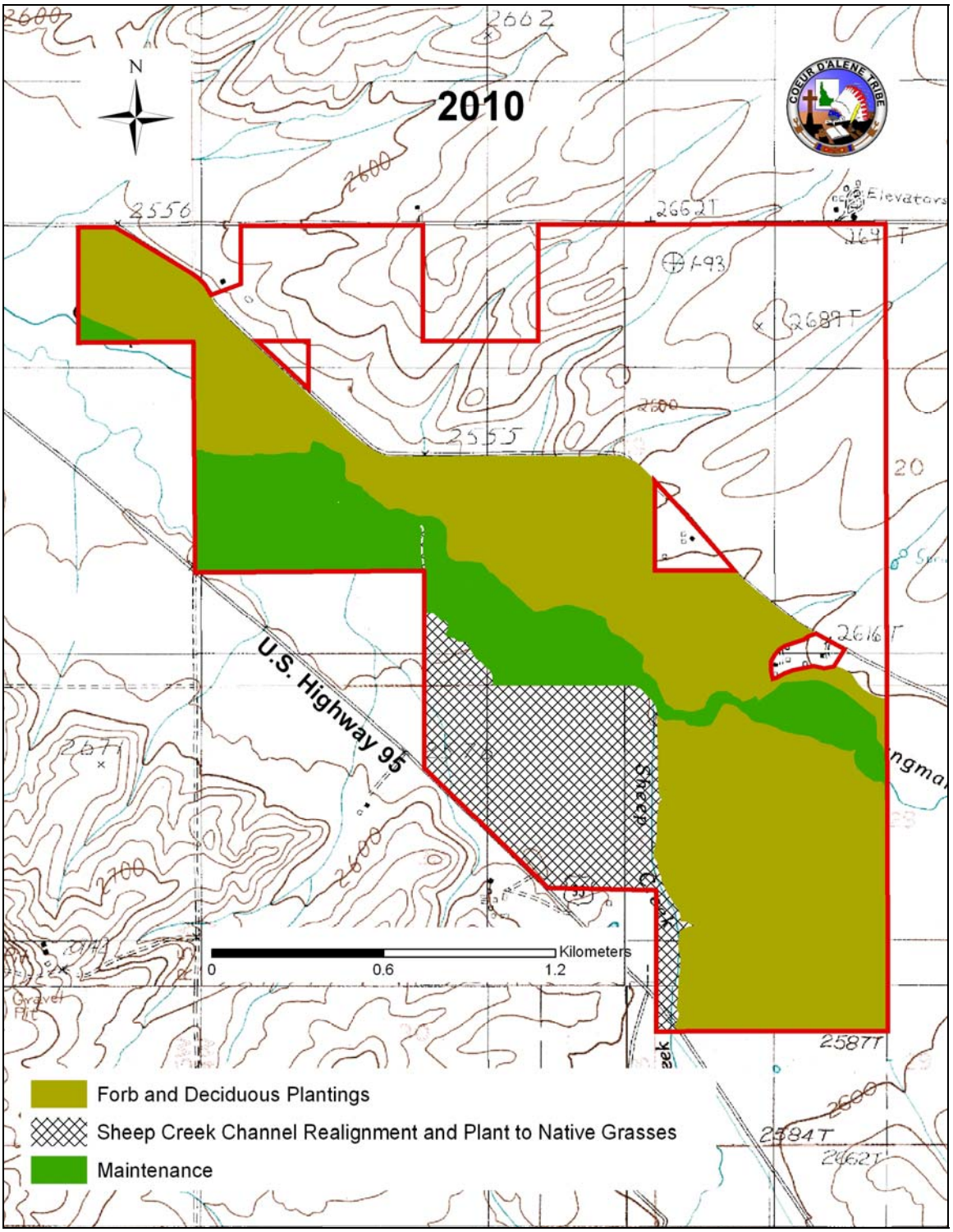


Figure B3. ***Schedule of 2010 Management Actions.***
During 2010; Sheep Creek Channel will be realigned and the area planted to native grasses however the channel will not be activated till vegetation is established to prevent erosion; forbs and deciduous shrubs and trees will be planted in areas planted to native grasses in 2090; and areas where native vegetation has been established will be maintained through herbicide treatment and/or replanting.

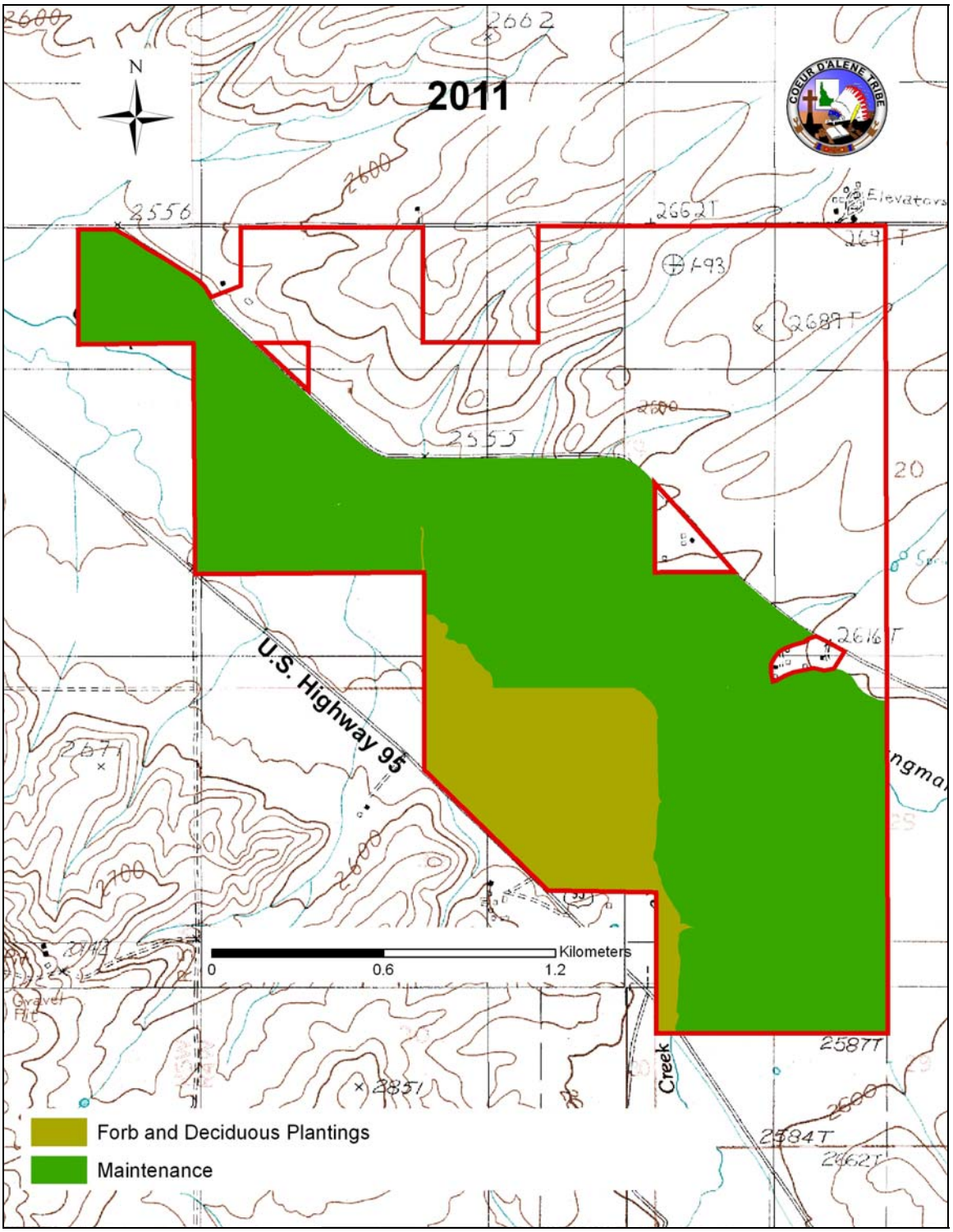


Figure B4. ***Schedule of 2011 Management Actions.***
In 2011; forbs and deciduous shrubs and trees will be planted in the area of the Sheep Creek realignment; and areas where native vegetation has been established will be maintained through herbicide treatment and/or replanting.

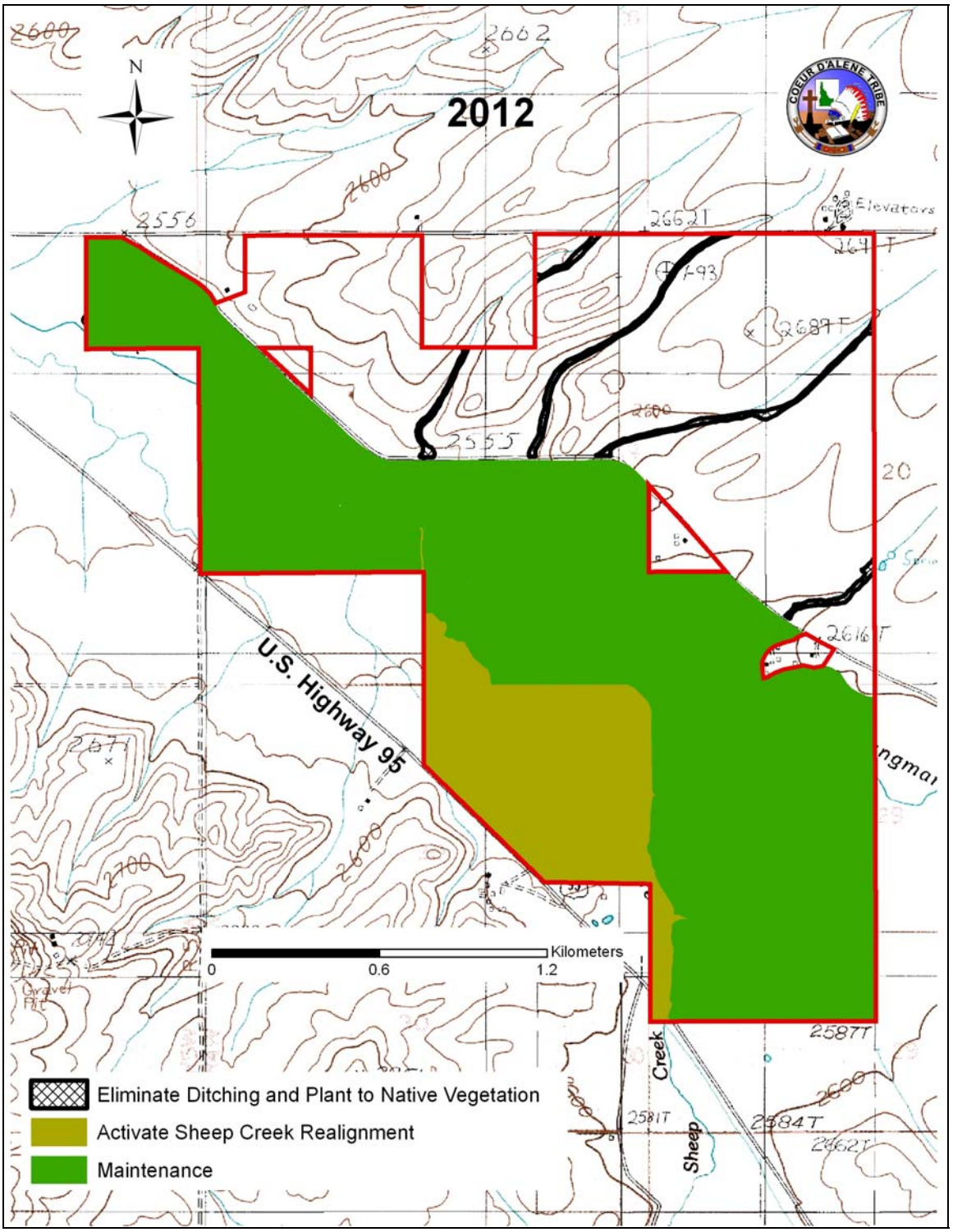


Figure B5. ***Schedule of 2012 Management Actions.***
In 2012; the water from Sheep Creek will be diverted into the established Sheep Creek realignment; ditches that were dug into the bottom of the drainages that descend from the higher grounds north of the current Old Sanders Road will be filled in and planted with native vegetation; and areas where native vegetation has been established will be maintained through herbicide treatment and/or replanting.

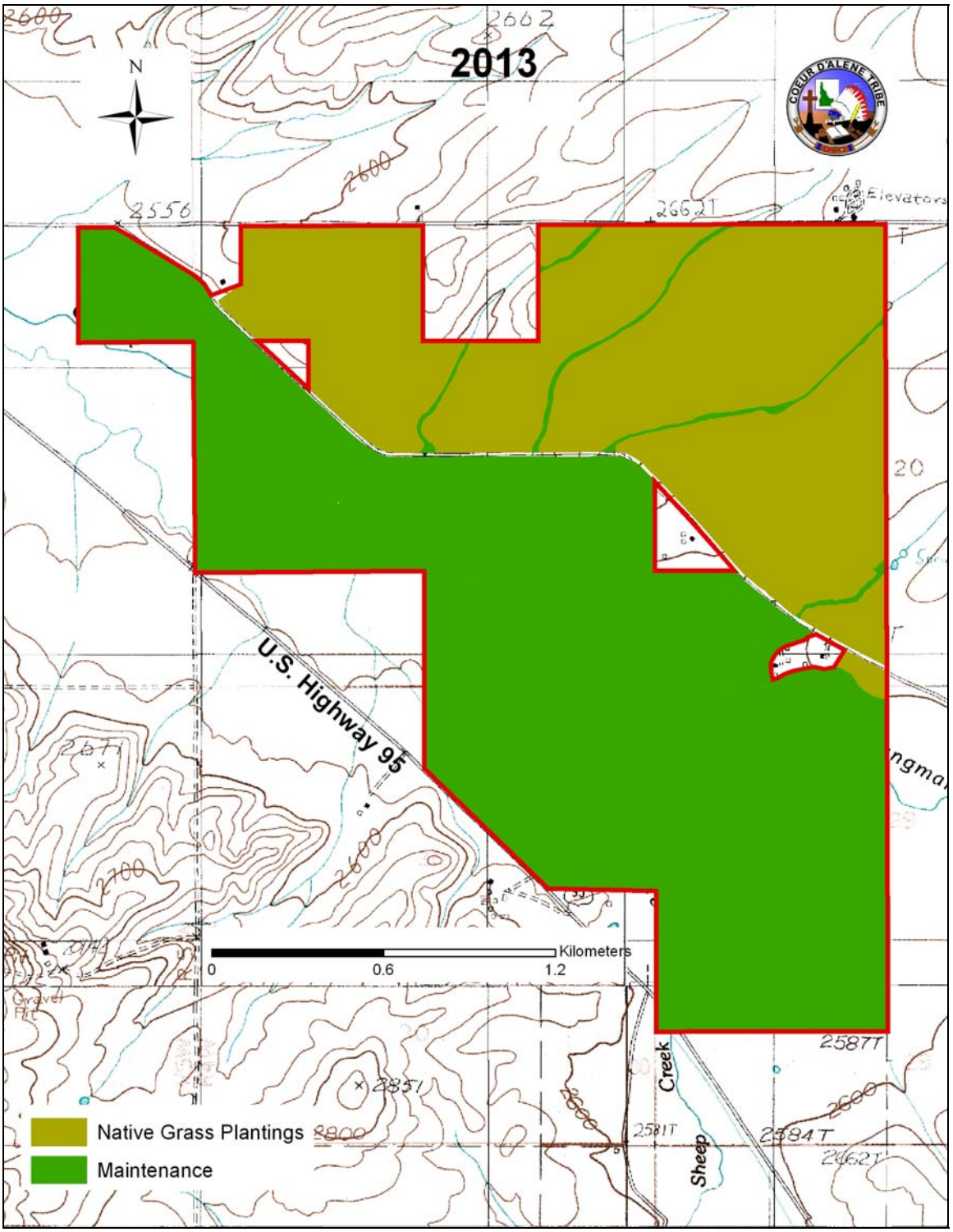


Figure B6. ***Schedule of 2013 Management Actions.***
In 2013; grasses native to Palouse Steppe will be planted in the uplands within the hnt'k'wipn Management Area*; and areas where native vegetation has been established will be maintained through herbicide treatment and/or replanting.*

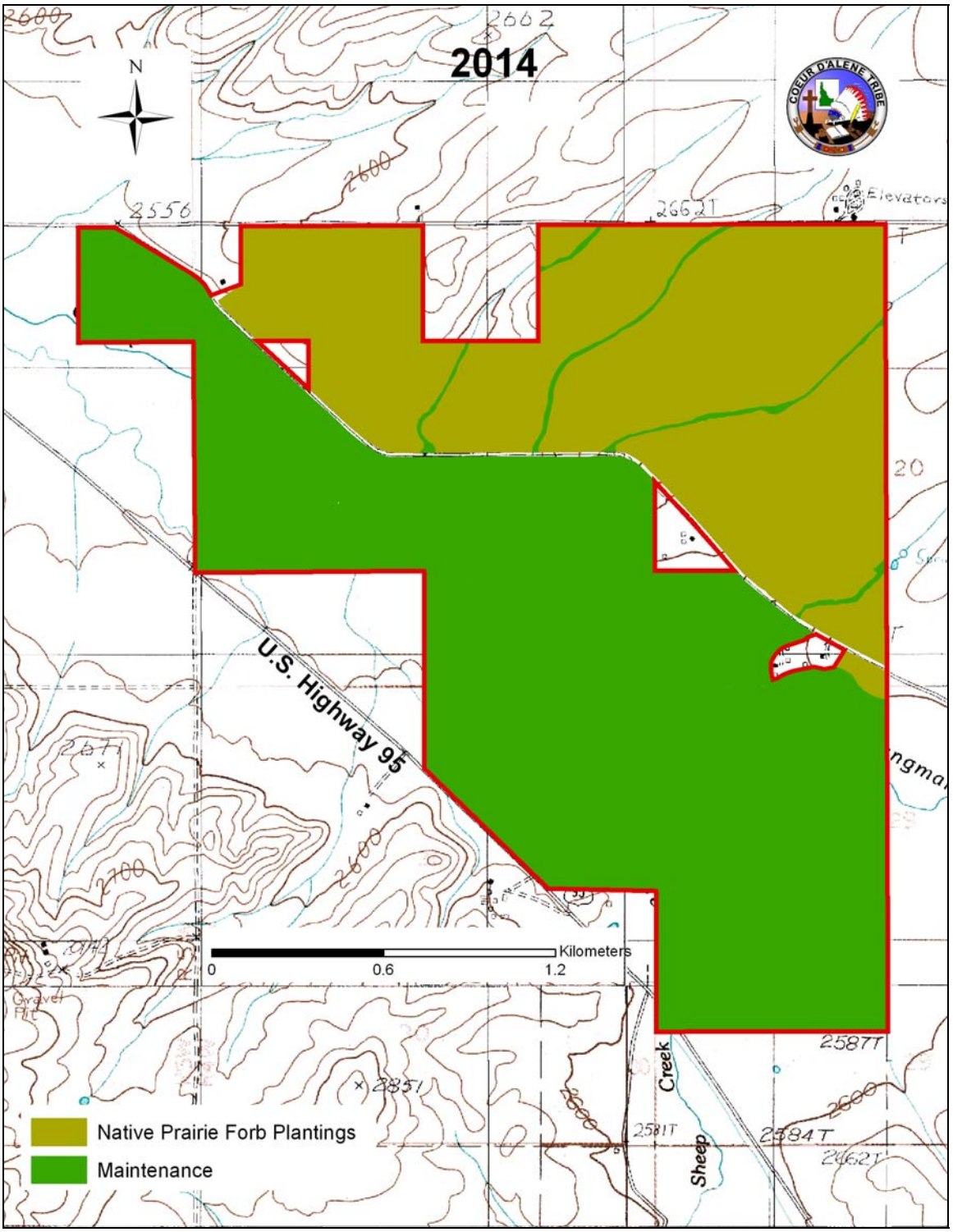


Figure B7. ***Schedule of 2014 Management Actions.***
In 2014; forbs native to Palouse Steppe will be planted in the uplands within the hnt'k'wipn Management Area; and areas where native vegetation has been established will be maintained through herbicide treatment and/or replanting.

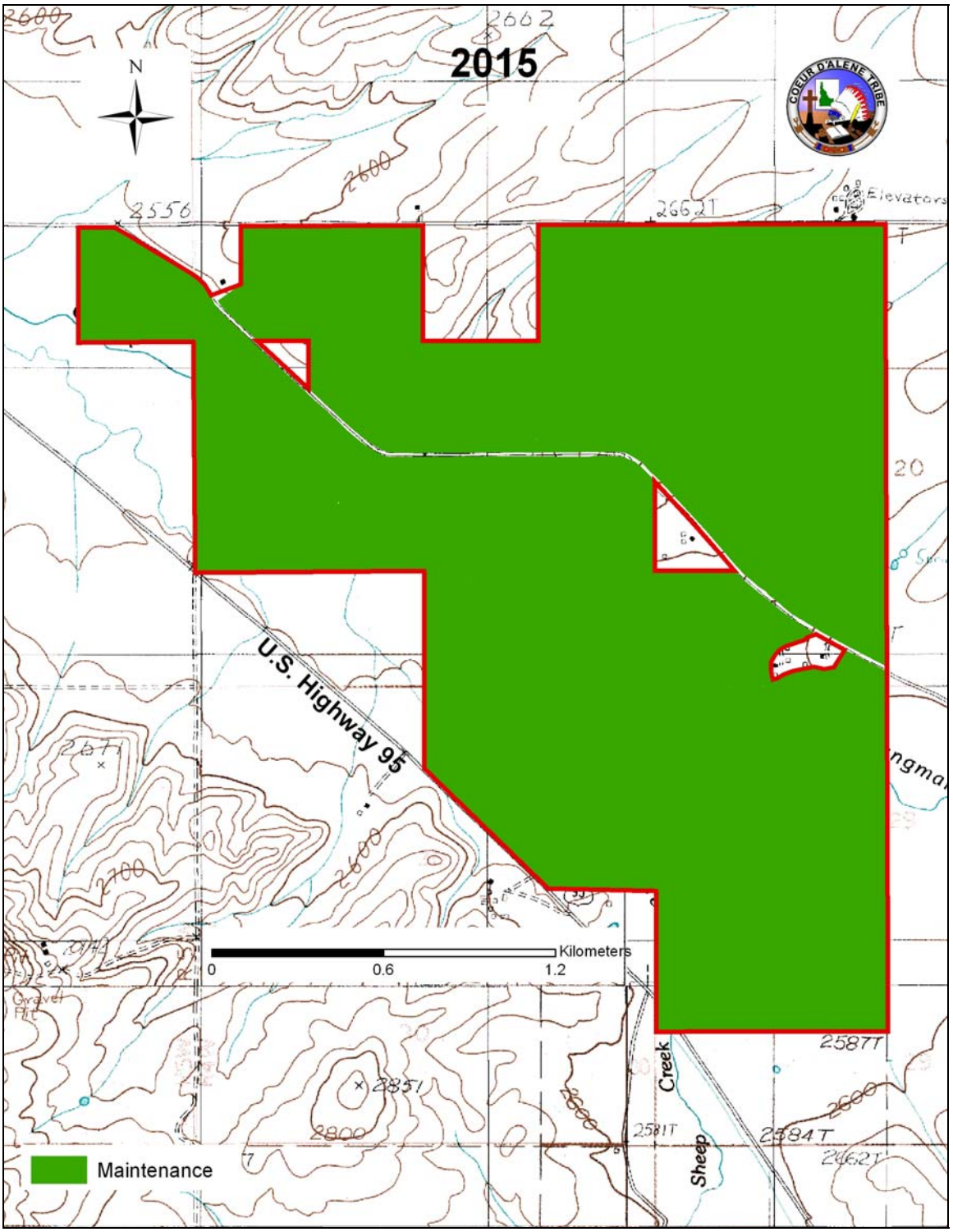


Figure B8. ***Schedule of 2015 Management Actions.***
This first phase of management of the hnt'k'wipn Management Area is scheduled for completion in 2015 when the emphasis will shift from establishing natural hydrologic processes and native vegetation patterns to maintaining those amenities within the property boundaries.

APPENDIX C

Timber Cruise Report

2/20/2008

Allotment T331

Forest Stand: 44041901, 44041903

SW ¼, NW ¼ ,Section 19, Township 44N, Range 4 W

Prepared by:

The Coeur d'Alene Tribe Forestry Program

Introduction

The purpose of this Timber Cruise Report is to state the current merchantable volume, condition, and value of the timber found on Coeur d'Alene Tribal Allotment T331. This report includes a brief description of the cruise methods used to determine the quantities and values ascribed and a description the timber stand itself. In addition, non-merchantable timber is discussed in relation to relative value as wildlife habitat. The report will conclude with a cash flow evaluation, which is used to estimate the total costs and profits associated with a maximum (50%) timber harvest operation.

Methods

Arc Maps and field inspections were used to determine that approximately 55.6 acres of Allotment 331 are forested. The remainder of the Allotment consists of agricultural land and grasslands. Hangman Creek flows through the northern portion of the forest and several wetlands that persist in abandoned stream channels also cut through the forest. These wetlands and streams within the area of potential harvest mandated the delineation of forested stream management zones (smz) (Figure 1). The Forest Management Plan (FMP) classifies streams as either Class I, Class II, or Class III depending on how long water is present and how much is present (Figure 2). Hangman Creek is classified as a Class I, which requires an average of 100' buffer zone from the water line within the stream bank. There were two Class II streams that drain to Hangman Creek, which require an average 50' buffer. Two Class III streams are present, and these require an average of 25' of buffer zone. These forested buffer zones were flagged with smz ribbon and were subtracted from the timbered acreages leaving 27.5 acres of harvestable timber.

A systematic random sample was used to determine the location of the sample plots within the targeted 27.5 acres. In this type of grid, there are 3 chains or 198 feet between transects and plots. This yielded a total of 28 sample plots and different methods were used to identify which trees to measure depending on the category the tree fell into. A relaskop using a basal area factor (BAF) of 20 was used to determine which sawlog trees to tally and to record the tree's height. A sawlog tree is also referred to as a merchantable tree, and is one that is larger than 8" diameter at breast height (dbh). Small sawlogs are trees between 8" and 11" (dbh) and trees greater than 12" (dbh) are large sawlogs. This information was then entered into the Forest Projecting and Planning System for projected volumes and relative statistical data.

Results

The primary timber species found on the subject property is ponderosa pine (*Pinus ponderosa),* Douglas-fir (*Pseudotsuga menziesii*), and grand fir (*Abies grandis*). The timbered portion of this property has the potential to achieve the characteristics of a low elevation mature and old growth forest as defined by the Coeur d'Alene Reservation Forest Management Plan, which defines low elevation old growth as a stand with 5-20 large (>20"dbh) trees per acre. The area targeted for harvest (Figure 1 and 2) includes an average of 74 trees per acre (tpa) of approximately 20" diameter at breast height (dbh).

The old growth forest target of 5-20 large (>20" dbh) trees per acre is easily met if the majority of the volume in the >20" DBH component of the stand is removed. Achieving the target tree density would mean removing 282,863 board feet of timber from the total of 492,094 board feet, leaving 204,778 board feet standing (Table 1). A total of 14% defect was observed and calculated with a 17.9 quantitative dbh, a basal area of 136 ft^2, and a 9.3% standard error.

While the overstory is comprised of large, mature pines, the understory is made up of pockets of well established ponderosa pine regeneration and scattered Douglas-fir, and grand fir. The stand could use a pre-commercial thinning to release the healthier, more vigorous trees and increase diversity amid the forest understory.

The property contains suitable habitat for a variety of species. The wetlands, stream, proximity to bluegrass fields, and limited access by vehicles, combine to create an area that is used by deer, elk, moose, black bear, and a variety of bird and small mammal species. There are an average of 3 snags per acre, many of which are currently being used by cavity nesters. Snag recruitment is also good since there are a large number of mature trees in declining health. There is also an adequate amount of down, dead, woody debris scattered throughout the parcel, providing adequate habitat for various small mammals.

The results of the timber cruise are summarized in the following tables. The current merchantable volume is expressed thousands of board feet (MBF) at the time of the cruise in March of 2008. All volumes are gross total volumes with net total volumes, less field and/or office cull, for 16 foot logs to a 6 inch top diameter using Scribner decimal C log rule.

Log, Tree and Stand Volumes by Stand / Species / Group

FBRI FPS Database Structure

Net of Buffers Acreage

Stand: 331 **Report Year: 2007** **Acres: 27.50**

	TPA	Dbh	# Logs /Acre	# Logs /Tree	# Logs /Mbf	Gross Scribner Board Volume /Log	Gross Scribner Board Volume /Acre	Gross Scribner Board Volume /Stand	% Defect Obs	% Defect Hid	Net Scribner Board Volume /Log	Net Scribner Board Volume /Acre	Net Scribner Board Volume /Stand
Species: PP													
Group: ..	0	26	1	7.0	8.0	126	170	4,688	0	5	119	162	**4,454**
Group: .C	38	17	144	3.8	12.1	83	11,922	327,852	9	5	72	10,286	**282,863**
Group: .L	36	16	113	3.1	13.2	76	8,584	236,047	8	5	66	7,446	**204,778**
Sum Species	74	20	258	4.7	11.1	95	20,676	568,587	6	5	86	17,894	**492,094**
Sum Stand	**74**	**20**	**258**	**4.7**	**11.1**	**95**	**20,676**	**568,587**	**6**	**5**	**86**	**17,894**	**492,094**

Table 1. Forest Projection and Planning System reported from Timber Cruise on T331 in February 2008. Abbreviations in this report include: TPA = trees per acre, Dbh = diameter at breast height, Mbf = thousand board feet, Obs = Observed, Hid = Hidden, PP = ponderosa pine, .. = Snags, .C = Cut Trees, .L = Leave Trees.

Statistics Report

FBRI FPS Database Structure

Forest Projection and Planning System - Coeur d'Alene Tribal Forestry

Stand	Basal Area	Quanitative DBH	Merchantable DBH	Standard Error
331	136	17.9	18.3	9.3

Table 2. Forest Projection and Planning System reported from Timber Cruise on T331 in February 2008. Abbreviations in this report include: Basal Area = square feet, DBH = diameter at breast height.

Estimated Timber Sale Cash Flow

Based on a maximum (50%) harvest on tribal allotment T331.

DATE OF ESTIMATE: March 2008

SPECIES	5 - 7.5" dbh	7.5- 11.5" dbh	11.5 - 19.5" dbh	19.5"+ dbh	TOTAL
Douglas Fir		0.00	0.00	0.00	1.10
Ponderosa Pine		70	123	91	284
TOTAL		70	123	91	**284**

DELIVERED LOG PRICE

Species	Delivered Log Price/Unit	Delivery Location
Douglas Fir	$390/MBF	Stimson, Coeur d'Alene
Ponderosa Pine	$350/MBF	Boise Building Solutions, Kettle Falls

GROSS STUMPAGE VALUE

Species	Delivered Log Price/MBF	Logging Cost / MBF	Gross Stumpage / MBF
Douglas Fir	n/a	n/a	n/a
Ponderosa Pine	$333.98	$192.72	$218.63

NET STUMPAGE VALUE

Volumes applied to gross stumpage values, less additional costs, results in the estimated net stumpage value for the subject property as of March 2008:

Species	Gross Stumpage / MBF	Cut Volume (mbf)	Total Gross Value
Douglas Fir	n/a	0	n/a
Ponderosa Pine	$218.63	284	$62,090.92
TOTAL GROSS VALUE			**$62,090.92**

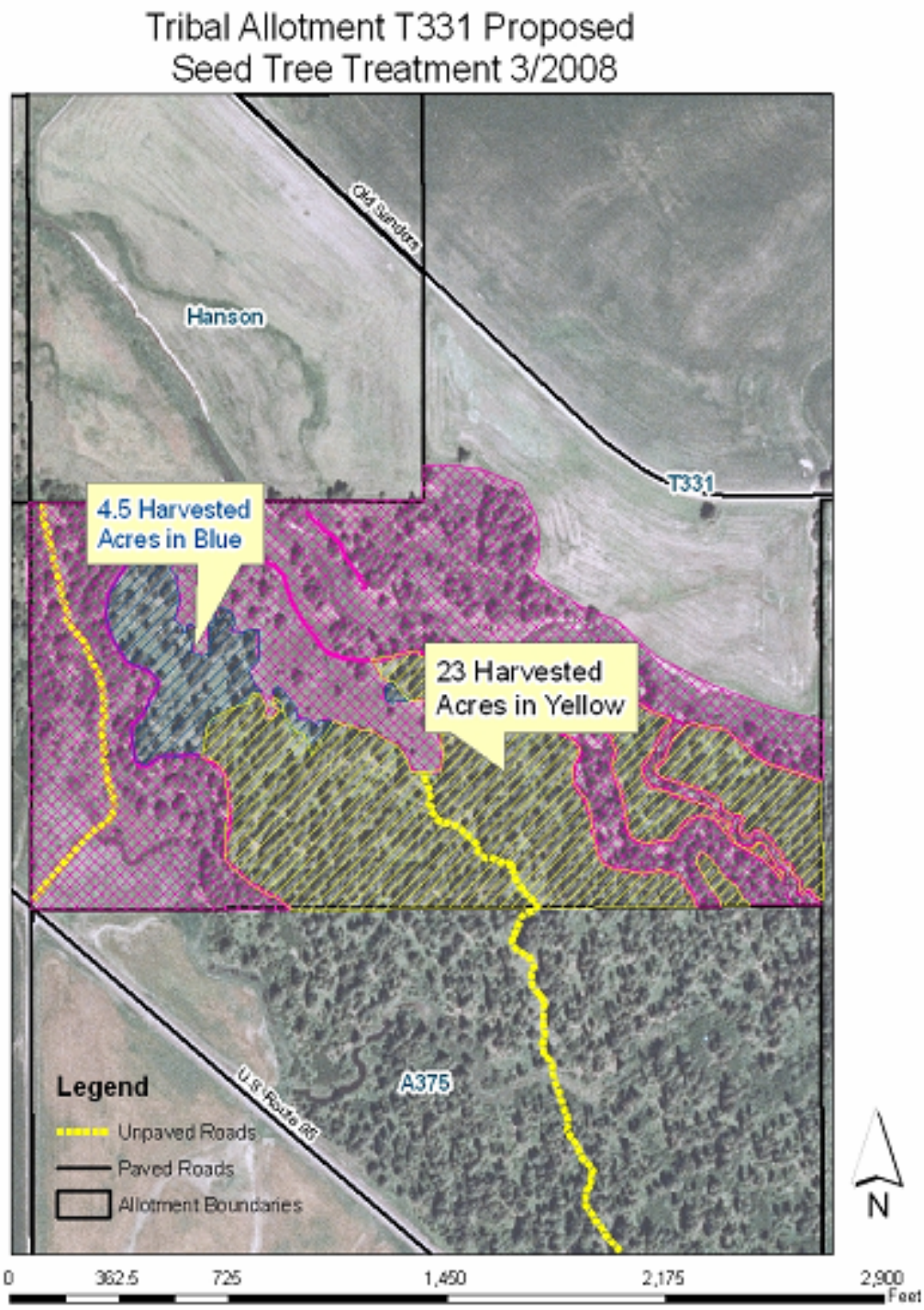


Figure 1. Arc Map photograph of the subject property showing the harvesting acres.

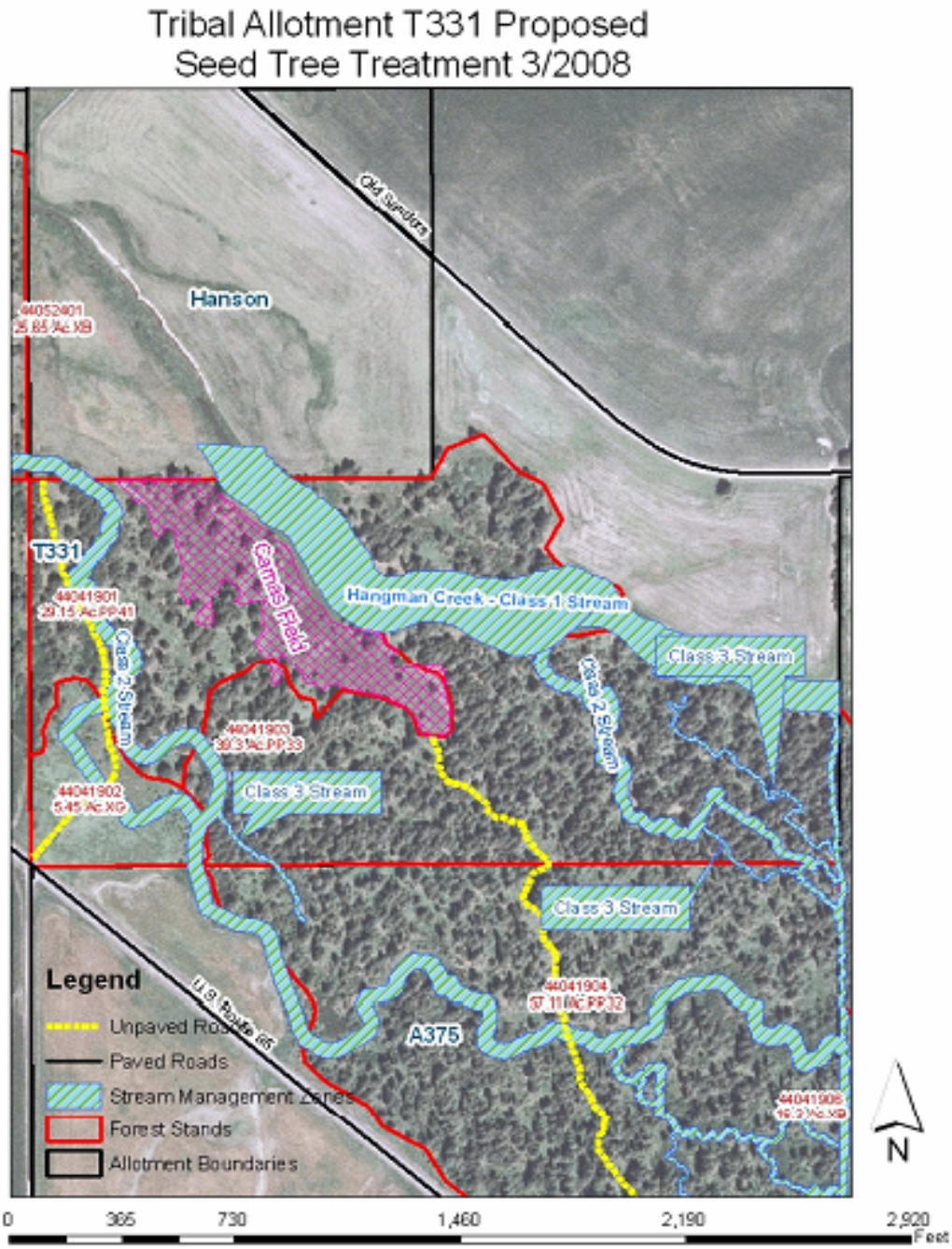


Figure 2. Arc Map photograph illustrating the Stream Management Zones and Forest Stand Boundaries.

APPENDIX D

Monitoring and Evaluation Plan

Effectiveness Monitoring

The purpose of monitoring for the Hangman Restoration Project and specifically for collecting data within the *hnt'k'wipn* Management Area is to determine the effectiveness of management actions in achieving the goals of the Project and Management Plan. The collection, analysis and interpretation of data from the flora and fauna of the *hnt'k'wipn* Management Area provides a critical step in establishing an adaptive management strategy aimed at maximizing the beneficial returns from management inputs. Monitoring and evaluation will rely principally on two evaluation processes that are established for Albeni Falls mitigation properties. These two processes, Habitat Evaluation Procedures, which directly assesses the crediting (HU) values for a given property, and methods established by the Albeni Falls Work Group (Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project) will be implemented to ensure that habitats respond adequately to management actions.

Habitat Evaluation Procedures

Habitat Evaluation Procedures will remain the central means of evaluating the effectiveness of management actions. Field measurements for the first HEP on the *hnt'k'wipn* Management Area were completed during June of 2005. Five of the species associated with the Albeni Falls Loss Assessment (Martin et al. 1998) were included in that evaluation and using only these Albeni Falls Target Species. HEP will be completed at 5 year intervals to measure the improvements in HU production. Protocols and models for the Albeni Falls Target Species are expected to be consistent with those used during the first HEP (Green 2007)

HU production for Albeni Falls Target Species in 2005 averaged 0.27 HUs per acre. With the implementation of the *hnt'k'wipn* Management Plan, Albeni Falls Target Species HUs are expected to average 1.2 per acre at the end of 10 years (2015). The HEP completed during 2010 will provide data that will indicate whether habitat responses are consistent with the 10 year HEP expectation.

Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project

While HEPs are mandated for crediting against the Albeni Falls Dam mitigation ledger, the methods and results are not sufficient to describe the effects of management actions on habitat and fauna. More importantly, a process is needed to provide additional insight into the changes in habitat complexity to define more precisely whether and to what degree shifts in management actions are needed to attain optimum habitat potentials. The parameters and data gathering protocols presented in the *Monitoring and Evaluation Plan for the Albeni Falls Mitigation Project* will quantify the progression of habitats and its effects on wildlife populations. The following listed parameters and protocols were taken from the *Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project*.

Permanent Sampling Points

Using the Universal Transverse Mercator coordinate system a permanent grid with spacing of 200 m was established by the Albeni Falls Work Group. The grid was initiated at a random point and extrapolated over all of the watersheds in which mitigation is to occur. Grid points were sequentially numbered within each of the covertypes within the *hnt'k'wipn* Management Area and within each of the crop types within the agricultural cover type. A subset of the original sampling grid points was selected for the *hnt'k'wipn* Management Area using a random numbers generator (Table C1). The 200-m spacing is equal to the preferred sample point separation for land bird point-count stations (Huff et al. 2000), and yields one potential sample point for every 4 ha of habitat. Closer grid-point spacing decreases the probability that data from adjacent sample points are independent and increases the risk of double counting birds when using variable-radius point-count sampling techniques in particular. This scheme may result in sample sizes that are too small to adequately detect changes in habitats and their associated wildlife communities for cover types that comprise relatively small proportions of mitigation properties. Consequently, some adjustment in sample allocation may be needed. Managers may choose to supplement this basic sampling scheme with additional sample points randomly selected from within a site-specific prescription area. These supplemental sample points will not become part of the long-term permanent sample-point set. They may be revisited more or less frequently than every three years and/or dropped from monitoring altogether at any time at the manager's discretion.

The sample points will be visited either every third year or one-third of the selected sample points will be visited each year on a three-year rotating basis. The use of rotating panels of sample points will allow us to effectively increase the sample size while still meeting the objectives of long-term monitoring within time and cost constraints (McDonald et al. 1998). Permanent sample sites that are visited every three years are revisited at a sufficient frequency to capture long-term trends in population and community change.

This stratified random sampling design makes no *a priori* distinction between sample points that fall on intact wetlands where management is custodial and restoration sites where there is active management and community changes may be dramatic even in a short amount of time. At a programmatic and project scale this is appropriate to document the success or failure of conservation strategies from a long-term monitoring perspective. However, it may not provide managers with adequate feedback on the success of site specific management prescriptions.

Monitoring in an adaptive management context implies benchmarks or desired outcomes against which management success can be measured. The vegetative and wildlife community structure of intact wetland habitats can act as one benchmark for the effectiveness of restoration management. The Albeni Falls Work Group will identify a subset of the permanent sample points of intact wetlands from each mitigation cover type to serve as reference sites against which restoration management may be evaluated.

Sample points selected as reference sites will initially be sampled for three consecutive years to establish a strong baseline data set. Based on initial results permanent baseline monitoring plots may also be established (to the extent possible) within formally designated ecological reference areas (e.g. USDA Forest Service Research Natural Areas) that are located in areas adjacent to mitigation properties but are functionally independent of mitigation properties and associated management. When available and applicable, the scientific literature will provide an additional source of reference benchmarks for project evaluation.

Cover Type	#	UTM Coordinates	
Forest	1	508022	5220827
	2	508428	5220797
	3	508012	5220627
	4	508212	5220617
	5	508411	5220607
	6	508611	5220598
	7	508801	5220388
	8	508990	5220178
Drainage	1	509449	5221356
	3	510036	5221123
	4	508032	5221027
	7	509210	5220568
	9	509200	5220368
05-springwheat	3	508661	5221596
	9	508451	5221406
	13	508641	5221196
	14	508840	5221187
	18	508830	5220987
05-winterwheat	2	509849	5221336
	3	510048	5221326
	7	509420	5220757
	9	509400	5220358
	17	510139	5219120
05-bluegrass	1	509659	5221546
	2	509859	5221536
	5	509829	5220937
	6	510028	5220927
05-oats	4	509380	5219959
	5	508970	5219779
	9	509360	5219559
	13	510158	5219520
	14	509749	5219340
Agricultural reference	1	507579	5222250
	2	507370	5222060
	3	507559	5221850

Table C1. UTM coordinates for permanent monitoring points identified for the *hnt'k'wipn* Management Area. Three agricultural reference points were selected as control points for bird sampling purposes.

Vegetation Sampling

Field Protocol

The goal of vegetation sampling is to collect comparative information on the vegetation. On all sites, sampling plots are located on predetermined coordinates for reference and permanent points.

Ground vegetation and substrate are measured within 20 × 50-cm metal plot frames placed at the center of each plot and on alternating sides of the transect at 4, 8, 12, and 16 m for a total of 17 samples for each plot. Plot frames are placed with the long (50 cm) side of the plot frame perpendicular to the measuring tape. Species of herbaceous vegetation are recorded and assigned to 1 of 6 cover categories (1 - < 5%; 2 – 6 to 25 %; 3 – 26 to 50%; 4 – 51 to 75%; 5 – 76 to 95 %; 6 - > 95% (Daubenmire 1959). The percent cover of bare ground, litter, or rock is measured in the same way. The height (to nearest cm) of the tallest vegetation is measured at three points along the midline of the plot frame. In tall marsh vegetation, the plot frame used is 3-sided (open on 1 of the 50-cm sides) to be able to slide the plot into the vegetation rather than placing over the vegetation. Instead of cover class, the number of stems of cattails and bulrushes are recorded. Height of vegetation is measured as above.

Shrubs are measured along 2-m wide belt transects radiating from the center of the plot. The species of each shrub is recorded, being careful not to double count shrubs near the center of the plot. To determine the size of each shrub the following measurements are taken: 1) as each shrub is encountered along the transect, the start point (to nearest cm) and end point (to nearest cm) along the transect is recorded (this gave the length of the shrub), 2) the width of the shrub is measured perpendicular to the transect, and 3) the height of the shrub is assigned to 1 of 4 categories (1 – below knee; 2- knee to waist; 3 – waist to shoulder; 4 – above shoulder).

Within each 16 × 16-m plot, the number of trees in each plot is recorded by species and diameter at breast height (dbh) size class. Size classes are: 1) 4-10 cm; 2) 11-25 cm; 3) 26-50 cm; 4) 51-75 cm; 5) 76-100 cm; 6) > 100 cm. The number of standing dead trees (i.e., snags) is recorded by species, size class, and stage of decay. The three classes are (1) recently dead, little decay, retention of bark, branches, and top, (2) evidence of decay, loss of some bark and branches and possibly part of the top, and (3) extensive decay, missing bark and most branches, and broken top.

Materials

Measuring tapes
Compass
Flagging
Plot frames – metal and open plastic frames
Plant guides such as Hitchcock
DBH tapes

Bird Sampling

Field Protocol

Bird populations are sampled by the point-count method. Each permanent or reference point is the center of a point-count station. The focal survey area consists of a 50-m radius circle around each birding station. Birds observed outside the point-count circle are recorded for presence/absence data.

Bird surveys are conducted during May and June 2004 beginning at approximately 0500 hours. A single observer spends 8-min at each birding station. To the extent possible, the order of visits to the point-count stations is reversed for each entry. This increases the probability of observing both early and late morning singers across the point count stations. All stations are visited a minimum of 5 times during the breeding season. To maximize the probability of recording all bird species present on a site regardless of variable arrival and breeding times, surveys are scheduled so that each site is visited at regular intervals throughout the breeding season. Sufficient numbers and variety of birds have arrived in northeastern Washington and begun singing by the second week in May. A period of extensive singing occurs during the mate selection period, but bird song begins to decline once nest building and egg laying start.

Weather conditions can have a great influence on the effectiveness of a survey. Because most birds are observed by sound, wind or rain can mask songs or call notes enough that they are not discernible to the observer. High wind and heavy rain can also force high canopy foragers to take shelter or generally decrease the morning activity of most birds. Surveys are not conducted, or are discontinued, if these weather conditions exist.

Materials

Binoculars
Trained observers
Measuring tape and flags
CD's of bird calls

Amphibian Sampling

Larval trapping is a sampling method well-suited for amphibians (Heyer et al. 1994). Larval traps are collapsible minnow traps modified to make the openings smaller. Transects of traps are established in marshes and bends of streams near the permanent or reference points. One trap is attached to a rebar post. Five traps are placed at each location. Traps are set for 5 days at each site during each of two trapping periods, one in early summer (mid-June through mid-July) and late summer (August-mid-September). Salamander or frog larvae are identified (using keys in Nussbaum et al. 1983), measured for snout-vent length, and examined for larval stage. Fish are also identified and counted.

Materials

Collapsible minnow traps
Keys to frogs and fish
Buckets
Rulers
Clipboards

Mammal Sampling

Changes in mammal use of the *hnt'k'wi̱pn* Management Area will be documented through the monitoring of small mammal populations that reflect habitat conditions or through quantifying ungulate use. Goal 4 of the management plan emphasizes the subsistence value of the mitigation property to the Coeur d'Alene Tribe. Ungulate populations were, and remain a major focus of subsistence and cultural activities on the Reservation. Also, ungulate foraging can conceivably alter the vegetation community and affect HU values. While the *Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project* presents small mammal sampling as the thrust of mammal monitoring efforts, the management and purpose of the *hnt'k'wi̱pn* Management Area suggests an examination of large mammal, particularly ungulate use of the property.

Small-mammal Sampling

Field Collection

Coordinates for permanent and reference points are used to establish grids for sampling of small-mammal populations by snap-trapping. Although snap traps do not effectively capture all small-mammal species, they are effective for most of the terrestrial, above-ground rodent species in the region.

Pairs of traps are placed at 12-m intervals on 5 × 9 grids. Typically the grid is centered on the sampling point, but this is not always possible. Trapping effort is standardized by trap night.

Traps are baited with a mixture of oats and peanut butter. They are set in the evening and checked the following morning for 3 nights per site. Trapping is conducted from late July until early September.

Upon capture, specimens are weighed (to nearest 0.1 gram), examined for sex, and measured (length of total body, tail, hindfoot, and ear). Specimens are frozen and later autopsied to examine reproductive condition. For females, length and width of ovaries, number of placental scars (indicative of past pregnancies), number and length of any embryos are measured. Testes length and width and length of the seminal vesicles are measured for males. Skulls are labeled and cleaned for positive species identification and some specimens are prepared as study skins.

Materials

Measuring tape
Flags and flagging
Museum special snap-traps (Woodstream Corp.). 90 traps required per grid.
Plastic bags
Self-adhesive labels
Sharpies
Scale
Rulers
Freezer
Dissecting equipment
Microscope

Ungulate Use Sampling

Field Collection

Initially, coordinates for permanent or reference points will be used as the center for circular plots from which fecal pellet groups are counted. Pellet groups will be counted within a 40 meter radius of plot center. If the sample size is insufficient to assure that the sample mean is ± 20% of the population mean with a 95% confidence level, additional plot centers will be selected from the established Albeni Falls sampling grid.
Materials

Measuring tape
Flags and flagging

APPENDIX E

Prescribed Fire Plan Template

ADMINISTRATIVE UNIT(S): _____

PRESCRIBED FIRE NAME: _____

PREPARED BY: _____ DATE: _____

Name & Qualification

TECHNICAL REVIEW BY: _____ DATE: _____

Name & Qualification

Complexity Rating: _____

APPROVED BY: _____ DATE: _____

Agency Administrator

Project Name: _____

Unit Name: _____

ELEMENT 2: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST

Instructions: The Agency Administrator Pre-Ignition Approval is the intermediate planning review process (i.e. between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator Pre-Ignition Approval evaluates whether compliance requirements, Prescribed Fire Plan elements, and internal and external notifications have been or will be completed and expresses the Agency Administrator's intent to implement the Prescribed Fire Plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

YES	NO	KEY ELEMENT QUESTIONS
		Is the Prescribed Fire Plan up to date? *Hints: amendments, seasonality.*
		Will all compliance requirements be completed? *Hints: cultural, threatened and endangered species, smoke management, NEPA.*
		Is risk management in place and the residual risk acceptable? *Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?*
		Will all elements of the Prescribed Fire Plan be met? *Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources*
		Will all internal and external notifications and media releases be completed? *Hints: Preparedness level restrictions*
		Will key agency staff be fully briefed and understand prescribed fire implementation?
		Are there any other extenuating circumstances that would preclude the successful implementation of the plan?
		Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?
		Other:

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

Project Name: _____

Unit Name: _____

ELEMENT 2: PRESCRIBED FIRE GO/NO-GO CHECKLIST

	YES	NO
A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist., if YES go to item B.		
B. If YES have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If YES proceed with checklist below, if NO STOP.		

YES	NO	QUESTIONS
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results

_____ Burn Boss

_____ Date

Project Name: _____

Unit Name: _____

ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY

PRESCRIBED FIRE NAME			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape			
2. The number and dependence of activities			
3. Off-site Values			
4 On-Site Values			
5. Fire Behavior			
6. Management organization			
7. Public and political interest			
8. Fire Treatment objectives			
9 Constraints			
10 Safety			
11. Ignition procedures/ methods			
12. Interagency coordination			
13. Project logistics			
14 Smoke management			

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	
CONSEQUENCES	
TECHNICAL DIFFICULTY	
SUMMARY COMPLEXITY DETERMINATION	
RATIONALE:	

Project Name: _____

Unit Name: _____

ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA

A. Physical Description

1. Location**:**
2. Size:
3. Topography:
4. Project Boundary:

B. Vegetation/Fuels Description:

1. On-site fuels data
2. Adjacent fuels data

C. Description of Unique Features:

ELEMENT 5: GOALS AND OBJECTIVES

A. Goals:

B. Objectives:

1. Resource objectives:
2. Prescribed fire objectives:

ELEMENT 6: FUNDING:

A. Cost:

B. Funding source:

Project Name: _____

Unit Name: _____

ELEMENT 7: PRESCRIPTION

A. Environmental Prescription:

B. Fire Behavior Prescription:

ELEMENT 8: SCHEDULING

A. Ignition Time Frames/Season(s):

B. Projected Duration:

C. Constraints:

ELEMENT 9: PRE-BURN CONSIDERATIONS

A. Considerations:

1. On Site:

2. Off Site

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):

C. Notifications:

Project Name: _____

Unit Name: _____

ELEMENT 10: BRIEFING

Briefing Checklist:

- ☐ Burn Organization
- ☐ Burn Objectives
- ☐ Description of Burn Area
- ☐ Expected Weather & Fire Behavior
- ☐ Communications
- ☐ Ignition plan
- ☐ Holding Plan
- ☐ Contingency Plan
- ☐ Wildfire Conversion
- ☐ Safety

ELEMENT 11: ORGANIZATION AND EQUIPMENT

A. Positions:

B. Equipment:

C. Supplies:

Project Name: _____

Unit Name: _____

ELEMENT 12: COMMUNICATION

A. Radio Frequencies

1. Command Frequency(s):
2. Tactical Frequency(s):
3. Air Operations Frequency(s):

B. Telephone Numbers:

ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL

A. Safety Hazards:

B. Measures Taken to Reduce the Hazards:

C. Emergency Medical Procedures:

D. Emergency Evacuation Methods:

E. Emergency facilities:

ELEMENT 14 TEST FIRE

A. Planned location:

B. Test Fire Documentation:

1. Weather conditions On-Site:
2. Test Fire Results:

Project Name: _____

Unit Name: _____

ELEMENT 15: IGNITION PLAN

A. Firing Methods:

B. Devices:

C. Techniques:

D. Sequences:

E. Patterns:

F. Ignition Staffing:

ELEMENT 16: HOLDING PLAN

A. General Procedures for Holding:

B. Critical Holding Points and Actions:

C. Minimum Organization or Capabilities Needed:

ELEMENT 17: CONTINGENCY PLAN

A. Trigger Points:

B. Actions Needed:

C. Additional Resources and Maximum Response Time(s):

Project Name: _____

Unit Name: _____

ELEMENT 18: WILDFIRE CONVERSION

A. Wildfire Declared By:

B. IC Assignment:

C. Notifications:

D. Extended Attack Actions and Opportunities to Aid in Fire Suppression:

ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY

A. Compliance:

B. Permits to be Obtained:

C. Smoke Sensitive Areas:

D. Impacted Areas:

E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:

ELEMENT 20: MONITORING

A. Fuels Information (forecast and observed) Required and Procedures:

B. Weather Monitoring Required and Procedures:

C. Fire Behavior Monitoring Required and Procedures:

D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:

Project Name: _____

Unit Name: _____

E. Smoke Dispersal Monitoring Required and Procedures:

ELEMENT 21: POST-BURN ACTIVITIES

Post-burn Activities That Must be Completed:

Project Name: _____

Unit Name: _____

APPENDICES

A. Maps: Vicinity and Project

B. Technical Review Checklist

C. Complexity Analysis

D. Job Hazard Analysis

E. Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)

Project Name: _____

Unit Name: _____

A: MAPS

1. Vicinity Map:

Project Name: _____

Unit Name: _____

2. Project Map:

Project Name: _____

Unit Name: _____

C. TECHNICAL REVIEWER CHECKLIST

PRESCRIBED FIRE PLAN ELEMENTS:	S /U	COMMENTS
1. Signature page		
2. GO/NO-GO Checklists		
3. Complexity Analysis Summary		
4. Description of the Prescribed Fire Area		
5. Goals and Objectives		
6. Funding		
7. Prescription		
8. Scheduling		
9. Pre-burn Considerations		
10. Briefing		
11. Organization and Equipment		
12. Communication		
13. Public and Personnel Safety, Medical		
14. Test Fire		
15. Ignition Plan		
16. Holding Plan		
17. Contingency Plan		
18. Wildfire Conversion		
19. Smoke Management and Air Quality		
20. Monitoring		
21. Post-burn Activities		
Appendix A: Maps		
Appendix B: Complexity Analysis		
Appendix C: JHA		
Appendix D: Fire Prediction Modeling Runs		
Other		

S = Satisfactory **U = Unsatisfactory**

Recommended for Approval: **Not Recommended for Approval:**

_____ _____ _____

Technical Reviewer Qualification and currency (Y/N) Date

Project Name: _____

Unit Name: _____

☐ **Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.**

C: COMPLEXITY ANALYSIS

Project Name: _____

Unit Name: _____

D. JOB HAZARD ANALYSIS

Project Name: _____

Unit Name: _____

E. FIRE BEHAVIOR MODELING DOCUMENTATION OR EMPIRICAL DOCUMENTATION